

The name “Rodless Actuator” comes from this technology’s close relationship to Electric Cylinders sharing many of the same components. Rather than having a rod, Rodless Actuators incorporate a carriage supported by linear bearings. Where Electric Cylinder are designed to extend in and out of the work area delivering force or thrust, Rodless Actuators are designed to be load carrying mechanisms (up to 300 lbs.) incorporating ballscrew, leadscrew, or belt drive transmissions with optional integrated gearboxes.

Rodless Actuators also share many of the fundamental design characteristics of Precision Positioning Tables (Section E). Precision Tables are designed to carry larger payloads and deliver superior repeatability and accuracy performance, Rodless Actuators offer longer travels (up to 108") and higher speeds (belt drives maximum speed 120 in/sec) at a lower price.

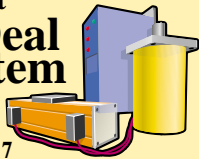
The R Series Rodless Actuator also forms the basis of IDC's Cartesian products. Rodless Actuators and Electric Cylinders can be combined to form a formidable XYZ positioning solution. Refer to section D to learn more about IDC Cartesian Systems.



Make it an IDEal System

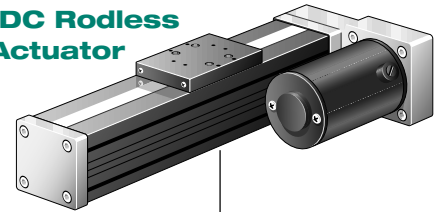
Make It An **IDEal System**

See Intro Pages 6 & 7



IDC drives and SmartDrives can be fully integrated into an IDC Rodless Actuator system by specifying the IDEal System option. When you buy an IDEal System all limits and connectors are pre-wired, drives or SmartDrives are configured for each positioning device, and the system is tested for basic operation. When your system arrives, you will be able to quickly and confidently “reconnect and run” your IDEal System. For more information regarding IDEal Systems for IDC Rodless Actuators, see page B-18.

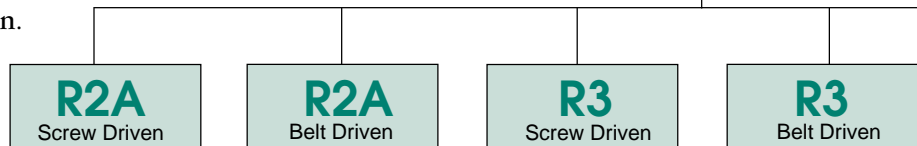
IDC Rodless Actuator



R Series

- Ballscrew, Acme Screw & Belt Versions
- Integrated Load Carrying Support Bearing
- Integrated Seal Strip
- IDEal System Option
- English and Metric Actuator Carriage Mounting

Organized by section.



Max. Performance		R2A Screw Driven	R2A Belt Driven	R3 Screw Driven	R3 Belt Driven
Thrust	N [lb.]:	450 [100]	450 [100]	2700 [600]	900 [200]
Speed	mm/s [in/s]:	760 [30]	2000 [80]	760 [30]	3000 [120]
Travel	mm [in]:	1830 [72]	1830 [72]	1830 [72]	1830 [72]
Loading	N [lb.]	220 [50]	220 [50]	440 [100]	440 [100]
Page	:	B-20	B-20	B-58	B-58

Overview



Rodless Actuator Control Options

IDC has applied our 25 years of application solving experience to bring you the widest range of actuator controls available.

Our designs emphasize ease-of-use, reliability and value.

Machine Interfaces

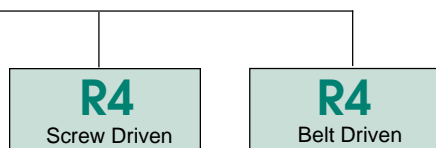
IDC Controls communicate with host PLCs and PCs via:

- RS-232C communications.
- Analog outputs.
- Discrete I/O.
- Discrete Binary/BCD data transfer and program execution.

Stand-Alone Machine Control

- Pre-programmed embedded control systems.
- With operator/programmer interface.
- With pushbutton and thumbwheel inputs.

For an overview of Rodless Actuator control options refer to page B-10.



3600 [800]	1300 [300]
1000 [40]	3000 [120]
2740 [108]	2740 [108]
1300 [300]	1300 [300]
B-120	B-120

How to Select an IDC Rodless Actuator



Let IDC walk you through the selection process. In the index of every product section you will find reference to a product **Selection Checklist** that will walk you through the selection process. The Checklist for Rodless Actuators is located on pages B-16 & B-17.

Use Rodless Actuators (vs. Electric Cylinders) When You Need:

- To position and guide a load for the lowest system cost.
- To save space by eliminating external guides and ways.
- The shortest overall work envelope (extended length equals retracted length).
- To combine multiple units into Cartesian systems.
- To complete, compact linear positioning system.

Rodless Actuator Section Overview

- Cross Section Comparison B-4
- Performance Comparison B-6
- Selecting Rodless Actuator Controls B-8
- IDC's Actuator Control Options B-10
- Custom & Modified Products B-12
- Product Selection Worksheet B-13
- Selection Checklist B-16
- Make it an IDEal System B-18



**Rodless Actuator
Cross Section Comparison
(next page)**

Principle of Operation

The operation of rodless actuators is similar to the electric cylinders described earlier. However, instead of an extending rod, a rodless unit features a moving carriage supported by linear bearings within an extruded aluminum chassis. This gives the rodless actuator the ability to guide and support a load, as well as position it.

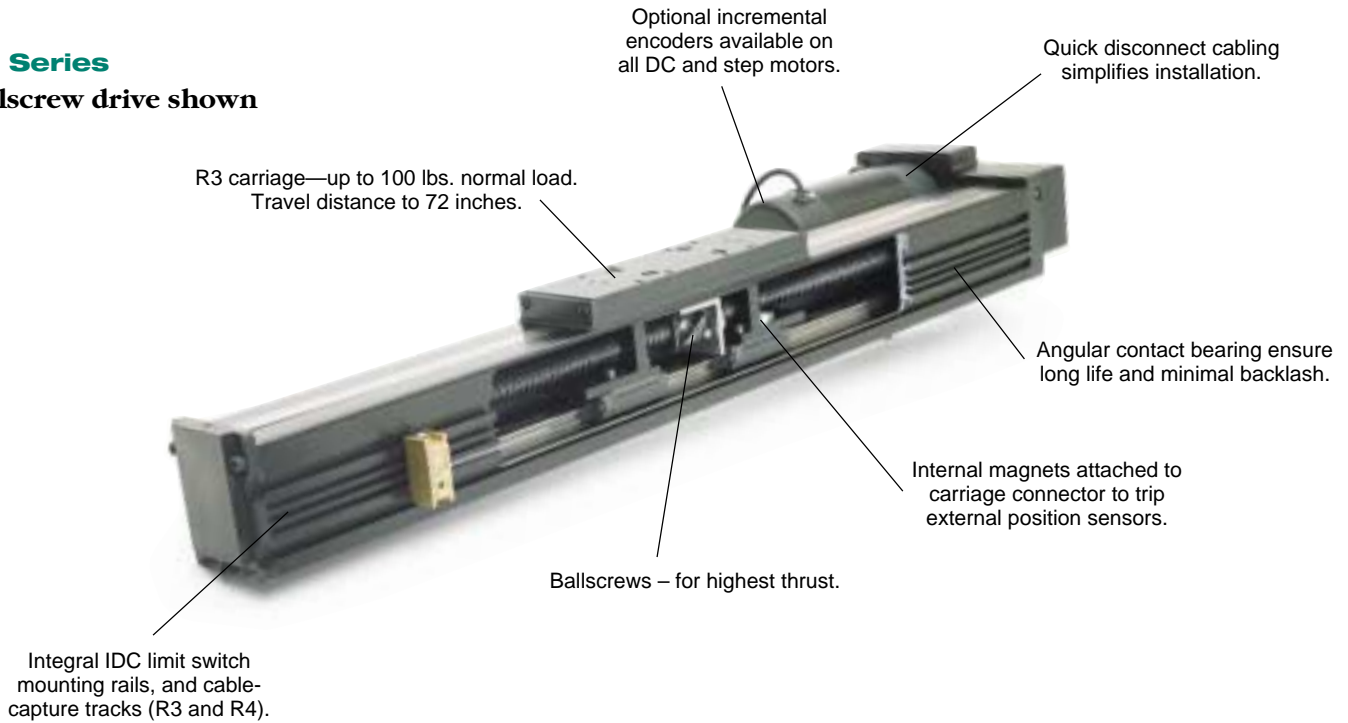
The carriage is driven by a lead screw or a steel reinforced carriage belt.

As you'll see in the cut-away features, we designed our rodless actuators for outstanding overall performance, value, flexibility and reliability in industrial applications.

Rodless Actuators

R3 Series

Ballscrew drive shown

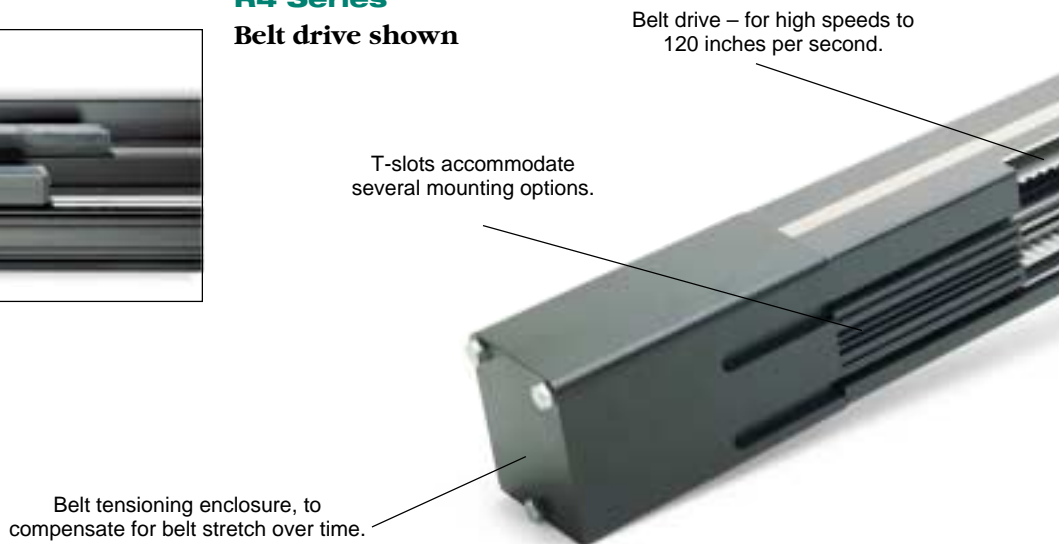


R4 Series

Belt drive shown



Size relationship of R2A, R3 and R4 Series

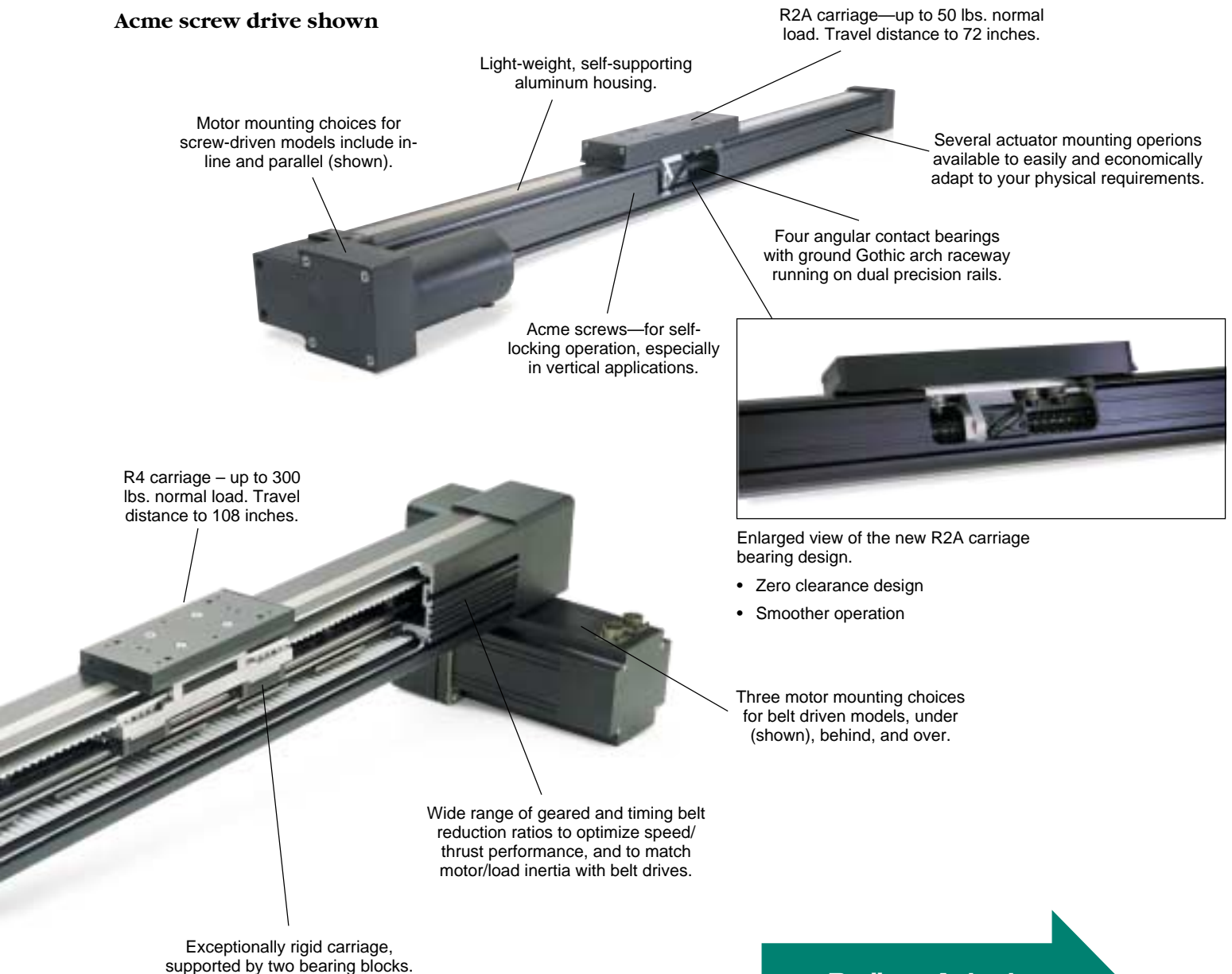


Common Features

- Ready to mount motor/actuator systems in choice of lengths, with one week delivery.
- Available with acme screw, ballscrew or high speed belt drive.
- Hard-coat anodized or fused epoxy external surfaces resist corrosion and physical damage.
- Non-magnetic stainless steel/elastomer seal protects internal parts and lubricants.
- Motor choices include: 24 volt DC, 160 volt DC, hybrid step motor, and brushless servo.
- English or Metric actuator mounting and carriage mounting.
- Modular design allows easy maintenance in severe duty applications. Field serviceable parts include belts, pulleys, gears, bearings and seals.
- Compatible controls offer diverse functionality, power, precision and cost.

R2A Series

Acme screw drive shown



**Rodless Actuator
Performance Comparison
(next page)**

Simple Selection

IDC offers three sizes of rodless actuators, each with four types of motors. To help you select the right rodless actuator system, each individual R2A, R3 and R4 models' complete specifications are given, and motion performance is characterized with our full range of motors and controls. See the pages listed below.

Rapid Delivery

Rodless actuators with any standard travel length, motor, mounting or other catalog option generally ship within one week. We also provide fast turnaround on custom configurations, so you can meet those tight schedules.



New R2A Series Actuator

The new R2A Series is designed to be a direct drop in replacement for its predecessor, the R2 Series actuators. It has similar outside dimensions to the old R2 design, and the same load carrying capacity. All mounting dimensions have remained the same. The carriage bearing system has been redesigned, replacing nylon bushings with long life, preloaded ball bearings. The major benefits of the new carriage bearing design are lower bearing friction, smoother operation and zero running clearance. Refer to B-20 for additional changes in performance data.

		NEW R2A Series Screw Drive	NEW R2A Series Belt Drive
Linear Transmission		Acme or ball screw	1/2 inch wide steel reinforced polyurethane belt
Max. Travel	in [mm]	72 [1830]	72 [1830]
Max. Speed	in/s [mm/s]	30 [760]	80 [2000]
Max. Thrust	lbs [N]	100 [450]	100 [450]
Repeatability	in [mm]	±0.001 [0.025]	±0.010 [0.25]
Cross Section Dimensions	in [mm]	2 x 2 [51 x 51]	
Bearings		Four angular contact bearings with ground Gothic arch raceway running on dual precision rails.	
Max. Carriage Load			
Normal	lbs [N]	50 [220]	
Roll moment	in-lbs [N-m]	50 [5.6]	
Pitch moment	in-lbs [N-m]	100 [11.3]	



Use Rodless Actuators (vs. Electric Cylinders) When You Desire:

- To position and guide a load for the lowest system cost.
- To save space by eliminating external guides and ways.
- The shortest overall work envelope (extended length equals retracted length)
- High speed and long travel length (belt drive)
- To combine multiple units into Cartesian systems.
- A complete, compact linear positioning system.



R3 Series Screw Drive	R3 Series Belt Drive	R4 Series Screw Drive	R4 Series Belt Drive
Acme or ball screw	1 inch wide steel reinforced polyurethane belt	Acme or ball screw	1.5 inch wide steel reinforced polyurethane belt
72 [1830]	72 [1830]	108 [2740]	108 [2740]
30 [760]	120 [3000]	40 [1000]	120 [3000]
300 [1300]	200 [900]	700 [3100]	300 [1300]
±0.001 [0.025]	±0.010 [0.25]	±0.001 [0.025]	±0.010 [0.25]
	2.5 x 2.8 [64.71]		3.6 x 4.25 [91 x 108]
	15 mm rail, 2 bearing blocks		20 mm rail, 2 bearing blocks
	100 [440]		300 [1300]
	300 [33.9]		600 [67.8]
	500 [56.5]		1,000 [113]

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 a rodless actuator system (viewing the motor, drive and actuator 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 systems 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** (B-16) as well as our **Product Selection Worksheets** (B-13). These two documents will help to ensure applications 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, rodless actuators 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 an step motor 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, applications 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...

DC Motor Controls are Ideal solutions when you need:	Servo & Stepper Smart Drive packages are Ideal solutions when you need:
• The same stopping point each cycle	• To change stopping points under program control
• Analog Position Control (0 - 10V, or 0/4 - 20 mA)	• A user interface (i.e., keypad, display)
• Simple push button operation & control	• The flexibility and integrity of Optically Isolated I/O
• One or two speed requirements per direction	• Mathematical functions
• To replace pneumatic cylinders	• Force Control (e.g., clamping, nut running, etc)
• To replace low thrust hydraulic cylinders	• Computer interfacing or control
• Automatic cycling between two locations	• Complex and customized motion profiles
• An end-of-move dwell timer	• High repeatability, resolution and/or accuracy
• To change speed when a sensor is triggered	• Multi-axis Control
• Web or Edge Guide Control	• Multiple program selection or "if - then" conditional logic
• The lowest system cost	• Stepper or brushless servo performance



Chart A

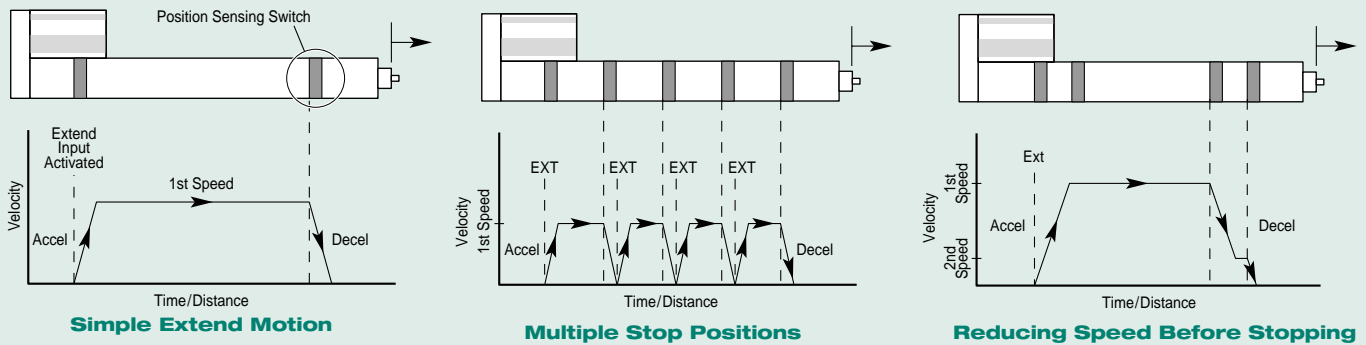
	Servo Products			Step Motor Products				Stand-Alone Controllers	
	Drive Only			Drive Only					
Model Number:	B8001	B8961	B8962	<i>NextStep</i>	S6961	S6962	<i>SmartStep</i>	961	962
Drive & Control Package (SmartDrive)		•	•		•	•	•		
Controller Only (SmartControl)								•	•
Control Input (IDeal = IDEal Prog. Language)	Analog & Step/Dir.	IDeal (Serial)	IDeal (Serial)	Step/Dir.	IDeal (Serial)	IDeal (Serial)	IDeal (Serial)	IDeal (Serial)	IDeal (Serial)
Number of Drive Axes	1	1	2	1	1	2	1	1*	2*
Front Panel Option		•	•		•	•	•	•	•
See Page	H-20	H-36	H-36	G-12	G-32	G-32	G-26	G-42	G-42

* Refers to Step & Direction digital outputs. Unlike SmartDrives, SmartControls do not have internal drives.

Rodless Actuators

Figure 1 Typical Examples of DC Motor Controls

Limit Switch Control

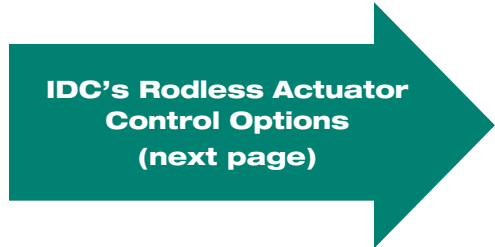


Smart Drives & Controls - or - Limit Switch & Analog Controls?

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.

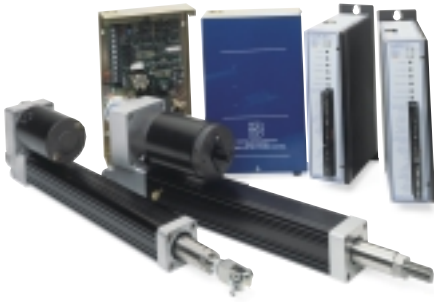
On the other hand, many positioning applications are simple in nature, requiring only a few fixed stopping positions, or the flexibility of following a simple analog control signal. In these situations, there is less of a need for programmability and operator influence. Why introduce the added complexity 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 Rodless Actuators. When in doubt, don’t hesitate to consult an IDC Applications Engineer at (800)747-0064.



IDC's Rodless Actuator Control Options

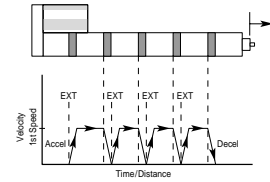
Limit Switch Controls



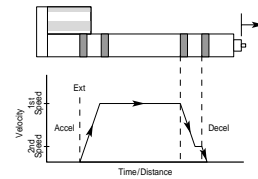
- Attractive pricing – exceptional value.
- Point-to-point moves.
- No program to write.
- Cylinder mounted sensors set *stop* and *reverse* positions.
- Interface to PLCs, operator switch panels, or I/O from industrial PC.
- Common Applications:
 - conveyor diverter gate
 - indexing
 - part rejection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

Reference: Section F

Simple Extend/Retract or Multiple Stop



Reducing Speed Before Stopping



Motor Type	Compatible Cylinders	Control Models	Interface Type
24V Brushed DC	R2A-D, R3-D	D220x, D230x, D240x	Discrete TTL or contact inputs. Ideal for PLC interfacing.
160V Brushed DC	R2A-H, R3-H R4-H	H3301B H4301B	

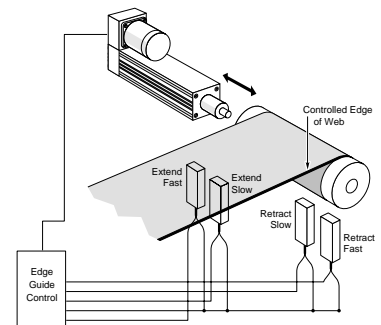


Edge Guide Control



- 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



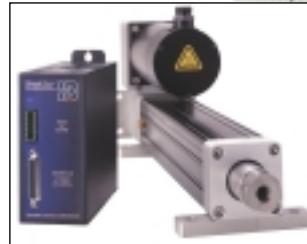
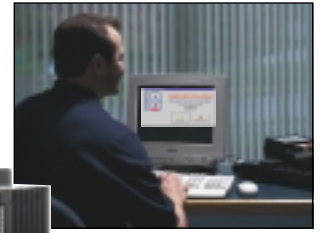
Motor Type	Compatible Cylinders	Control Models	Interface Type
160V Brushed DC	R2A-H, R3-H R4-H	H3321B H4321	Web edge position control of using an array of 2 or 4 discrete (on/off) sensors.



SmartDrives and SmartControls

Fully Integrated Stepper and Servo Motion Control Products

- Easy to use IDEal 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

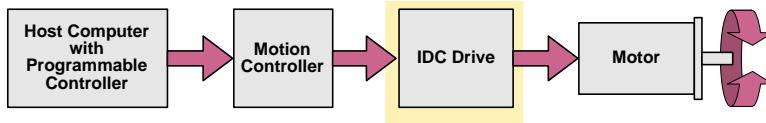


Reference: Section G (Step Motor Systems) and Section H (Servo Motor Systems)

Motor Type	Compatible Cylinders	Control Models	Interface Type
Step Motor	R2A-P, R3-P	SmartStep23 S6961	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.
	R3-S, R4-S	SmartStep23 SmartStep S6961 S6962 (2-axis)	
Brushless Servo	R2A-B, R3-B, R4-B	B8961	
		B8962 (2-axis)	

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)

Motor Type	Compatible Cylinders	Control Models	Interface Type
Step Motor	R2A-P, R3-S/P, R4-S	NextStep23 S6002 (2-axis)	Step/Direction or CW/CCW index pulse.
Brushless Servo	R2A-B, R3-B, R4-B	B8001	Step/Direction or ±10 VDC velocity or torque signal.

Product Selection Worksheet (page 1 of 3)

Worksheet

Rodless
Actuators

For selection assistance, fax to your local IDC Distributor or directly to IDC

Prepared By

Name _____

Company _____

Phone _____

Fax _____

Email _____

Address _____

Prepared For

Name _____

Company _____

Phone _____

Fax _____

E-mail _____

Address _____

User's primary business _____

Type of machine IDC product to be used on _____

Current IDC user? Yes No

Project Time Frame

Proposal _____ / _____ / _____

Build prototype _____ / _____ / _____

In production _____ / _____ / _____

Volume Requirements

Next 12 months: _____

Year 2: _____

Year 3: _____

Action Required

- Demo Price quotation
 Recommend product Call me to discuss

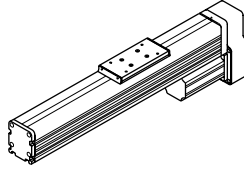
Please include drawings, comments or additional information on separate pages.



Rodless Actuators

Product Selection Worksheet (page 2 of 3)

Linear Actuator Selection Data Rodless Actuator



Rodless Actuators

Loads

<p>Payload</p> <p>Weight _____ lbs</p> <p><input type="checkbox"/> Payload Externally Supported, by _____ (rails, etc.)</p> <p>Hold Position: <input type="checkbox"/> After move <input type="checkbox"/> Power off</p>	<p>Carriage Loads (Rodless only)</p> <p>M_p _____ in-lbs</p> <p>M_R _____ in-lbs</p> <p>M_y _____ in-lbs</p> <p>Side Load _____ lbs</p>	<div style="text-align: center;"> </div> <p>Orientation</p> <p><input type="checkbox"/> Vertical</p> <p><input type="checkbox"/> Horizontal</p> <p><input type="checkbox"/> Inclined _____ ° (angle from horizontal plane)</p>
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Motion

<p>Travel</p> <p>Stroke Length Required _____ in (= usable travel distance + min. 2 inches for limit switches)</p> <p>Shortest Move _____ in</p> <p><u>Max. Available Stroke Length (in)</u> Electric Cylinders:</p>	<p>Speed (WCM=Worst-Case Move)</p> <p>WCM Distance _____ in</p> <p>Time for WCM _____ sec</p> <p style="text-align: center;"><i>or</i></p> <p>Max. Speed _____ in/sec</p> <p>Min. Speed _____ in/sec</p> <p><i>Complete Move Profile Chart (see p. 4)</i></p>	<p>Precision</p> <p>Repeatability _____ in</p> <p>Accuracy _____ in</p> <p>Max. Backlash _____ in</p> <p>Resolution _____ in</p> <p>Straightness/Flatness _____ in</p>
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Thrust Calculation (See Engineering Section in IDC catalog for assistance)

<p>Thrust</p> <p>Thrust = Force_{ACCELERATED MASS} + Force_{FRICTION} + Force_{GRAVITY} + Force_{EXTERNAL}</p> <p>_____ lbs = _____ lbs + _____ lbs + _____ lbs + _____ lbs</p>
--

Duty Cycle/Life

<p>Duty Cycle</p> <p>Total Cycle Time _____ sec. Extend/Retract Cycles per day _____</p> <p>Sum of Move Times _____ sec. Move Distance per cycle _____</p> <p><i>Complete Move Profile Chart (see p. 4)</i></p>	<p>Required Life</p> <p>Units: <input type="checkbox"/> Inches <input type="checkbox"/> Meters <input type="checkbox"/> Cycles <input type="checkbox"/> Months <input type="checkbox"/> Years</p> <p>Minimum Life _____</p> <p>Maintenance/Lube Interval _____</p>
--	--

Environment

<p>Operating Temperature</p> <p><input type="checkbox"/> Normal 32-140°F [0-60°C]</p> <p><input type="checkbox"/> High Temp. _____ °F / °C</p> <p><input type="checkbox"/> Low Temp. _____ °F / °C</p>	<p>Contaminants (Check all that apply)</p> <p>Solid: _____ Liquid: _____</p> <p><input type="checkbox"/> non-abrasive <input type="checkbox"/> coarse chips <input type="checkbox"/> Dripping <input type="checkbox"/> Non-corrosive</p> <p><input type="checkbox"/> abrasive <input type="checkbox"/> fine dust <input type="checkbox"/> Mist / Spray <input type="checkbox"/> Corrosive</p> <p><input type="checkbox"/> Splashing</p> <p><input type="checkbox"/> High Pressure</p>
<p>Conditions</p> <p><input type="checkbox"/> Washdown <input type="checkbox"/> Outdoor <input type="checkbox"/> Vacuum <input type="checkbox"/> Cleanroom</p>	



Product Selection Worksheet (page 3 of 3)

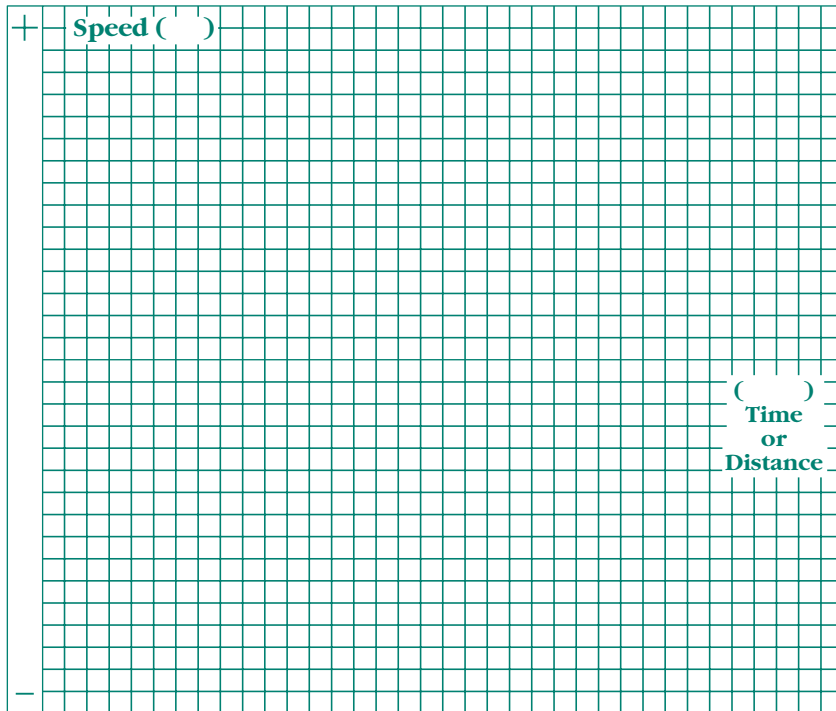
Worksheet

Rodless
Actuators

Motion Control Data

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.



Control Method

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

Description of Application

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

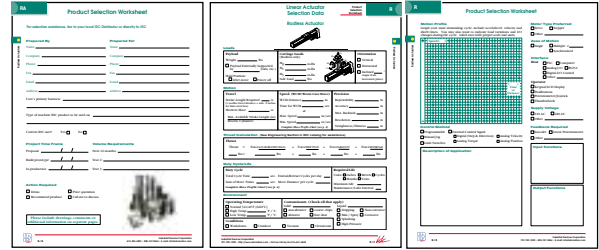
Rodless Actuators



Rodless Actuator Selection Checklist

The following steps describe the process of selecting an actuator model which matches your application requirements.

- 1) **Complete Product Selection Worksheet**
(see pages B-16 to B-18)



- 2) **Maximum Thrust Required**

Determine thrust requirement for your application, then adjust with safety factor for selected motor technology.

Formula:
$$\text{Max Thrust} = F_{\text{applied}} + F_{\text{gravity}} + F_{\text{accl}} + F_{\text{friction}}$$
 Example: 50 lbs payload
Horizontal orientation

Sample Calculation:
 $0 + 0 + 2.5 \text{ lbs} + 0 = \underline{2.5 \text{ lbs thrust}}$ (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

Motor Type	Safety Factor
Brushed DC Servo Motor (D, H)	1.20 (20%)
Step Motors (P)	1.30 (30%)
Brushless Servo Motors (B)	1.20 (20%)

Sample Calculation:
 $2.5 \times 1.20 = 3.00 \text{ lbs thrust}$ (required for selection of brushless servo)

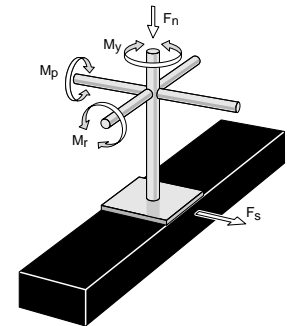
- 3) **Calculate Moment Loading**
Determining the moment loads on the carriage of the actuator.

Example: $(F_{\text{applied}} + F_{\text{gravity}} + F_{\text{accl}} + F_{\text{friction}}) \times L = M_{\text{pitch}}$

L = Distance between the center of force and the screw or belt in the actuator.

Note: Distance between the carriage and the rail cylinder can be found on the general specifications pages of each rodless actuator.

$3.00 \text{ lbs} \times 2.76 \text{ in} = 8.28 \text{ in/lbs}$



- 4) **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.

Formula:
$$\text{Duty Cycle} = \text{ON time} \div \text{TOTAL time}$$

Sample Calculation:
REPEATED MOTION: 30 seconds ON, 15 seconds DWELL, then repeat.
DUTY CYCLE = $30 \text{ seconds ON} \div 45 \text{ seconds TOTAL CYCLE TIME} = \underline{66\% \text{ Duty Cycle}}$

- 5) **Peak Speed Requirement**
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 40 inches in 2.0 seconds.
Peak Speed Requirement: $40 \text{ inches} \div 2.0 \text{ seconds} \times 1.5 = \underline{30 \text{ inches per second}}$

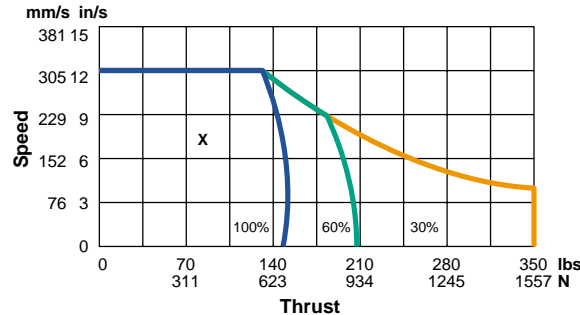


6) Select Speed-Thrust Curve

Search the speed thrust curves for one which meets both your speed thrust requirements.

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 • Moment Loading • Payload



7) Stroke Length

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

a) Usable Stroke Distance

Start with the required usable stroke distance. If you need to move 18 inches back and forth in a repeated cycle, then this distance is 18 inches.

b) 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: $X = m v^2 \div 2F$

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.

Example: You require 18" actual travel. Payload = 25 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.

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.

9) Proceed to How To Order Section

The motor, transmission ratio, and stroke has 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:



Continue to How to Order Pages:

Motor Type	R2A	R3	R4
D: 24 VDC Motors	B-24	B-61	—
H: 160 VDC Motors	B-30	B-66	B-102
S/P: Step Motors	B-36	B-72	B-108
B: Brushless Servo Motors	B-42	B-82	B-116



The new R2A Series is designed to be a direct drop in replacement of its predecessor, the R2 Series actuators. It has similar outside dimensions to the old R2 design, and the same load carrying capacity of 50 lbs [22.7 kg]. All mounting dimensions have remained the same. The carriage bearing system has been redesigned, replacing nylon bushings with long life, preloaded ball bearings. The major benefits of the new carriage bearing design are lower bearing friction, smoother operation and zero running clearance. Please note that the performance data has changed for the R2A Series. The maximum thrust rating is now 100 lbs. The moment load limits are now: Pitch = 100 in-lbs; Roll = 50 in-lbs; Yaw = 100 in-lbs. The side load has been increased to 50 lbs.

The R2A Series is designed as a low-cost package for travels of up to 72 in [1830 mm]— extended lengths are available on belt-driven models; please consult the factory for details. The same flexible seal used with the R3 and R4 Series prevent environmental contamination and ensures long life, making it an affective industrial-grade solution.

Two basic drive mechanisms can be used: belt-driven models offer the most rapid moves, and leadscrew models offer the highest thrust capacity and repeatability.

There are four motor types available to meet a variety of application requirements:

R2A-D - 24 Volt DC

- Cost effective.
- Simple motion.
- Open loop operation.

R2A-H - 160 Volt DC

- High torque brushed DC servo motor.
- Thrust monitored.

R2A-S/P - Step Motor

- High load and duty cycle.
- In-position holding.
- Economical open loop operation (encoder optional).
- Repeatable positioning to 0.0005 inches [0.013 mm]

R2A-B - Brushless Servo

- Very high acceleration and power.
- High duty cycle.
- Precise servo operation.

		R2A-D Series	R2A-H Series	R2A-S/P Series	R2A-B Series
Load (Thrust) Capacity	lbs [N]	100 [450]			
Max. No Load Speed	in/s [mm/s]	30 [760] screw-drive, 80 [2000] belt-drive			
Max. Carriage Load	lbs [kg]	50 [22.7]			
Repeatability	in [mm]	±0.005 [0.13]	±0.001 [0.025]	±0.0005 [0.013]	±0.001 [0.025]
Motor Type	24 Volt DC	160 Volt DC Servo	1.8° Hybrid StepperBrushless Servo		
Compatible Controls Offered		D2200 D2300 D2400	H3301B H3321B	NextStep [®] S6002 S6961 S6962 SmartStep [®] / SmartStep [®] 23	B8001 B8961 B8962
Typical System Cost*		\$1,400 - 2,000	\$2,100 - 4,500	\$2,000 - 3,600	\$3,300 - 4,900

* System cost based on single quantity price, 30 inch stroke actuator with control.



Common Specifications

Rodless Actuator

R2A

Rodless Actuators

Travel Lengths	6, 12, 18, 24, 30, 36, 42, 48, 60, 72 inches
Construction Materials	
Bearing Housing	Type 380 die cast aluminum, epoxy coated
Guide Housing	6063 T-6 aluminum, hard anodized and Teflon impregnated
Carriage Assembly	6061 T-6 aluminum, hard anodized
Internal Guide Bearings	Four angular contact bearings with ground Gothic arch raceway running on dual precision rails
Leadscrew or Belt	
Pitch Choices	2, 5 Ball; 2, 5 Acme
Support Bearings	Ball bearings
Acme Screw; drive nut	0.625" diameter alloy steel screw; lubricated polyacetal plastic (R2A-D) or bronze (R2A-H, R2A-S/P, R2A-B)
Ball Screw; drive nut	0.625" diameter hardened alloy steel screw; alloy steel, heat treated ballnut
Belt Drive	0.5" wide polyurethane with steel reinforcement cords
Flexible Seal	Stainless steel band with elastomeric seal
Motor	D, H - see page B-53; P22, BN23 - see page B-54

Weight (Approximate, without options)

R2A-D	17 + 0.3 × (inches stroke) lbs	[7.7 + 0.14 × (inches stroke)] kg
R2A-H	19 + 0.3 × (inches stroke) lbs	[8.6 + 0.14 × (inches stroke)] kg
R2A-P22	17 + 0.3 × (inches stroke) lbs	[7.7 + 0.14 × (inches stroke)] kg
R2A-S32	19 + 0.3 × (inches stroke) lbs	[8.6 + 0.14 × (inches stroke)] kg
R2A-BN23	16 + 0.3 × (inches stroke) lbs	[7.3 + 0.14 × (inches stroke)] kg

Environmental Operation

Temperature Range	-20° to 140°F [-28° to 60°C]
Moisture/Contaminants	IP 44 rated: Splash-proof, protected against ingress of solid particles greater than 0.040" [1 mm] diameter. Non-corrosive, non-abrasive.

R2A Series Actuator Inertia

Equations

Rotary Inertia (reflected to the motor) = A + B × (stroke, in) + C × (load, lb) + D
 Linear Inertia (reflected to the carriage) = [A + B × (stroke, in) + D]/C + (load, lb)

Belt Driven Models				A	B	C	D	
Models	Motors	Ratio	Belt	(lb-in-s ²)	(lb-in-s ² /in)	(lb-in-s ² /lb)	Motor	(lb-in-s ²)
R2A...-20T	H, S32, BN23	2:1	0.5 wide	1.51 E-04	5.99 E-07	1.46 E-04	D	1.13 E-03
R2A...-31T	H, BN23	3.1:1		1.35 E-04	2.48 E-07	5.78 E-05	H	3.06 E-03
R2A...-35T	P22	3.5:1		1.06 E-04	1.94 E-07	4.53 E-05	P22	3.81 E-04
R2A...-120T	D, P22, BN23	12:1		2.03 E-05	1.62 E-08	4.02 E-06	S32	1.06 E-03
							BN23	4.47 E-04

Screw Driven Models				A	B	C
Models	Motors	Ratio	Screw	(lb-in-s ²)	(lb-in-s ² /in)	(lb-in-s ² /lb)
R2A...-102B	H, P22, BN23	1:1	0.625x0.5	1.99 E-04	7.12 E-05	1.64 E-05
R2A...-152B	All	1.5:1		9.14 E-05	3.17 E-05	7.29 E-06
R2A...-202B	All	2:1		5.35 E-05	1.78 E-05	4.10 E-06
R2A...-312B	H, BN23	3.1:1		9.51 E-05	7.12 E-06	1.63 E-06
R2A...-352B	D, P22	3.5:1		7.46 E-05	5.59 E-06	1.28 E-06
R2A...-1202B	D	12:1		1.75 E-05	5.02 E-07	1.13 E-07
R2A...-105B	All	1:1	0.625x0.2	1.74 E-04	7.12 E-05	2.62 E-06
R2A...-155B	All	1.5:2		8.04 E-05	3.17 E-05	1.17 E-06
R2A...-205B	D, H, P22	2:1		4.73 E-05	1.78 E-05	6.64 E-07
R2A...-355B	D, P22	3.5:1		7.25 E-05	5.59 E-06	2.10 E-07
R2A...-1205B	D	12:1		1.74 E-05	5.02 E-07	1.62 E-08
R2A...-102A	H, P22	1:1	0.625x0.5	1.99 E-04	7.12 E-05	1.64 E-05
R2A...-105A	H, P22, BN23	1:1	0.625x0.2	1.74 E-04	7.12 E-05	2.62 E-06
R2A...-155A	D, BN23	1.5:1		8.01 E-05	3.17 E-05	1.17 E-06
R2A...-205A	All	2:1		4.71 E-05	1.78 E-05	6.64 E-07
R2A...-315A	H, BN23	3.1:1		9.24 E-05	7.12 E-06	2.68 E-07
R2A...-355A	D, P22	3.5:1		7.25 E-05	5.59 E-06	2.10 E-07
R2A...-1205A	D	12:1		1.74 E-05	5.02 E-07	1.62 E-08

Metric Conversions:
 1 mm = 0.03937 in
 1 kg = 2.205 lb
 1 lb-in-s² = 1129 kg-cm² = 1.152 kg-cm-s²



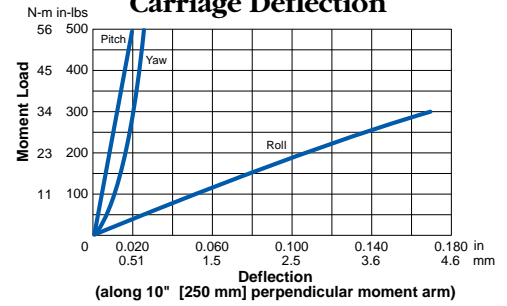
Carriage Straightness & Flatness

±0.005 in/ft [0.125 mm/300 mm], not to exceed ±0.035 in [0.9 mm]

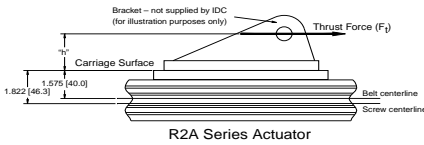
Load Limits

Normal (F_n)	±50 lbs [220 N]
Side (F_s)	±50 lbs [220 N]
Pitch (M_p)	100 in-lbs [11.3 N-m]
Roll (M_r)	50 in-lbs [5.65 N-m]
Yaw (M_y)	100 in-lbs [11.3 N-m]

Moment Load vs. Carriage Deflection



Pitch Moment Example



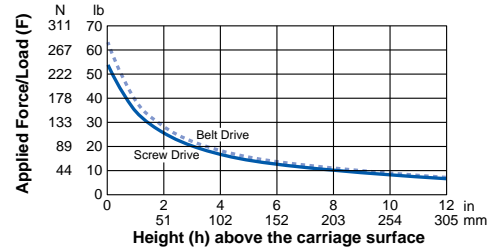
R2A Belt Equation:

$$M_p = (1.575 + b) * F_t, \text{ in}^* \text{lbs}$$

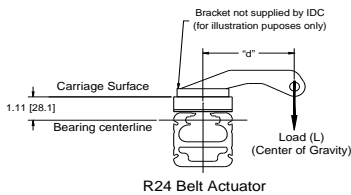
R2A Screw Equation:

$$M_p = (1.822 + b) * F_t, \text{ in}^* \text{lbs}$$

Note that the distance from carriage surface to the screw/belt centerline has been added to the moment arm.



Roll Moment Example (overhung load)

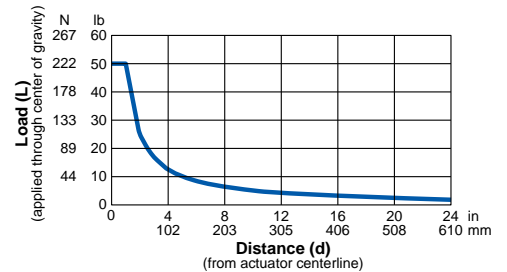


R2A Belt Equation:

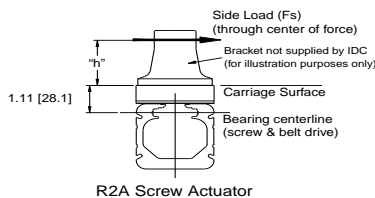
$$M_r = d * L, \text{ in}^* \text{lbs}$$

R2A Screw Equation (not shown):

$$M_r = d * L, \text{ in}^* \text{lbs}$$



Roll Moment Example (side load)



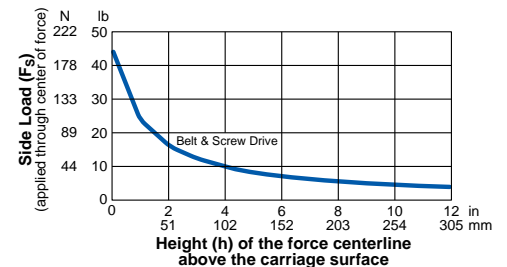
R2A Belt Equation (not shown):

$$M_r = (1.11 + b) * F_s, \text{ in}^* \text{lbs}$$

R2A Screw Equation:

$$M_r = (1.11 + b) * F_s, \text{ in}^* \text{lbs}$$

Note that the distance from carriage surface to the bearing centerline has been added to the moment arm.

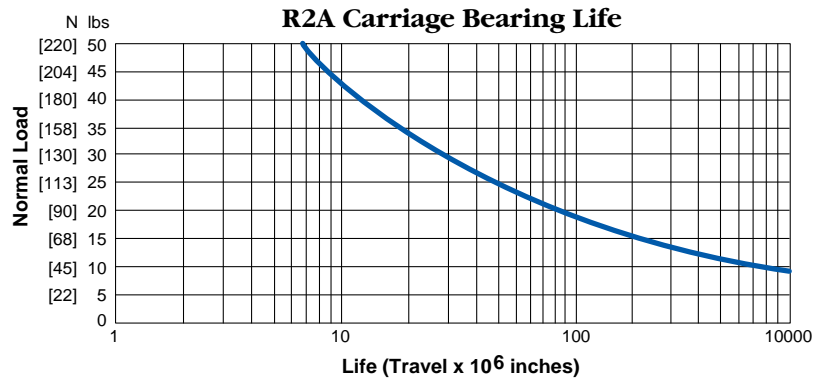




Life

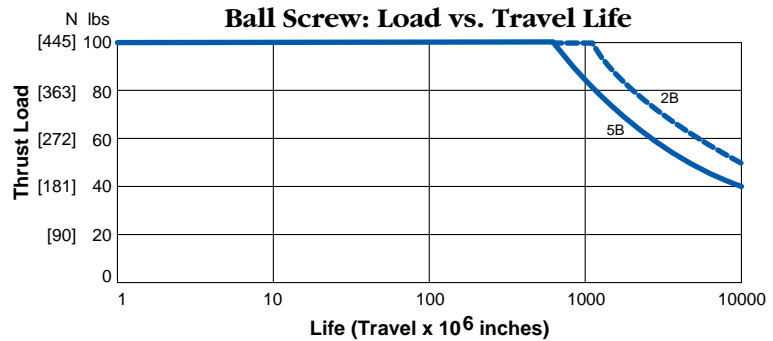
Belt Drive

As belt-driven actuators are generally used horizontally with light thrust loads, life is usually a function of the load weight. Actual life will be determined by carriage loading, speed, acceleration, and duty cycle and operating environment. The curve to the right shows predicted life of the actuator under ideal conditions. Derate as required by your application.



Ball Screw

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, gravitational and friction loads.



Acme Screw

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

A travel life of 1 million inches under the maximum rated load can be used as a first approximation. Since wear is a function of several application parameters (load, duty cycle, speed, acceleration rates, environment, etc.) it is often difficult to exactly predict travel life of an acme screw.

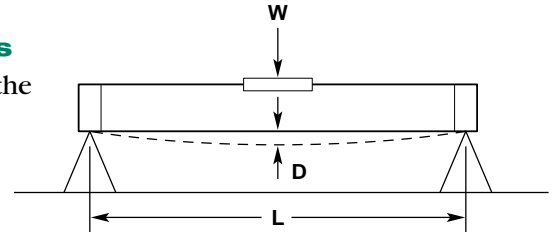
Maintenance

The R2A carriage seal and internal bearing design prevents lubricant contamination and nearly eliminates the need for routine maintenance. Replacement parts are available from the factory - see the Rodless Actuator Manual for details.

The equations to the right provide deflection as a function of the various loads applied to the carriage. Deflection should not exceed 0.015 in [0.38 mm]. Mounting spacing should not exceed 48 in [1200 mm].

Actuator Deflection, Mounting Configurations

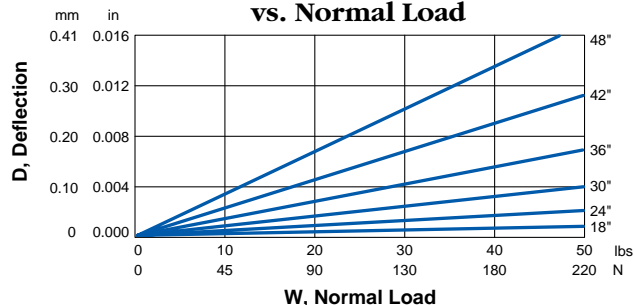
Actuator deflection will affect the flatness or straightness of the actuator when the system is supported at spaced mounting points.



- W = Load (lbs)
- D = Deflection (inches)
- L = Mounting Spacing (inches)

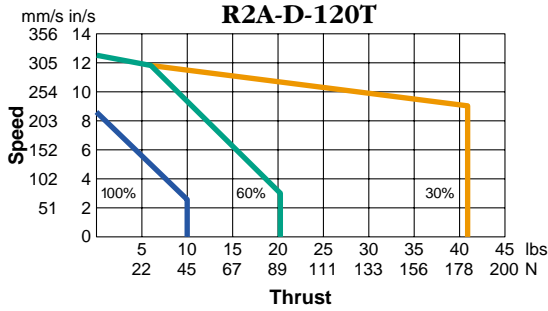
Orientation	Deflection Equation	Maximum Deflection Allowed
Normal		
Belt Drive	$D = WL^3/3.3 \times 10^8 + 0.00003 \cdot W$, inches	0.015" [0.38 mm]
Screw Drive	$D = WL^3/3.3 \times 10^8 + 0.00012 \cdot W$, inches	0.015" [0.38 mm]
Side	$D = WL^3/2.7 \times 10^8$, inches	0.015" [0.38 mm]

Actuator Deflection vs. Normal Load





Belt-Drive Models



R2A-D-120T: 12:1 Helical Gears, 3 inch/rev Drive Belt

Max. No-Load Accel.	95 in/s ²	2.4 m/s ²
Travel per Motor Rev	0.25 in	6.35 mm
Repeatability	±0.030 in	±0.76 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

Rodless Actuators

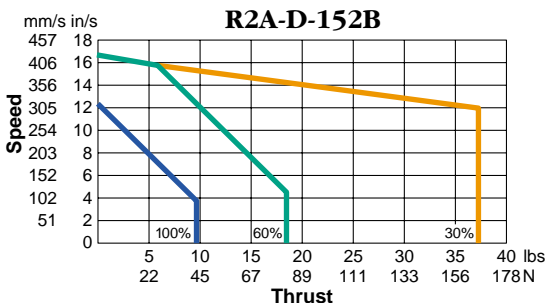


- Performance curves using D2200 or D2300 Series Controls.
- Duty cycle is percentage of "on time" over a 10-minute interval.
- Repeatability achievable with D2300 control. Cylinders reduce speed prior to final positioning.
- Repeatability and Accuracy will be affected by belt stretch under heavier loads.



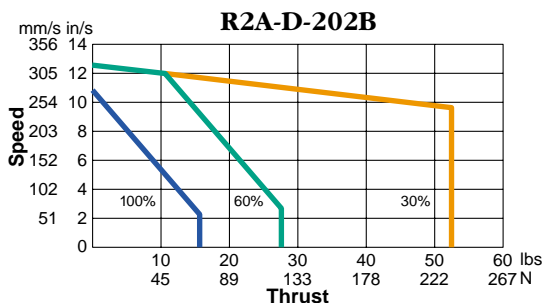


High Speed Ball Screw Models



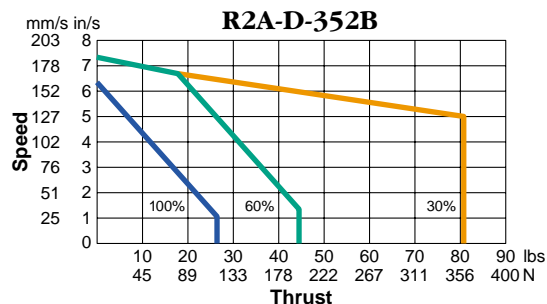
R2A-D-152B: 1.5:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	105 in/s ²	2.7 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



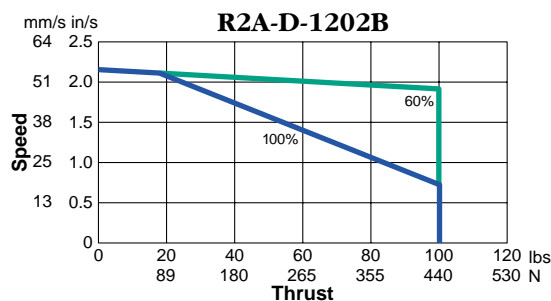
R2A-D-202B: 2:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	90 in/s ²	2.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-D-352B: 3.5:1 Helical Gears, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	52 in/s ²	1.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-D-1202B: 12:1 Helical Gears, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	17 in/s ²	0.4 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



To configure your system see page B-28.

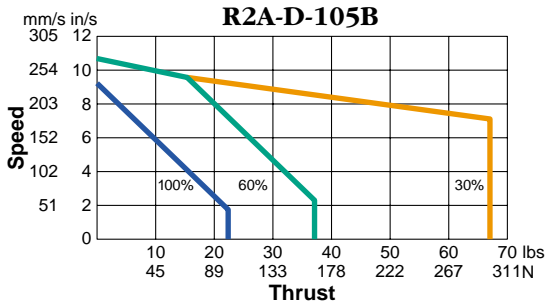
- Consider leadscrew **critical speed** and **column load limits** when specifying longer lengths.

Stroke (inches)	30.0	25.5	17.3	12.5	9.4	7.4	5.9	4.1	3.0	Critical Speed (in/sec)
2 thru 12	18	24	30	36	42	48	60	72		
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



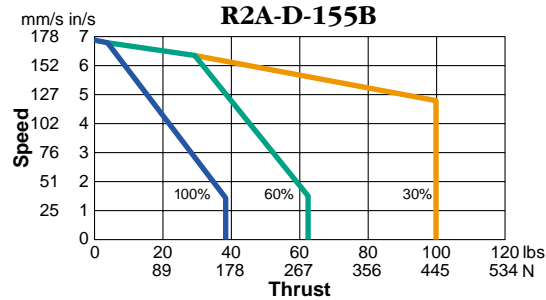
Ball Screw Models

Rodless Actuators



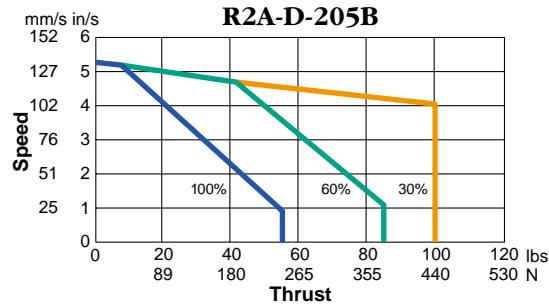
R2A-D-105B-P: 1:1 Timing Belt, 5 rev/inch Ballscrew
R2A-D-105B-I: 1:1 Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	55 in/s ²	1.4 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



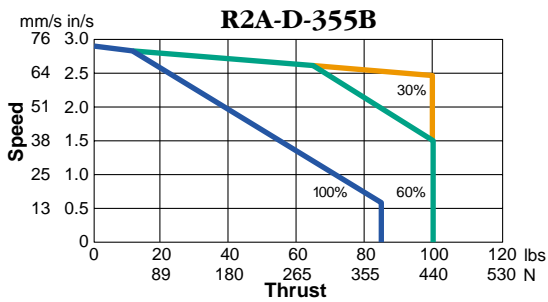
R2A-D-155B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	45 in/s ²	1.1 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



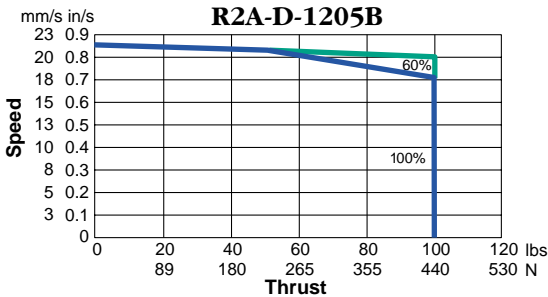
R2A-D-205B: 2:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	35 in/s ²	0.9 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-D-355B: 3.5:1 Helical Gears, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	20 in/s ²	0.5 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-D-1205B: 12:1 Helical Gears, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	70 in/s ²	1.8 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

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

5B

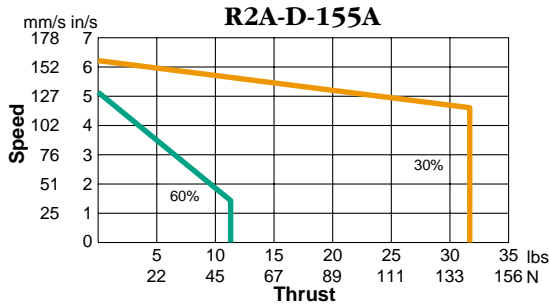
15.0	10.2	6.9	5.0	3.8	2.9	2.4	1.6	1.2	Critical Speed (in/sec)
2 thru 12	18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)

- Performance curves using D2200 or D2300 Series Controls.
- Duty cycle is percentage of "on time" over a 10-minute interval.
- Repeatability achievable with D2300 control. Cylinders reduce speed prior to final positioning.



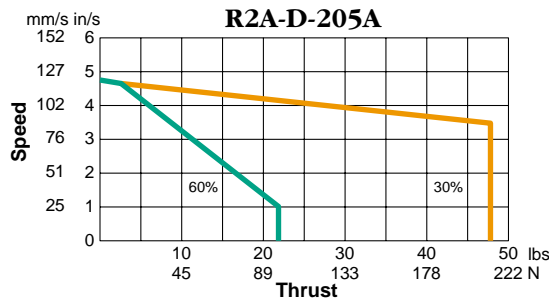


Acme Screw Models



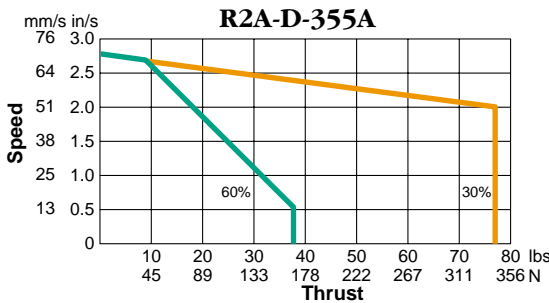
R2A-D-155A: 1.5:1 Timing Belt, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	45 in/s ²	1.1 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



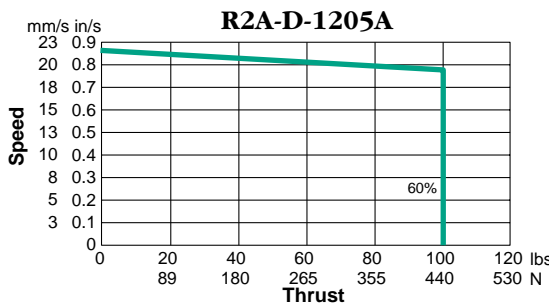
R2A-D-205A: 2:1 Timing Belt, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	35 in/s ²	0.9 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-D-355A: 3.5:1 Helical Gears, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	20 in/s ²	0.5 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-D-1205A: 12:1 Helical Gears, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	7 in/s ²	0.2 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



To configure your system see page B-30.

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

5A

	15.0	10.6	6.7	4.7	3.4	2.6	2.1	1.4	1.0	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	98	63	44	Column Load Limit (lbs)



How To Order

Steps to Ordering a Complete R2A-D System

You are ready to specify an R2A-D actuator model number after you have:

- found the Base Model that meets your speed, thrust and repeatability requirements (pages B-24 to B-27), with a comfortable safety margin,
- verified that the R2A-D meets your carriage loading requirements, and
- chosen a control compatible with the D motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin.

Belt driven units generally move light loads at high speed over longer lengths.

Screw driven units are recommended for high thrust and vertical applications. Consider that acme screws have more friction and are self locking.

2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.



1		2		3		4		5	
Base Model		Stroke Length		Motor Orientation		Mounting		Options	
Belt Drive Models									
R2A-D	Drive Ratio	Belt							
R2A-D-120T		T	6 36	AR Over Right	MS1 E	EMK			
			12 42	BR Behind Right	MS5 English	Encoder			
			18 48	CR Under Right	MS6 M	Q			
			24 60	AL Over Left	Metric	Quick			
			30 72	BL Behind Left		Disconnect			
				CL Under Left					
Screw Drive Models									
R2A-D	Drive Ratio	Screw							
Ball Screw	Acme Screw		6 36	I In-line	MS1 E	BS24/BS115/			
R2A-D-105B	R2A-D-155A		12 42	(only with 10 ratio)	MS5 English	BS240			
R2A-D-152B	R2A-D-205A		18 48	P Parallel Underneath	MS6 M	Brake on			
R2A-D-155B	R2A-D-355A		24 60	PR Parallel Right	MF3 Metric	Screw			
R2A-D-202B	R2A-D-1205A		30 72	PL Parallel Left		EM			
R2A-D-205B						Encoder			
R2A-D-352B						Q			
R2A-D-355B						Quick			
R2A-D-1202B						Disconnect			
R2A-D-1205B									



How To Order

Rodless Actuator
50 lbs Payload
24 Volt DC Motor

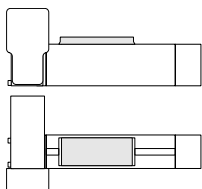
R2A-D

3. Motor Orientation

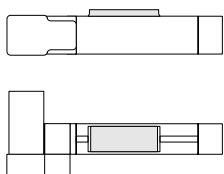
Dimensional drawings start on page B-48.

Belt Drive Models

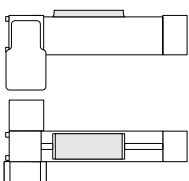
AR - Over Right



BR - Behind Right



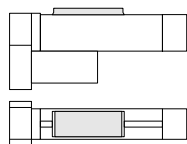
CR - Under Right



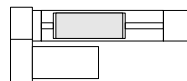
For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify AL, BL, CL.

Screw Drive Models

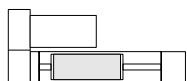
P - Parallel Underneath



PR - Parallel Right Side



PL - Parallel Left Side



I - In-Line

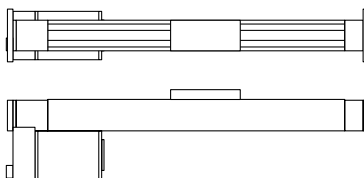


4. Mounting

Dimensional drawings start on page B-51.

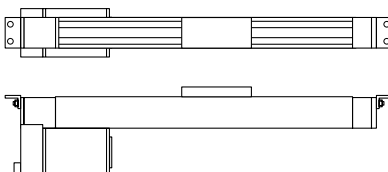
Actuator

MF3 Rectangular Flanges



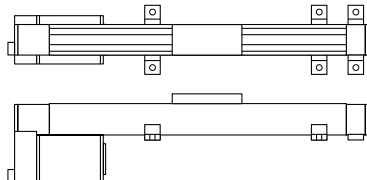
MF3 (flanges) is not available with in-line models or belt drive models.

MS1 Side End Angles

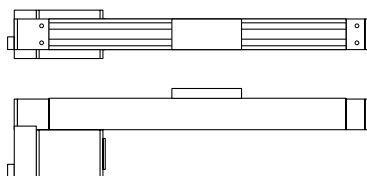


MS1 (end angles) is not available with in-line models.

MS5 Feet



MS6 Side Tapped Holes



English/Metric Carriage and Mounting Option

Specifies actuator mounting and carriage with Metric (M) or English (E) mounting provisions.

5. Other Options

BS - Holding Brake

20 in-lb [2.2 N-m] electrically released brake mounted on the lead screw shaft. *Not available with MF3, MS1 or belt drive actuators.*

EMK - Encoder

1000 line incremental encoder mounted on the rear shaft of the D motor.

Q - Quick Disconnect

Quick disconnect receptacle installed in the cylinder drive housing. Includes a 12 foot [3.7 m] motor cable with molded quick disconnect plug. Cannot be ordered with D in-line models, or with -EM option.

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

- RP1 Normally open Hall-effect
- RP2 Normally closed Hall-effect
- RPS-1 Normally open reed
- RPS-2 Normally closed reed

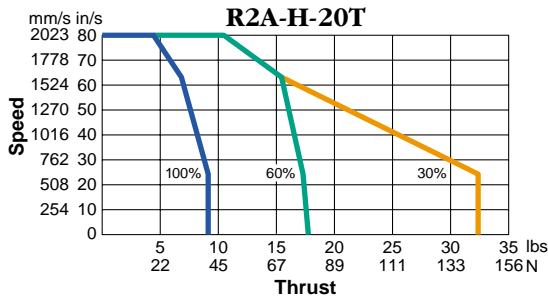
7. Compatible Controls

Model	Description
D2200	Simple limit switch control
D2300	Limit switch control
D2400	Limit switch control with time delay

Rodless Actuators

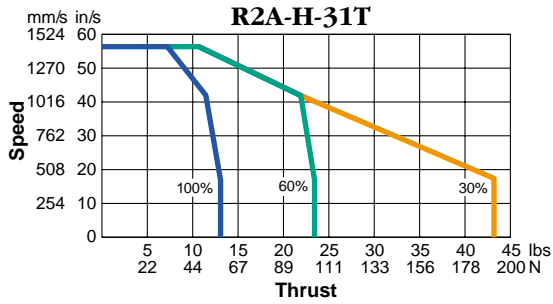


Belt-Drive Models



R2A-H-20T: 2:1 Timing Belt, 3.0 inch/rev Drive Belt

Max. No-Load Accel.	270 in/s ²	6.9 m/s ²
Travel per Motor Rev	1.50 in	38.10 mm
Repeatability	±0.030 in	±0.76 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R2A-H-31T: 3.1:1 Helical Gears, 3.0 inch/rev Drive Belt

Max. No-Load Accel.	200 in/s ²	5.1 m/s ²
Travel per Motor Rev	0.96 in	24.38 mm
Repeatability	±0.030 in	±0.76 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

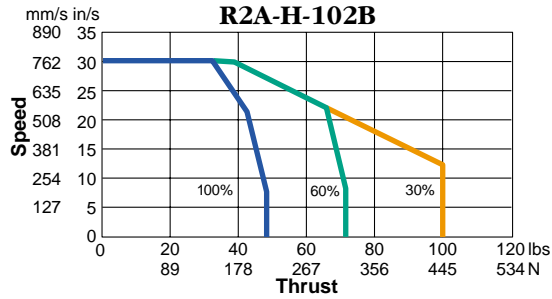


- Performance curves using H3000 Series Controls.
- For operation in the 60% or 30% region, motor temperature rise due to load, speed, number of acceleration/deceleration, and ambient temperature require consideration.
- Repeatability and Accuracy will be affected by belt stretch under heavier loads.



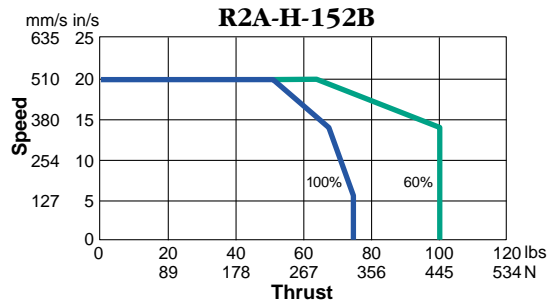


High Speed Ball Screw Models



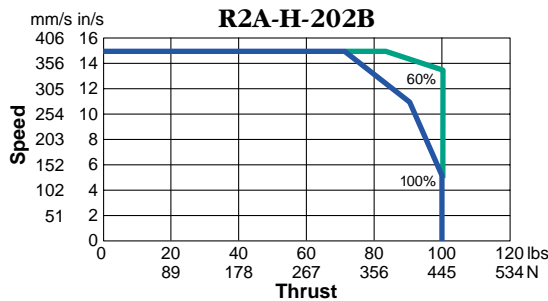
R2A-H-102B-P: 1:1 Timing Belt, 2 rev/inch Ballscrew
 R2A-H-102B-I: 1:1 Inline Coupling, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	120 in/s ²	3.0 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-H-152B: 1.5:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	85 in/s ²	2.2 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-H-202B: 2:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	65 in/s ²	1.7 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



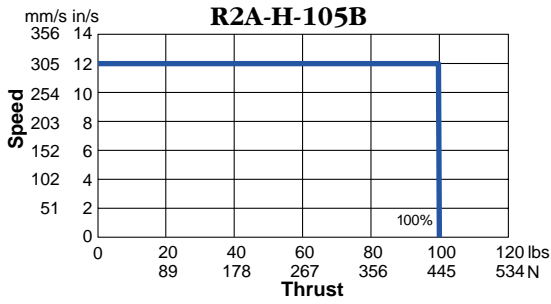
To configure your system see page B-34.

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

	30.0	30.0	22.3	15.5	11.4	8.7	6.9	4.6	3.3	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)

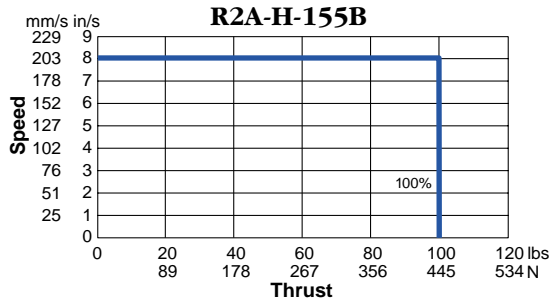


Ball Screw Models



R2A-H-105B-P: 1:1 Timing Belt, 5 rev/inch Ballscrew
R2A-H-105B-I: 1:1 Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	50 in/s ²	1.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-H-155B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	36 in/s ²	0.9 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



- Performance using H3000 Series Controls.
- For operation in the 60% or 30% region, motor temperature rise due to load, speed, number of acceleration/deceleration, and ambient temperature require consideration.

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

5B

15.0	14.0	8.9	6.2	4.5	3.5	2.7	1.8	1.3	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



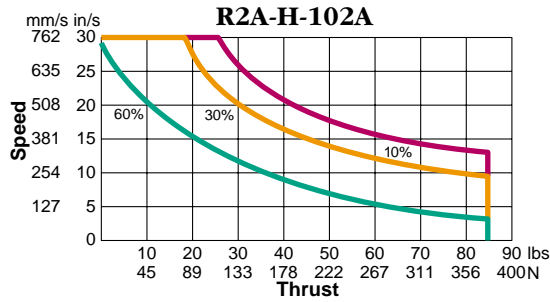


Performance

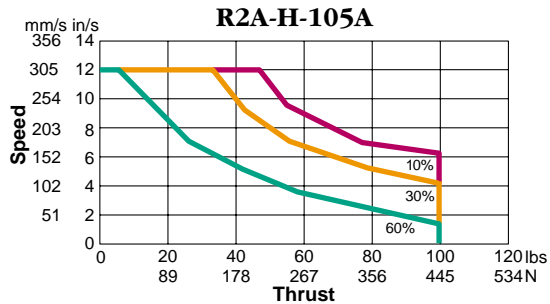
Rodless Actuator
50 lbs Payload
160 Volt DC Motor

R2A-H

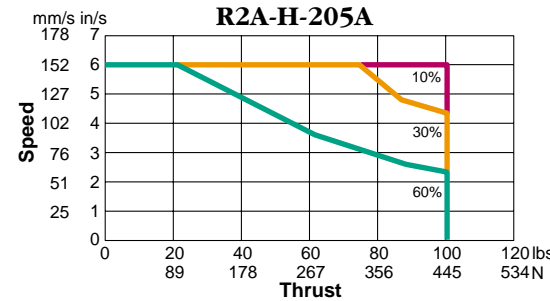
Acme Screw Models



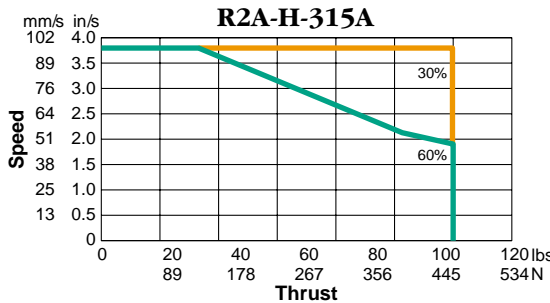
	R2A-H-102A-P: 1:1 Timing Belt, 2 rev/inch Acme Screw	R2A-H-102A-I: 1:1 Inline Coupling, 2 rev/inch Acme Screw
Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	120 in/s ²	3.0 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



	R2A-H-105A-P: 1:1 Timing Belt, 5 rev/inch Acme Screw	R2A-H-105A-I: 1:1 Inline Coupling, 5 rev/inch Acme Screw
Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	50 in/s ²	1.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



	R2A-H-205A: 2:1 Timing Belt, 5 rev/inch Acme Screw	
Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	27 in/s ²	0.7 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



	R2A-H-315A: 3.1:1 Helical Gears, 5 rev/inch Acme Screw	
Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	15 in/s ²	0.4 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



To configure your system see page B-34.

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

5A

	15.0	10.6	6.7	4.7	3.4	2.6	2.1	1.4	1.0	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	98	63	44	Column Load Limit (lbs)

2A

	30.0	30.0	22.3	15.5	11.4	8.7	6.9	4.6	3.3	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



How To Order

Steps to Ordering a Complete R2A-H System

You are ready to specify an R2A-H actuator model number after you have:

- found the Base Model that meets your speed, thrust and repeatability requirements (pages B-30 to B-33), with a comfortable safety margin,
- verified that the R2A-H meets your carriage loading requirements, and
- chosen a control compatible with the H motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin.

Belt driven units generally move light loads at high speed over longer lengths.

Screw driven units are recommended for high thrust and vertical applications. Consider that acme screws have more friction and are self locking.

2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.



1		2		3		4		5	
Base Model		Stroke Length		Motor Orientation		Mounting		Options	
Belt Drive Models									
R2A-H	Drive Ratio	Belt							
R2A-H-20T R2A-H-31T		T	6 36 12 42 18 48 24 60 30 72	BR Behind Right CR Under Right AL Over Left BL Behind Left CL Under Left	MS1 MS5 MS6	E English M Metric	BM24/BM115/ BM240 Brake on Motor EMK Encoder Q Quick Disconnect		
Screw Drive Models									
R2A-H	Drive Ratio	Screw							
Ball Screw R2A-H-102B R2A-H-105B R2A-H-152B R2A-H-155B R2A-H-202B	Acme Screw R2A-H-102A R2A-H-105A R2A-H-205A R2A-H-315A		6 36 12 41 18 48 24 60 32 72	I In-line (only with 10 ratio) P Parallel Underneath PR Parallel Right PL Parallel Left	MS1 MS5 MS6 MF3	E English M Metric	BM24/BM115/ BM240 Brake on Motor BS24/BS115/BS240 Brake on Screw EM Encoder Q Quick Disconnect		



How To Order

Rodless Actuator
50 lbs Payload
160 Volt DC Motor

R2A-H

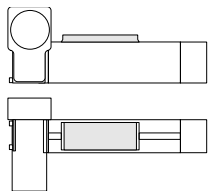
Rodless Actuators

3. Motor Orientation

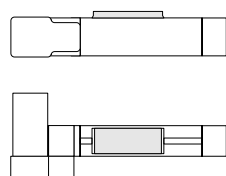
Dimensional drawings start on page B-48.

Belt Drive Models

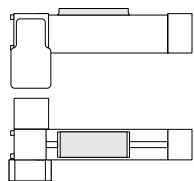
AL - Over Left



BR - Behind Right



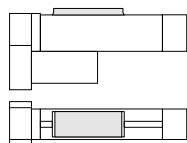
CR - Under Right



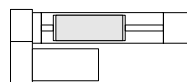
For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify AL, BL, CL.

Screw Drive Models

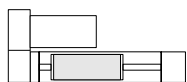
P - Parallel Underneath



PR - Parallel Right Side



PL - Parallel Left Side



I - In-Line

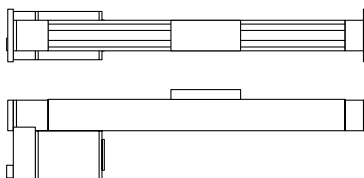


4. Mounting

Dimensional drawings start on page B-51.

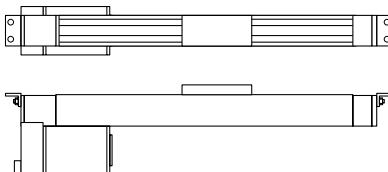
Actuator

MF3 Rectangular Flanges



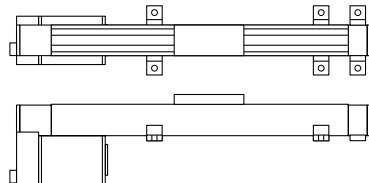
MF3 (flanges) is not available with in-line models or belt drive models.

MS1 Side End Angles

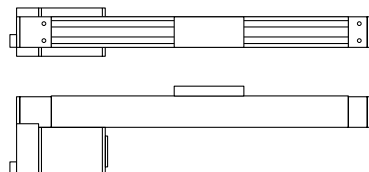


MS1 (end angles) is not available with in-line models.

MS5 Feet



MS6 Side Tapped Holes



English/Metric Carriage and Mounting Option

Specifies actuator mounting and carriage with Metric (M) or English (E) mounting provisions.

5. Other Options

BM - Motor Holding Brake

10 in-lb holding brake mounted on the H motor.

BS - Holding Brake

20 in-lb electrically released brake mounted on the lead screw shaft. *Not available with MF3, MS1 or belt drive actuators.*

EM - Encoder

500 line incremental encoder mounted on the rear shaft of the H motor.

Q - Quick Disconnect

Quick disconnect receptacle installed in the cylinder drive housing. Includes a 12 foot [3.7 m] motor cable with molded quick disconnect plug. *Included with H-inline models.*

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

- RP1 Normally open Hall-effect
- RP2 Normally closed Hall-effect
- RPS-1 Normally open reed
- RPS-2 Normally closed reed

7. Compatible Controls

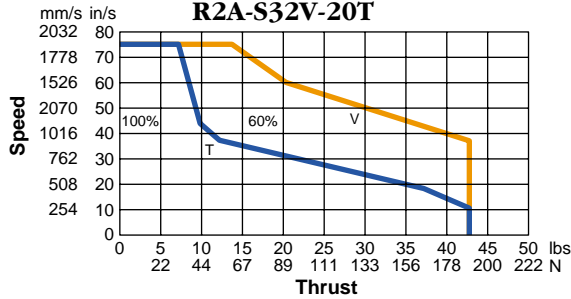
Model Description

- H3301B Limit switch control
- H3321B Edge guide control



Belt-Drive Models

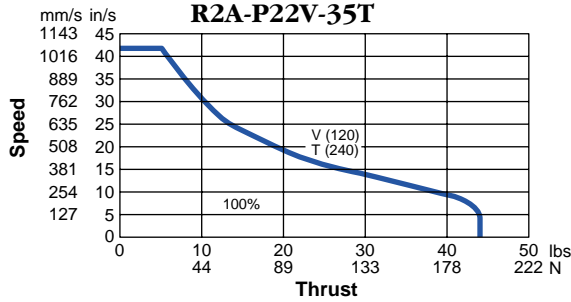
R2A-S32T-20T
R2A-S32V-20T



R2A-S32(T/V)-20T: 2:1 Timing Belt, 3 inch/rev Belt

Travel per Motor Rev	1.50 in	38.10 mm
Repeatability	±0.004 in	±0.10 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

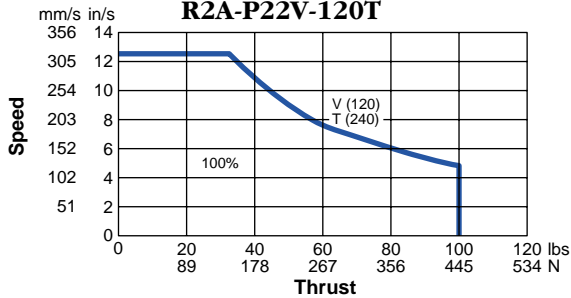
R2A-P22T-35T
R2A-P22V-35T



R2A-P22(T/V)-35T: 3.5:1 Helical Gears, 3 inch/rev Drive Belt

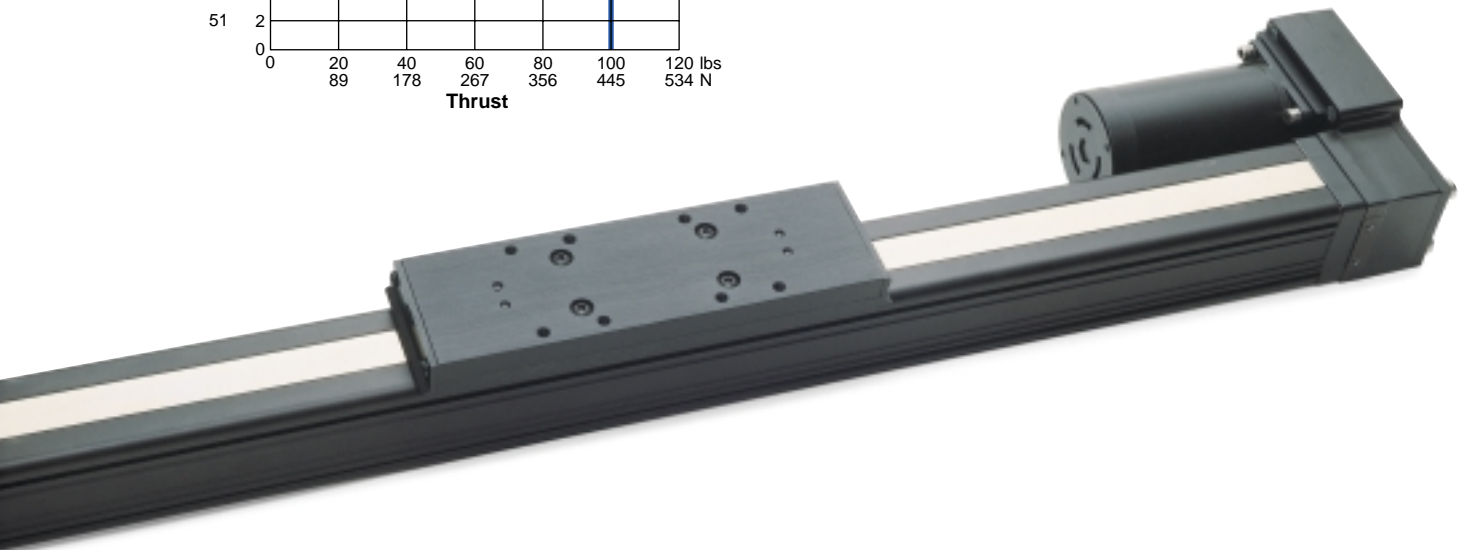
Travel per Motor Rev	0.84 in	21.34 mm
Repeatability	±0.004 in	±0.10 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

R2A-P22T-120T
R2A-P22V-120T



R2A-P22(T/V)-120T: 12:1 Helical Gears, 3 inch/rev Drive Belt

Travel per Motor Rev	0.25 in	6.35 mm
Repeatability	±0.004 in	±0.10 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

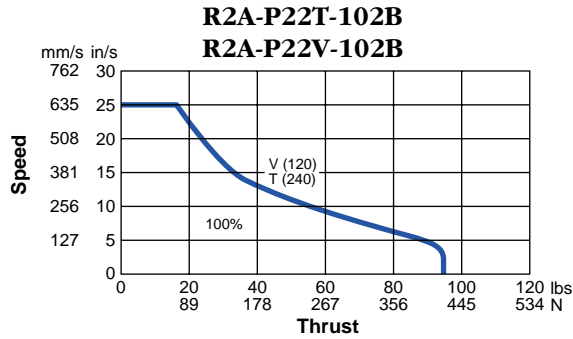


- Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.
- Repeatability and Accuracy will be affected by belt stretch under heavier loads.



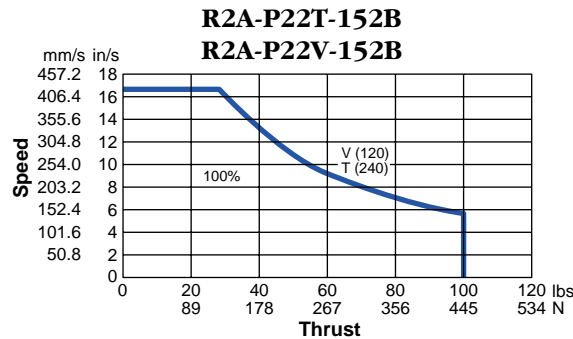


High Speed Ball Screw Models



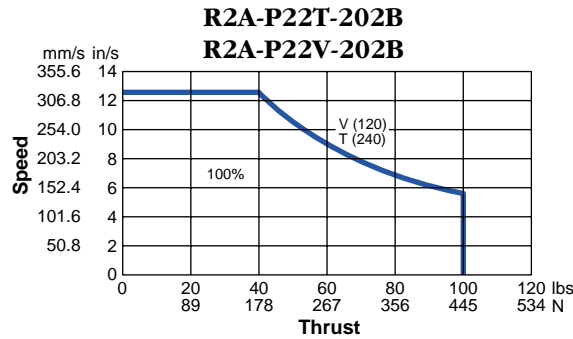
R2A-P22(T/V)-102-P: 1:1 Timing Belt, 2 rev/inch Ballscrew
R2A-P22(T/V)-102-B: 1:1 Inline Coupling, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



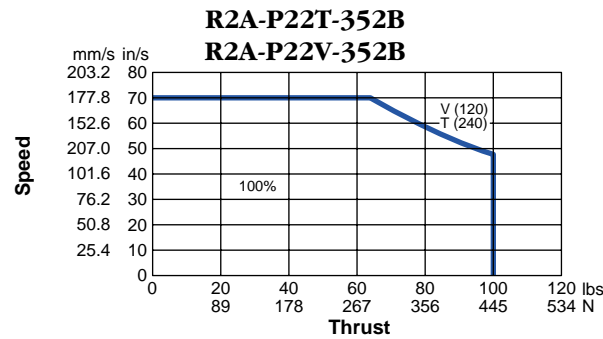
R2A-P22(T/V)-152-B: 1.5:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-P22(T/V)-202-B: 2:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-P22(T/V)-352-B: 3.5:1 Helical Gears, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



To configure your system see page B-40.



• Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.

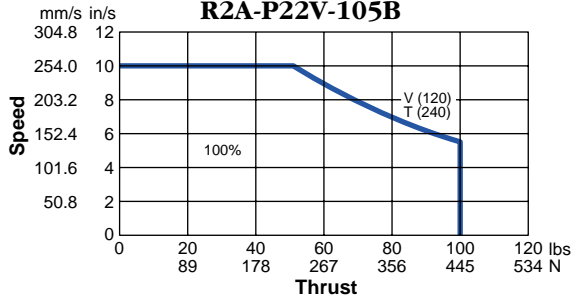
• Consider leadscrew **critical speed** and **column load limits** when specifying longer lengths.

2B	30.0	25.5	17.3	12.5	9.4	7.4	5.9	4.1	3.0	Critical Speed (in/sec)
	2 thru 12	18	24	30	36	42	48	60	72	Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



Ball Screw Models

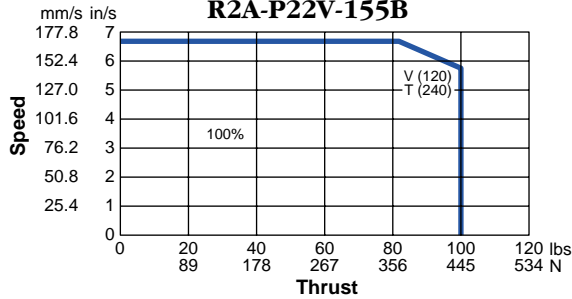
R2A-P22T-105B
R2A-P22V-105B



R2A-P22(T/V)-105B-P: 1:1 Timing Belt, 5 rev/inch Ballscrew
R2A-P22(T/V)-105B-I: 1:1 Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

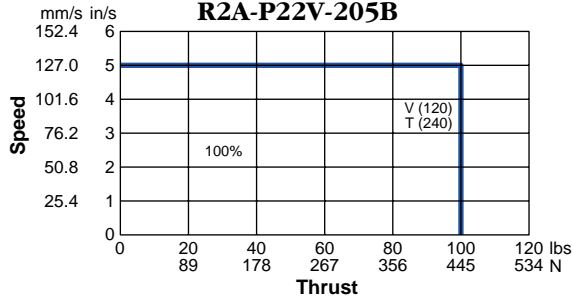
R2A-P22T-155B
R2A-P22V-155B



R2A-P22(T/V)-155B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R2A-P22T-205B
R2A-P22V-205B



R2A-P22(T/V)-205B: 2:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



• Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.

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

5B

	15.0	10.2	6.9	5.0	3.8	2.9	2.4	1.6	1.2	Critical Speed (in/sec)
2 thru 12	18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)

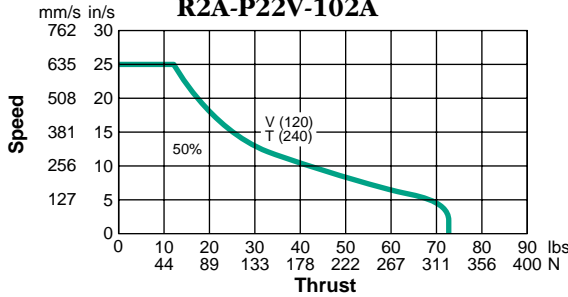




Acme Screw Models

R2A-P22T-102A

R2A-P22V-102A

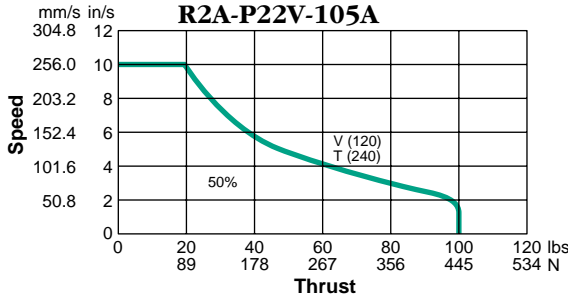


R2A-P22(T/V)-102A-P: 1:1 Timing Belt, 2 rev/inch Acme Screw
 R2A-P22(T/V)-102A-I: 1:1 Inline Coupling, 2 rev/inch Acme Screw

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R2A-P22T-105A

R2A-P22V-105A

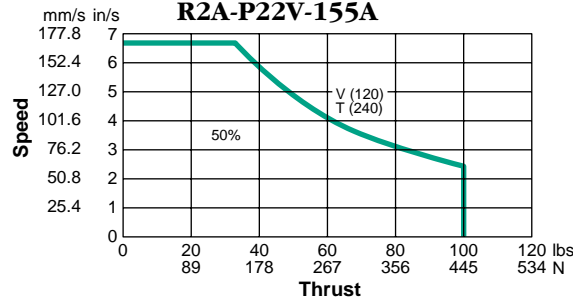


R2A-P22(T/V)-105A-P: 1:1 Timing Belt, 5 rev/inch Acme Screw
 R2A-P22(T/V)-105A-I: 1:1 Inline Coupling, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R2A-P22T-155A

R2A-P22V-155A

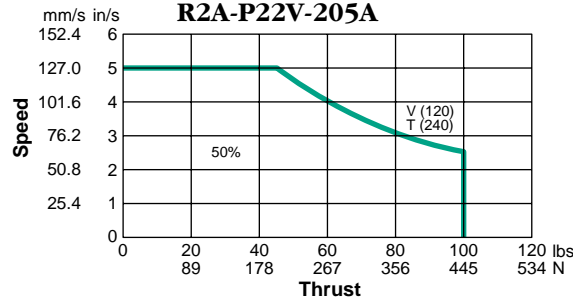


R2A-P22(T/V)-155A: 1.5:1 Timing Belt, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R2A-P22T-205A

R2A-P22V-205A



R2A-P22(T/V)-205A: 2:1 Timing Belt, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



• Performance using S6000 Series, *NextStep*[®], and *SmartStep*[®] Controls.



To configure your system see page B-40.

• Consider leadscrew **critical speed** and **column load limits** when specifying longer lengths.
5A

	15.0	12.5	7.7	5.2	3.8	2.8	2.2	1.8	1.2	0.9	Critical Speed (in/sec)
6 thru 10	12	18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	98	63	44		Column Load Limit (lbs)



How To Order

Steps to Ordering a Complete R2A-S/P System

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

- found the R2A-S/P Base Model that meets your speed, thrust and repeatability requirements (pages B-36 to B-39), with a comfortable safety margin,
- verified that the R2A-S/P meets your carriage loading requirements, and
- chosen a control compatible with the P22 or S32 motor.

IDC recommends using the application data form on pages (B-13 to B-15). Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable

safety margin (30% reserve for steppers).

Belt driven units generally move light loads at high speed over longer lengths. Screw driven units are recommended for high thrust and vertical applications. Consider that acme screws have more friction and are self locking.

P22, S32 motor wiring
($x = N, T$ or V):

- N 8 leads, no quick disconnect.
- T Series, 12 ft [3.7 m] quick disconnect cable included.
- V Parallel, 12 ft [3.7 m] quick disconnect cable included.

For the P22 motor, the quick disconnect is on the gear housing.
For the S32 motor, the quick disconnect is on the motor.

2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.



1	2	3	4	5
Base Model	Stroke Length	Motor Orientation	Mounting	Options
Belt Drive Models				
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">R2A-S/P</div> <div style="margin-right: 10px;">—</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Drive Ratio</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Belt</div> </div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">6 36</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">AR Over Right*</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">MS1 E</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">EMK</div> </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">R2A-S/P</div> <div style="margin-right: 10px;">—</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Drive Ratio</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Belt</div> </div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">12 42</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">BR Behind Right</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">MS5 English</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Encoder</div> </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">R2A-S/P</div> <div style="margin-right: 10px;">—</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Drive Ratio</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Belt</div> </div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">18 48</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">CR Under Right</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">MS6 M</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">Metric</div> </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">R2A-S/P</div> <div style="margin-right: 10px;">—</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Drive Ratio</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Belt</div> </div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">24 60</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">AL Over Left*</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">BL Behind Left</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">CL Under Left</div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">*P22 motor only</div> </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">R2A-S/P</div> <div style="margin-right: 10px;">—</div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Drive Ratio</div> <div style="border: 1px solid black; padding: 2px; margin-right: 5px;">Belt</div> </div> <div style="margin-right: 10px;">—</div> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">30 72</div> </div>
<div style="border: 1px solid black; padding: 5px;"> R2A-S32x-20T R2A-P22x-35T R2A-P22x-120T x = N, T or V </div>				
Screw Drive Models				
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<div style="border: 1px solid black; padding: 5px;"> Ball Screw Acme Screw R2A-P22x-102B R2A-P22x-102A R2A-P22x-105B R2A-P22x-105A R2A-P22x-152B R2A-P22x-155A R2A-P22x-155B R2A-P22x-205A R2A-P22x-202B R2A-P22x-205B R2A-P22x-352B x = N, T or V </div>				



How To Order

Rodless Actuator
50 lbs Payload
Step Motor

R2A-S/P

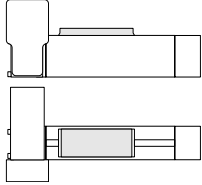
Rodless Actuators

3. Motor Orientation

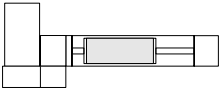
Dimensional drawings start on page B-48.

Belt Drive Models

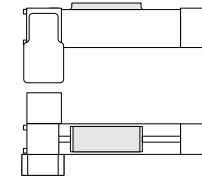
AR - Over Right



BR - Behind Right



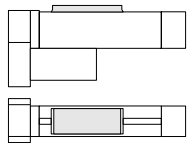
CR - Under Right



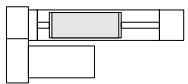
S32 motor not available with AL, AR motor orientation. For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify AL, BL, CL.

Screw Drive Models

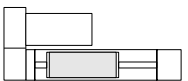
P - Parallel Underneath



PR - Parallel Right Side



PL - Parallel Left Side



I - In-Line



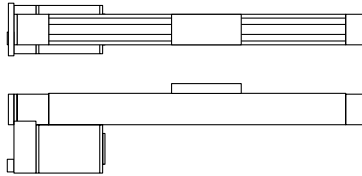
In-line models are supplied with 8 motor leads only (no quick disconnect, 12 foot cable).

4. Mounting

Dimensional drawings start on page B-51.

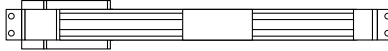
Actuator

MF3 Rectangular Flanges



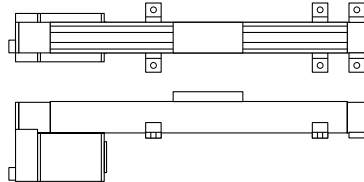
MF3 (flanges) is not available with in-line models or belt drive models.

MS1 Side End Angles

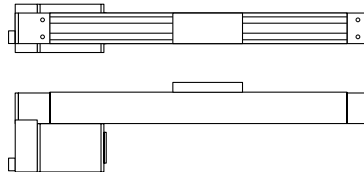


MS1 (end angles) not available with in-line models.

MS5 Feet



MS6 Side Tapped Holes



English/Metric Carriage and Mounting Option

Specifies actuator mounting and carriage with Metric (M) or English (E) mounting provisions.

5. Other Options

BS - Holding Brake

20 in-lb electrically released brake mounted on the lead screw shaft. *Not available with MF3, MS1, or belt drive actuators.*

EMK - Encoder

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

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

- RP1 Normally open Hall-effect
- RP2 Normally closed Hall-effect
- RPS-1 Normally open reed
- RPS-2 Normally closed reed

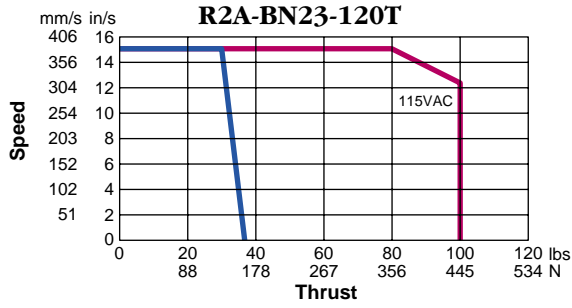
7. Compatible Controls

Model Description

Model	Description
NextStep [®]	Microstepping drive
S6002	2-axis microstepping drive
S6961	IDEal [™] programmable microstepping Smart Drive
S6962	2-axis IDEal [™] microstepping Smart Drive
SmartStep [™] 23	3 amp programmable microstepping Smart Drive for 23 frame motor
SmartStep [™]	1-axis IDEal [™] programmable microstepping Smart Drive



Belt-Drive Models

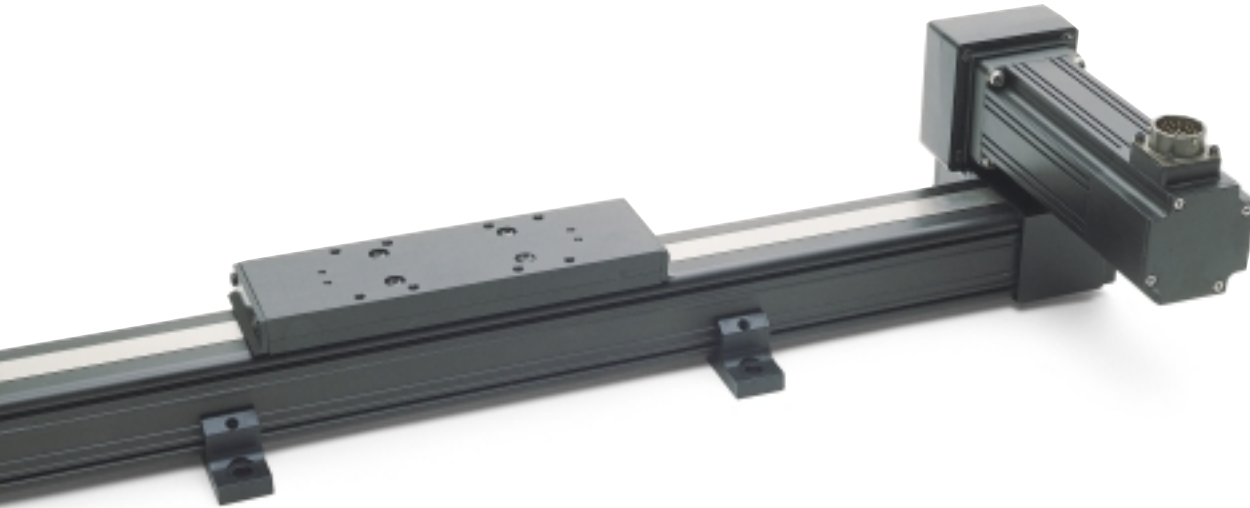


R2A-BN23-120T: 12:1 Helical Gears, 3 inch/rev Drive Belt

Max. No-Load Accel.	770 in/s ²	19.5 m/s ²
Travel per Motor Rev	0.25 in	6.35 mm
Repeatability	±0.004 in	±0.10 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

Rodless Actuators

- Continuous duty region (115VAC) (max rms torque, over any 10 minute interval)
- Intermittent duty max region (max 2 second duration)

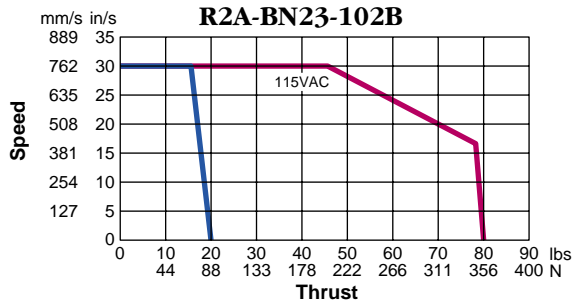


- Performance using B8000 Series Controls at 115 VAC.
- Accuracy will be affected by belt stretch under heavier loads.



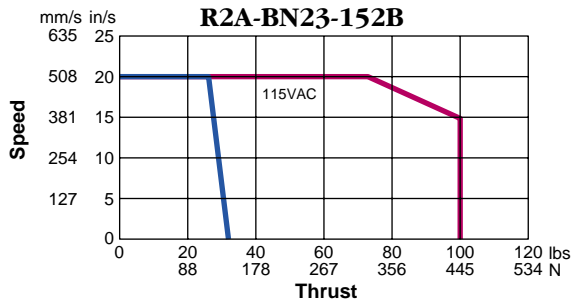


High Speed Ball Screw Models



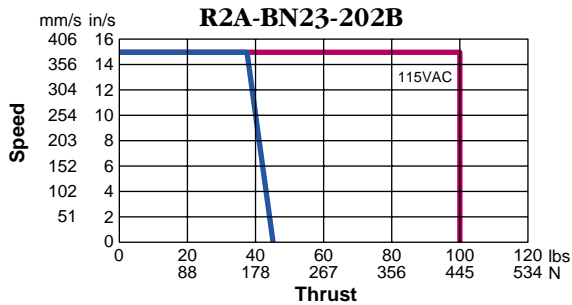
R2A-BN23-102B-P: 1:1 Timing Belt, 2 rev/inch Ballscrew
R2A-BN23-102B-I: 1:1 Inline Coupling, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-BN23-152B: 1.5:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-BN23-202B: 2:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

 Continuous duty region (115VAC)
(max rms torque, over any 10 minute interval)

 Intermittent duty max region (max 2 second duration)



To configure your system see page B-46.

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

2B

	30.0	25.5	17.3	12.5	9.4	7.4	5.9	4.1	3.0	Critical Speed (in/sec)
2 thru 12	18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)

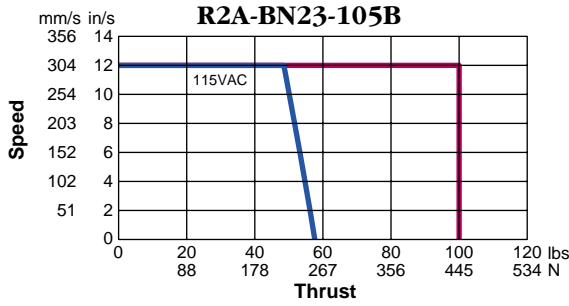


• Performance using B8000 Series Controls at 115 VAC.



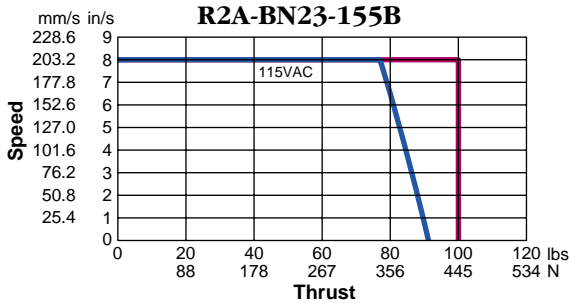
Ball Screw Models

Rodless Actuators



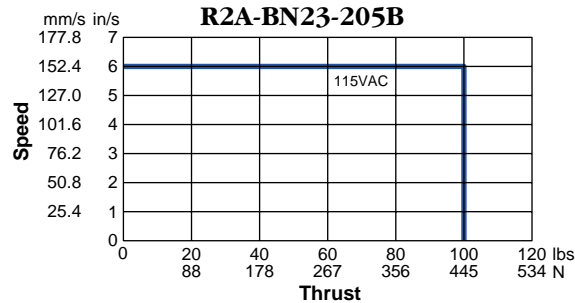
R2A-BN23-105-P: 1:1 Timing Belt, 5 rev/inch Ballscrew
R2A-BN23-105B-I: 1:1 Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	360 in/s ²	9.1 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-BN23-155B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-BN23-205B: 2:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

■ Continuous duty region (115VAC) (max rms torque, over any 10 minute interval)

■ Intermittent duty max region (max 2 second duration)

• Performance using B8000 Series Controls at 115 VAC.

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

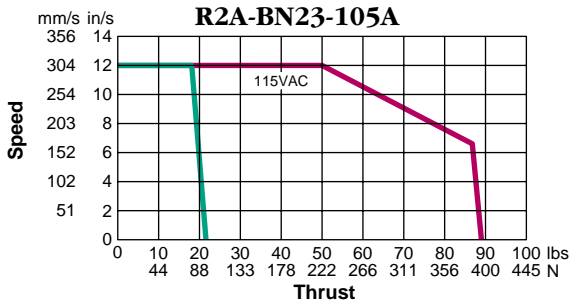
5B

15.0	10.2	6.9	5.0	3.8	2.9	2.4	1.6	1.2	Critical Speed (in/sec)
2 thru 12	18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



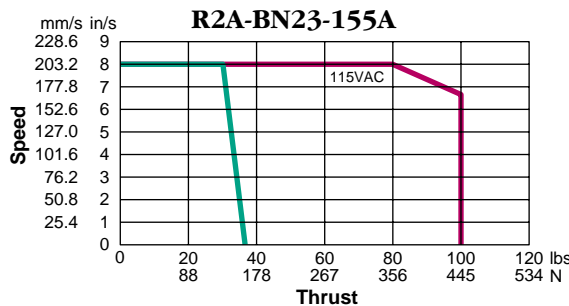


Acme Screw Models



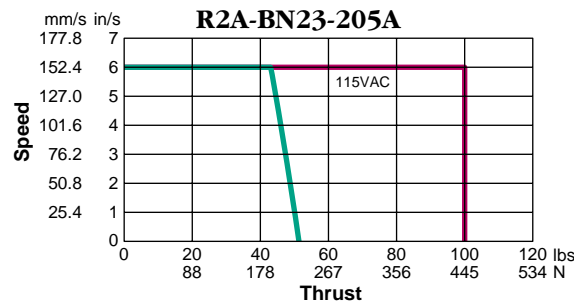
R2A-BN23-105A-P: 1:1 Timing Belt, 5 rev/inch Acme Screw
R2A-BN23-105A-I: 1:1 Inline Coupling, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	360 in/s ²	9.1 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm




R2A-BN23-155A: 1.5:1 Timing Belt, 5 rev/inch Acme Screw


Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R2A-BN23-205A: 2:1 Timing Belt, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

 60% duty region
(115VAC)
(max rms torque, over
any 10 minute interval)

 Intermittent duty max region
(max 2 second duration)



• Performance using B8000 Series Controls at 115 VAC.



To configure your system see page B-46.

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

5A	15.0	12.5	7.7	5.2	3.8	2.8	2.2	1.8	1.2	0.9	Critical Speed (in/sec)
6 thru 10	12	18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	98	63	44	Column Load Limit (lbs)



How To Order

Steps to Ordering a Complete R2A-B System

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

- found the R2A-BN Base Model that meets your speed, thrust and repeatability requirements (pages B-42 to B-45), with a comfortable safety margin,
- verified that the R2A-BN meets your carriage loading requirements, and
- chosen a control compatible with the BN23 motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin.

Belt driven units generally move light loads at high speed over longer lengths.

Screw driven units are recommended for high thrust and vertical applications. Consider that acme screws have more friction and are self locking.

The BN23 motor features a 1000 line incremental encoder and 12 ft [3.7 m] jacketed cables for the motor and encoder.

There is no quick disconnect option for R2A-BN actuators.

2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.



1	2	3	4	5																																								
Base Model	Stroke Length	Motor Orientation	Mounting	Options																																								
Belt Drive Models																																												
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">R2A-BN23</div> <div style="margin-right: 10px;">—</div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="text-align: center; font-size: 8px;">Drive Ratio</div> <div style="border: 1px solid black; width: 30px; height: 20px; margin: 0 auto;"></div> </div> <div style="margin-right: 10px;">—</div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="text-align: center; font-size: 8px;">Belt</div> <div style="border: 1px solid black; padding: 2px; margin: 0 auto;">T</div> </div> </div> <div style="border: 1px solid black; margin-top: 5px; padding: 2px;">R2A-BN23-120T</div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="margin-right: 5px;">—</div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> </div> <div style="margin-top: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;">6</td><td style="width: 20px;">36</td></tr> <tr><td>12</td><td>42</td></tr> <tr><td>18</td><td>48</td></tr> <tr><td>24</td><td>60</td></tr> <tr><td>30</td><td>72</td></tr> </table> </div>	6	36	12	42	18	48	24	60	30	72	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="margin-right: 5px;">—</div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> </div> <div style="margin-top: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;">AR</td><td>Over Right</td></tr> <tr><td>BR</td><td>Behind Right</td></tr> <tr><td>CR</td><td>Under Right</td></tr> <tr><td>AL</td><td>Over Left</td></tr> <tr><td>BL</td><td>Behind Left</td></tr> <tr><td>CL</td><td>Under Left</td></tr> </table> </div>	AR	Over Right	BR	Behind Right	CR	Under Right	AL	Over Left	BL	Behind Left	CL	Under Left	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 30px; height: 20px; margin-right: 5px;"></div> <div style="margin-right: 5px;">—</div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> </div> <div style="margin-top: 5px;"> <table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;">MS1</td><td>E</td></tr> <tr><td>MS5</td><td>English</td></tr> <tr><td>MS6</td><td>Metric</td></tr> </table> </div>	MS1	E	MS5	English	MS6	Metric													
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Screw Drive Models																																												
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Ball Screw	Acme Screw																																											
R2A-BN23-102B	R2A-BN23-105A																																											
R2A-BN23-105B	R2A-BN23-155A																																											
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BS24/BS115/ BS240																																												
Brake on Screw																																												



How To Order

Rodless Actuator
50 lbs Payload
Brushless Servo

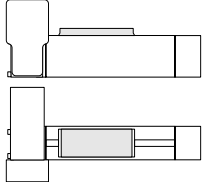
R2A-B

3. Motor Orientation

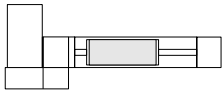
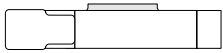
Dimensional drawings start on page B-48.

Belt Drive Models

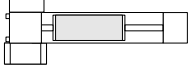
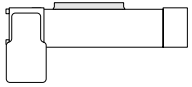
AR – Over Right



BR – Behind Right



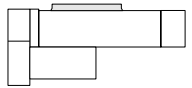
CR – Under Right



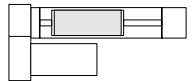
For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify AL, BL, CL.

Screw Drive Models

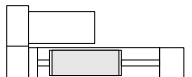
P – Parallel Underneath



PR – Parallel Right Side



PL – Parallel Left Side



I – In-Line

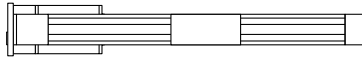


4. Mounting

Dimensional drawings start on page B-51.

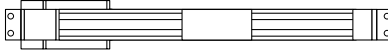
Actuator

MF3 Rectangular Flanges



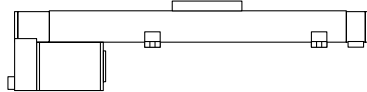
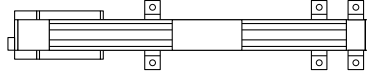
MF3 (flanges) is not available with in-line models or belt drive models.

MS1 Side End Angles

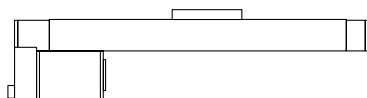
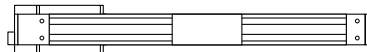


MS1 (end angles) is not available with in-line models.

MS5 Feet



MS6 Side Tapped Holes



English/Metric Carriage and Mounting Option

Specifies actuator mounting and carriage with Metric (M) or English (E) mounting provisions.

5. Other Options

BS – Holding Brake

20 in-lb electrically released brake mounted on the lead screw shaft. *Not available with MF3, MS1 or belt drive actuators.*

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

- RP1 Normally open Hall-effect
- RP2 Normally closed Hall-effect
- RPS-1 Normally open reed
- RPS-2 Normally closed reed

7. Compatible Controls

Important: The BN23 motor is only rated for 115 VAC operation. Use of 230 VAC power may damage the motor.

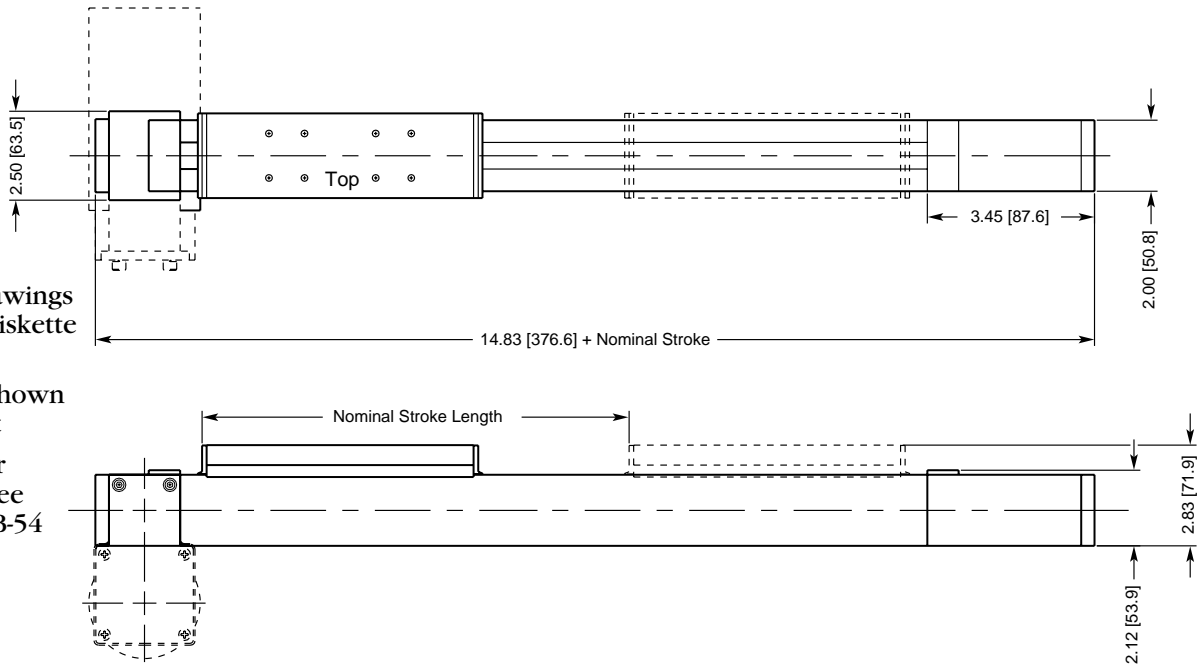
Model	Description
B8001	Digital servo drive
B8961	<i>IDEAL™</i> programmable digital servo Smart Drive
B8962	2-axis <i>IDEAL™</i> programmable digital servo Smart Drive

Rodless Actuators

Overall Dimensions

Rodless Actuators

- AutoCAD® drawings available on diskette
- Six motor orientations shown below & right
- Include motor dimensions; see pages B-53 - B-54

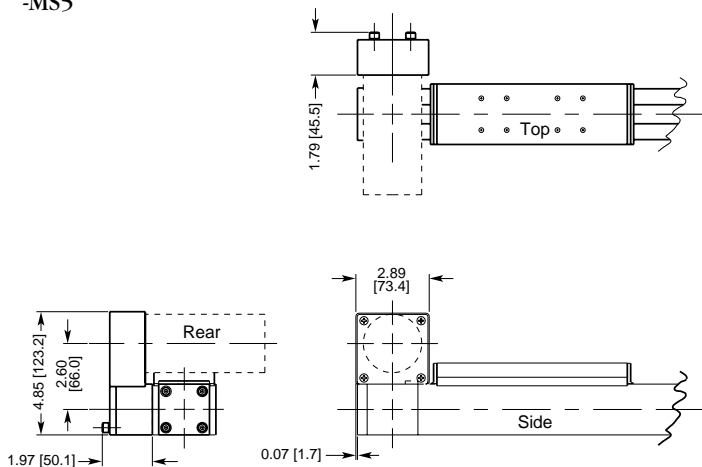


Motor Orientation Options

-AL Over Left

Compatible Mountings

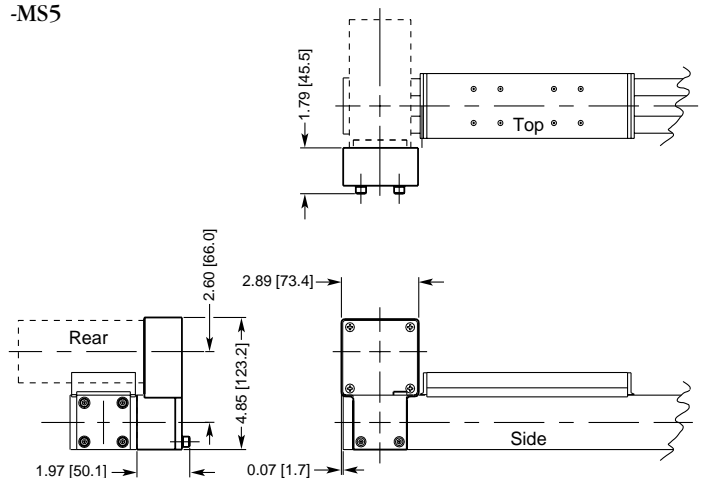
- MS1
- MS5



-AR Over Right

Compatible Mountings

- MS1
- MS5



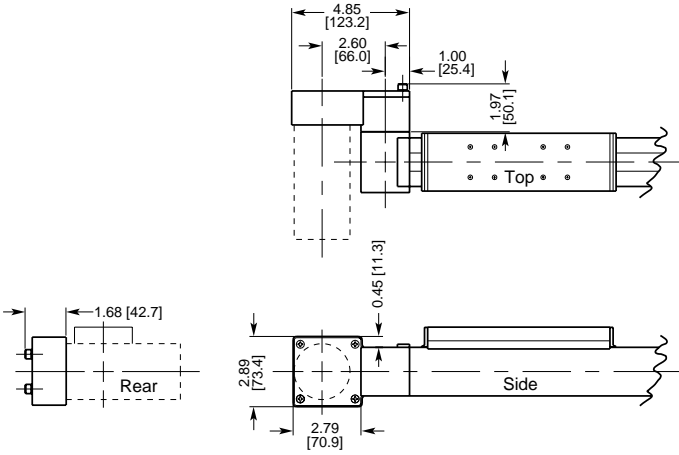
* H motor compatible with AR, not AL.

Motor Orientation Options

-BL Behind Left

Compatible Mountings

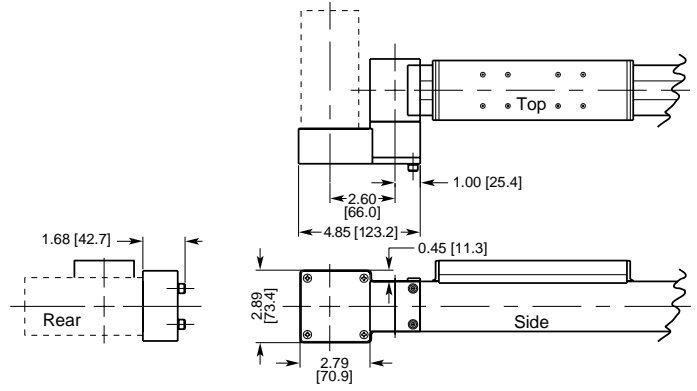
- MS5
- MS6



-BR Behind Right

Compatible Mountings

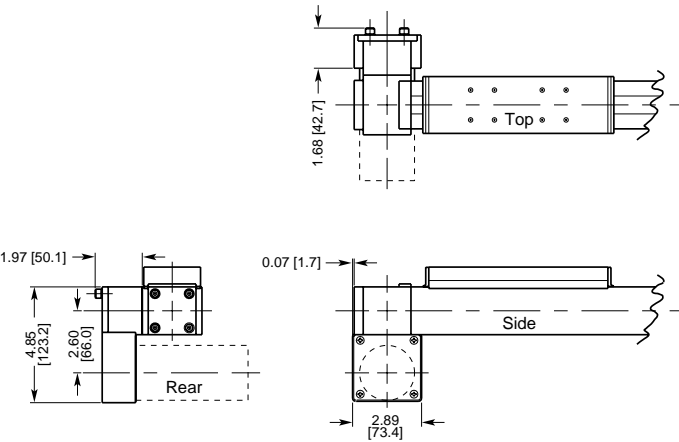
- MS5
- MS6



-CL Under Left

Compatible Mountings

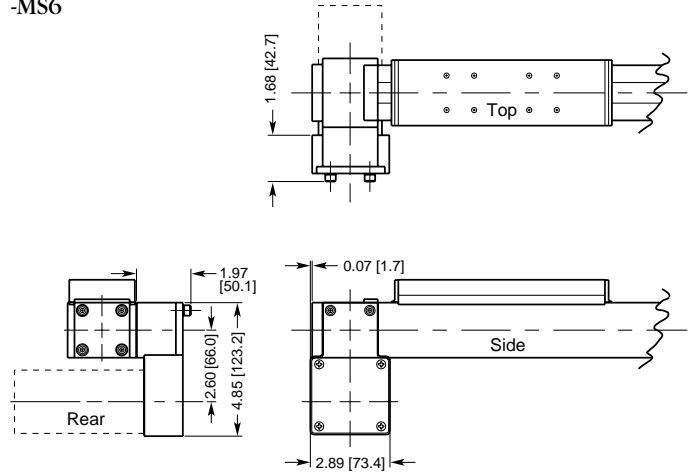
- MS5
- MS6



-CR Under Right

Compatible Mountings

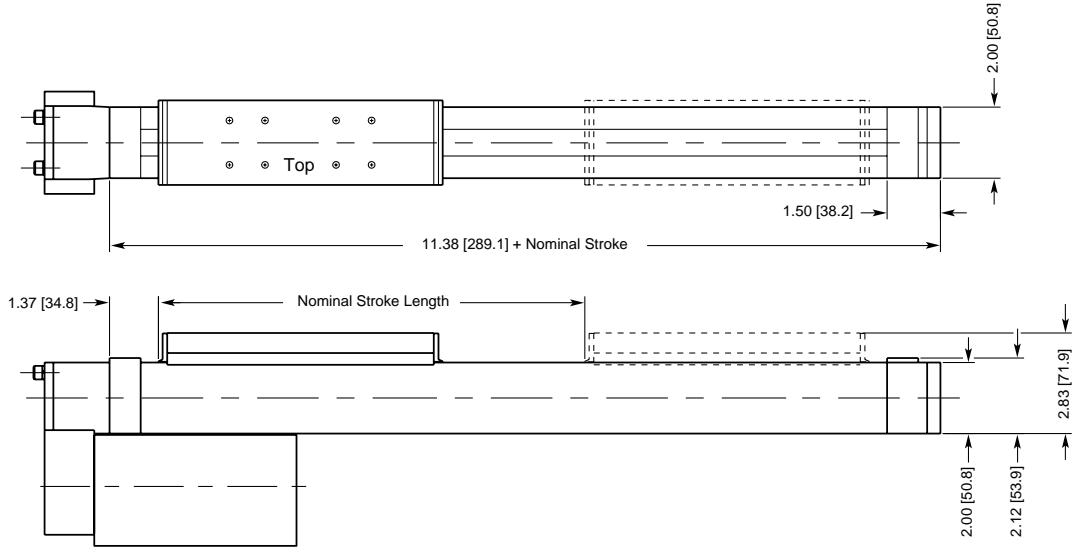
- MS5
- MS6



Overall Dimensions

Rodless Actuators

- AutoCAD® drawings available on diskette
- Four motor orientations shown below
- Include motor dimensions; see pages B-53 - B-54

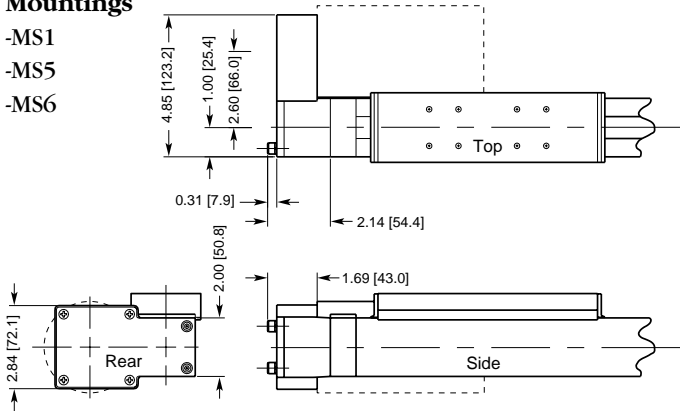


Motor Orientation Options

-PL Parallel Left Side

Compatible Mountings

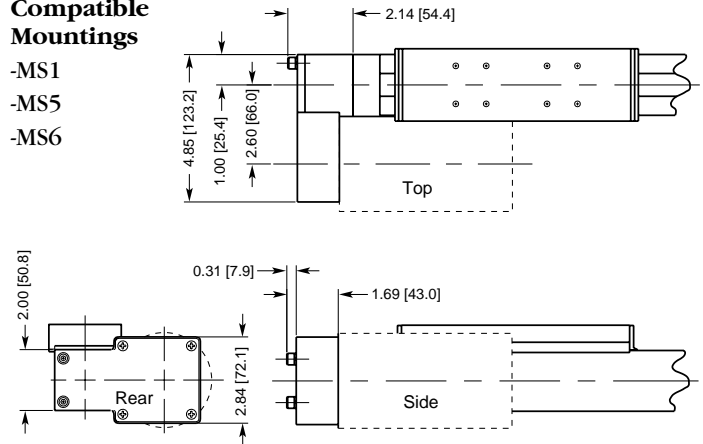
- MS1
- MS5
- MS6



-PR Parallel Right Side

Compatible Mountings

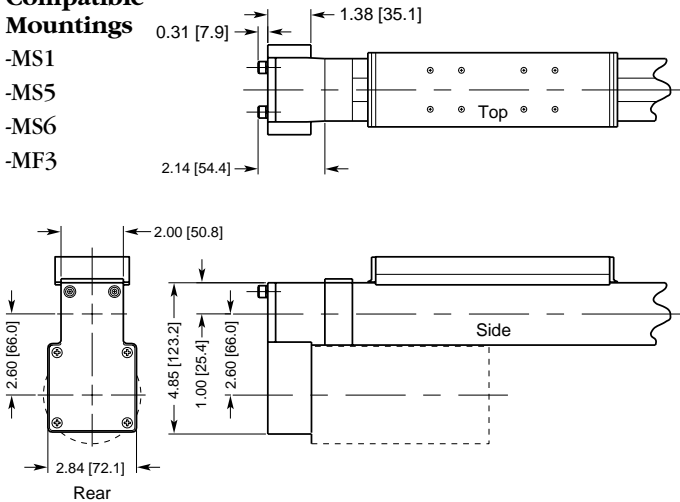
- MS1
- MS5
- MS6



-P Parallel Below

Compatible Mountings

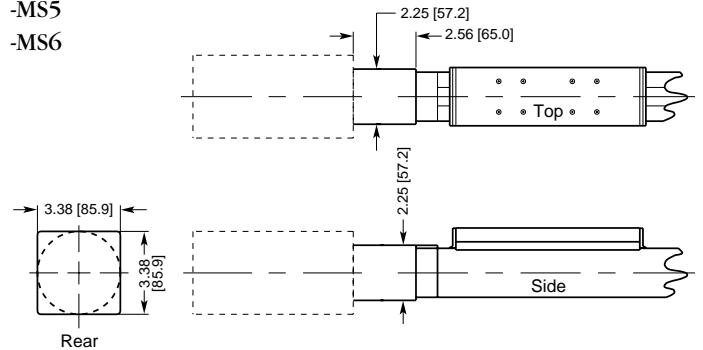
- MS1
- MS5
- MS6
- MF3



-I In-Line

Compatible Mountings

- MS5
- MS6



Mounting Option Dimensions

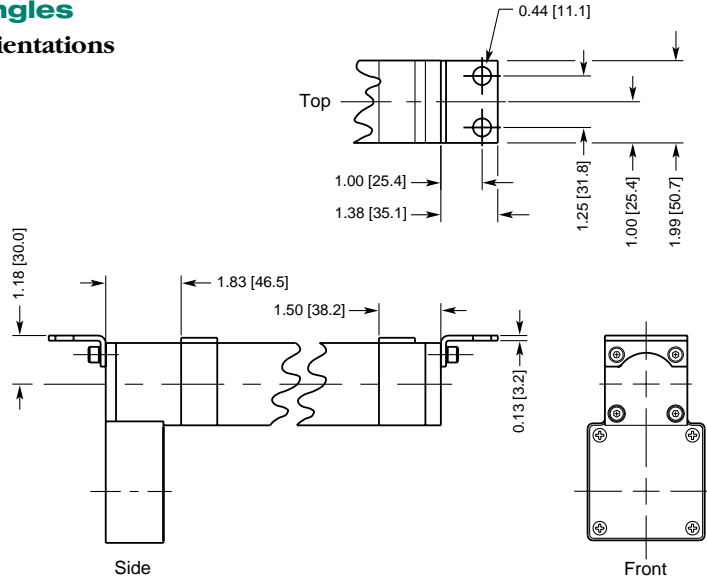
Rodless Actuator

R2A

-MS1 Side End Angles

Compatible Motor Orientations

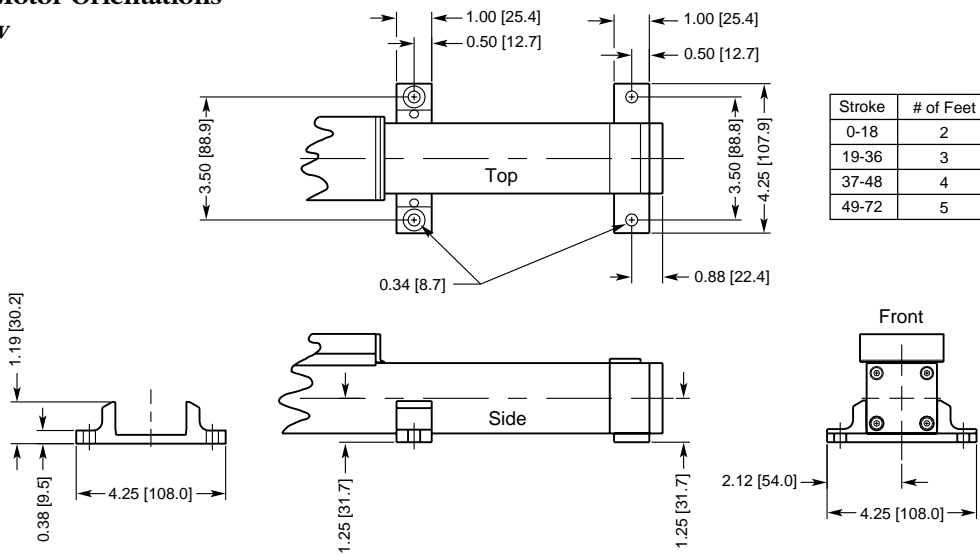
Belt	Screw
-AR	-P
-AL	-PR
-PL	-PL



-MS5 Adjustable Feet

Compatible Motor Orientations

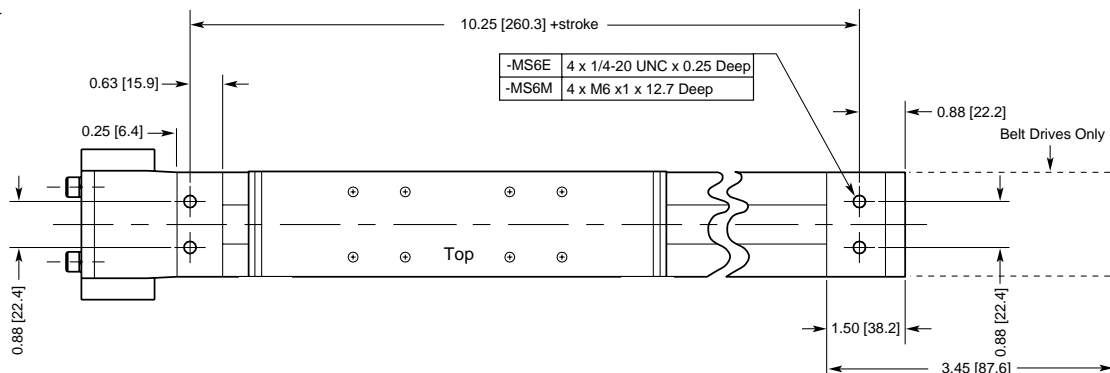
Belt	Screw
-AR	-P
-AL	-PR
-BR	-PL
-BL	-I
-CR	
-CL	



-MS6 Side Tapped Holes

Compatible Motor Orientations

Belt	Screw
-BR	-P
-BL	-PR
-CR	-PL
-CL	-I



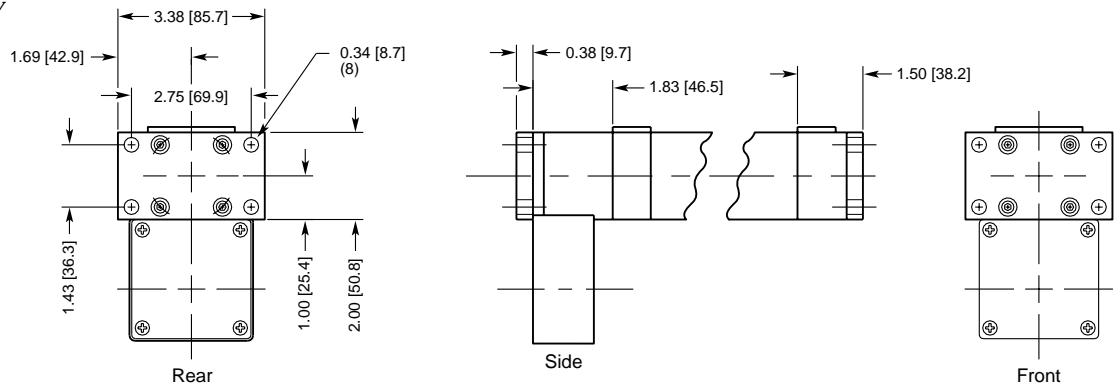
-MF3 Front & Rear Rectangular Flanges

Screw Driven Models Only

Compatible Motor Orientations

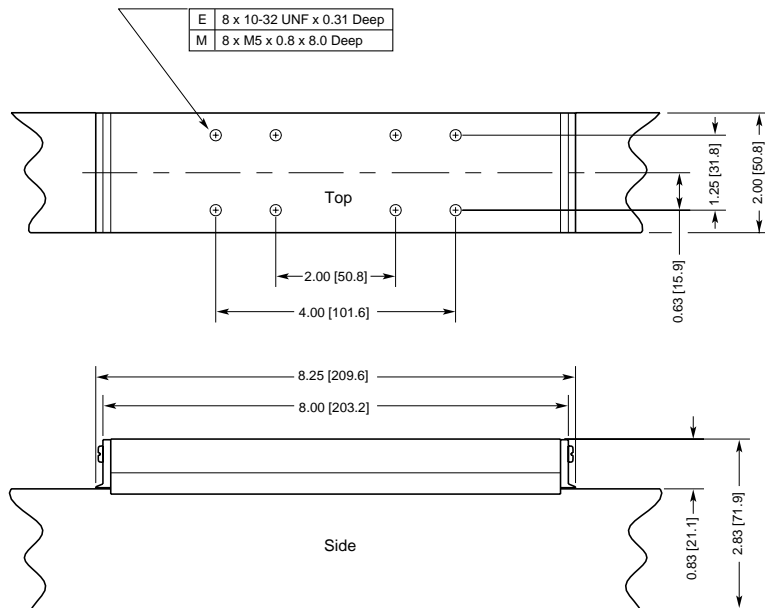
Belt Screw

Not available -P



Carriage Dimensions

Dimensions





D Motor

Inductance
Terminal Resistance
Hipot Breakdown
Voltage
Current

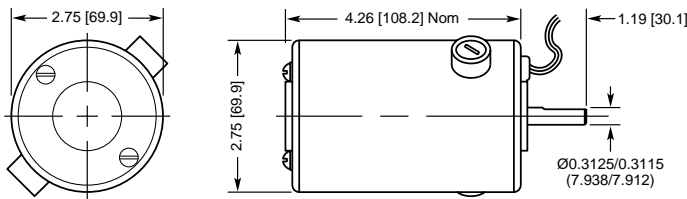
Permanent magnet 2-pole, 24 volt DC motor

1.63 mH
0.7 ohms $\pm 20\%$
500 VAC
24 VDC max

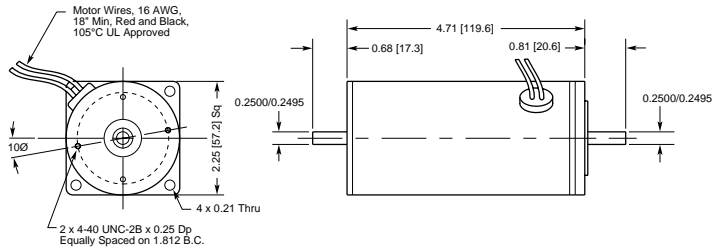
Continuous
Peak
Torque Constant
Voltage Constant
No Load Speed
Connections
User Cabling
Anticipated Life of brushes
Temperature

4.5 A max
12 A max
8.8 oz-in/Amp
6.5 V/Krpm
3,600 rpm
2 leads, 12 inch length
Less than 50 feet (16 AWG), 50-100 feet (14 AWG), 100-200 feet (10 AWG)
1 million cycles. Replaceable.
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 performance curves for system duty ratings.

Parallel (-P) Models



Inline (-I) Models



H Motor

Inductance
Terminal Resistance
Hipot Breakdown
Voltage
Current

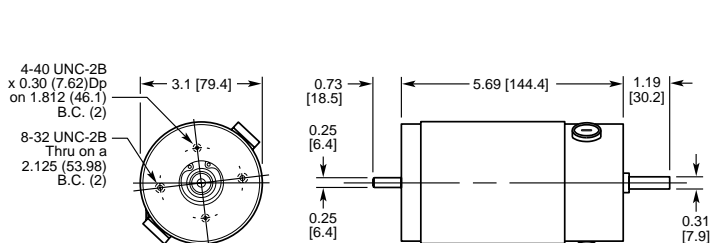
Permanent magnet 2-pole, 160 volt DC motor

19 mH
6.4 ohms $\pm 20\%$
500 VAC
160 VDC max

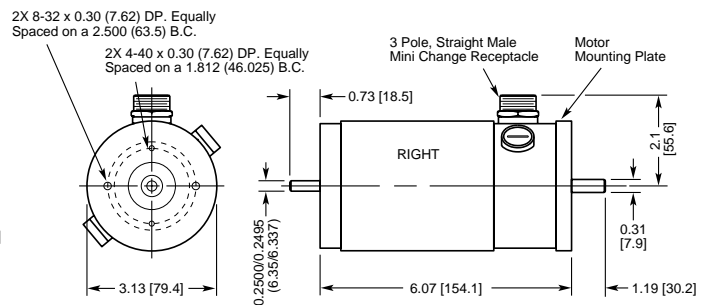
Continuous
Peak
Torque Constant
Voltage Constant
No Load Speed
Connections
User Cabling
Anticipated Life of brushes
Temperature

2 A max
8 A max
54 oz-in/Amp
40 V/Krpm
3,900 rpm
Quick disconnect: 3 contact receptacle, including case ground, in anodized aluminum shell, includes 12 ft cable with molded plug.
Less than 50 feet (16 AWG), 50-100 feet (14 AWG), 100-200 feet (10 AWG)
5 million cycles. Replaceable.
180°F (82°C) maximum allowable motor case temperature.
Actual motor case temperature is dependent on ambient temp., duty cycle, speed, and load. Refer to speed vs. thrust performance curves for duty ratings.

Parallel (-P) Models



Inline (-I) Models



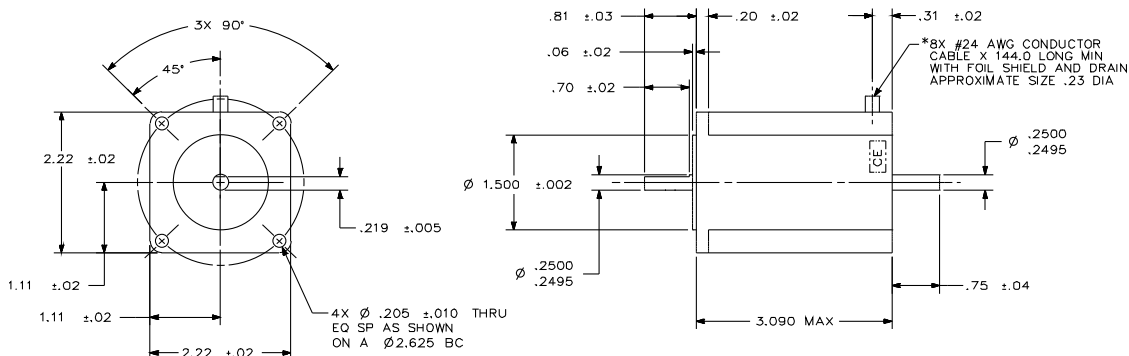
**P22 Motor**

Inductance
Motor Current
Hipot Breakdown
Connections

User Cabling
Temperature

1.8° Permanent Magnet Hybrid Step Motor

63.2 mH in Series (P22T), 15.8 mH in Parallel (P22V)
0.7 Amps in Series (P22T), 1.5 Amps in Parallel (P22V)
500 VAC/1800 VDC (phase to phase; phase to ground)
P22N: 8 leads, each 12" long each
P22T, P22VV: quick disconnect receptacle on actuator gear housing; includes
12 ft [3.7 m] cable with molded plug
Less than 100 feet (20 AWG), 100-200 feet (18 AWG)
212°F (100°C) maximum allowable case temperature.
Actual motor case temperature is dependent on ambient temp., duty cycle,
speed and load. Refer to speed vs. thrust performance curves for system duty
ratings.



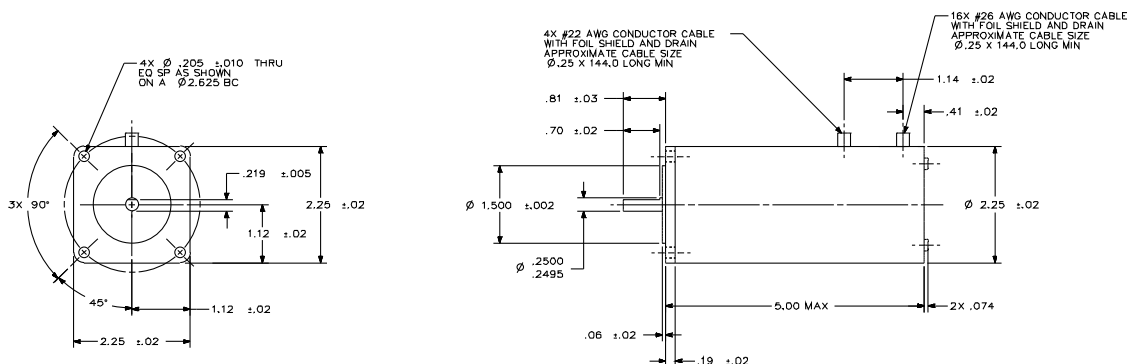
*INLINE UNITS ONLY, OTHER UNITS USE QUICK DISCONNECT PORT.

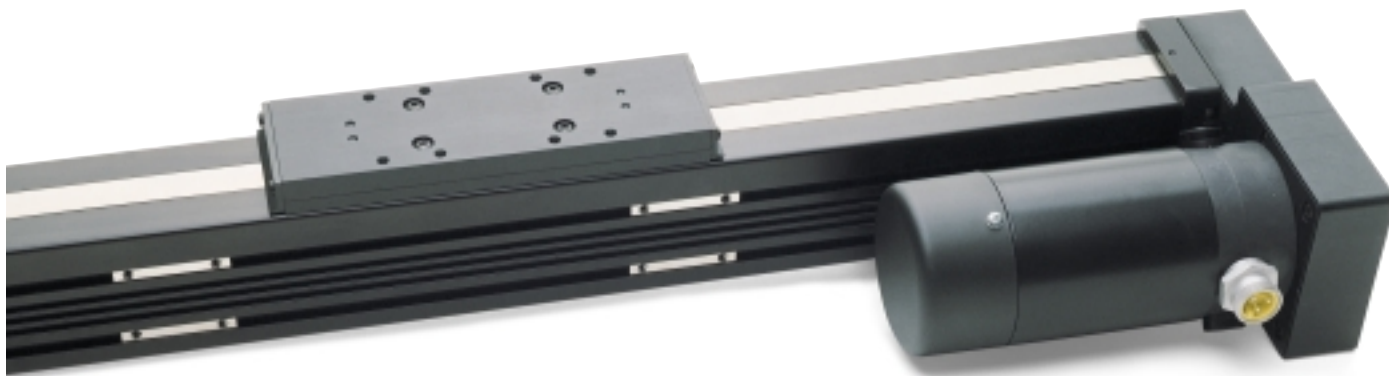
BN23 Motor

Winding Data
Inductance
Terminal Resistance
Torque Constant
Torque Output
Continuous
Peak
Rotor Inertia
Connections
Temperature
Environmental

Rare Earth Magnet Brushless Servo Motor

12.5 mH ±10%
7.17 ohms ±10%
2.56 in-lbs/amp
3.31 in-lbs [0.37 N-m]
11.86 in-lbs [1.34 N-m]
0.00045 in-lb-sec² [0.505 kg-cm²]
12 ft jacketed cables for motor windings and encoder.
212°F (100°C) maximum allowable case temperature.
Actual motor case temperature is dependent on ambient temperature,
duty cycle, speed and load





R3 series actuators fit the majority of rodless applications where carriage loads are less than 100 lbs [445 N]. A robust design using an internal linear motion guide rail and our built-in flexible seal ensures reliable operation in an industrial environment.

Two basic drive mechanisms can be used: Belt-drive offers the most rapid moves, and leadscrew offers the highest thrust capacity and repeatability.

There are four motor types available to meet a variety of application requirements:

R3-D - 24 Volt DC

- Cost effective.
- Simple motion.
- Open loop operation.

R3-H - 160 Volt DC

- High torque brushed DC servo motor.
- Thrust monitored.

R3-S/P - Step Motor

- High load and duty cycle.
- In-position holding.
- Economical open loop operation (encoder optional).
- Repeatable positioning to 0.0005 inches [0.013 mm].

R3-B - Brushless Servo

- Very high accelerations.
- High duty cycle.
- Precise closed loop operation.

		R3-D Series	R3-H Series	R3-S/P Series	R3-B Series
Load (Thrust) Capacity	lbs [N]	300 [1335] screw-drive		200 [890] belt-drive	
Max. No Load Speed	in/s [mm/s]	40 [1000] screw-drive, 120 [3000] belt-drive			
Max. Carriage Load	lbs [kg]	100 [45]			
Repeatability	in [mm]	±0.005 [0.13]	±0.001 [0.025]	±0.0005 [0.013]	±0.001 [0.025]
Motor Type		24 Volt DC Servo	160 Volt DC Servo	1.8° Hybrid Stepper	Brushless Servo
Compatible Controls Offered		D2200	H3301B	<i>NextStep</i>	B8001
		D2300	H3321B	S6002	B8961
		D2400		S6961	B8962
				S6962	
			<i>SmartStep</i>		
Typical System Cost*		\$2,500-3,100	\$3,200-3,800	\$3,100-4,700	\$4,400-6,100

* System cost based on single quantity price, 30 inch stroke actuator with control.



Common Specifications

Rodless Actuator

R3

Rodless Actuators

Travel Lengths

6, 12, 18, 24, 30, 36, 42, 48, 60, 72 inches

Construction Materials

Bearing Housing

6063 T-6 aluminum, hardcoat anodized

Guide Housing

6063 T-6 aluminum, hardcoat anodized

Carriage Assembly

6061 T-6 aluminum, hardcoat anodized

Internal Rail Bearings

Recirculating ball on precision ground rail

Leadscrew or Belt

Support Bearings

Angular contact, high thrust ball bearings

Acme Screw; drive nut

0.625" diameter alloy steel screw; lubricated polyacetal plastic (R3-D) or lubricated bronze drivenut (R3-H, R3-S, R3-B)

Ball Screw; drive nut

0.625" diameter hardened alloy steel screw; alloy steel, heat treated ballnut

Belt Drive

1.0" wide XL pitch polyurethane with steel reinforcement cords

Flexible Seal

Stainless steel band with elastomeric seal

Motor

D - B-93; H - B-94; P22 - B-95; S33 - B-95; B23 - B-96; B33 - B-96

Weight (Approximate, without options)

R3-D $17 + 0.4 \times (\text{inches stroke})$ lbs [7.7 + 0.18 × (inches stroke)] kg

R3-H $19 + 0.4 \times (\text{inches stroke})$ lbs [8.6 + 0.18 × (inches stroke)] kg

R3-S23 $17 + 0.4 \times (\text{inches stroke})$ lbs [7.7 + 0.18 × (inches stroke)] kg

R3-S33 $20 + 0.4 \times (\text{inches stroke})$ lbs [9.1 + 0.18 × (inches stroke)] kg

R3-B23 $17 + 0.4 \times (\text{inches stroke})$ lbs [7.7 + 0.18 × (inches stroke)] kg

R3-B32 $25 + 0.4 \times (\text{inches stroke})$ lbs [11.3 + 0.18 × (inches stroke)] kg

Environmental Operation

Temperature Range

-20° to 140°F [-28° to 60°C]

Moisture/Contaminants

IP 44 rated: Splash-proof, protected against ingress of solid particles greater than 0.040" [1 mm] diameter.

R3 Series Actuator Inertia

Equations

Rotary Inertia (reflected to the motor) = $A + B^* (\text{stroke, in}) + C^* (\text{load, lb}) + D$

Linear Inertia (reflected to the carriage) = $[A + B^* (\text{stroke, in}) + D]/C + (\text{load, lb})$

Belt Driven Models

Models	Motors	Ratio	Belt	A (lb-in-s ²)	B (lb-in-s ² /in)	C (lb-in-s ² /lb)
R3...-20T	B23	2:1	1.0 wide	1.56 E-03	4.82 E-06	5.78 E-04
R3...-50T	H, P22/S33, B23/32	5:1		3.78 E-04	7.61 E-07	9.12 E-05
R3...-70T	H, P22/S33, B23/32	7:1		1.75 E-04	3.93 E-07	4.72 E-05

Motor	D (lb-in-s ²)
D	1.13 E-03
H	3.06 E-03
P22	3.81 E-04
S33	1.66 E-03
B23	1.20 E-04
B32	1.00 E-03

Screw Driven Models

Models	Motors	Ratio	Screw	A (lb-in-s ²)	B (lb-in-s ² /in)	C (lb-in-s ² /lb)
R3...-102B	H, P22/S33, B23	1:1	0.625x0.5	2.15 E-04	7.12 E-05	1.64 E-05
R3...-152B	All	1.5:1		9.80 E-05	3.17 E-05	7.29 E-06
R3...-202B	All	2:1		5.70 E-05	1.78 E-05	4.10 E-06
R3...-502B	All	5:1		1.41 E-04	2.80 E-06	6.48 E-07
R3...-702B	D, H, P22	7:1		6.38 E-05	1.45 E-06	3.35 E-07
R3...-105B	All	1:1	0.625x0.2	1.80 E-04	7.12 E-05	2.62 E-06
R3...-155B	All	1.5:1		8.22 E-05	3.17 E-05	1.17 E-06
R3...-205B	All	2:1		4.81 E-05	1.78 E-05	6.64 E-07
R3...-505B	D, H, P22/S33	5:1		1.40 E-04	2.80 E-06	9.71 E-08
R3...-705B	D, P22	7:1		6.31 E-05	1.45 E-06	5.36 E-08
R3...-102A	H, P22/S33	1:1	0.625x0.5	2.01 E-04	7.12 E-05	1.64 E-05
R3...-105A	H, P22/S33, B23	1:1	0.625x0.2	1.79 E-04	7.12 E-05	2.62 E-06
R3...-155A	D, B23	1.5:1		8.19 E-05	3.17 E-05	1.17 E-06
R3...-205A	All	2:1		4.80 E-05	1.78 E-05	6.64 E-07
R3...-505A	All	5:1		1.40 E-04	2.80 E-06	9.71 E-08
R3...-705A	D, H, P22	7:1		6.31 E-05	1.45 E-06	5.36 E-08

Metric Conversions:

1 mm = 0.03937 in

1 kg = 2.205 lb

1 lb-in-s² = 1129 kg-cm² = 1.152 kg-cm-s²



Carriage

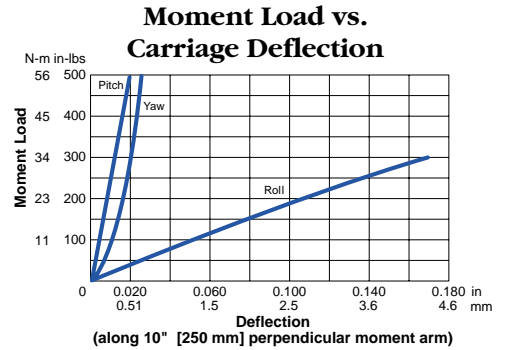
Straightness & Flatness

±0.005 in/ft [0.125 mm/300 mm], not to exceed ±0.035 in [0.9 mm]

Load Limits

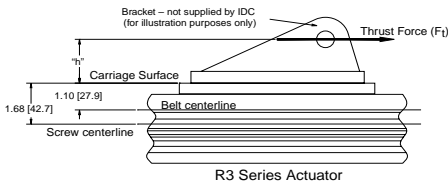
Normal (F_n)	±100 lbs [±450 N]
Side (F_s)	±100 lbs [450 N]
Pitch (M_p)	500 in-lbs [56 N-m]
Roll (M_r)	300 in-lbs [34 N-m]
Yaw (M_y)	500 in-lbs [56 N-m]

Refer to the Engineering Section, page K-12, for more information on moment loading



Rodless Actuators

Pitch Moment Example



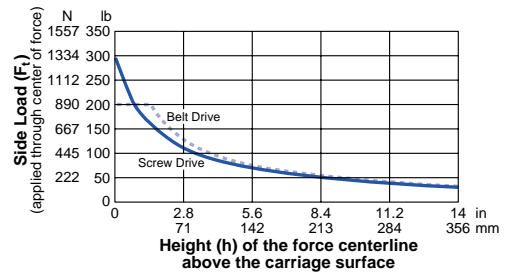
R3 Belt Equation:

$$M_p = (1.10 + b) * F_t, \text{ in}^* \text{lbs}$$

R3 Screw Equation:

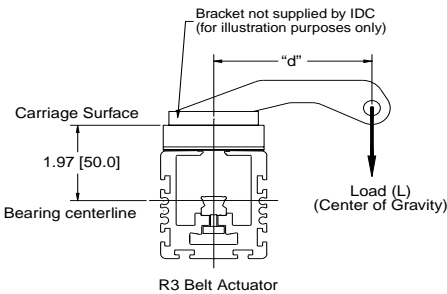
$$M_p = (1.68 + b) * F_t, \text{ in}^* \text{lbs}$$

Note that the distance from carriage surface to the screw/belt centerline has been added to the moment arm.



Roll Moment Example

(overhung load)

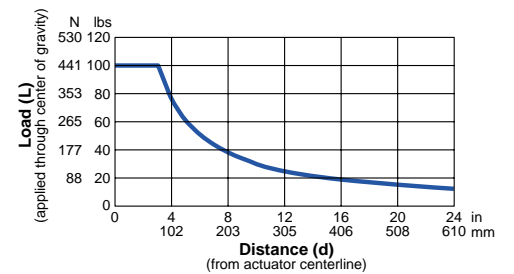


R3 Belt Equation:

$$M_r = d * L, \text{ in}^* \text{lbs}$$

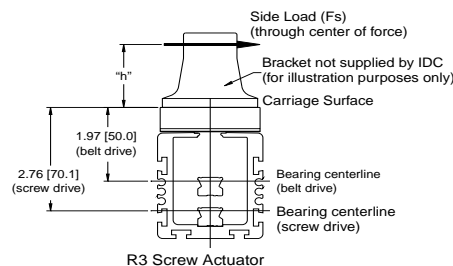
R3 Screw Equation (not shown):

$$M_r = d * L, \text{ in}^* \text{lbs}$$



Roll Moment Example

(side load)



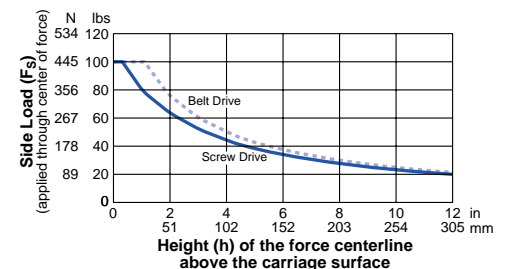
R3 Belt Equation (not shown):

$$M_r = (1.97 + b) * F_s, \text{ in}^* \text{lbs}$$

R3 Screw Equation:

$$M_r = (2.76 + b) * F_s, \text{ in}^* \text{lbs}$$

Note that the distance from carriage surface to the bearing centerline has been added to the moment arm.





Life

Belt Drive

As belt-driven actuators are generally used horizontally with light thrust loads, life is usually a function of the load weight. Actual life will be determined by carriage loading, speed, acceleration, and duty cycle and operating environment. The curve to the right shows predicted life of the actuator under ideal conditions. Derate as required by your application.

Ball Screw

Ball screw 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, gravitational and friction loads.

Acme Screw

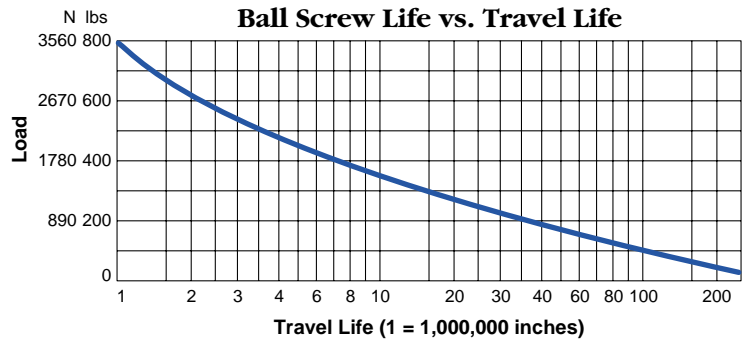
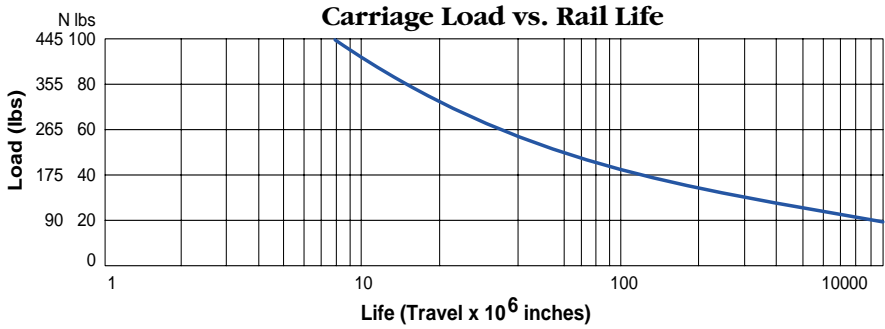
Usable life for an acme screw is defined as the length of travel completed before linear backlash of leadscrew and nut exceeds 0.020" [0.5 mm].

A travel life of 1 million inches under the maximum rated load can be used as a first approximation. Since wear is a function of several application parameters (load, duty cycle, speed, acceleration rates, environment, etc.) it is often difficult to exactly predict travel life of an acme screw.

Maintenance

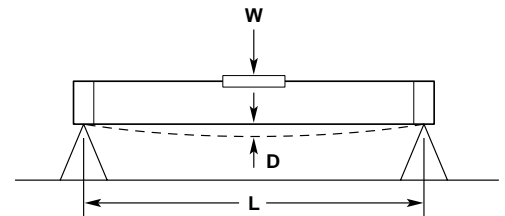
The R3 carriage seal and internal bearing design prevents lubricant contamination and nearly eliminates the need for routine maintenance. Replacement parts are available from the factory - see the Rodless Actuator Manual for details.

The equations to the right provide deflection as a function of the various loads applied to the carriage. Deflection should not exceed 0.015 in [0.38 mm]. Mounting spacing should not exceed 48 in [1200 mm].



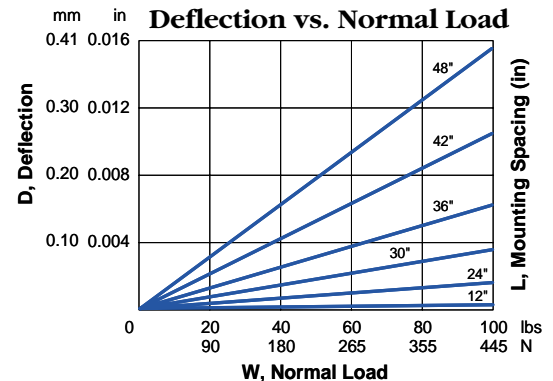
Actuator Deflection, Mounting Configurations

Actuator deflection will affect the flatness or straightness of the actuator when the system is supported at spaced mounting points.



- W = Load (lbs)
- D = Deflection (inches)
- L = Mounting Spacing (inches)

The chart to the right provides a quick reference for deflection vs. normal load.



Orientation

- Normal
- Side
- Pitch
- Roll
- Yaw

Deflection Equation

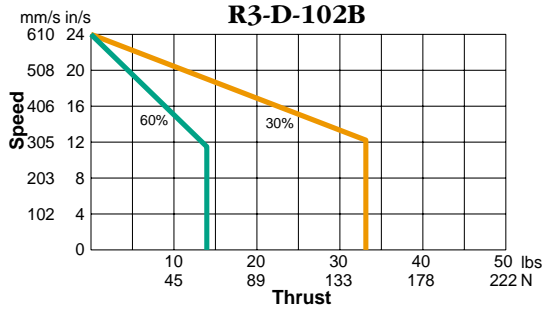
- Normal $D = WL^3 / 7.2 \times 10^8$, inches
- Side $D = WL^3 / 6.5 \times 10^8$, inches
- Pitch 3.3×10^{-6} radians/in-lb
- Roll 4.6×10^{-5} radians/in-lb
- Yaw 5.1×10^{-6} radians/in-lb

Maximum Allowed

- 0.010" [.25 mm]
- 0.010" [.25 mm]
- 0.002 radians @ 500 in-lbs
- 0.014 radians @ 300 in-lbs
- 0.003 radians @ 500 in-lbs

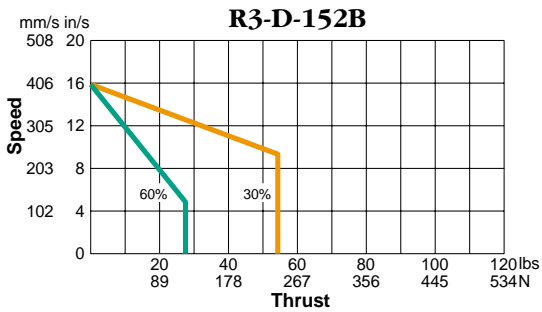


High Speed Ball Screw Models



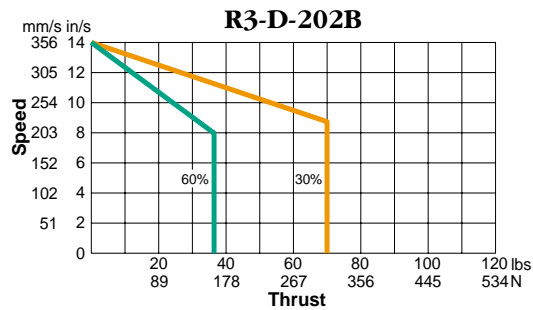
R3-D-102B-P: 1:1 Timing Belt, 2 rev/inch Ballscrew
R3-D-102B-I: 1:1 Inline Coupling, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	145 in/s ²	3.7 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-D-152B: 1.5:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	15 lbs	67 N
Max. No-Load Accel.	115 in/s ²	2.9 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-D-202B: 2:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	15 lbs	67 N
Max. No-Load Accel.	95 in/s ²	2.4 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

Rodless Actuators



- Performance using D2200 or D2300 Series Controls.
- Duty cycle is percentage of "on time" over a 10 minute interval.
- Repeatability achievable with D2300 control. Cylinders reduce speed prior to final positioning.



To configure your system see page B-64.

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

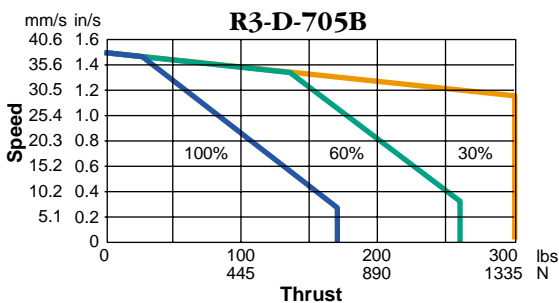
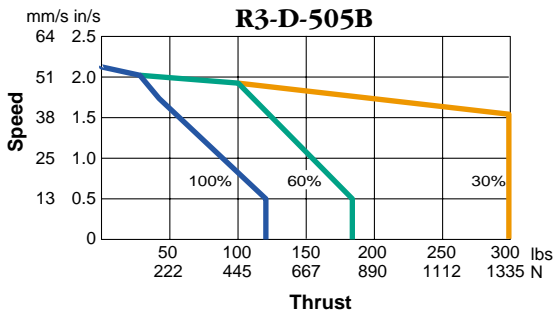
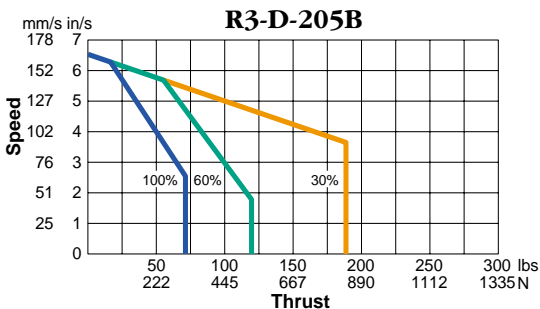
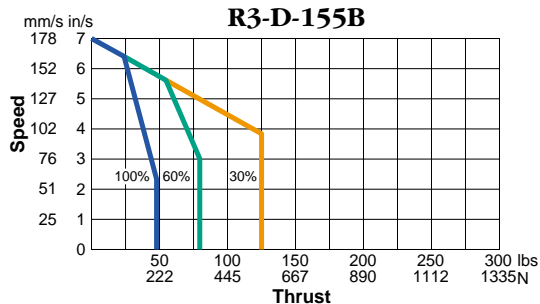
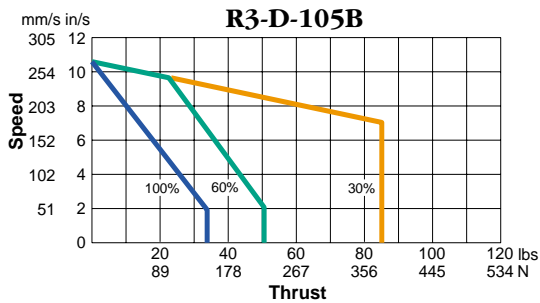
2B

	30.0	23.6	16.2	11.8	9.0	7.1	4.7	3.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)



Ball Screw Models

Rodless Actuators



R3-D-105B-P: 1:1 Timing Belt, 5 rev/inch Ballscrew
R3-D-105B-I: 1:1 Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	60 in/s ²	1.5 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-D-155B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	47 in/s ²	1.2 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-D-205B: 2:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	38 in/s ²	1.0 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-D-505B: 5:1 Helical Gears, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	14 in/s ²	0.4 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-D-705B: 7:1 Helical Gears, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	4 in/s ²	0.1 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.010 in	±0.25 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

- Performance using D2200 or D2300 Series Controls.
- Duty cycle is percentage of "on time" over a 10 minute interval.
- Repeatability achievable with D2300 control. Cylinders reduce speed prior to final positioning.

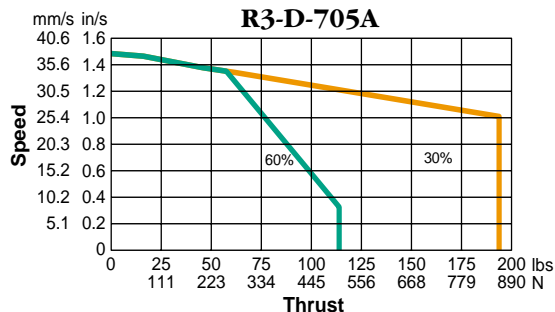
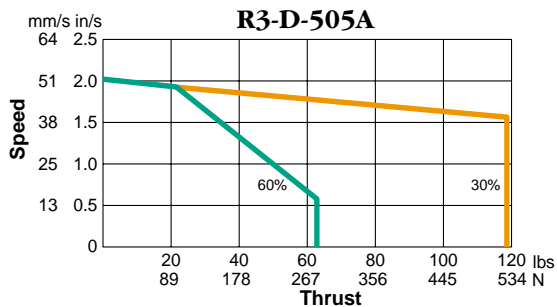
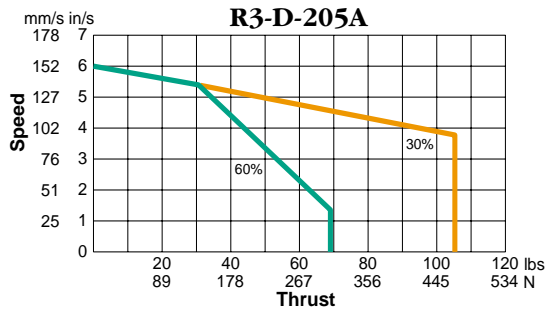
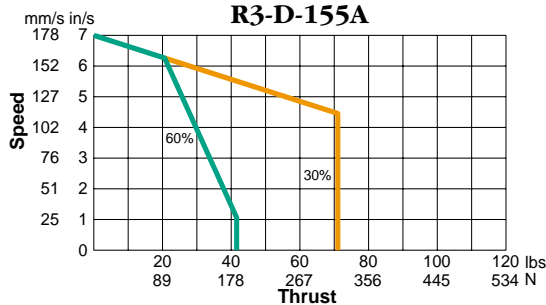
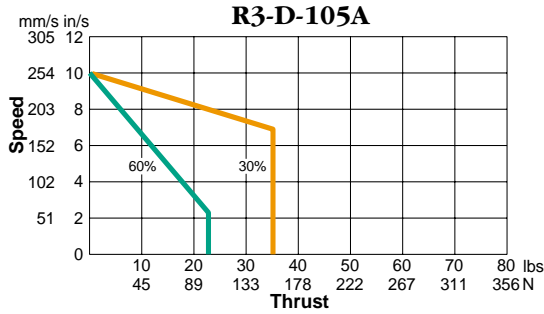
- Consider leadscrew **critical speed** and **column load limits** when specifying longer lengths.

5B								Critical Speed (in/sec)
15.0	9.4	6.5	4.7	3.6	2.8	1.9	1.3	
6 thru 18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)





Acme Screw Models



R3-D-105A-P: 1:1 Timing Belt, 5 rev/inch Acme Screw
 R3-D-105A-I: 1:1 Inline Coupling, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	60 in/s ²	1.5 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-D-155A: 1.5:1 Timing Belt, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	47 in/s ²	1.2 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-D-205A: 2:1 Timing Belt, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	38 in/s ²	1.0 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-D-505A: 5:1 Helical Gears, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	14 in/s ²	0.4 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-D-705A: 7:1 Helical Gears, 5 rev/inch Acme Screw

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	4 in/s ²	0.1 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.005 in	±0.13 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



To configure your system see page B-64.

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

5A

	15.0	11.3	7.1	4.9	3.6	2.7	2.1	1.4	1.0	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	250	175	125	95	60	40	Column Load Limit (lbs)



How To Order

Steps to Ordering a Complete R3-D System

You are ready to specify an R3-D actuator model number after you have:

- found the Base Model that meets your speed, thrust and repeatability requirements (pages B-61 to B-63), with a comfortable safety margin,
- verified that the R3-D meets your carriage loading requirements, and
- chosen a control compatible with the D motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin. Consider that acme screws have more friction and are self locking.

The D Series motor has two 18 inch [0.5 m] lead wires. There is no quick disconnect option for R3-D actuators.

2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.



1		2		3		4			5		
Base Model		Stroke Length		Motor Orientation		Mounting			Options		
Screw Drive Models											
R3-D	—	Drive Ratio	Screw	—	—	Actuator Carriage			—		
Ball Screw	—	Acme Screw	—	—	I	In-line (only with 10 ratio)	A	S	E	BS24/BS115/BS240	
R3-D-105B	—	R3-D-155A	—	6	36	P	Parallel Underneath	Feet	Single	English	Brake on Screw
R3-D-152B	—	R3-D-205A	—	12	42	PR	Parallel Right	B	D	M	EM
R3-D-155B	—	R3-D-505A	—	18	48	PL	Parallel Left	T-Nuts	Double	Metric	Encoder
R3-D-202B	—	R3-D-705A	—	24	60			C			GL
R3-D-205B	—		—	30	72			Flanges			Left Lube Port
R3-D-502B	—		—								GR
R3-D-505B	—		—								Right Lube Port
R3-D-702B	—		—								
R3-D-705B	—		—								



How To Order

Rodless Actuator
100 lbs Payload
24 Volt DC Motor

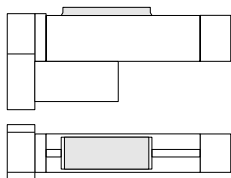
R3-D

3. Motor Orientation

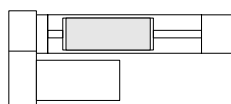
Dimensional drawings start on page B-90.

Screw Drive Models

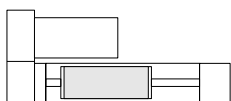
P - Parallel Underneath



PR - Parallel Right Side



PL - Parallel Left Side



I - In-Line

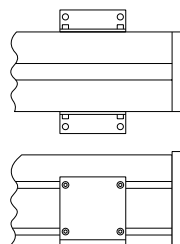


4. Mounting

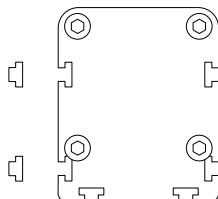
Dimensional drawings start on page B-91.

Actuator

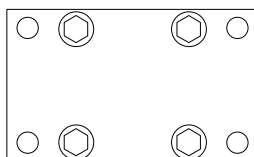
A - Angle Brackets



B - T-Nuts



C - Front and Rear Flanges



Option C (flanges) available only with -P screw-drive actuators.

Carriage

S - Single carriage

D - Dual carriage. Includes a second free floating carriage. Be sure to order additional travel length.

English/Metric

Specifies actuator mounting and carriage option with Metric (M) or English (E) mounting provisions.

5. Other Options

BS - Holding Brake

20 in-lb electrically released brake mounted on the lead screw shaft.

Not available with mounting option C (flanges).

EMK - Encoder

1000 line incremental encoder mounted on the rear shaft of the D motor.

GL - Left Lube Port

Lube access ports on left side of actuator allow easy re-lubrication of moving parts.

GR - Right Lube Port

Lube access ports on right side of actuator allow easy re-lubrication of moving parts.

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

- RP1 Normally open Hall-effect
- RP2 Normally closed Hall-effect
- RPS-1 Normally open reed
- RPS-2 Normally closed reed

Additional T-Nuts

TNR3-M - One pair Metric

TNR3-E - One pair English

7. Compatible Controls

Model Description

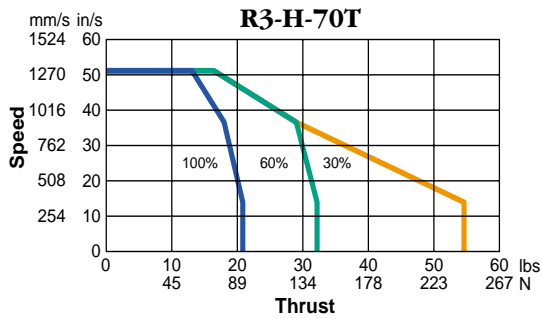
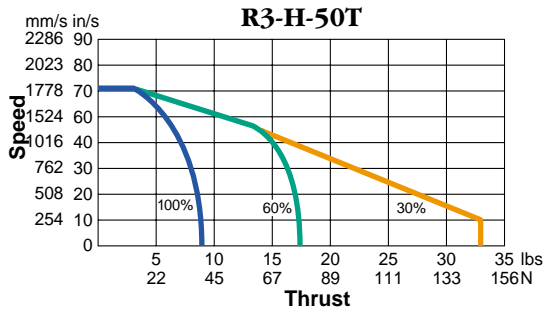
- D2200 Simple limit switch control
- D2300 Limit switch control
- D2400 Limit switch control with time delay.

Rodless Actuators



Belt-Drive Models

Rodless Actuators

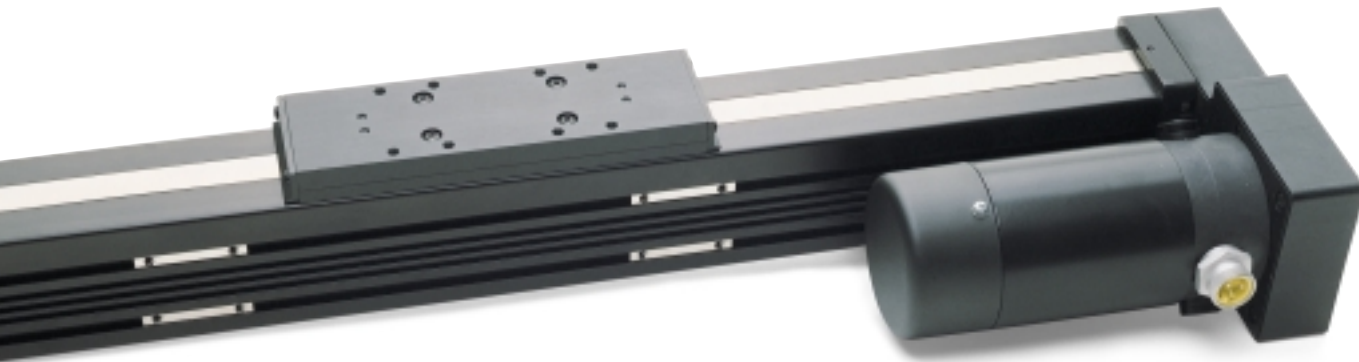


R3-H-50T: 5:1 Helical Gears, 6 inch/rev Drive Belt

Max. No-Load Accel.	295 in/s ²	7.5 m/s ²
Travel per Motor Rev	1.19 in	30.23 mm
Repeatability	±0.010 in	±0.25 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

R3-H-70T: 7:1 Helical Gears, 6 inch/rev Drive Belt

Max. No-Load Accel.	80 in/s ²	2.0 m/s ²
Travel per Motor Rev	0.86 in	21.77 mm
Repeatability	±0.010 in	±0.25 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

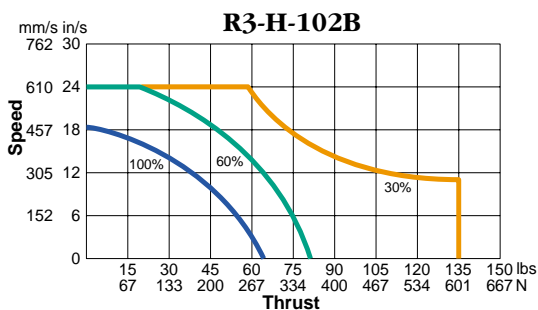


- Performance using H3000 Series Controls.
- Duty cycle is percentage of "on time" over a 10 minute interval. For operation in the 60% or 30% region, motor temperature rise due to load, speed, number of acceleration/decelerations, and ambient temperature require consideration.
- * Accuracy will be affected by belt stretch under heavier loads.



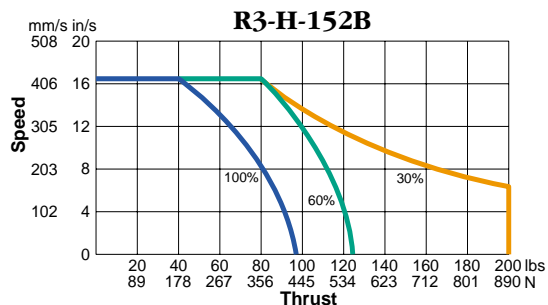


High Speed Ball Screw Models



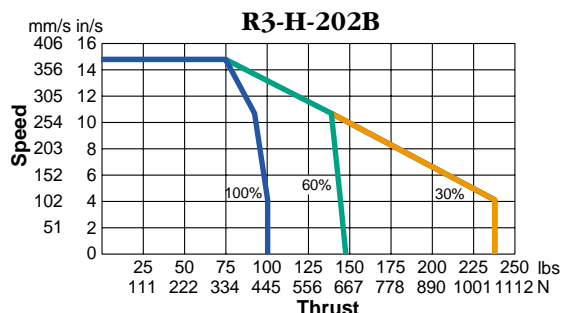
R3-H-102B-P: 1:1 Timing Belt, 2 rev/inch Ballscrew
R3-H-102B-I: 1:1 Inline Coupling, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	125 in/s ²	3.2 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



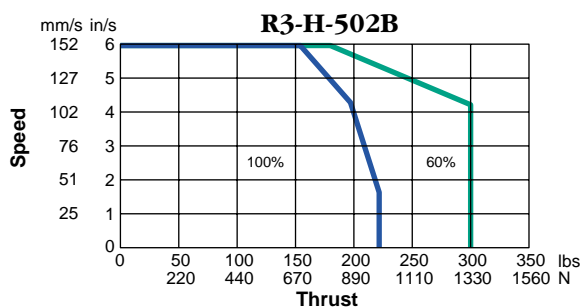
R3-H-152B: 1.5:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	90 in/s ²	2.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



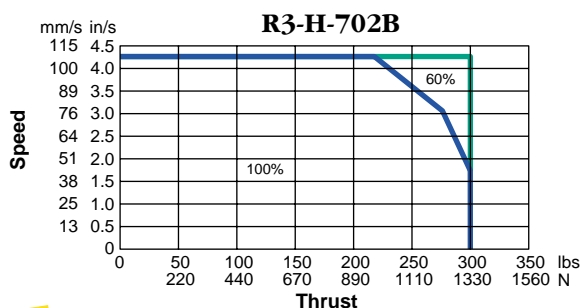
R3-H-202B: 2:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	68 in/s ²	1.7 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-H-502B: 5:1 Helical Gears, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	26 in/s ²	0.7 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-H-702B: 7:1 Helical Gears, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	7 in/s ²	0.2 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

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

2B

30.0	23.6	16.2	11.8	9.0	7.1	4.7	3.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)

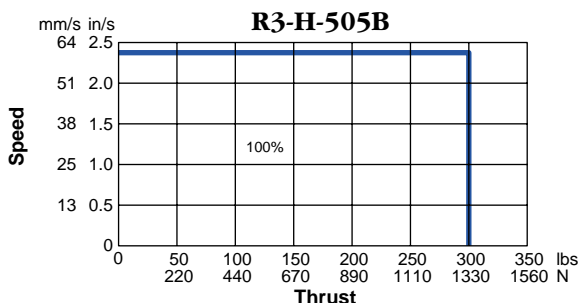
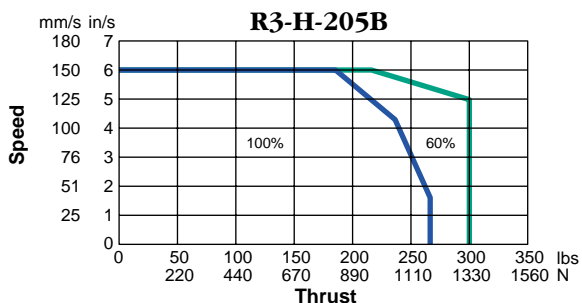
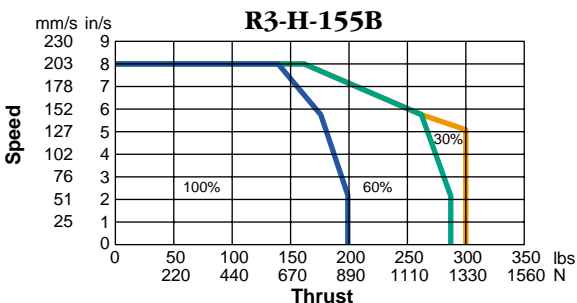
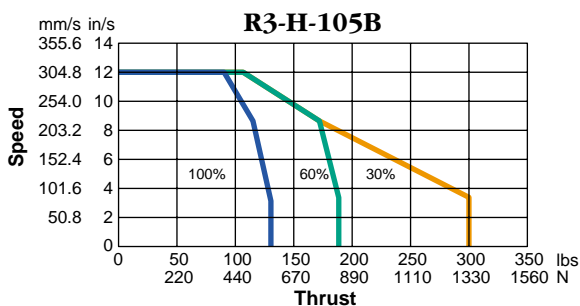


To configure your system see page B-70.



Ball Screw Models

Rodless Actuators



R3-H-105B-P: 1:1 Timing Belt, 5 rev/inch Ballscrew
R3-H-105B-I: 1:1 Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	50 in/s ²	1.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-H-155B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	36 in/s ²	0.9 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-H-205B: 2:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	27 in/s ²	0.7 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-H-505B: 5:1 Helical Gears, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	11 in/s ²	0.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

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

5B

15.0	9.4	6.5	4.7	3.6	2.8	1.9	1.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)

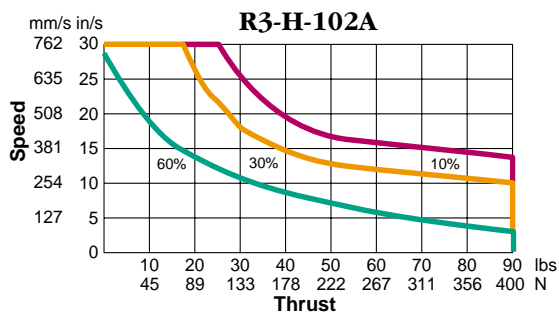


- Performance using H3000 Series Controls.
- Duty cycle is percentage of "on time" over a 10 minute interval. For operation in the 60% or 30% region, motor temperature rise due to load, speed, number of acceleration/decelerations, and ambient temperature require consideration.

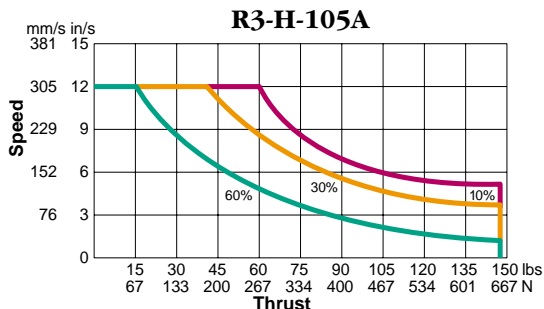




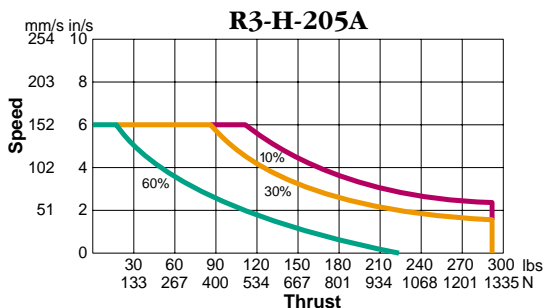
Acme Screw Models



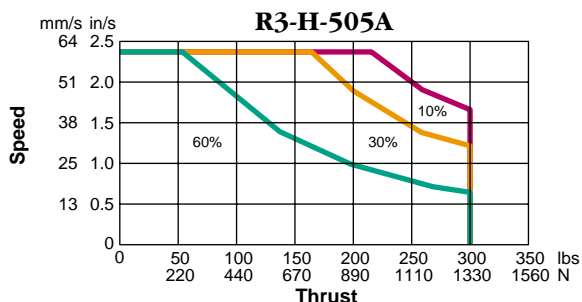
R3-H-102A-P: 1:1 Timing Belt, 2 rev/inch Acme Screw		
R3-H-102A-I: 1:1 Inline Coupling, 2 rev/inch Acme Screw		
Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	120 in/s ²	3.0 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.003 in	±0.076 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-H-105A-P: 1:1 Timing Belt, 5 rev/inch Acme Screw		
R3-H-105A-I: 1:1 Inline Coupling, 5 rev/inch Acme Screw		
Min. Backdrive Load	400 lbs	1779 N
Max. No-Load Accel.	50 in/s ²	1.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-H-205A: 2:1 Timing Belt, 5 rev/inch Acme Screw		
Min. Backdrive Load	400 lbs	1779 N
Max. No-Load Accel.	27 in/s ²	0.7 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-H-505A: 5:1 Helical Gears, 5 rev/inch Acme Screw		
Min. Backdrive Load	400 lbs	1779 N
Max. No-Load Accel.	11 in/s ²	0.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

Rodless Actuators



- Performance using H3000 Series Controls.
- Duty cycle is percentage of "on time" over a 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.

2A

Stroke (inches)	30.0	23.6	16.2	11.8	9.0	7.1	4.7	3.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72		
	n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)



To configure your system see page B-70.

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

5A

Stroke (inches)	15.0	11.3	7.1	4.9	3.6	2.7	2.1	1.4	1.0	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72		
	n/a	n/a	n/a	250	175	125	95	60	40	Column Load Limit (lbs)



How To Order

Steps to Ordering a Complete R3-H System

You are ready to specify an R3-H actuator model number after you have:

- found the Base Model that meets your speed, thrust and repeatability requirements (pages B-66 to B-69), with a comfortable safety margin,
- verified that the R3-H meets your carriage loading requirements, and
- chosen a control compatible with the H motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin.

Belt driven units generally move light loads at high speed over longer lengths.

Screw driven units are recommended for high thrust and vertical applications. Consider that acme screws have more friction and are self locking.

All R3-H actuators include a motor quick disconnect and 12 ft [3.7m] cable.

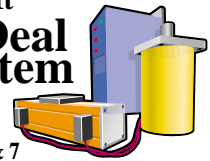
2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.

Make It
An **IDEAL**
System

See Intro
Pages 6 & 7



1		2		3		4			5	
Base Model		Stroke Length		Motor Orientation		Mounting			Options	
Belt Drive Models										
R3-H	Drive Ratio	Belt				Actuator Carriage				
		T								
R3-H-50T R3-H-70T			6 36 12 42 18 48 24 60 30 72	AR Over Right BR Behind Right CR Under Right AL Over Left BL Behind Left CL Under Left	A Feet B T-Nuts <i>nm</i> = distance between carriage centers	S Single <i>Dnm</i> Double	E English M Metric	BM24/BM115/ BM240 Brake on Motor EMK Encoder GL Left Lube Port GR Right Lube Port		
Screw Drive Models										
R3-H	Drive Ratio	Screw				Actuator Carriage				
Ball Screw R3-H-102B R3-H-105B R3-H-152B R3-H-155B R3-H-202B R3-H-205B R3-H-502B R3-H-505B R3-H-702B	Acme Screw R3-H-102A R3-H-105A R3-H-205A R3-H-505A	6 36 12 42 18 48 24 60 30 72	I In-line (only with 10 ratio) P Parallel Underneath PR Parallel Right PL Parallel Left	A Feet B T-Nuts C Flanges	S Single D Double	E English M Metric	BM24/BM115/ BM240 Brake on Motor BS24/BS115/ BS240 Brake on Screw EM Encoder GL Left Lube Port GR Right Lube Port			





How To Order

Rodless Actuator
100 lbs Payload
24 Volt DC Motor

R3-H

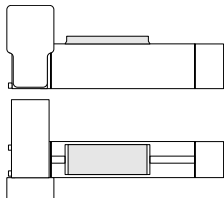
Rodless Actuators

3. Motor Orientation

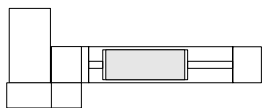
Dimensional drawings start on page B-88.

Belt Drive Models

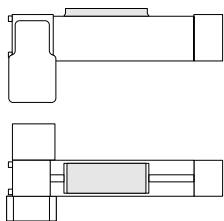
AR - Over Right



BR - Behind Right



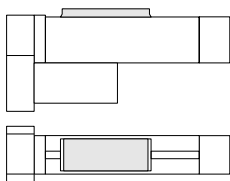
CR - Under Right



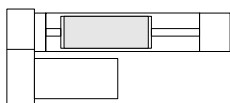
For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify AL, BL, CL.

Screw Drive Models

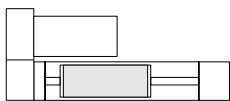
P - Parallel Underneath



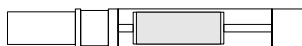
PR - Parallel Right Side



PL - Parallel Left Side



I - In-Line

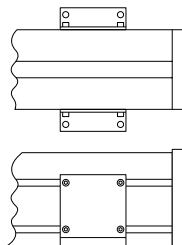


4. Mounting

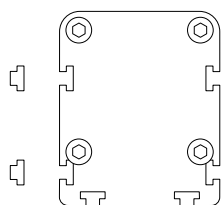
Dimensional drawings start on B-91.

Actuator

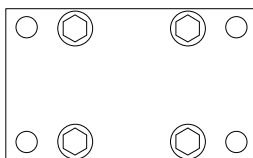
A - Angle Brackets



B - T-Nuts



C - Front and Rear Flanges



Option C (flanges) available only with -P screw-drive actuators.

Carriage

S - Single carriage

D - Dual carriage (screw-driven actuators). Includes a second free-floating carriage.

Dnn - Dual carriage (belt-driven actuators). Includes a second carriage rigidly fixed to the driven carriage.

nm is the distance between carriage centers (minimum distance is 10").

Be sure to order additional travel length to account for the second carriage and the distance between the two carriages.

English/Metric

Specifies actuator mounting and carriage option with Metric (M) or English (E) mounting provisions.

5. Other Options

BM - Motor Holding Brake

10 in-lb holding brake mounted on the H motor.

BS - Holding Brake

20 in-lb electrically released brake mounted on the lead screw shaft. *Not available with mounting option C (flanges) or with belt drive actuators.*

EM - Encoder

500 line incremental encoder mounted on the rear shaft of the H motor.

GL - Left Lube Port

Lube access ports on left side of actuator allow easy re-lubrication of moving parts.

GR - Right Lube Port

Lube access ports on right side of actuator allow easy re-lubrication of moving parts.

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

RP1 Normally open Hall-effect

RP2 Normally closed Hall-effect

RPS-1 Normally open reed

RPS-2 Normally closed reed

Additional T-Nuts

TNR3-M - One pair Metric

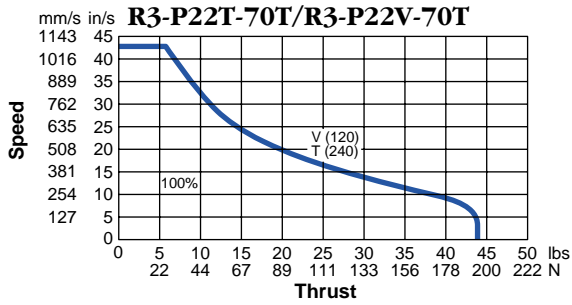
TNR3-E - One pair English

7. Compatible Controls

Model	Description
H3301B	Limit switch control
H3321B	Edge guide control

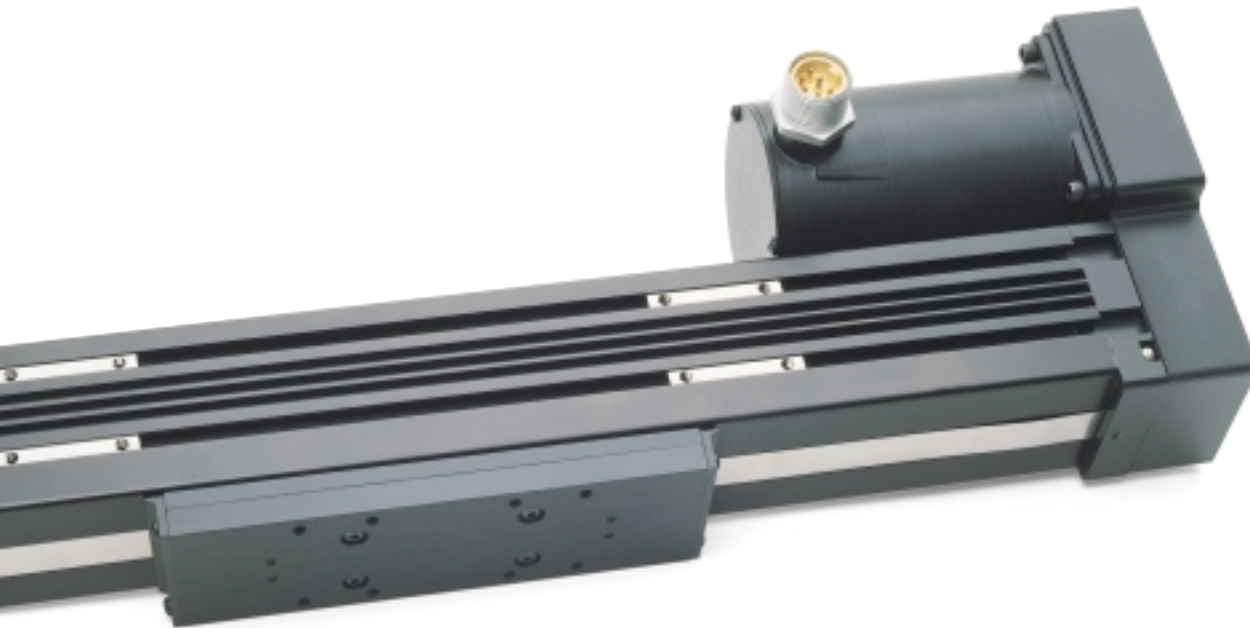


Belt-Drive Models



R3-P22(T/V)-70T: 7:1 Helical Gears, 6 inch/rev Drive Belt

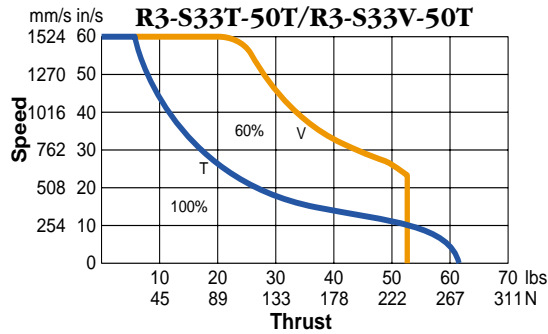
Travel per Motor Rev	0.86 in	21.77 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



- Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.
- * Repeatability and Accuracy will be affected by belt stretch under heavier loads.

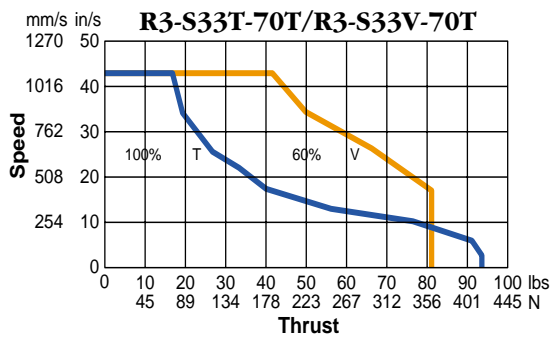


Belt-Drive Models



R3-S33(T/V)-50T: 5:1 Helical Gears, 6 inch/rev Drive Belt

Travel per Motor Rev	1.19 in	30.2 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R3-S33(T/V)-70T: 7:1 Helical Gears, 6 inch/rev Drive Belt

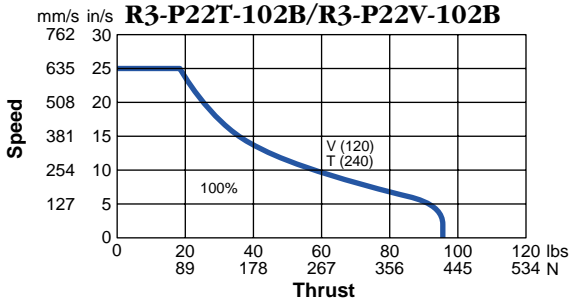
Travel per Motor Rev	0.86 in	21.77 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



- Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.
- * Repeatability and Accuracy will be affected by belt stretch under heavier loads.

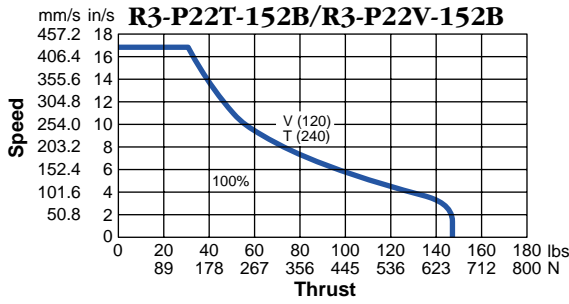


High Speed Ball Screw Models



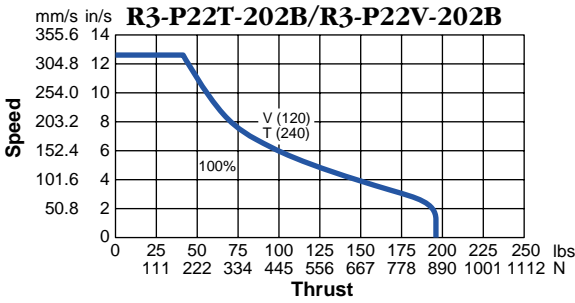
R3-P22(T/V)-102B-P: 1:1 Timing Belt, 2 rev/inch Ballscrew
R3-P22(T/V)-102B-I: 1:1 Inline Coupling, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



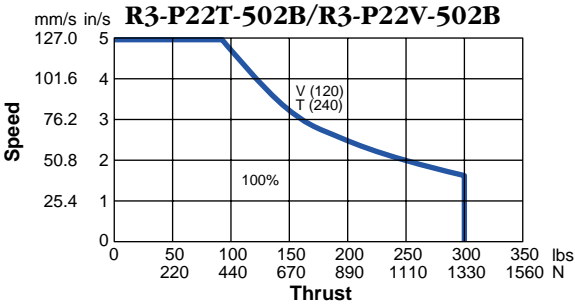
R3-P22(T/V)-152B: 1.5:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



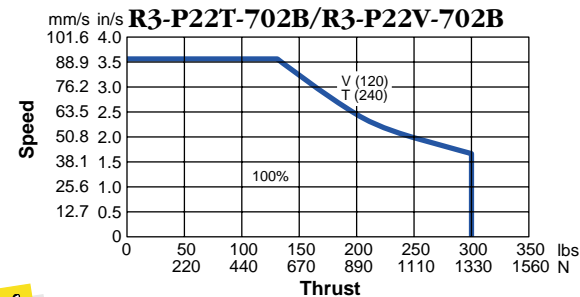
R3-P22(T/V)-202B: 2:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-P22(T/V)-502B: 5:1 Helical Gears, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-P22(T/V)-702B: 7:1 Helical Gears, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

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

2B

30.0	23.6	16.2	11.8	9.0	7.1	4.7	3.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)

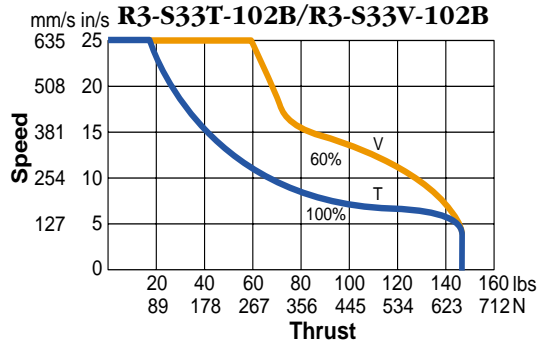


To configure your system see page B-80.



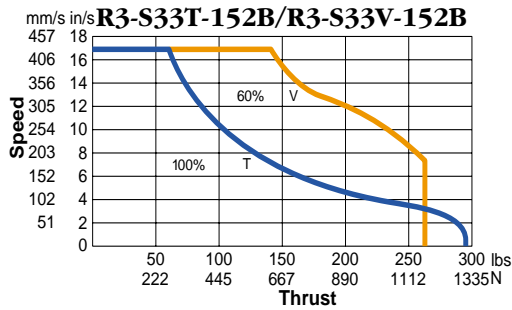


High Speed Ball Screw Models



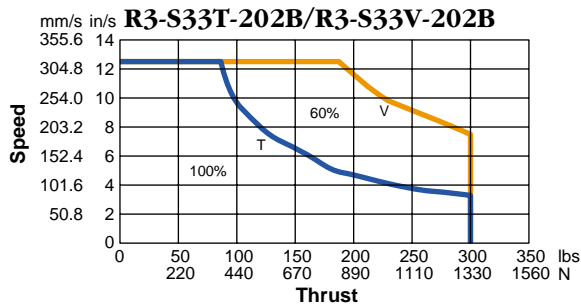
R3-S33(T/V)-102B-P: 1:1 Timing Belt, 2 rev/inch Ballscrew
R2S33(T/V)-102B-I: 1:1 Inline Coupling, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



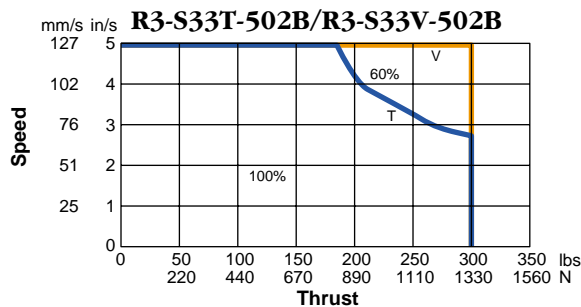
R3-S33(T/V)-152B: 1.5:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-S33(T/V)-202B: 2:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-S33(T/V)-502B: 5:1 Helical Gears, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



To configure your system see page B-80.



• Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.

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

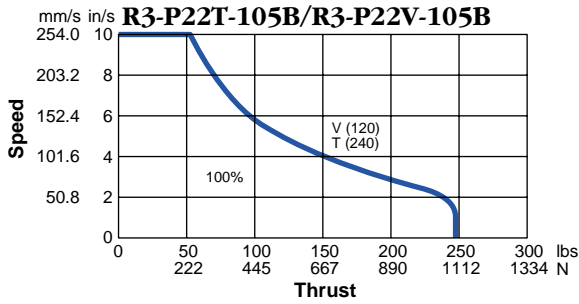
2B

	30.0	23.6	16.2	11.8	9.0	7.1	4.7	3.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)



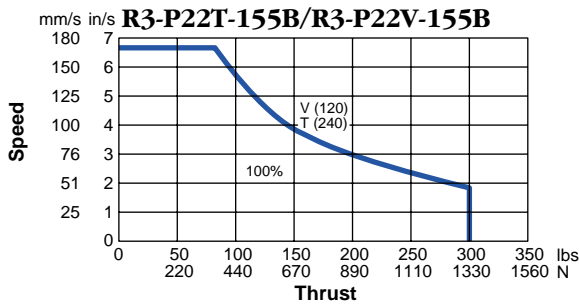
Ball Screw Models

Rodless Actuators



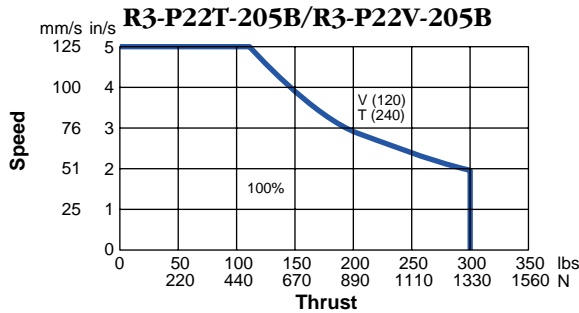
R3-P22(T/V)-105B-P: 1:1 Timing Belt, 5 rev/inch Ballscrew
R3-P22(T/V)-105B-I: 1:1 Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



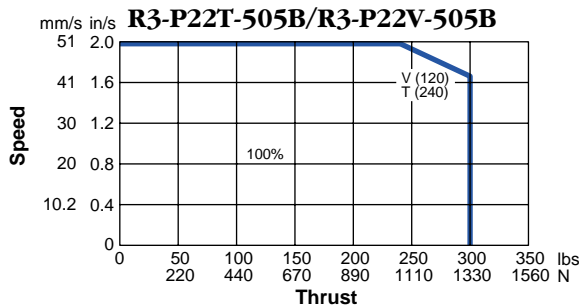
R3-P22(T/V)-152B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



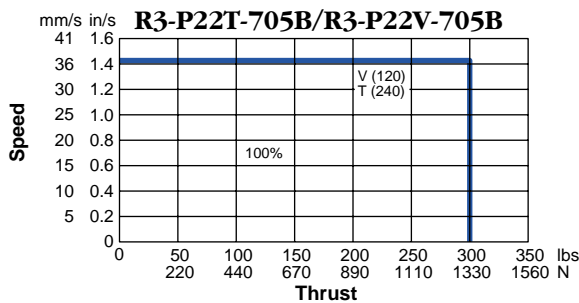
R3-P22(T/V)-205B: 2:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-P22(T/V)-505B: 5:1 Helical Gears, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-P22(T/V)-705B: 7:1 Helical Gears, 5 rev/inch Ballscrew

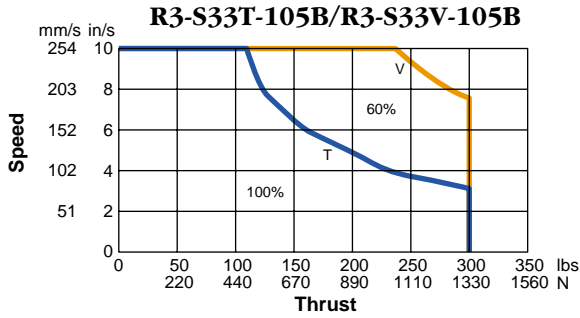
Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

• Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.



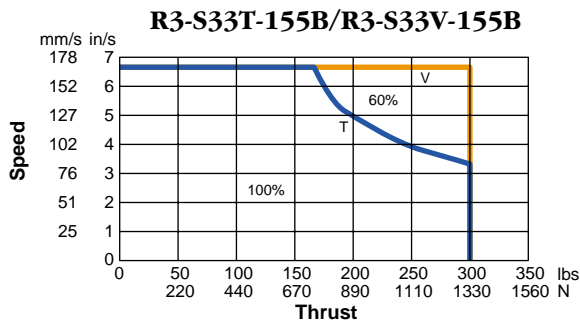


Ball Screw Models



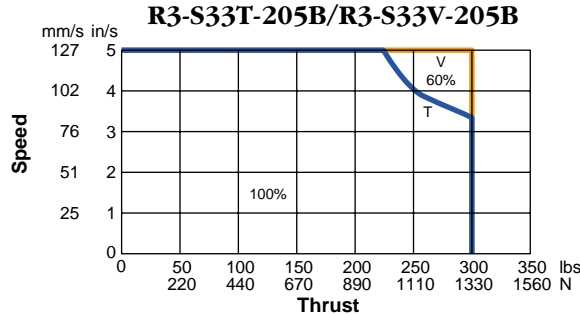
R3-S33(T/V)-105B-P: 1:1 Timing Belt, 5 rev/inch Ballscrew
R3-S33(T/V)-105B-I: 1:1 Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



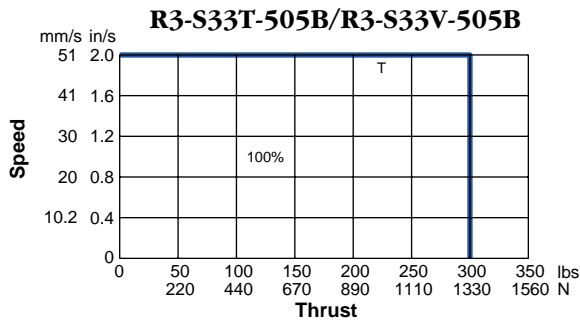
R3-S33(T/V)-155B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-S33(T/V)-205B: 2:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	120 lbs	534 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-S33(T/V)-505B: 5:1 Helical Gears, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



• Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.

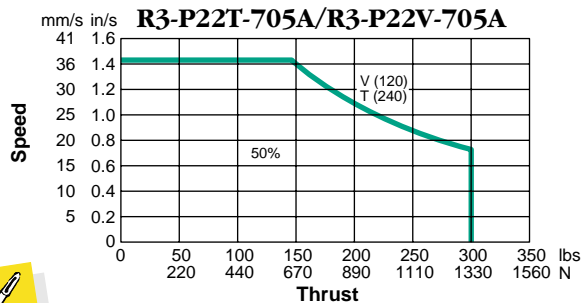
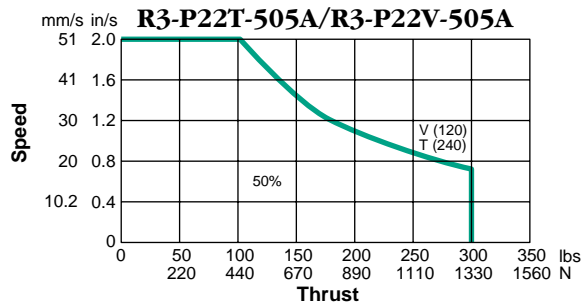
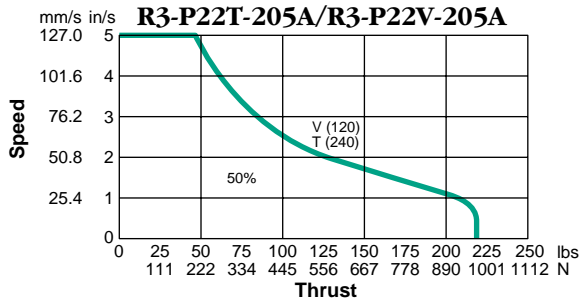
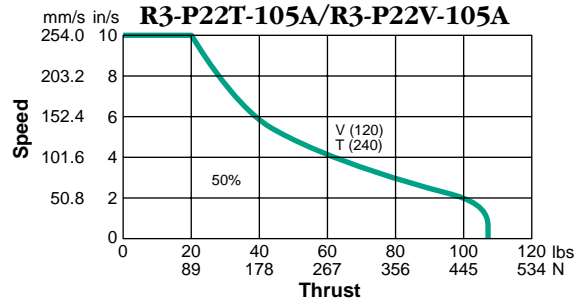
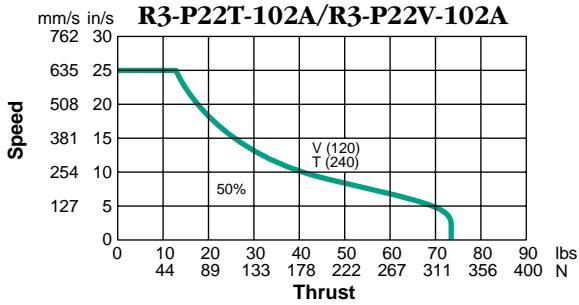
• Consider leadscrew **critical speed** and **column load limits** when specifying longer lengths.

5B

15.0	9.4	6.5	4.7	3.6	2.8	1.9	1.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)



Acme Screw Models



To configure your system see page B-80.

5B

15.0	9.4	6.5	4.7	3.6	2.8	1.9	1.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)

R3-P22(T/V)-102A-P: 1:1 Timing Belt, 2 rev/inch Acme Screw
R3-P22(T/V)-102A-I: 1:1 Inline Coupling, 2 rev/inch Acme Screw

Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-P22(T/V)-105A-P: 1:1 Timing Belt, 5 rev/inch Acme Screw
R3-P22(T/V)-105A-I: 1:1 Inline Coupling, 5 rev/inch Acme Screw

Min. Backdrive Load	400 lbs	1779 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R3-P22(T/V)-205A: 2:1 Timing Belt, 5 rev/inch Acme Screw

Min. Backdrive Load	400 lbs	1779 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.010 in/ft	±0.25 mm

R3-P22(T/V)-505A: 5:1 Helical Gears, 5 rev/inch Acme Screw

Min. Backdrive Load	400 lbs	1779 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.010 in/ft	±0.25 mm

R3-P22(T/V)-705A: 7:1 Helical Gears, 5 rev/inch Acme Screw

Min. Backdrive Load	400 lbs	1779 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.010 in/ft	±0.25 mm

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

2A

30.0	23.6	16.2	11.8	9.0	7.1	4.7	3.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)

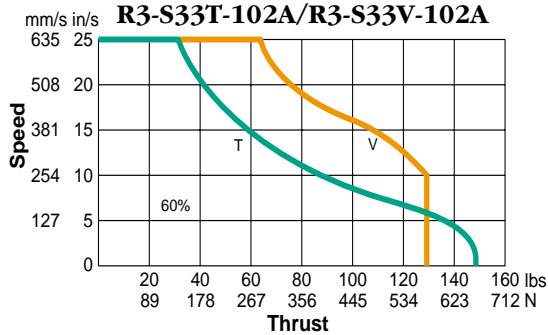
5A

15.0	11.3	7.1	4.9	3.6	2.7	2.1	1.4	1.0	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	250	175	125	95	60	40	Column Load Limit (lbs)

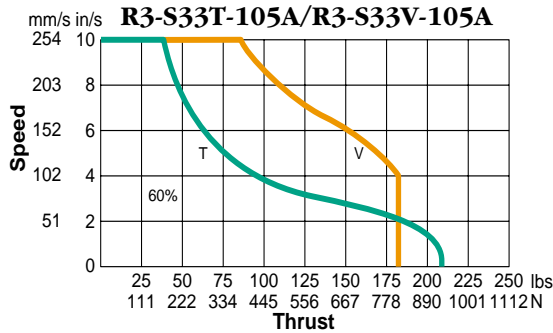




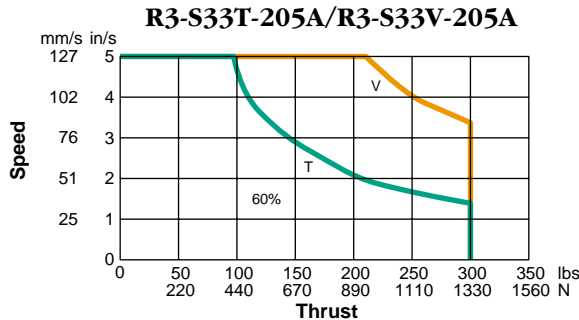
Acme Screw Models



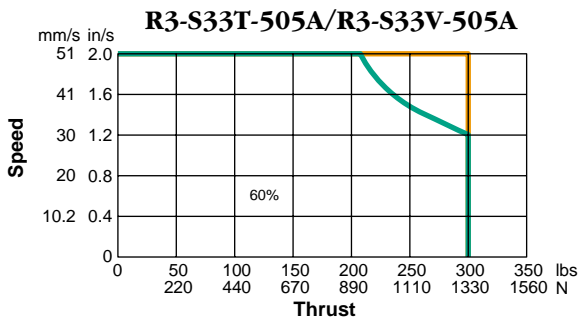
R3-S33(T/V)-102A-P: 1:1 Timing Belt, 2 rev/inch Acme Screw		
R3-S33(T/V)-102A-I: 1:1 Inline Coupling, 2 rev/inch Acme Screw		
Min. Backdrive Load	20 lbs	89 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-S33(T/V)-105A-P: 1:1 Timing Belt, 5 rev/inch Acme Screw		
R3-S33(T/V)-105A-I: 1:1 Inline Coupling, 5 rev/inch Acme Screw		
Min. Backdrive Load	400 lbs	1779 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-S33(T/V)-205A: 2:1 Timing Belt, 5 rev/inch Ballscrew		
Min. Backdrive Load	400 lbs	1779 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-S33(T/V)-505A: 5:1 Helical Gears, 5 rev/inch Acme Screw		
Min. Backdrive Load	400 lbs	1779 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



To configure your system see page B-80.

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

2A

30.0	23.6	16.2	11.8	9.0	7.1	4.7	3.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)

5A

15.0	11.3	7.1	4.9	3.6	2.7	2.1	1.4	1.0	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	250	175	125	95	60	40	Column Load Limit (lbs)



- Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.



How To Order

Steps to Ordering a Complete R3-S/P System

You are ready to specify an R3-S/P actuator model number after you have:

- found the R3-S/P Base Model that meets your speed, thrust and repeatability requirements (pages B-72 to B-79), with a comfortable safety margin,
- verified that the R3-S/P meets your carriage loading requirements, and
- chosen a control compatible with the S33 or P22 motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin (30% reserve for steppers).

Belt driven units generally move light loads at high speed over longer lengths. Screw driven units are recommended for high thrust and vertical applications. Consider that acme screws have more friction and are self locking.

S33 motor wiring ($x = N, T$ or V):

- N 8 leads, no quick disconnect.
- T Series, quick disconnect and 12 foot cable included.
- V Parallel, quick disconnect and 12 foot cable included.

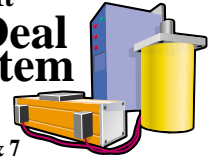
P22 motors are supplied with an 8-conductor, 12 ft [3m] shielded cable.

2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.

Make It
An **IDEAL**
System



See Intro
Pages 6 & 7

1		2		3		4			5
Base Model		Stroke Length		Motor Orientation		Mounting			Options
Belt Drive Models									
Motor	Drive Ratio	Belt			Actuator Carriage				
R3		T			A	S	E		EMK
			6 36	AR Over Right	Feet	Single	English		Encoder
			12 42	BR Behind Right	B	<i>Dnn</i>	M		GL
			18 48	CR Under Right	T-Nuts	Double	Metric		Left Lube Port
			24 60	AL Over Left	<i>nn</i> = distance between carriage centers				GR
			30 72	BL Behind Left					Right Lube Port
				CL Under Left					
Screw Drive Models									
Motor	Drive Ratio	Screw			Actuator Carriage				
R3					A	S	E		BS24/BS115/ BS240
			6 36	I In-line (only with 10 ratio)	Feet	Single	English		Brake on Screw
			12 42	P Parallel Underneath	B	D	M		EM
			18 48	PR Parallel Right	T-Nuts	Double	Metric		Encoder
			24 60	PL Parallel Left					GL
			30 72		C	Flanges			Left Lube Port
									GR
									Right Lube Port
									Port





How To Order

Rodless Actuator
100 lbs Payload
Step Motor

R3-S/P

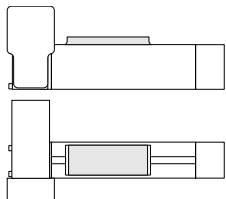
Rodless Actuators

3. Motor Orientation

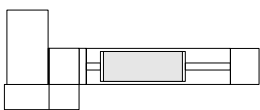
Dimensional drawings start on page B-88.

Belt Drive Models

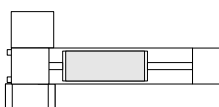
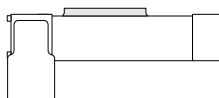
AR - Over Right



BR - Behind Right



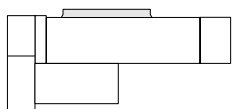
CR - Under Right



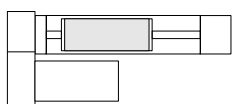
For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify AL, BL, CL.

Screw Drive Models

P - Parallel Underneath



PR - Parallel Right Side



PL - Parallel Left Side



I - In-Line

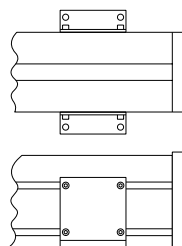


4. Mounting

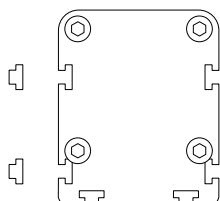
Dimensional drawings start on page B-91.

Actuator

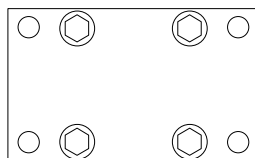
A - Angle Brackets



B - T-Nuts



C - Front and Rear Flanges



Option C (flanges) available only with -P screw-drive actuators.

Carriage

S - Single carriage

D - Dual carriage (screw-driven actuators). Includes a second free-floating carriage.

Dnn - Dual carriage (belt-driven actuators). Includes a second carriage rigidly fixed to the driven carriage.

nn is the distance between carriage centers (minimum distance is 10").

Be sure to order additional travel length to account for the second carriage and the distance between the two carriages.

English/Metric

Specifies actuator mounting and carriage option with Metric (M) or English (E) mounting provisions.

5. Other Options

BS - Holding Brake

20 in-lb electrically released brake mounted on the lead screw shaft. *Not available with mounting option C (flanges) or with belt drive actuators.*

EMK - Encoder

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

GL - Left Lube Port

Lube access ports on left side of actuator allow easy re-lubrication of moving parts.

GR - Right Lube Port

Lube access ports on right side of actuator allow easy re-lubrication of moving parts.

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

- RP1 Normally open Hall-effect
- RP2 Normally closed Hall-effect
- RPS-1 Normally open reed
- RPS-2 Normally closed reed

Additional T-Nuts

- TNR3-M - One pair Metric
- TNR3-E - One pair English

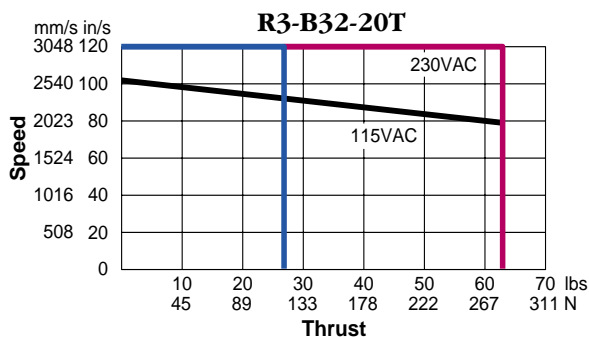
7. Compatible Controls

Model	Description
NextStep	Microstepping drive
S6002	2-axis microstepping drive
S6961	IDEAL™ programmable microstepping Smart Drive
S6962	2-axis IDEAL™ programmable microstepping Smart Drive
SmartStep	IDEAL™ programmable microstepping Smart Drive
SmartStep 23	IDEAL™ programmable microstepping Smart Drive (for 23 frame motors only)



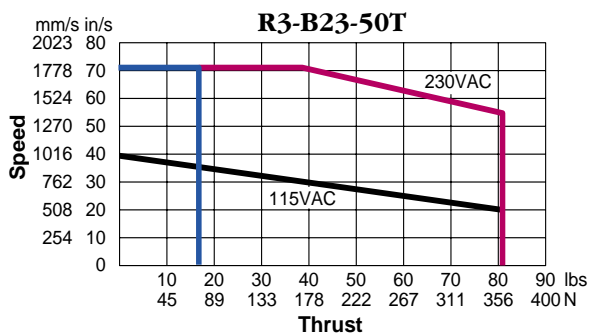
Belt-Drive Models

Rodless Actuators



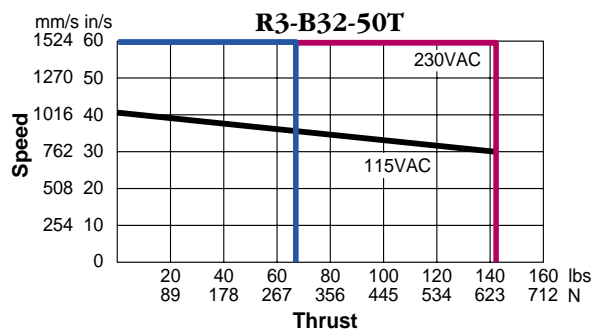
R3-B32-20T: 2:1 Timing Belt, 6 inch/rev Drive Belt

Max. No-Load Accel.	770 in/s ²	19.5 m/s ²
Travel per Motor Rev	3.00 in	76.20 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



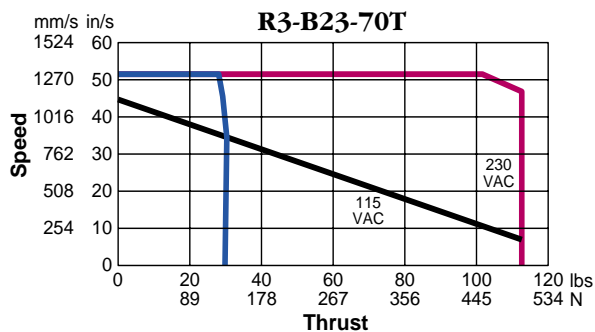
R3-B23-50T: 5:1 Helical Gears, 6 inch/rev Drive Belt

Max. No-Load Accel.	650 in/s ²	16.5 m/s ²
Travel per Motor Rev	1.19 in	30.23 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



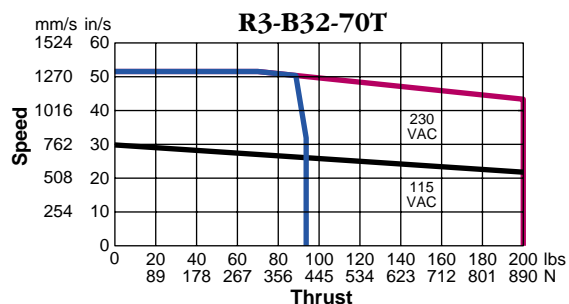
R3-B32-50T: 5:1 Helical Gears, 6 inch/rev Drive Belt

Max. No-Load Accel.	770 in/s ²	19.5 m/s ²
Travel per Motor Rev	1.19 in	30.23 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R3-B23-70T: 7:1 Helical Gears, 6 inch/rev Drive Belt

Max. No-Load Accel.	500 in/s ²	12.7 m/s ²
Travel per Motor Rev	0.86 in	21.77 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R3-B32-70T: 7:1 Helical Gears, 6 inch/rev Drive Belt

Max. No-Load Accel.	500 in/s ²	12.7 m/s ²
Travel per Motor Rev	0.86 in	21.77 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

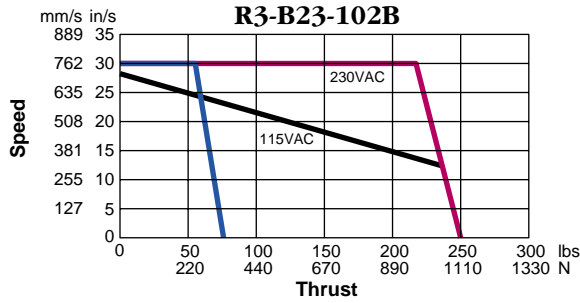
Continuous duty region (230 VAC/115VAC) (max rms torque, over any 10 minute interval)
 Intermittent duty max region (max 2 second duration)

- Performance using B8000 Series Controls.
- Accuracy will be affected by belt stretch under heavier loads.



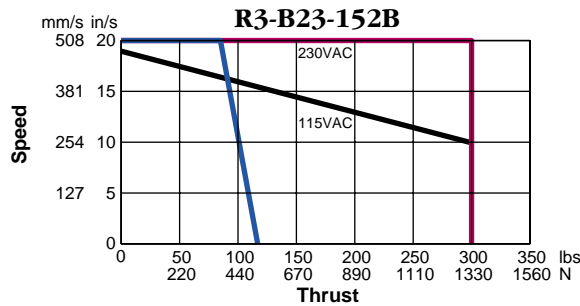


High Speed Ball Screw Models



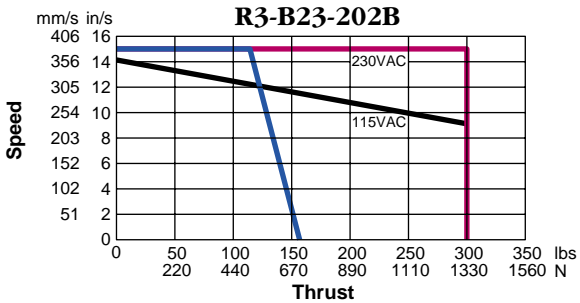
R3-B23-102B-P: 1:1 Timing Belt, 2 rev/inch Ballscrew
 R3-B23-102B-I: 1:1 Inline Coupling, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



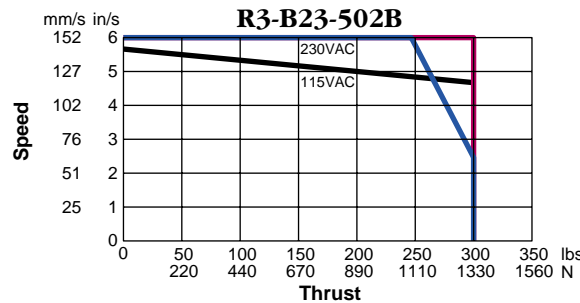
R3-B23-152B: 1.5:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-B23-202B: 2:1 Timing Belt, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-B23-502B: 5:1 Helical Gears, 2 rev/inch Ballscrew

Min. Backdrive Load	10 lbs	45 N
Max. No-Load Accel.	310 in/s ²	7.9 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

Continuous duty region (230 VAC/115VAC) (max rms torque, over any 10 minute interval)

Intermittent duty max region (max 2 second duration)



To configure your system see page B-86.

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

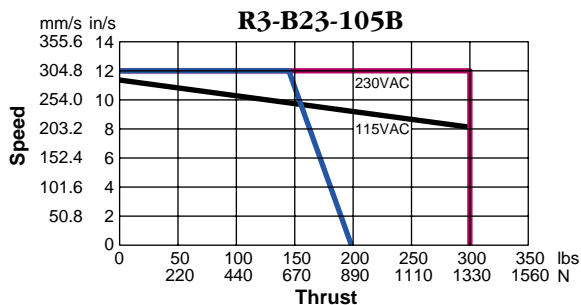
2B

	30.0	23.6	16.2	11.8	9.0	7.1	4.7	3.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)



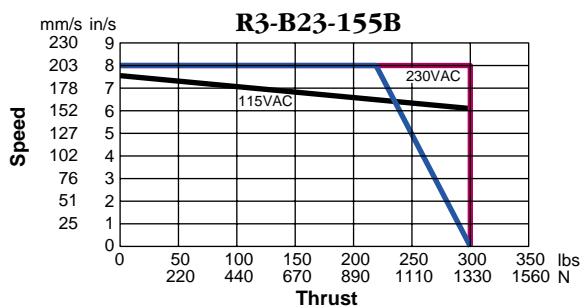
Ball Screw Models

Rodless Actuators



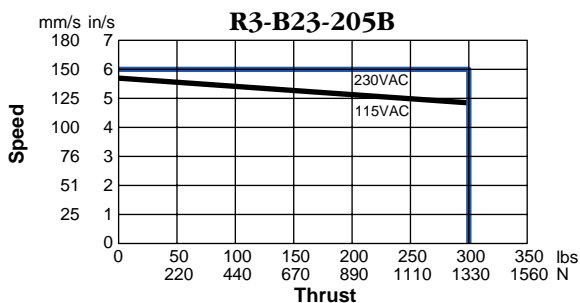
R3-B23-105B-P: 1:1 Timing Belt, 5 rev/inch Ballscrew
R3-B23-105B-I: 1:1 Inline Coupling, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	360 in/s ²	9.1 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-B23-155B: 1.5:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-B23-205B: 2:1 Timing Belt, 5 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

Continuous duty region (230 VAC/115VAC) (max rms torque, over any 10 minute interval)

Intermittent duty max region (max 2 second duration)

Performance using B8000 Series Controls.

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

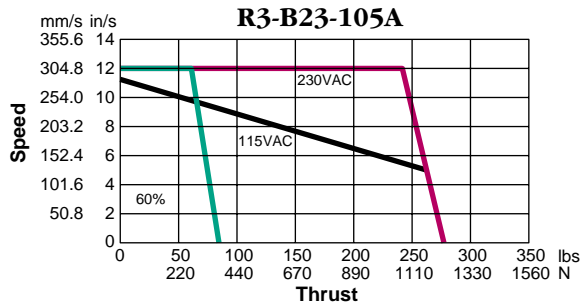
5B

	15.0	9.4	6.5	4.7	3.6	2.8	1.9	1.3	Critical Speed (in/sec)
6 thru 18	24	30	36	42	48	60	72		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	300	190	130	Column Load Limit (lbs)



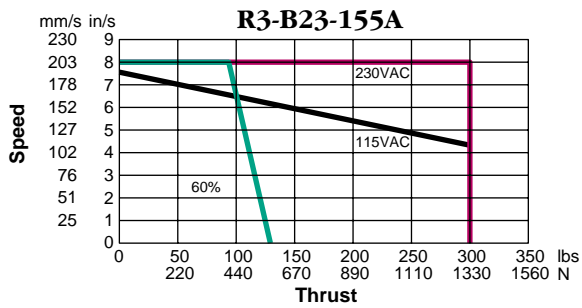


Acme Screw Models



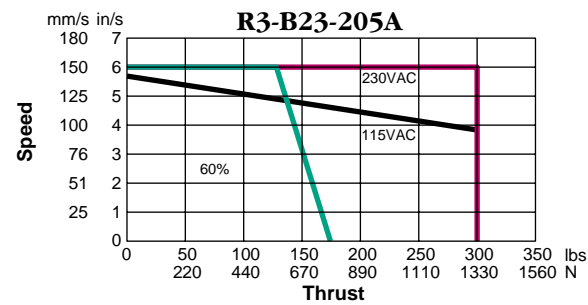
R3-B23-105A-P: 1:1 Timing Belt, 5 rev/inch Acme Screw
R3-B23-105A-I: 1:1 Inline Coupling, 5 rev/inch Acme Screw

Min. Backdrive Load	300 lbs	1330 N
Max. No-Load Accel.	360 in/s ²	9.1 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



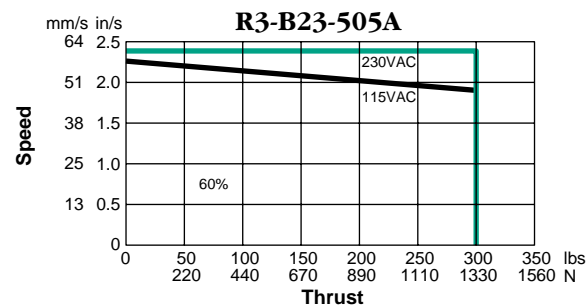
R3-B23-155A: 1.5:1 Timing Belt, 5 rev/inch Acme Screw

Min. Backdrive Load	300 lbs	1330 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm




R3-B23-205A: 2:1 Timing Belt, 5 rev/inch Acme Screw


Min. Backdrive Load	300 lbs	1330 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R3-B23-505A: 5:1 Helical Gears, 5 rev/inch Acme Screw

Min. Backdrive Load	300 lbs	1330 N
Max. No-Load Accel.	130 in/s ²	3.3 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

 60% duty region
(230 VAC/115VAC)
(max rms torque, over
any 10 minute interval)

 Intermittent duty max region
(max 2 second duration)



To configure your system see page B-86.

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

5A

15.0	11.3	7.1	4.9	3.6	2.7	2.1	1.4	1.0	Critical Speed (in/sec)
6 thru 12	18	24	30	36	42	48	60	72	Stroke (inches)
n/a	n/a	n/a	250	175	125	95	60	40	Column Load Limit (lbs)



How To Order

Steps to Ordering a Complete R3-B System

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

- found the R3-B Base Model that meets your speed, thrust and repeatability requirements (pages B-82 to B-85), with a comfortable safety margin,
- verified that the R3-B meets your carriage loading requirements, and
- chosen a control compatible with the B23 or B32 motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin.

Belt driven units generally move light loads at high speed over longer lengths.

Screw driven units are recommended for high thrust and vertical applications. Consider that acme screws have more friction and are self locking.

The B32 and B23 motors feature rugged and environmentally protected IP65 construction. Both motors include a 2000 line incremental encoder and MS style motor and encoder connections. The R3-B actuator includes 12 ft [3.7] motor and encoder cables.

2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.



1				2		3		4			5
Base Model				Stroke Length		Motor Orientation		Mounting			Options
Belt Drive Models											
R3	Motor	Drive Ratio	Belt					Actuator Carriage			
			T								
	R3-B23-50T			6	36	AR	Over Right	A	S	E	BM24/BM115/
	R3-B23-70T			12	42	BR	Behind Right	Feet	Single	English	BM240
	R3-B32-20T			18	48	CR	Under Right	B	Dmm	M	Brake on Motor
	R3-B32-50T			24	60	AL	Over Left	T-Nuts	Double	Metric	GL
	R3-B32-70T			30	72	BL	Behind Left	nn = distance between carriage centers			Left Lube Port
						CL	Under Left				GR
											Right Lube Port
Screw Drive Models											
R3	Motor	Drive Ratio	Screw					Actuator Carriage			
	Ball Screw	Acme Screw		6	36	I	In-line (only with 10 ratio)	A	S	E	BM24/BM115/
	R3-B23-102B	R3-B23-105A		12	42			Feet	Single	English	BM240
	R3-B23-105B	R3-B23-155A		18	48	P	Parallel Underneath	B	D	M	Brake on Motor
	R3-B23-152B	R3-B23-205A		24	60	PR	Parallel Right	T-Nuts	Double	Metric	BS24/BS115/
	R3-B23-155B	R3-B23-505A		30	72	PL	Parallel Left	C			BS240
	R3-B23-202B							Flanges			Brake on Screw
	R3-B23-205B										GL
	R3-B23-502B										Left Lube Port
											GR
											Right Lube Port





How To Order

Rodless Actuator
100 lbs Payload
Brushless Servo

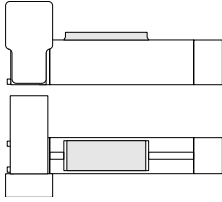
R3-B

3. Motor Orientation

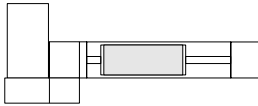
Dimensional drawings start on page B-88.

Belt Drive Models

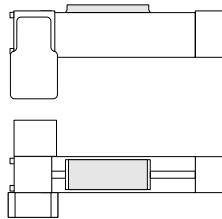
AR - Over Right



BR - Behind Right



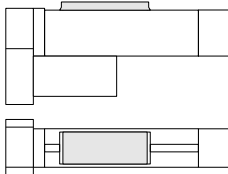
CR - Under Right



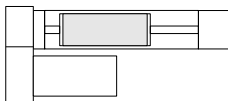
For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify AL, BL, CL.

Screw Drive Models

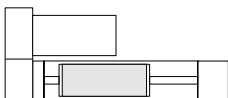
P - Parallel Underneath



PR - Parallel Right Side



PL - Parallel Left Side



I - In-Line

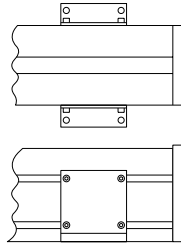


4. Mounting

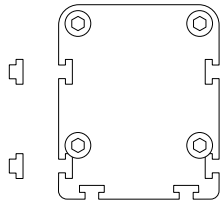
Dimensional drawings start on page B-91.

Actuator

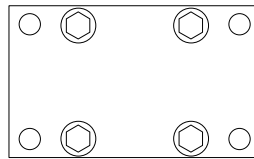
A - Angle Brackets



B - T-Nuts



C - Front and Rear Flanges



Option C (flanges) available only with -P screw-drive actuators.

Carriage

S - Single carriage

D - Dual carriage (screw-driven actuators). Includes a second free-floating carriage.

D_{mn} - Dual carriage (belt-driven actuators). Includes a second carriage rigidly fixed to the driven carriage.

mn is the distance between carriage centers (minimum distance is 10").

Be sure to order additional travel length to account for the second carriage and the distance between the two carriages.

English/Metric

Specifies actuator mounting and carriage option with Metric (M) or English (E) mounting provisions.

5. Other Options

BM - Motor Holding Brake

60 in-lb holding brake mounted on B32 motor or 10 in-lb holding brake mounted on B23 motor.

BS - Holding Brake

20 in-lb electrically released brake mounted on the lead screw shaft. *Not available with mounting option C (flanges) or with belt drive actuators.*

GL - Left Lube Port

Lube access ports on left side of actuator allow easy re-lubrication of moving parts.

GR - Right Lube Port

Lube access ports on right side of actuator allow easy re-lubrication of moving parts.

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

- RP1 Normally open Hall-effect
- RP2 Normally closed Hall-effect
- RPS-1 Normally open reed
- RPS-2 Normally closed reed

Additional T-Nuts

- TNR3-M - One pair Metric
- TNR3-E - One pair English

7. Compatible Controls

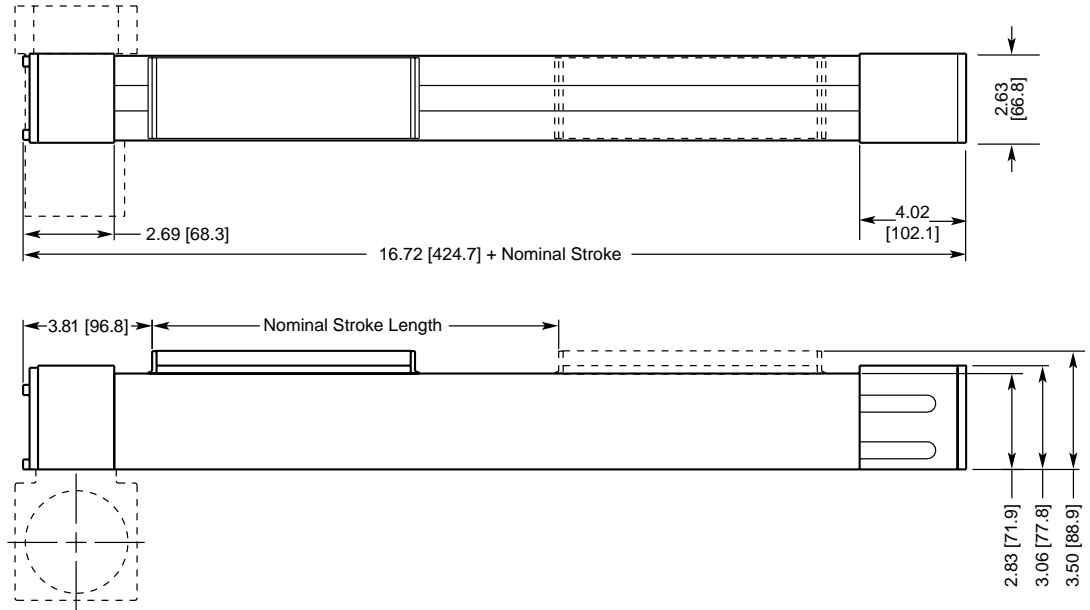
Model	Description
B8001	Digital servo drive
B8961	<i>IDEAL™</i> programmable digital servo Smart Drive
B8962	2-axis <i>IDEAL™</i> programmable digital servo Smart Drive

Rodless Actuators

Overall Dimensions

Rodless Actuators

- AutoCAD® drawings available on diskette
- Six motor orientations shown below & right
- Include motor dimensions; see pages B-93 - B-96



Motor Orientation Options

-AL Over Left

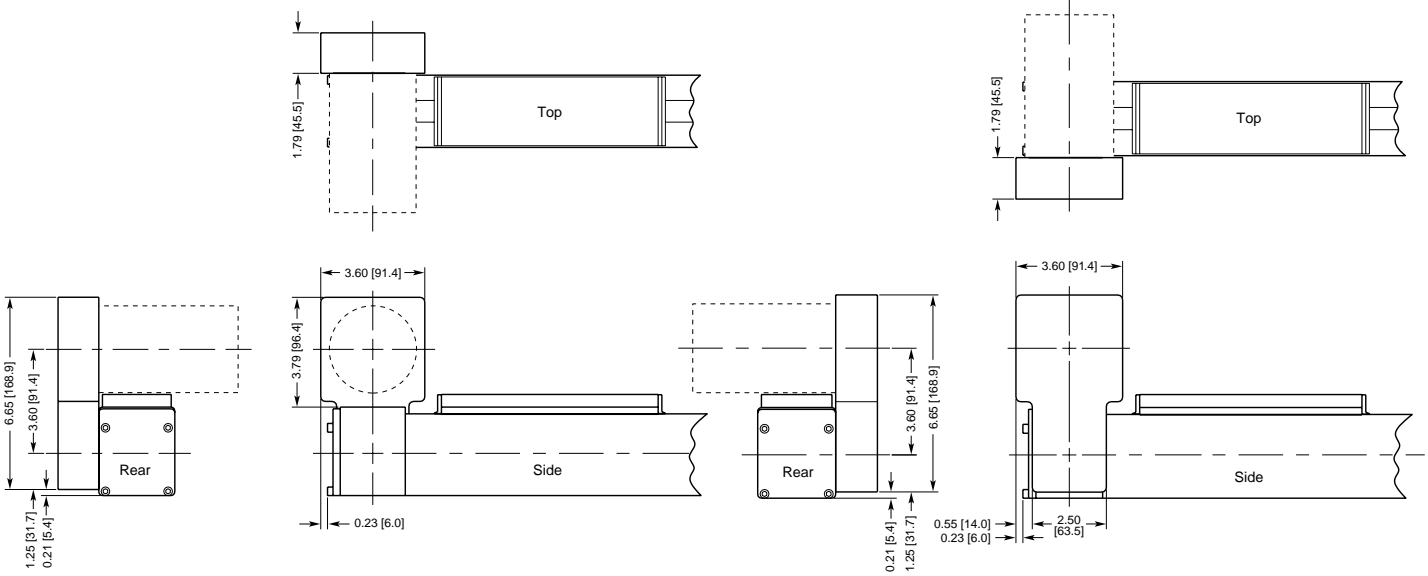
Compatible Mountings

- A Angle Brackets
- B T-Nuts

-AR Over Right

Compatible Mountings

- A Angle Brackets
- B T-Nuts

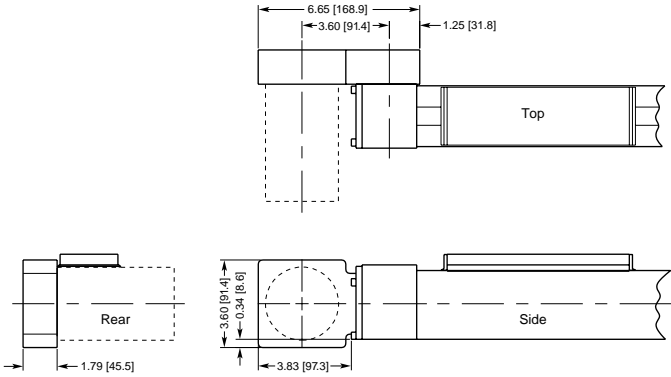


Motor Orientation Options

-BL Behind Left

Compatible Mountings

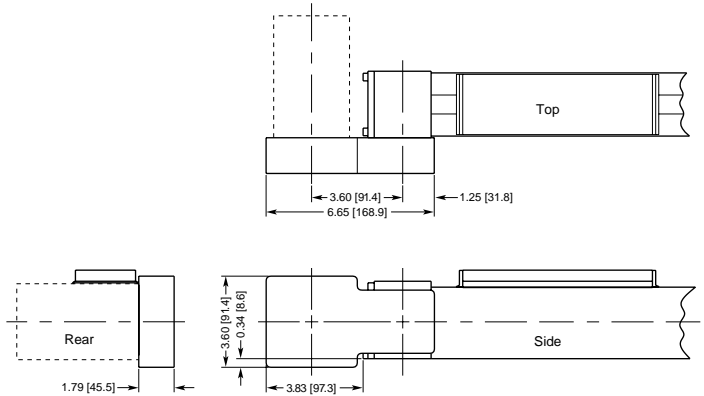
- A Angle Brackets
- B T-Nuts



-BR Behind Right

Compatible Mountings

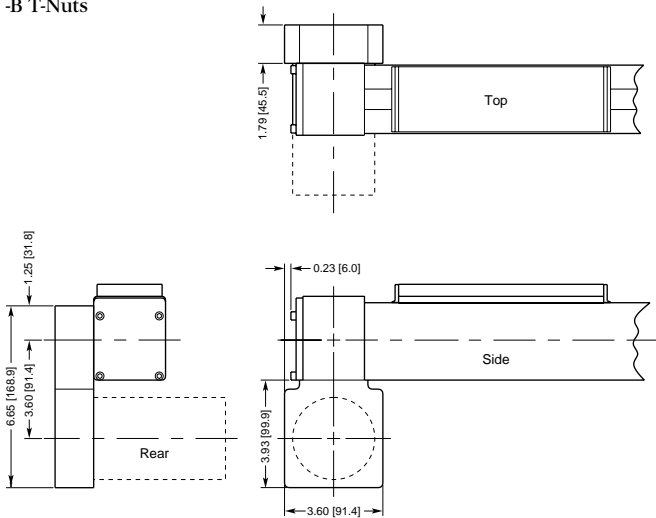
- A Angle Brackets
- B T-Nuts



-CL Under Left

Compatible Mountings

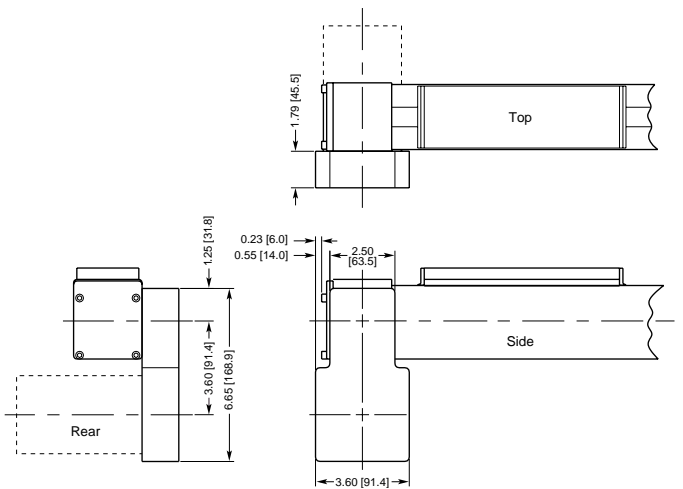
- A Angle Brackets
- B T-Nuts



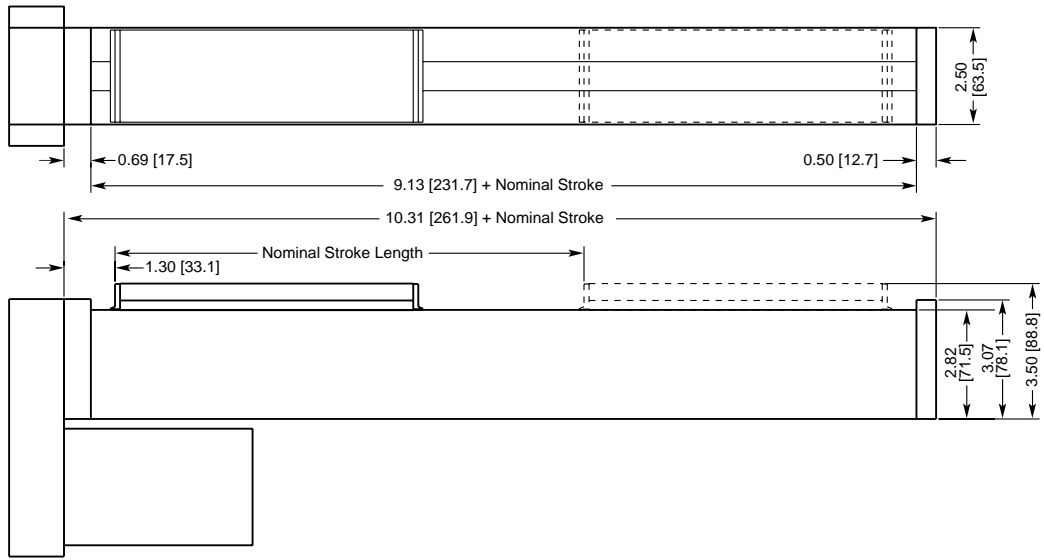
-CR Under Right

Compatible Mountings

- A Angle Brackets
- B T-Nuts



Overall Dimensions



Rodless Actuators

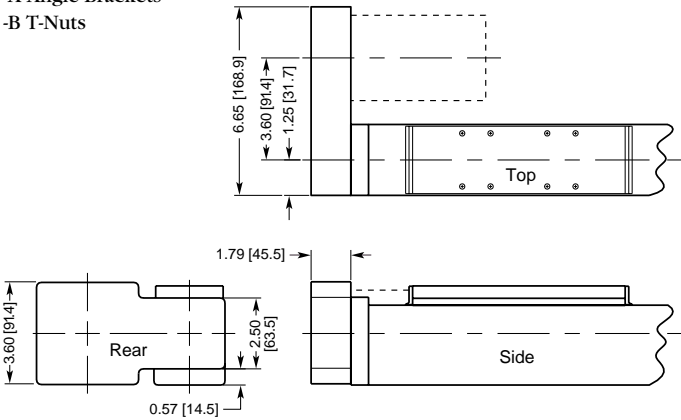
- AutoCAD® drawings available on diskette
- Four motor orientations shown below & right
- Include motor dimensions; see pages B-93 - B-96

Motor Orientation Options

-PL Parallel Left Side

Compatible Mountings

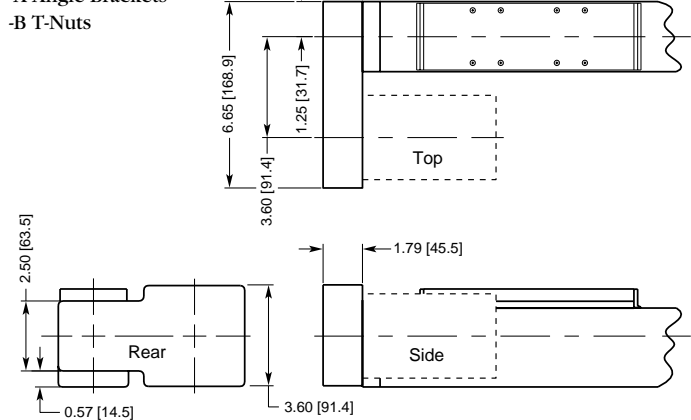
- A Angle Brackets
- B T-Nuts



-PR Parallel Right Side

Compatible Mountings

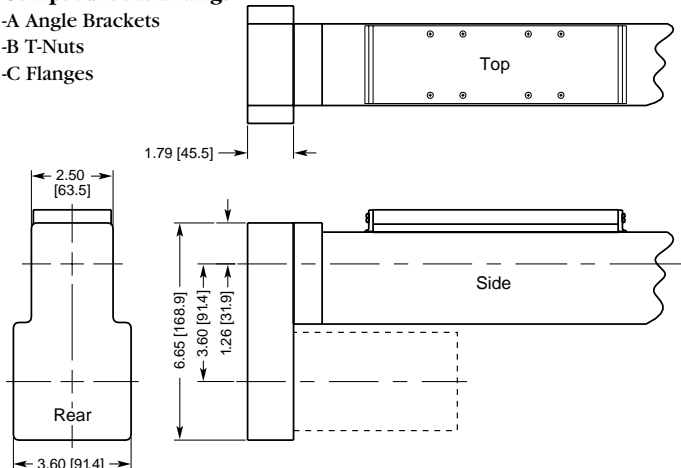
- A Angle Brackets
- B T-Nuts



-P Parallel Below

Compatible Mountings

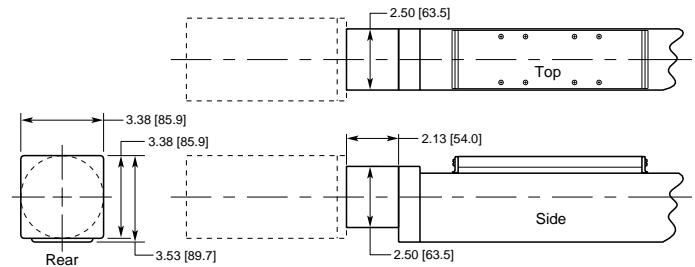
- A Angle Brackets
- B T-Nuts
- C Flanges



-I In-Line

Compatible Mountings

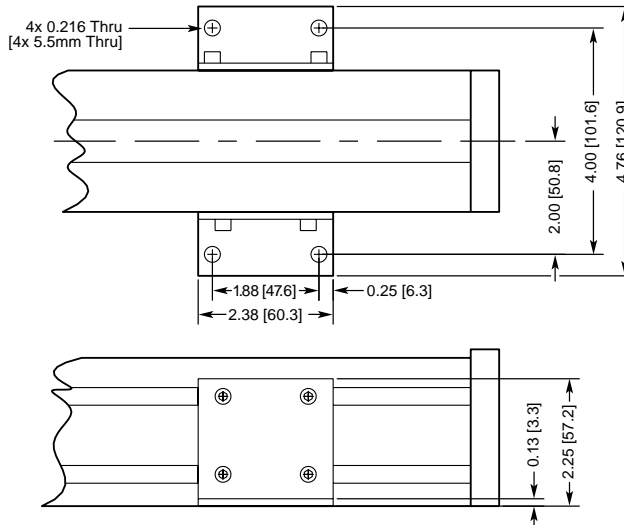
- A Angle Brackets
- B T-Nuts



-A Adjustable Angle Brackets

Compatible Motor Orientations

Belt	Screw
-AR	-P
-AL	-PR
-BR	-PL
-BL	-I
-CR	
-CL	

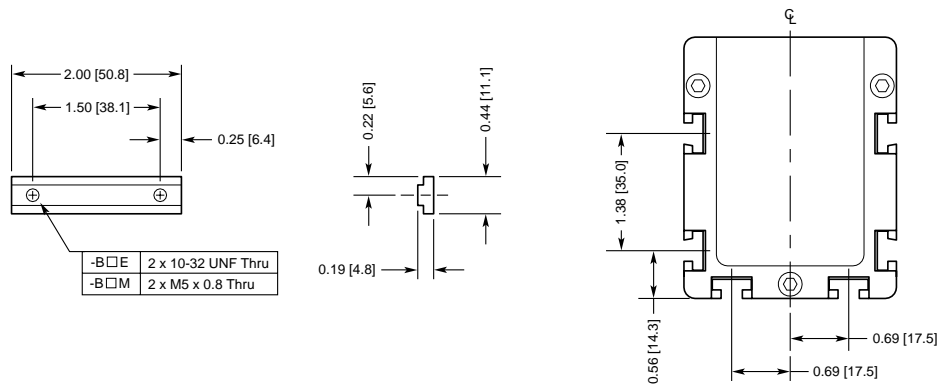


Stroke	No. of Angle Brackets
0-18	4
19-36	6
37-48	8
49-72	10

-B Adjustable T-Nuts

Compatible Motor Orientations

Belt	Screw
-AR	-P
-AL	-PR
-BR	-PL
-BL	-I
-CR	
-CL	



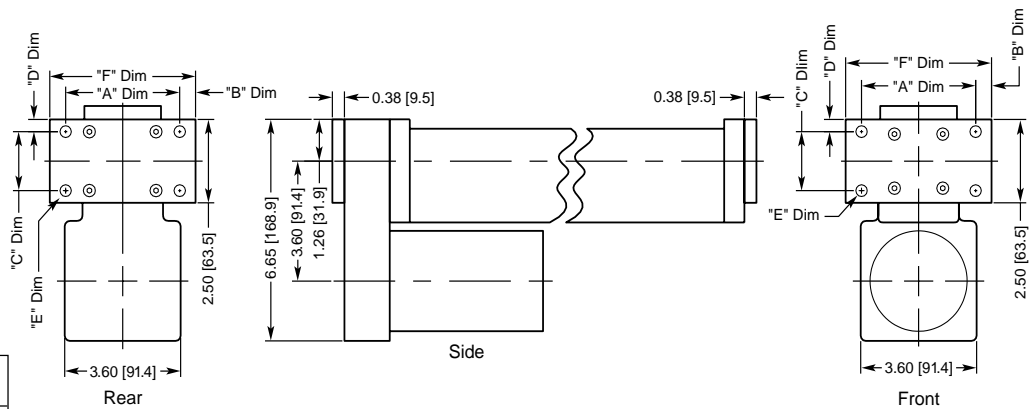
Stroke	Pairs of T-Nuts
0-18	4
19-36	6
37-48	8
49-72	10

-C Front & Rear Rectangular Flanges

Screw Driven Models Only

Compatible Motor Orientations

Belt	Screw
not available	-P

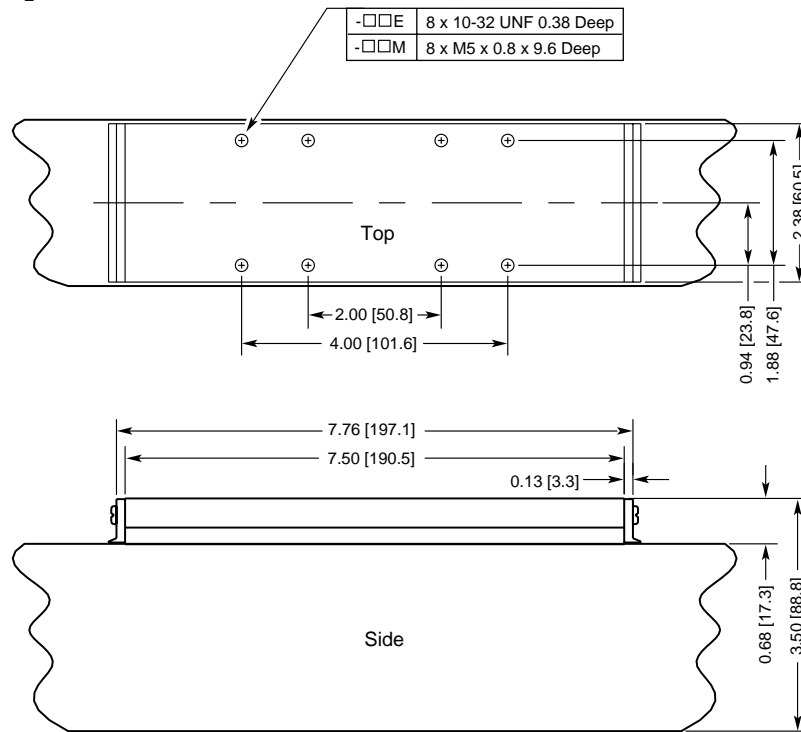


Dimension	-C □ E English (in)	-C □ M Metric (mm)
A	3.44	90.0
B	0.34	12.5
C	1.63	45.0
D	0.44	9.2
E	∅0.38	∅9.0
F	4.13	115.0

Carriage Dimensions

Dimensions

- □ S □ Single Carriage Option

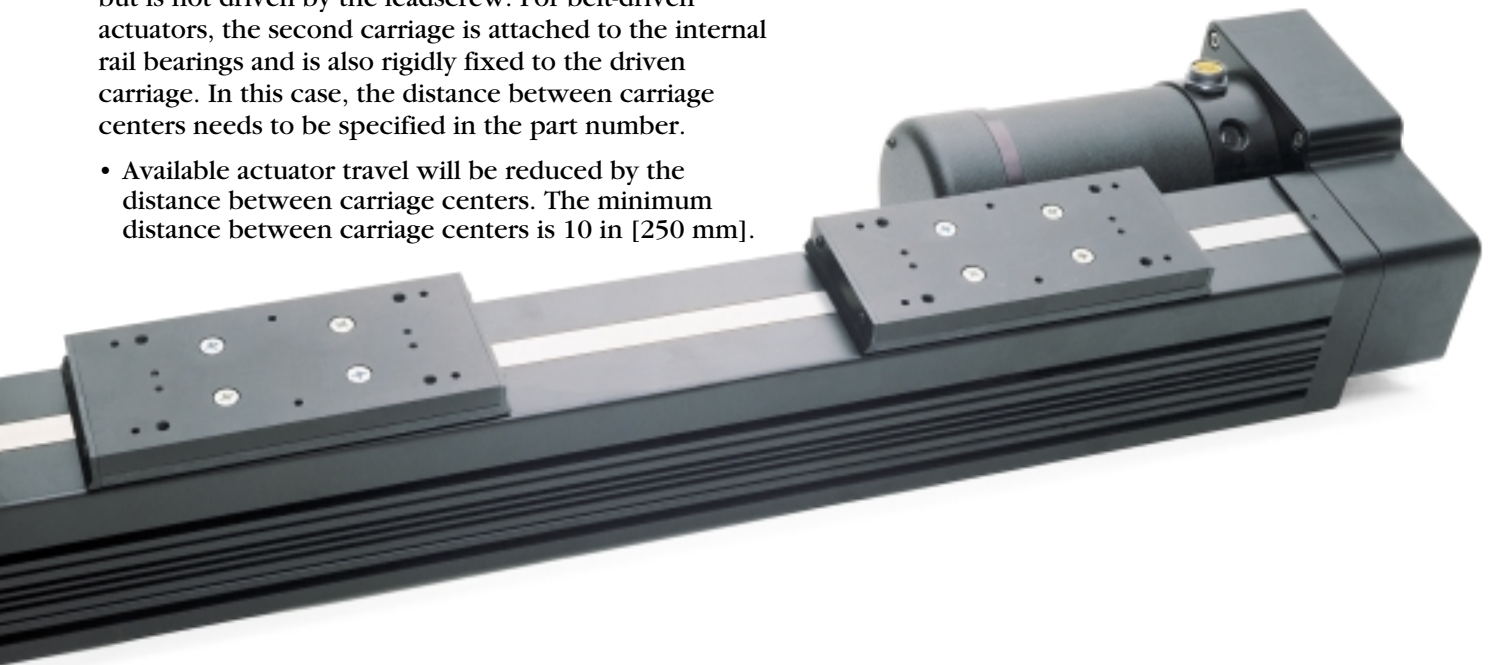


- □ Dm □ Dual Carriage Option

(*nn* is the distance between carriage centers.
Omit for screw-driven actuators.)

Increase carriage capacity by supporting the load at two separate locations. For screw-driven actuators, the second carriage is attached to the internal rail bearings, but is not driven by the leadscrew. For belt-driven actuators, the second carriage is attached to the internal rail bearings and is also rigidly fixed to the driven carriage. In this case, the distance between carriage centers needs to be specified in the part number.

- Available actuator travel will be reduced by the distance between carriage centers. The minimum distance between carriage centers is 10 in [250 mm].





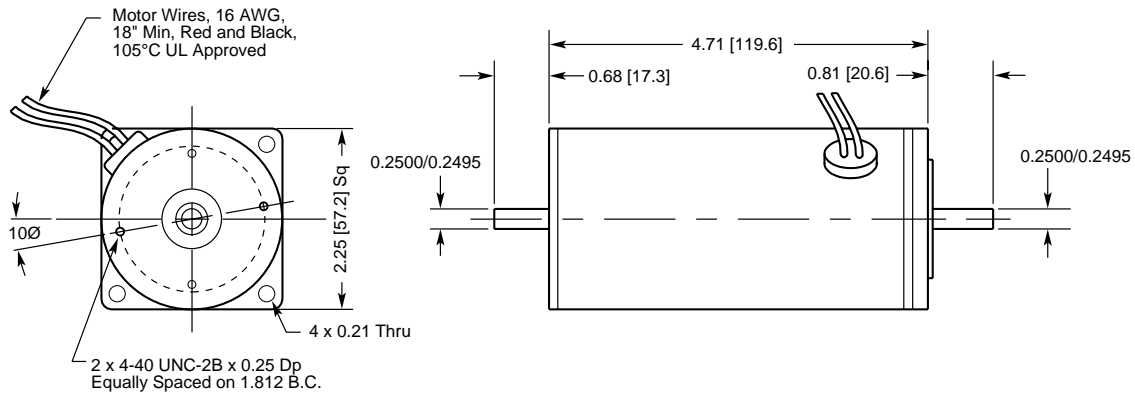
Motor Specifications

Rodless Actuator

R3

D Motor

Inductance	1.63 mH
Terminal Resistance	0.7 ohms \pm 20%
Hipot Breakdown Voltage	500 VAC
Current	160 VDC max
Continuous	4.5 A max
Peak	12 A max
Torque Constant	8.8 oz-in/Amp
Voltage Constant	6.5 V/Krpm
No Load Speed	3,600 rpm
Connections	2 leads, 12 inch length
User Cabling	Less than 50 feet (16 AWG), 50-100 feet (14 AWG), 100-200 feet (10 AWG)
Anticipated Life of brushes	1 million cycles. Replaceable.
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 performance curves for system duty ratings.



Rodless Actuators



H Motor

Inductance
Terminal Resistance
Hipot Breakdown
Voltage
Current
Continuous
Peak
Torque Constant
Voltage Constant
No Load Speed
Connections

User Cabling
Anticipated Life of brushes
Temperature

Permanent magnet 2-pole, 160 volt DC motor

19 mH
6.4 ohms $\pm 20\%$
500 VAC
160 VDC max

2 A max
8 A max

54 oz-in/Amp
40 V/Krpm
3,900 rpm

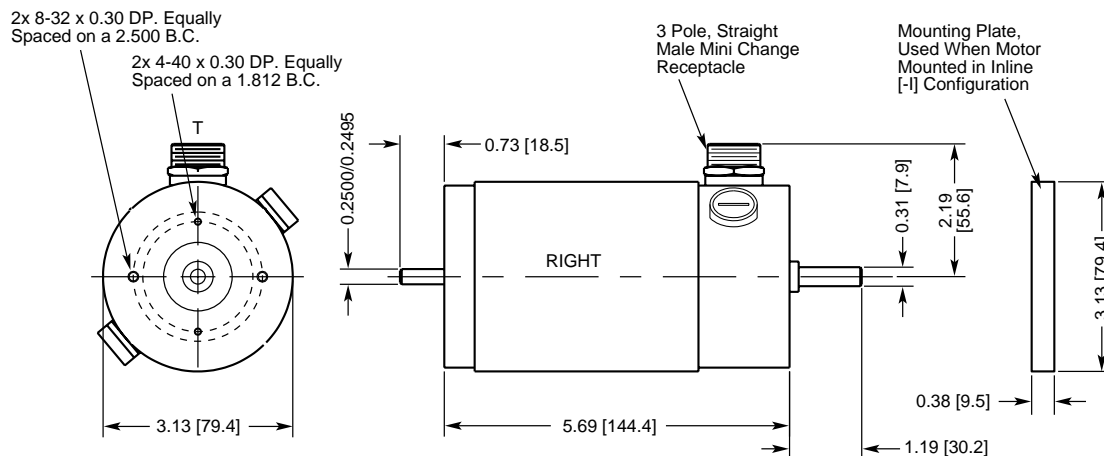
Quick disconnect; 3 contact receptacle, including case ground, in anodized aluminum shell, includes 12 foot cable with molded plug.

Less than 50 feet (16 AWG), 50-100 feet (14 AWG), 100-200 feet (10 AWG)

5 million cycles. Replaceable.

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 performance curves for system duty ratings.





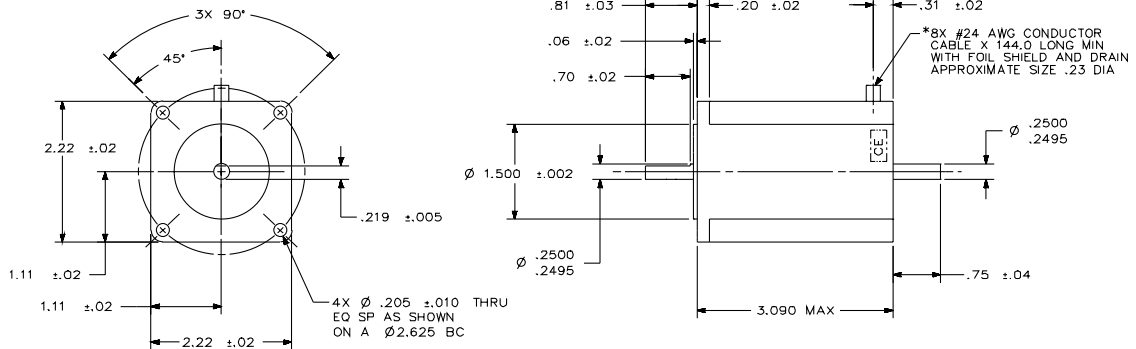
P22 Motor

Inductance
 Motor Current
 Hipot Breakdown
 Connections

1.8° Permanent Magnet Hybrid Step Motor

63.2 mH in Series (P22T), 15.8 mH in Parallel (P22V)
 0.7 Amps in Series (P22T), 1.5 Amps in Parallel (P22V)
 500 VAC/1800 VDC (phase to phase; phase to ground)
 P22N: 8 leads, each 12" long each
 P22T, P22VV: quick disconnect receptacle on actuator gear housing; includes 12 ft [3.7 m] cable with molded plug
 Less than 100 feet (20 AWG), 100-200 feet (18 AWG)
 212°F (100°C) maximum allowable case temperature.
 Actual motor case temperature is dependent on ambient temp., duty cycle, speed and load. Refer to speed vs. thrust performance curves for system duty ratings.

User Cabling
 Temperature



*INLINE UNITS ONLY, OTHER UNITS USE QUICK DISCONNECT PORT.

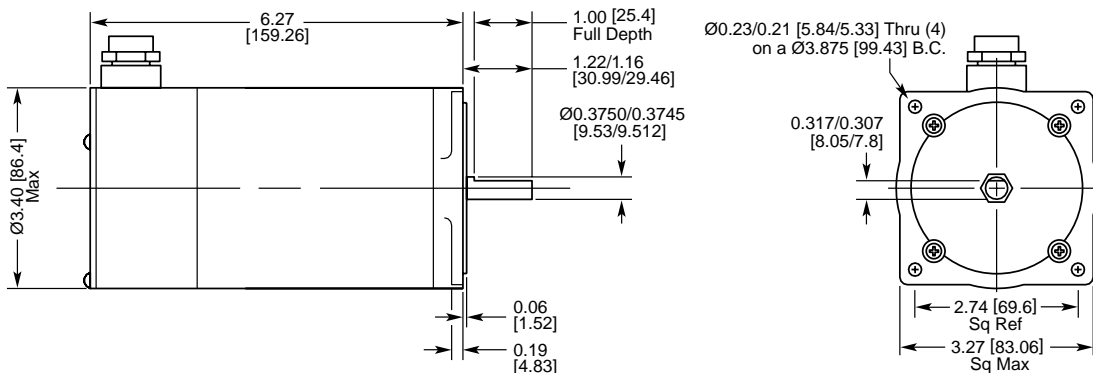
S33 Motor

Inductance (windings)
 Motor Current
 HIPOT Breakdown
 Connections

1.8° Permanent magnet hybrid step motor

10 mH in series, 2.5 mH in parallel
 3.5 Amps in Series (S33T), 7 Amps in Parallel (S33V)
 750VAC
 S33N: 8 leads, each 8 inches long
 S33V/S33T: Quick disconnect receptacle in anodized aluminum shell; includes 12 ft [3.7m] cable with molded plug
 Less than 100 feet (20 AWG), 100-200 feet (18 AWG)
 212°F [100°C] maximum allowable motor 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.

User Cabling
 Temperature



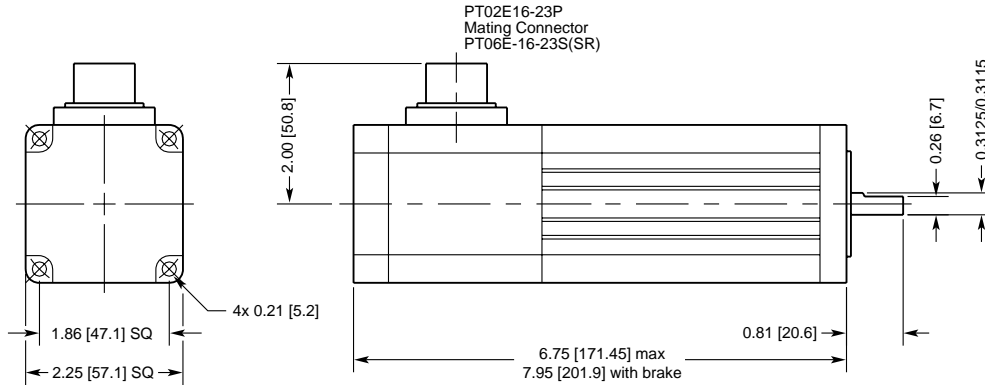


B23 Motor

- Winding Data
- Inductance
- Terminal Resistance
- Torque Constant
- Torque Output
- Continuous
- Peak
- Rotor Inertia
- Connections
- Temperature
- Environmental

Rare Earth Magnet Brushless Servo Motor

- 16 mH $\pm 10\%$
- 10.6 ohms $\pm 10\%$
- 3.6 in-lbs/amp
- 6 in-lbs [0.68 N-m]
- 30 in-lbs [3.4 N-m]
- 0.00012 in-lb-sec² [0.135 kg-cm²]
- MS-type connectors for motor windings and encoder including 12 ft [3.7m] cables with mating connectors
- 212°F [100°C] maximum allowable motor case temperature.
- Rugged IP65 dust and waterproof construction

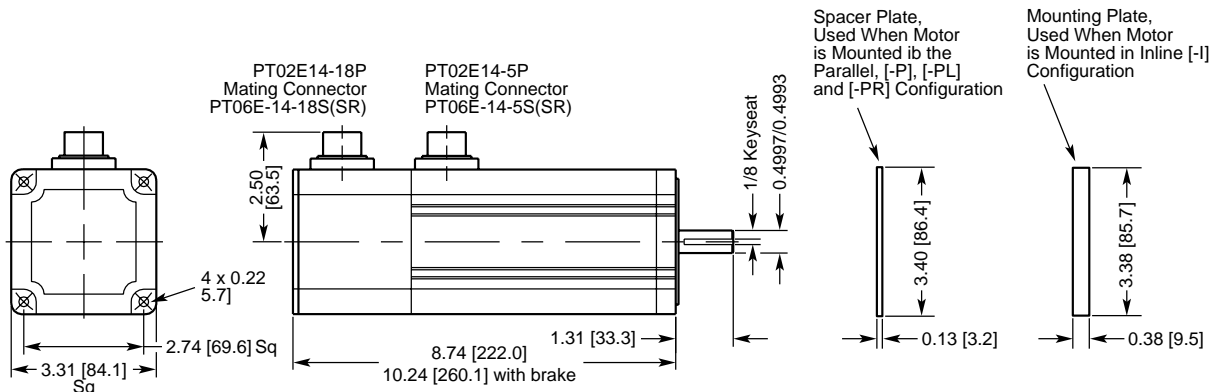


B32 Motor

- Winding Data
- Inductance
- Terminal Resistance
- Torque Constant
- Torque Output
- Continuous
- Peak
- Rotor Inertia
- Connections
- Temperature
- Environmental

Rare Earth Magnet Brushless Servo Motor

- 9.8 mH $\pm 10\%$
- 3.4 ohms $\pm 10\%$
- 6.2 in-lbs/amp
- 25 in-lbs [2.8 N-m]
- 105 in-lbs [11.9 N-m]
- 0.0010 in-lb-sec² [1.13 kg-cm²]
- MS-type connectors for motor windings and encoder including 12 ft [3.7m] cables with mating connectors
- 212°F [100°C] maximum allowable motor case temperature.
- Rugged IP65 dust and waterproof construction





High Performance Rodless Actuator

The R4 is our most powerful rodless actuator and can carry the heaviest carriage loads. With its internal linear motion guide bearing, and built-in flexible seal, the R4 Series is designed for operation in an industrial environment.

Two basic drive mechanisms can be used: Belt-drive offers the most rapid moves, and leadscrew offers the highest thrust capacity and repeatability.

There are three motor types available to meet a variety of application requirements:

R4-H - 160 Volt DC

- High torque brushed DC servo motor.
- Precise closed loop operation.
- Thrust monitored.

R4-S - Step Motor

- High load and duty cycle.
- In-position holding.
- Economical open loop operation (encoder optional).
- Repeatable positioning to 0.0005 inches [0.013 mm].

R4-B - Brushless Servo Motor

- Very high acceleration and power.
- High duty cycle.
- Precise closed loop operation.

		R4-H Series		R4-S Series		R4-B Series	
Load (Thrust) Capacity	lbs [N]	1,200 [5,300] screw drive, 300 [1,300] belt drive					
Max. No Load Speed	in/s [m/s]	40 [1,000] screw drive, 120 [3,000] belt drive					
Max. Carriage Load	lbs [kg]	300 [135]					
Repeatability	in [mm]	±0.001 [±0.025]		± 0.0005 [±0.013]		± 0.001 [±0.025]	
Peak Power	W	1,000		600		1,900	
Continuous Power	W	500		600		1,050	
Motor Type		160 volt DC Servo Stepper		1.8° Hybrid		Brushless Servo	
Compatible Controls Offered (Model)		H4301	B8001	<i>NextStep</i> S6002 S6961 S6962		B8001 B8961 B8962	
				<i>SmartStep</i>			
Typical System Cost*		\$4,100 - 6,700		\$4,000 - 5,800		\$5,300 - 7,200	

*System cost based on single quantity price, 30 inch stroke actuator with control.





Common Specifications

Travel Lengths	6, 12, 18, 24, 30, 36, 42, 48, 60, 72, 84, 96, 108 inches
Construction Materials	
Bearing Housing	6063 T-6 aluminum, hardcoat anodized
Guide Housing	6063 T-6 aluminum, hardcoat anodized
Carriage Assembly	6061 T-6 aluminum, hardcoat anodized
Internal Rail Bearings	Recirculating ball on precision ground rail
Leadscrew or Belt	
Support Bearings	Angular contact, high thrust ball bearings
Ball Screw; drive nut	1.0" diameter hardened alloy steel screw; alloy steel, heat treated ballnut
Belt Drive	1.5" wide L pitch urethane with steel reinforcement cords
Flexible Seal	Stainless steel band with elastomeric seal

Weight (Approximate, without options)

	Screw-driven Actuators	Belt-driven Actuators
	- □ □ 1B, - □ □ 4B	- □ □ T
R4-H4	$36 + 0.85 \times (\text{inches stroke}) \text{ lbs}$	$36 + 0.64 \times (\text{inches stroke}) \text{ lbs}$
R4-S33	$32 + 0.85 \times (\text{inches stroke}) \text{ lbs}$	$32 + 0.64 \times (\text{inches stroke}) \text{ lbs}$
R4-S42	$40 + 0.85 \times (\text{inches stroke}) \text{ lbs}$	$40 + 0.64 \times (\text{inches stroke}) \text{ lbs}$
R4-B32	$30 + 0.85 \times (\text{inches stroke}) \text{ lbs}$	$30 + 0.64 \times (\text{inches stroke}) \text{ lbs}$
R4-B41	$36 + 0.85 \times (\text{inches stroke}) \text{ lbs}$	$36 + 0.64 \times (\text{inches stroke}) \text{ lbs}$

Environmental Operation

Temperature Range	-20° to 140°F [-28° to 60°C]
Moisture/Contaminants	IP 44 rated: Splash-proof, protected against ingress of solid particles greater than 0.040" [1 mm] diameter.

R4 Series Actuator Inertia

Equations

Rotary Inertia (reflected to the motor) = $A + B^* (\text{stroke, in}) + C^* (\text{load, lb}) + D$
 Linear Inertia (reflected to the carriage) = $[A + B^* (\text{stroke, in}) + D]/C + (\text{load, lb})$

Belt Driven				A	B	C	Motor	D
Models	Motors	Ratio	Belt	(lb-in-s ²)	(lb-in-s ² /in)	(lb-in-s ² /lb)		(lb-in-s ²)
R4...-20T	H4, S42, B42	2:1	1.5 wide	6.06 E-03	1.06 E-05	9.02 E-04	H4	1.25 E-02
R4...-30T	S33, B32	3:1		2.32 E-03	4.71 E-06	4.01 E-04	S33	1.66 E-03
R4...-50T	All	5:1		1.07 E-03	1.62 E-06	1.38 E-04	S42	7.13 E-03
R4...-100T	All	10:1		4.40 E-04	4.21 E-07	3.60 E-05	B32	1.00 E-03
							B41	2.60 E-03

Screw Driven				A	B	C	
Models	Motors	Ratio	Screw	(lb-in-s ²)	(lb-in-s ² /in)	(lb-in-s ² /lb)	
R4...-101B	All	1:1	1x1	2.17 E-03	7.12 E-05	6.56 E-05	
R4...-151B	All	1.5:1		1.04 E-03	3.17 E-05	2.92 E-05	
R4...-201B	All	2:1		6.63 E-04	1.78 E-05	1.64 E-05	
R4...-501B	All	5:1		4.32 E-04	2.72 E-06	2.51 E-06	
R4...-1001B	All	10:1		2.75 E-04	7.12 E-07	6.48 E-07	
R4...-104B	All	1:1	1x0.25	1.80 E-03	7.12 E-05	4.10 E-06	
R4...-154B	All	1.5:1		8.99 E-04	3.17 E-05	1.83 E-06	
R4...-204B	All	2:1		5.84 E-04	1.78 E-05	1.02 E-06	
R4...-504B	All	5:1		4.20 E-04	2.72 E-06	1.62 E-07	
R4...-1004B	All	10:1		2.72 E-04	7.12 E-07	4.86 E-08	

Metric Conversions:
 1 mm = 0.03937 in
 1 kg = 2.205 lb
 1 lb-in-s² = 1129 kg-cm² = 1.152 kg-cm-s²



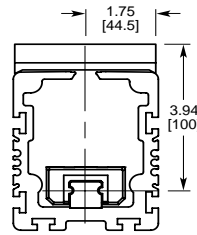
General Specifications

Carriage Straightness & Flatness

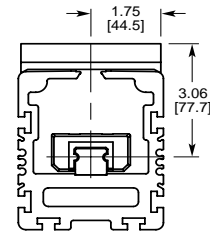
± 0.005 in/ft [0.125 mm/300 mm], not to exceed
 ± 0.035 in [0.9 mm]

Load Limits

Normal (F_n)	± 300 lbs [± 1330 N]
Side (F_s)	± 150 lbs [667 N]
Pitch (M_p)	1,000 in-lbs* [113 N-m]
Roll (M_r)	600 in-lbs* [68 N-m]
Yaw (M_y)	1,000 in-lbs [113 N-m]

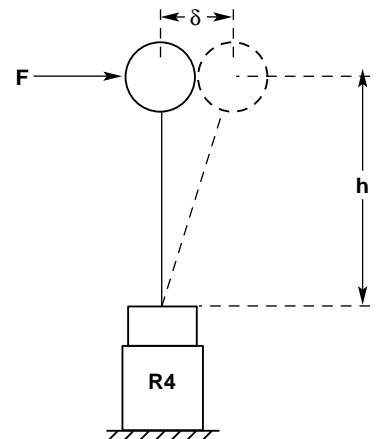
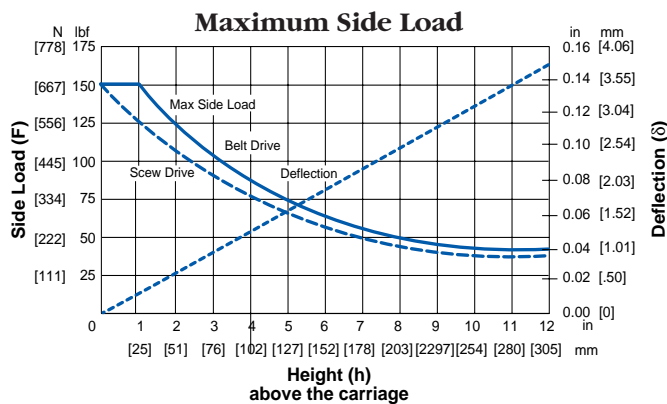
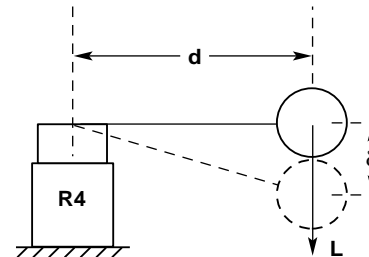
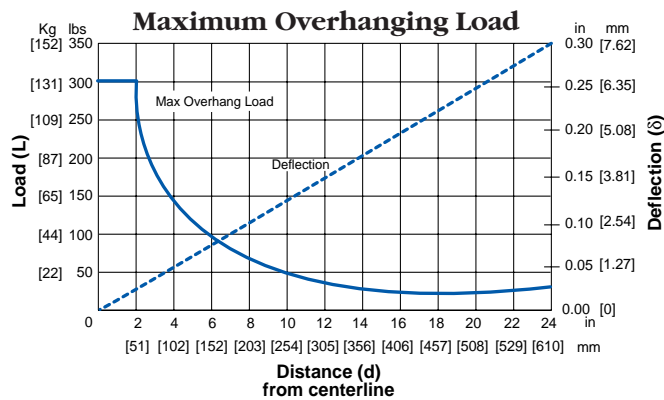
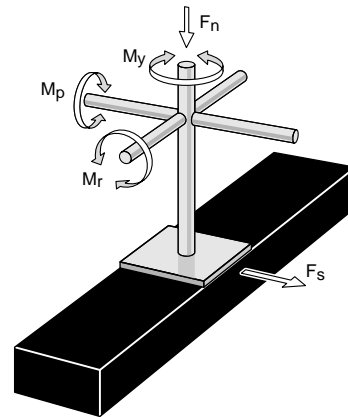
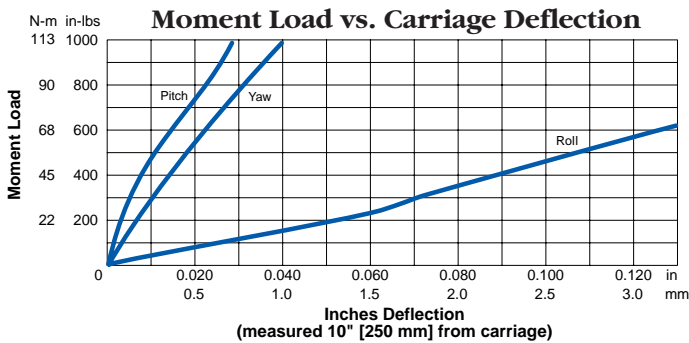


R4 Screw



R4 Belt

* Be sure to add distance from carriage to bearing centerline to moment arm for pitch and roll calculations.





Life

Belt Drive

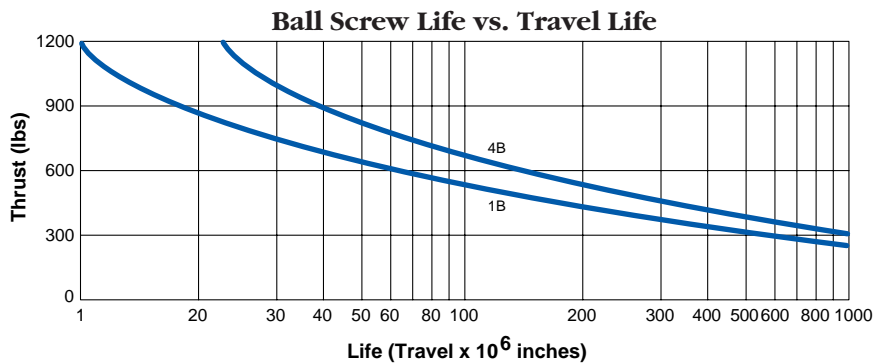
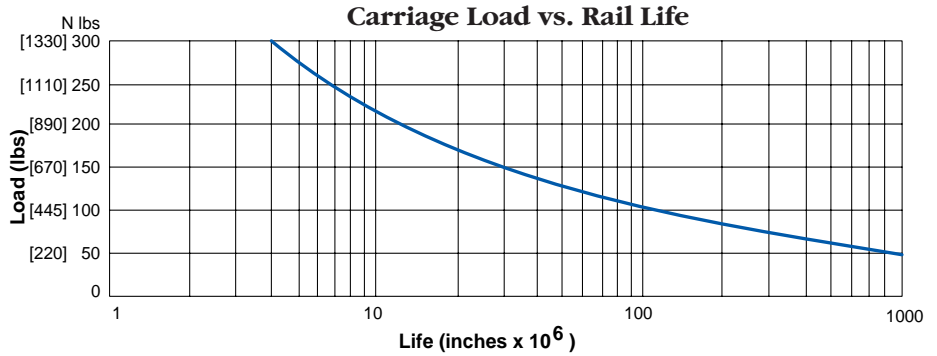
As belt-driven actuators are generally used horizontally with light thrust loads, life is usually a function of the load weight. Actual life will be determined by carriage loading, speed, acceleration, and duty cycle and operating environment. The curve to the right shows predicted life of the actuator under ideal conditions. Derate as required by your application.

Ball Screw

Ball screw 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, gravitational and friction loads.

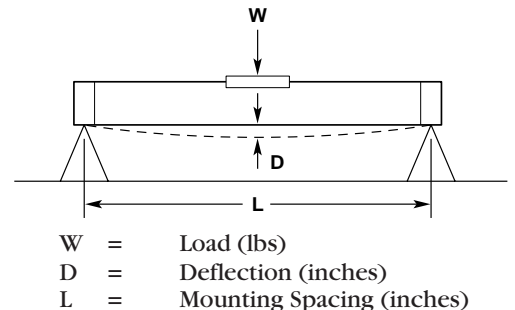
Maintenance

The R4 carriage seal and internal bearing design prevents lubricant contamination and nearly eliminates the need for routine maintenance. Replacement parts are available from the factory – see the Rodless Actuator Manual for details.

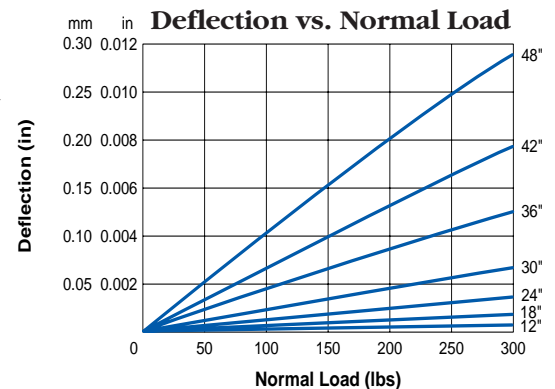


Actuator Deflection, Mounting Configurations

Actuator deflection will affect the flatness or straightness of the actuator when the system is supported at spaced mounting points.



The chart to the right provides a quick reference for deflection vs. normal load.



The equations to the right provide deflection as a function of the various loads applied to the carriage. Deflection should not exceed 0.015 in [0.38 mm]. Mounting spacing should not exceed 48 in [1200 mm].

Orientation

- Normal
- Side
- Pitch
- Roll
- Yaw

Deflection Equation

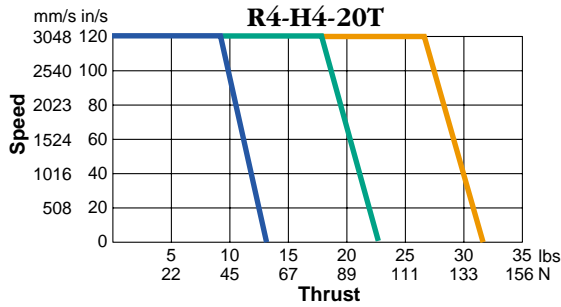
- $WL^3/2.8 \times 10^9$, inches
- $WL^3/1.3 \times 10^9$, inches
- 3×10^{-6} radians/in-lb
- 2×10^{-5} radians/in-lb
- 4×10^{-6} radians/in-lb

Maximum Allowed

- 0.010" [0.25 mm]
- 0.010" [0.25 mm]
- 0.003 radians @ 1,000 in-lbs
- 0.013 radians @ 600 in-lbs
- 0.004 radians @ 1,000 in-lbs

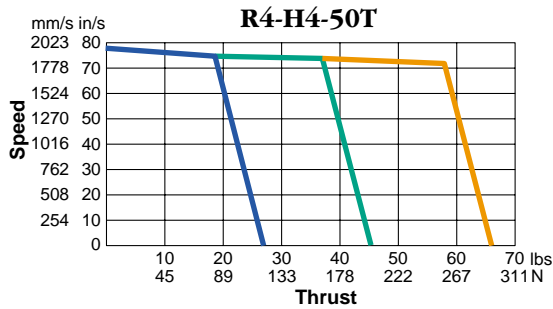


Belt-Drive Models



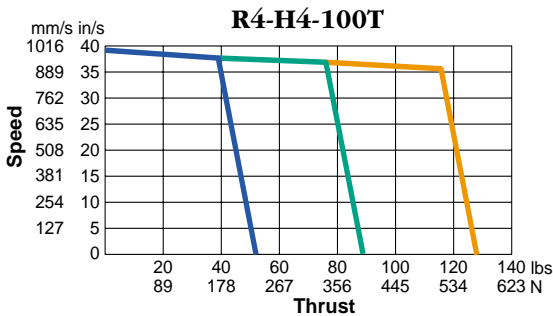
R4-H4-20T: 2:1 Timing B-elt, 7.4 inch/rev B-elt

Max. No-Load Accel.	555 in/s ²	14.1 mm/s ²
Travel per Motor Rev	3.71 in	94.23 mm
Repeatability	±0.030 in	±0.76 mm
B-elt Accuracy	±0.010 in/ft	±0.25 mm



R4-H4-50T: 5:1 Helical Gears, 7.4 inch/rev B-elt

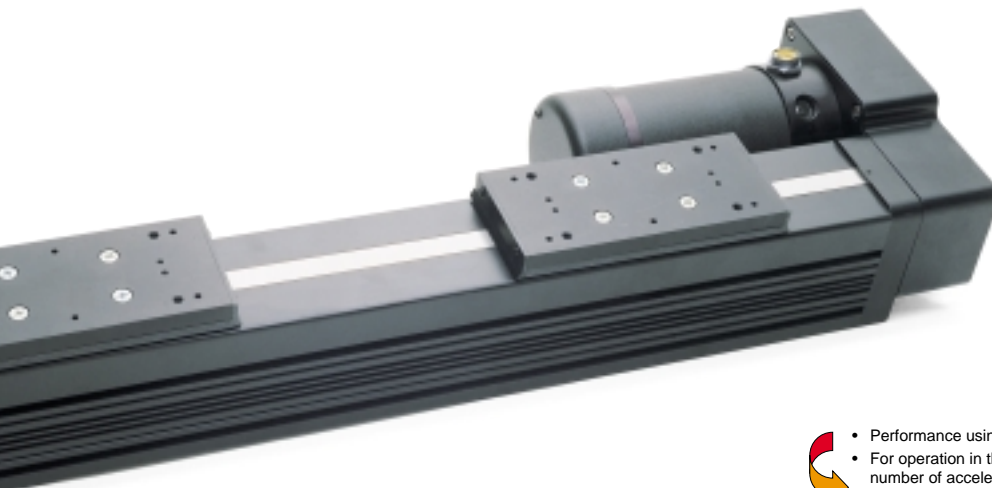
Max. No-Load Accel.	356 in/s ²	9.0 mm/s ²
Travel per Motor Rev	1.45 in	36.83 mm
Repeatability	±0.030 in	±0.76 mm
B-elt Accuracy	±0.010 in/ft	±0.25 mm



R4-H4-100T: 10:1 Helical Gears, 7.4 inch/rev Belt

Max. No-Load Accel.	191 in/s ²	4.9 mm/s ²
Travel per Motor Rev	0.74 in	18.80 mm
Repeatability	±0.030 in	±0.76 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

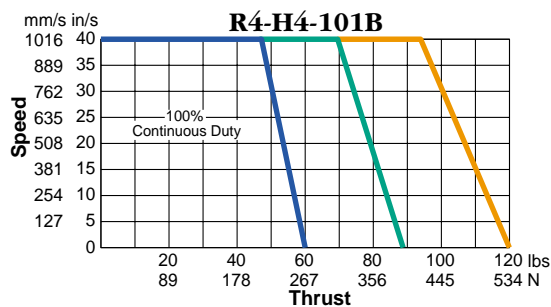
- Continuous duty region
(max rms thrust, over any 10 minute interval)
- 50% duty region
(5 min on time max)
- Peak region
(max 2 second duration)



- Performance using H4000 Series Controls.
- For operation in the 60% or 30% region, motor temperature rise due to load, speed, number of acceleration/decelerations, and ambient temperature require consideration.
- Accuracy will be affected by belt stretch under heavier loads.

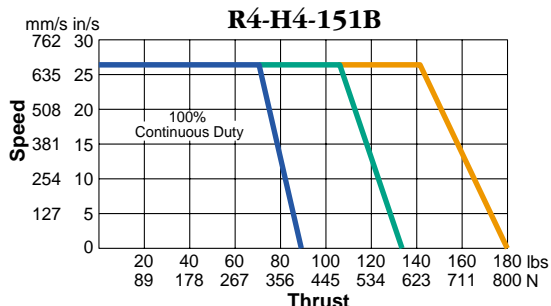


High Speed Ball Screw Models



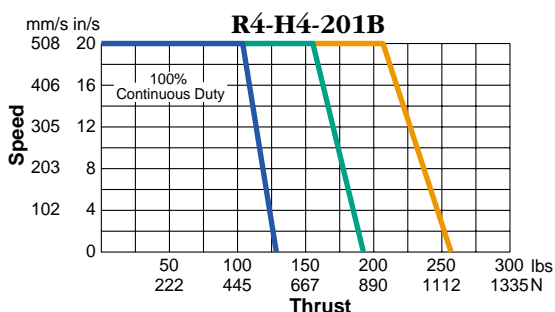
R4-H4-101B-P: 1:1 Timing Belt, 1 rev/inch Ballscrew
R4-H4-101B-I: 1:1 Inline Coupling, 1 rev/inch Ballscrew

Min. Backdrive Load	15 lbs	67 N
Max. No-Load Accel.	276 in/s ²	7.0 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



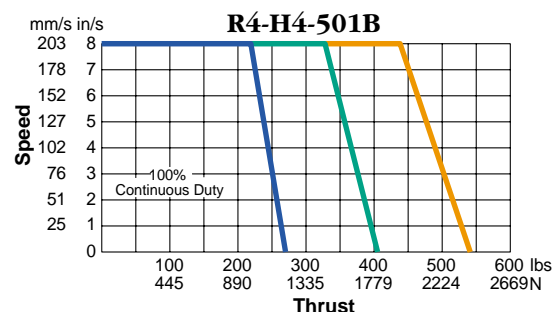
R4-H4-151B: 1.5:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	203 in/s ²	5.2 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



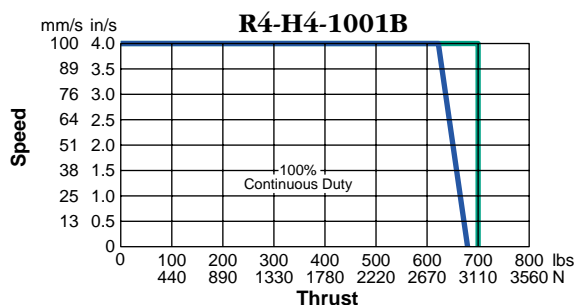
R4-H4-201B: 2:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	158 in/s ²	4.0 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-H4-501B: 5:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	50 lbs	222 N
Max. No-Load Accel.	63 in/s ²	1.6 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-H4-1001B: 10:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	33 in/s ²	0.8 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

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

1B	40.0	35.4	28.4	19.5	14.2	10.8	8.5	6.9	Critical Speed (in/sec)
	6 thru 36	42	48	60	72	84	96	108	Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)

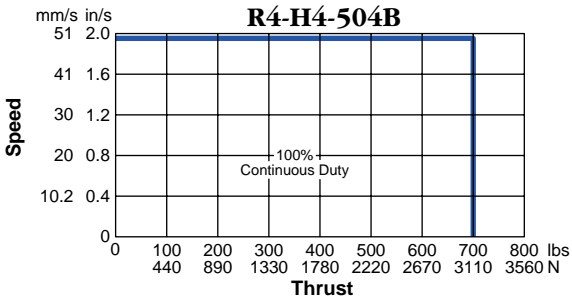
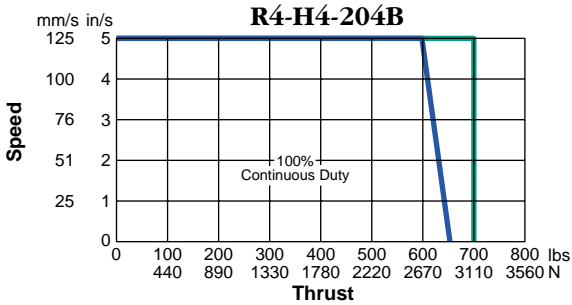
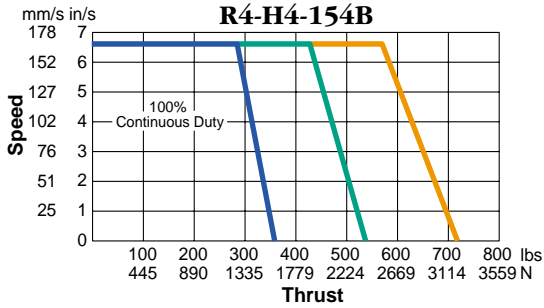
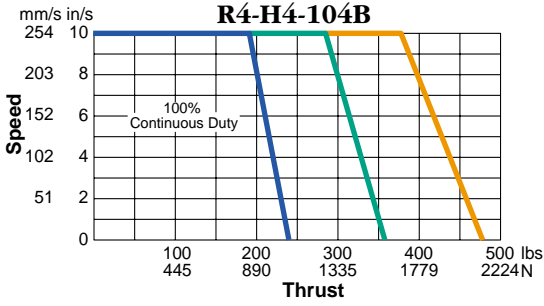


To configure your system see page B-106.



Ball Screw Models

Rodless Actuators



■ Continuous duty region (max rms thrust, over any 10 minute interval)

■ 50% duty region (5 min on time max)

■ Peak region (max 2 second duration)



To configure your system see page B-106.

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

4B		10.0	8.8	7.1	4.9	3.6	2.7	2.1	1.7	Critical Speed (in/sec)
6 thru 36	42	48	60	72	84	96	108			Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)

- Performance using H4000 or Series Controls.
- 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

Rodless Actuator
300 lbs Payload
160 Volt DC Motor

R4-H4



Rodless Actuators



How To Order

Steps to Ordering a Complete R4-H4 System

You are ready to specify an R4-H4 actuator model number after you have:

- found the Base Model that meets your speed, thrust and repeatability requirements (pages B-102 to B-105), with a comfortable safety margin,
- verified that the R4-H4 meets your carriage loading requirements, and
- chosen a control compatible with the H4 motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin.

Belt driven units generally move light loads at high speed over longer lengths.

Screw driven units are recommended for high thrust and vertical applications.

All R4-H4 actuators include a motor quick disconnect and 12 ft [3.7 mm] cable.

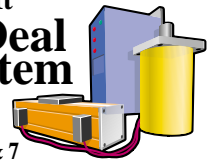
2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.

Make It
An **IDEAL**
System

See Intro
Pages 6 & 7



1	2	3	4	5
Base Model	Stroke Length	Motor Orientation	Mounting	Options
Belt Drive Models				
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">R4-H4</div> <div style="margin: 0 10px;">—</div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 5px;">Drive Ratio</div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> </div> <div style="margin: 0 10px;">—</div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 5px;">Belt</div> <div style="border: 1px solid black; padding: 2px; font-weight: bold;">T</div> </div> </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 10px;">—</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 10px;">—</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">Actuator Carriage</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 10px;">—</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	<div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div>
<div style="border: 1px solid black; padding: 5px;"> R4-H4-20T R4-H4-50T R4-H4-100T </div>	6 48 12 60 18 72 24 84 30 96 36 108 42	BR Behind Right CR Under Right BL Behind Left CL Under Left	A Feet B T-Nuts S Single Dnn Double E English M Metric nn = distance between carriage centers	BM24/BM115/ BM240 Brake on Motor EMK Encoder GL Left Lube Port GR Right Lube Port
Screw Drive Models				
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;">R4-H4</div> <div style="margin: 0 10px;">—</div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 5px;">Drive Ratio</div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> </div> <div style="margin: 0 10px;">—</div> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 5px;">Screw</div> <div style="border: 1px solid black; width: 30px; height: 20px;"></div> </div> </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 10px;">—</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 10px;">—</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">Actuator Carriage</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> <div style="margin: 0 10px;">—</div> <div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div> </div>	<div style="border: 1px solid black; width: 40px; height: 20px; margin-right: 5px;"></div>
<div style="border: 1px solid black; padding: 5px;"> Ball Screw R4-H4-101B R4-H4-151B R4-H4-201B R4-H4-501B R4-H4-1001B R4-H4-104B R4-H4-154B R4-H4-204B R4-H4-504B R4-H4-1004B </div>	6 48 12 60 18 72 24 84 30 96 36 108 42	I In-line (only with 10 ratio) PR Parallel Right PL Parallel Left	A Feet B T-Nuts C Flanges S Single D Double E English M Metric	BM24/BM115/ BM240 Brake on Motor BS24/BS115/ BS240 Brake on Screw EM Encoder GL Left Lube Port GR Right Lube Port



How To Order

Rodless Actuator
300 lbs Payload
160 Volt DC Motor

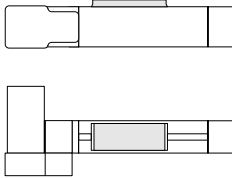
R4-H4

3. Motor Orientation

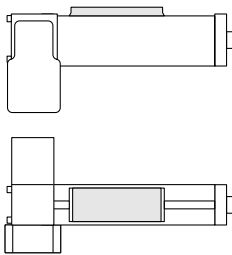
Dimensional drawings start on page B-128.

Belt Drive Models

BR - Behind Right



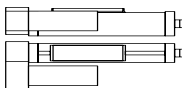
CR - Under Right



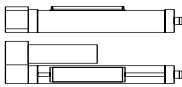
For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify BL, CL.

Screw Drive Models

PR - Parallel Right Side



PL - Parallel Left Side



I - Inline

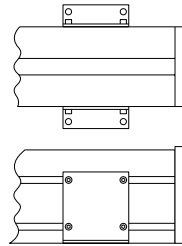


4. Mounting

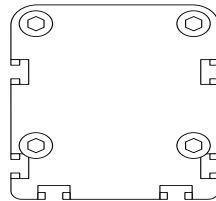
Dimensional drawings start on page B-131.

Actuator

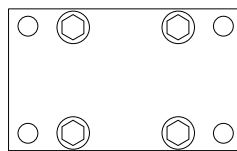
A - Angle Brackets



B - T-Nuts



C - Front and Rear Flanges



Option C (flanges) available only with -P screw-drive actuators.

Carriage

S - Single carriage

D - Dual carriage (screw-driven actuators). Includes a second free-floating carriage.

Dnn - Dual carriage (belt-driven actuators). Includes a second carriage rigidly fixed to the driven carriage.

nn is the distance between carriage centers (minimum distance is 10").

Be sure to order additional travel length to account for the second carriage and the distance between the two carriages.

English/Metric

Specifies actuator mounting and carriage option with Metric (M) or English (E) mounting provisions.

5. Other Options

BM - Motor Holding Brake

20 in-lb holding brake mounted on the H4 motor

BS - Holding Brake

75 in-lb electrically released brake mounted on the lead screw shaft. Available with screw drive parallel models only. Not available with mounting option C (flanges).

EM - Encoder

500 line incremental encoder mounted on the rear shaft of the H4 motor.

GL - Left Lube Port

Lube access ports on left side of actuator allow easy re-lubrication of moving parts.

GR - Right Lube Port

Lube access ports on right side of actuator allow easy re-lubrication of moving parts.

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

RP1 Normally open Hall-effect

RP2 Normally closed Hall-effect

RPS-1 Normally open reed

RPS-2 Normally closed reed

Additional T-Nuts

TNR4-M - One pair Metric

TNR4-E - One pair English

7. Compatible Controls

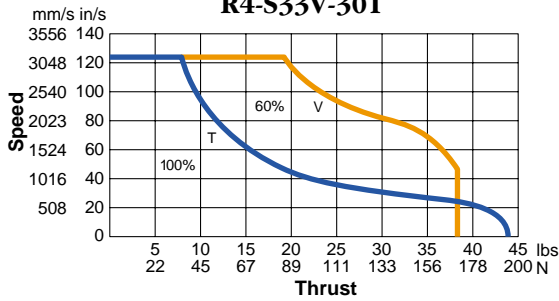
Model	Description
H4301	Limit switch control
H4321	Edge guide control

Rodless Actuators



Belt-Drive Models

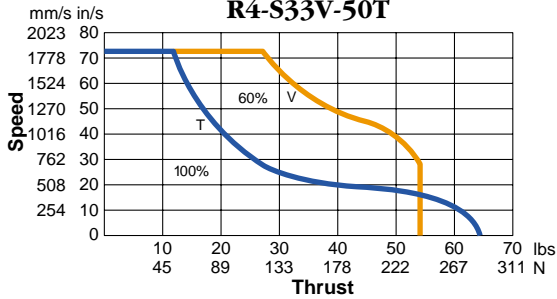
R4-S33T-30T
R4-S33V-30T



R4-S33(T/V)-30T: 3:1 Timing Belt, 7.4 inch/rev Belt

Travel per Motor Rev	2.47 in	62.74 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

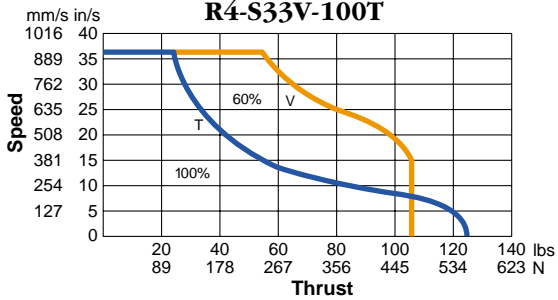
R4-S33T-50T
R4-S33V-50T



R4-S33(T/V)-50T: 5:1 Helical Gears, 7.4 inch/rev Belt

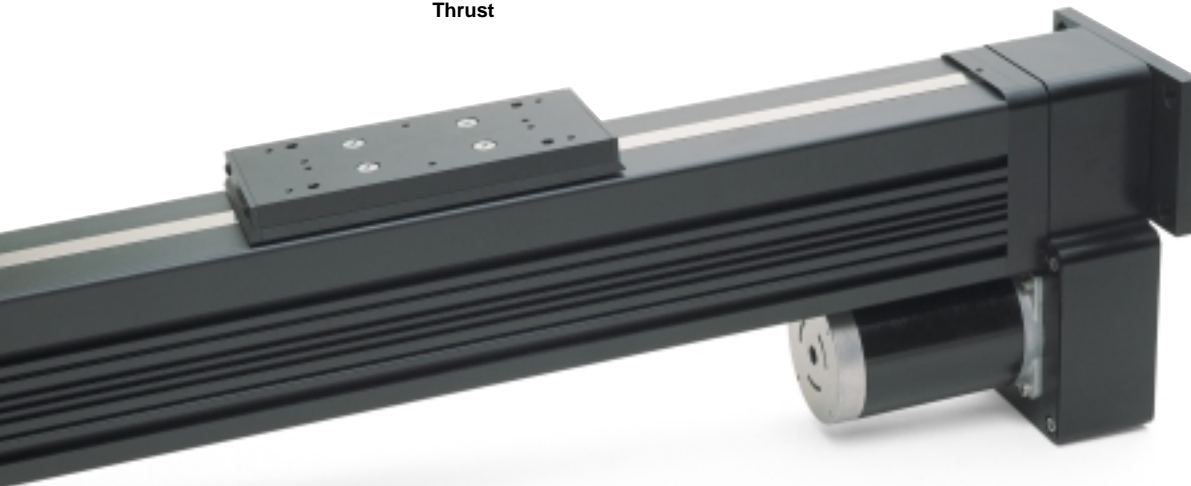
Travel per Motor Rev	1.45 in	36.83 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

R4-S33T-100T
R4-S33V-100T



R4-S33(T/V)-100T: 10:1 Helical Gears, 7.4 inch/rev Belt

Travel per Motor Rev	0.74 in	18.80 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

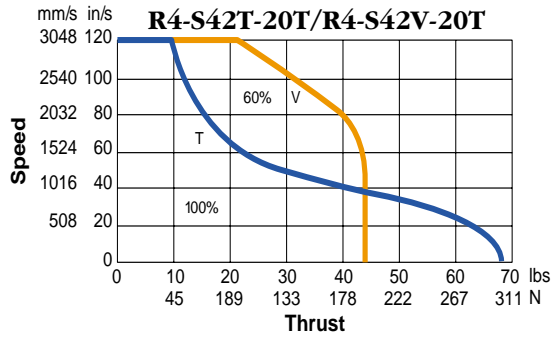


• Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.



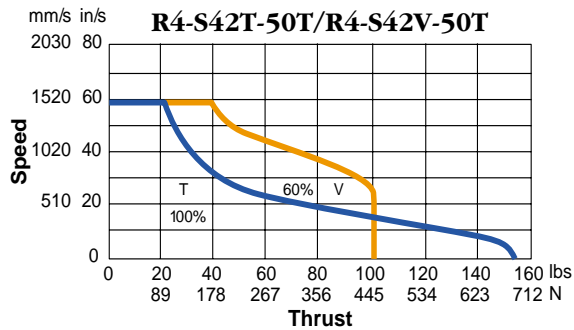


Belt-Drive Models



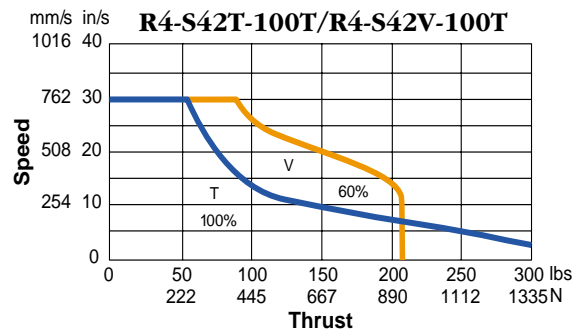
R4-S42(T/V)-20T: 2:1 Timing Belt, 7.4 inch/rev Belt

Travel per Motor Rev	3.71 in	94.23 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R4-S42(T/V)-50T: 5:1 Helical Gears, 7.4 inch/rev Belt

Travel per Motor Rev	1.45 in	36.83 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R4-S42(T/V)-100T: 10:1 Helical Gears, 7.4 inch/rev Belt

Travel per Motor Rev	0.74 in	18.80 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



- Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.
- * Accuracy will be affected by belt stretch under heavier loads

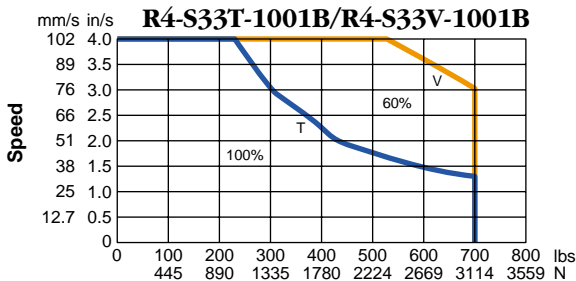
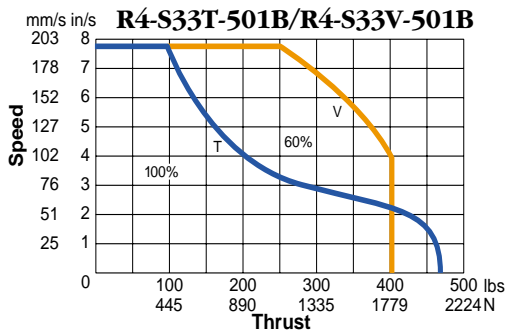
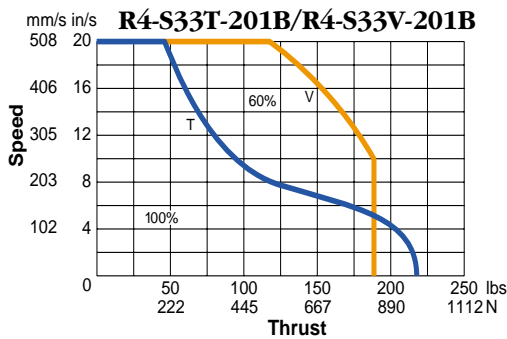
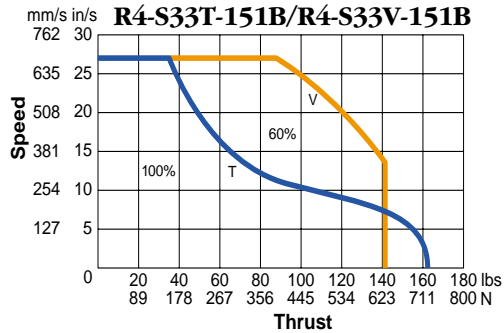
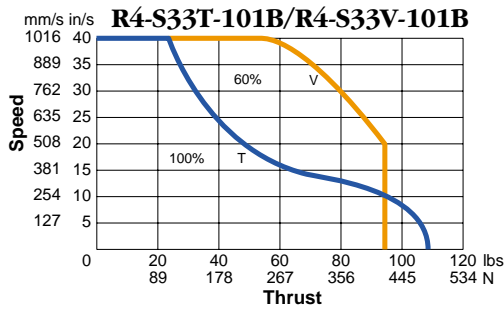


To configure your system see page B-114.



Ball Screw Models

Rodless Actuators



R4-S33(T/V)-101B-P: 1:1 Timing Belt, 1 rev/inch Ballscrew
R4-S33(T/V)-101B-I: 1:1 Inline Coupling, 1 rev/inch Ballscrew

Min. Backdrive Load	30 lbs	133 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R4-S33(T/V)-151B: 1.5:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	40 lbs	178 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R4-S33(T/V)-201B: 2:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	45 lbs	200 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R4-S33(T/V)-501B: 5:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	100 lbs	445 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R4-S33(T/V)-1001B: 10:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	200 lbs	890 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

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

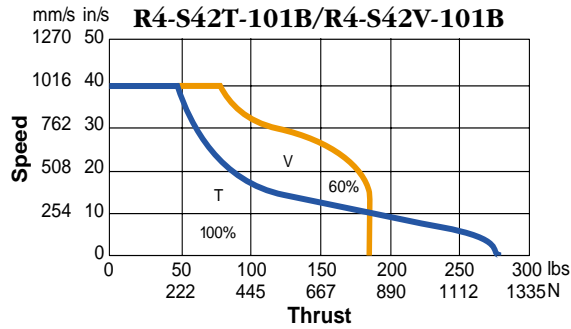
1B

40.0	35.4	28.4	19.5	14.2	10.8	8.5	6.9	Critical Speed (in/sec)
6 thru 36	42	48	60	72	84	96	108	Stroke (inches)
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



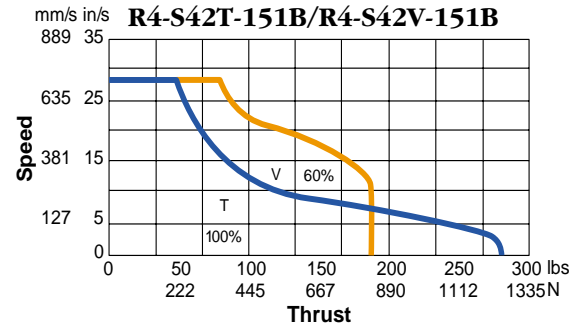


High Speed Ball Screw Models



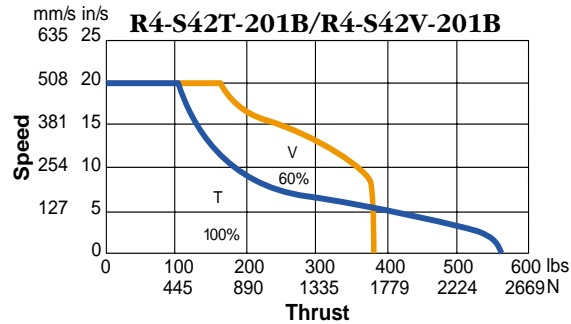
R4-S42(T/V)-101B-P: 1:1 Timing Belt, 1 rev/inch Ballscrew
R4-S42(T/V)-101B-I: 1:1 Inline Coupling, 1 rev/inch Ballscrew

Min. Backdrive Load	30 lbs	133 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



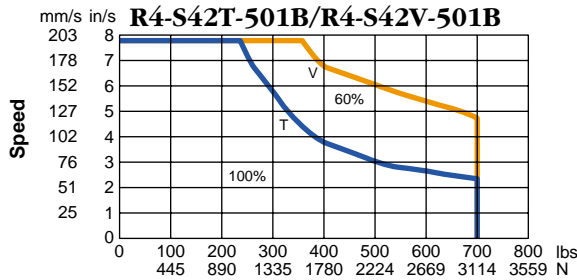
R4-S42(T/V)-151B: 1.5:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	40 lbs	178 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



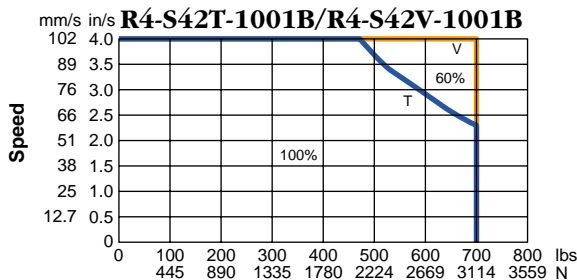
R4-S42(T/V)-201B: 2:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	45 lbs	200 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-S42(T/V)-501B: 5:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	100 lbs	445 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-S42(T/V)-1001B: 10:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	200 lbs	890 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

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

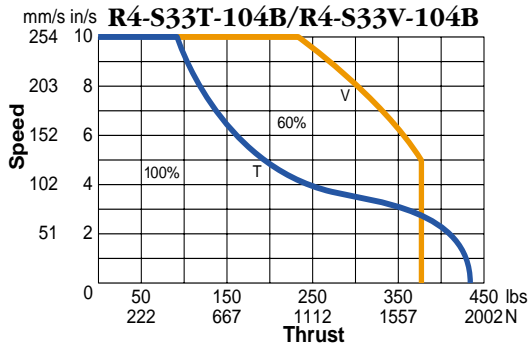
1B	40.0	35.4	28.4	19.5	14.2	10.8	8.5	6.9	Critical Speed (in/sec)
	6 thru 36	42	48	60	72	84	96	108	Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



To configure your system see page B-114.

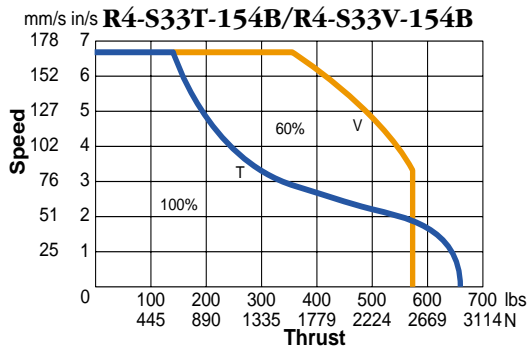


Ball Screw Models



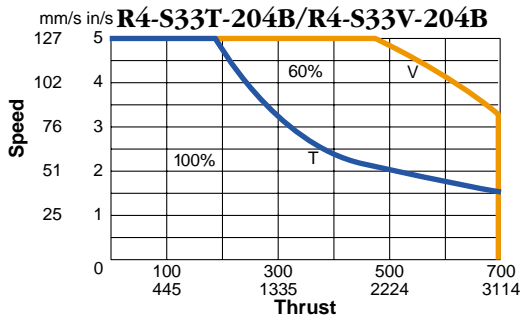
R4-S33(T/V)-104B-P: 1:1 Timing Belt, 4 rev/inch Ballscrew
R4-S33(T/V)-104B-I: 1:1 Inline Coupling, 4 rev/inch Ballscrew

Min. Backdrive Load	120 lbs	534 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



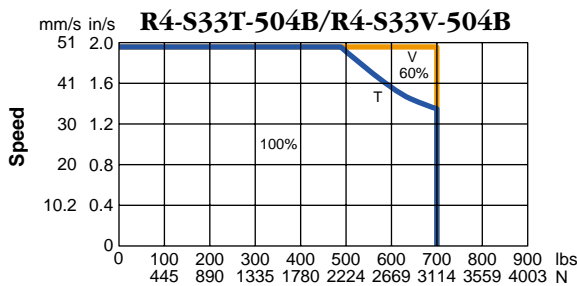
R4-S33(T/V)-154B: 1.5:1 Timing Belt, 4 rev/inch Ballscrew

Min. Backdrive Load	160 lbs	712 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-S33(T/V)-204B: 2:1 Timing Belt, 4 rev/inch Ballscrew

Min. Backdrive Load	180 lbs	801 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-S33(T/V)-504B: 5:1 Helical Gears, 4 rev/inch Ballscrew

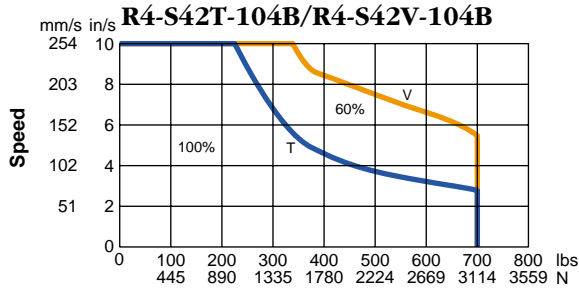
Min. Backdrive Load	450 lbs	2002 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

• Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.



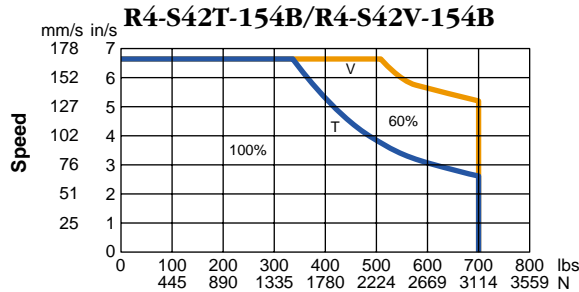


Ball Screw Models



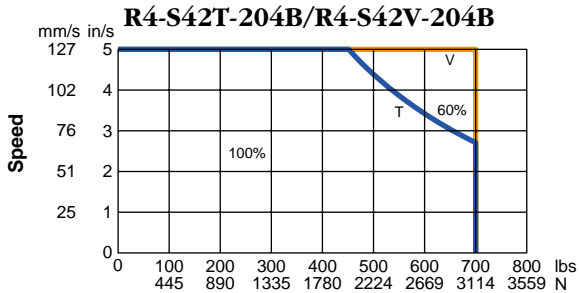
R4-S42(T/V)-104B-P: 1:1 Timing Belt, 4 rev/inch Ballscrew
R4-S42(T/V)-104B-I: 1:1 Inline Coupling, 4 rev/inch Ballscrew

Min. Backdrive Load	120 lbs	534 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



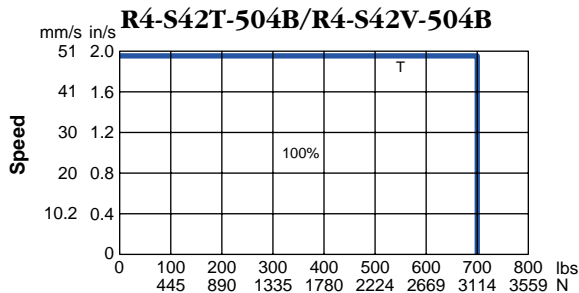
R4-S42(T/V)-154B: 1.5:1 Timing Belt, 4 rev/inch Ballscrew

Min. Backdrive Load	160 lbs	712 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-S42(T/V)-204B: 2:1 Timing Belt, 4 rev/inch Ballscrew

Min. Backdrive Load	180 lbs	800 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-S42(T/V)-504B: 5:1 Helical Gears, 4 rev/inch Ballscrew

Min. Backdrive Load	450 lbs	2002 N
Backlash	0.015 in	0.38 mm
Repeatability	±0.0005 in	±0.013 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



To configure your system see page B-114.



• Performance using S6000 Series, *NextStep*, and *SmartStep* Controls.

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

4B	10.0	8.8	7.1	4.9	3.6	2.7	2.1	1.7	Critical Speed (in/sec)
6 thru 36	42	48	60	72	84	96	108		Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



How To Order

Steps to Ordering a Complete R4-S System

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

- found the Base Model that meets your speed, thrust and repeatability requirements (pages B-108 to B-111), with a comfortable safety margin,
- verified that the R4-S meets your carriage loading requirements, and
- chosen a control compatible with the S33 or S42 motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin (30% reserve for steppers).

Belt driven units generally move light loads at high speed over longer lengths. Screw driven units are recommended for high thrust and vertical applications.

S33 motor wiring (x = N, T or V)

N 8 leads, no quick disconnect.

T Series, quick disconnect and 12 foot cable included.

V Parallel, quick disconnect and 12 foot cable included.

All R4-S42 actuators include a motor quick disconnect and 12 ft [3.7 m] cable.

2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.

Make It
An **IDEAL**
System

See Intro
Pages 6 & 7



1		2		3		4			5
Base Model		Stroke Length		Motor Orientation		Mounting			Options
Belt Drive Models									
R4		Drive Ratio	Belt			Actuator Carriage			
			T						
x = N, T or V	R4-S33x-30T R4-S33x-50T R4-S33x-100T	6 12 18	48 60 72	AR Over Right* BR Behind Right CR Under Right		A Feet	S Single	E English	EMK Encoder GL
x = T or V	R4-S42x-20T R4-S42x-50T R4-S42x-100T	24 30 36 42	84 96 108	AL Over Left* BL Behind Left CL Under Left		B T-Nuts	Dnn Double	M Metric	Left Lube Port GR Right Lube Port
						mm = distance between carriage centers			
Screw Drive Models									
R4		Drive Ratio	Screw			Actuator Carriage			
	Ball Screw	6 12 18 24 30 36 42	48 60 72 84 96 108	I In-line (only with 10 ratio) P Parallel Under* PR Parallel Right PL Parallel Left		A Feet	S Single	E English	BS24/BS115/ BS240 Brake on Screw EM Encoder GL
x = N, T or V	R4-S33x-101B R4-S33x-104B R4-S33x-151B R4-S33x-154B R4-S33x-201B R4-S33x-204B R4-S33x-501B R4-S33x-504B R4-S33x-1001B R4-S33x-1004B					B T-Nuts	D Double	M Metric	Left Lube Port GR Right Lube Port
x = T or V	R4-S42x-101B R4-S42x-104B R4-S42x-151B R4-S42x-154B R4-S42x-201B R4-S42x-204B R4-S42x-501B R4-S42x-504B R4-S42x-1001B R4-S42x-1004B			*Only with X34, X42, S33 motors		C Flanges			





How To Order

Rodless Actuator
300 lbs Payload
Step Motor

R4-S

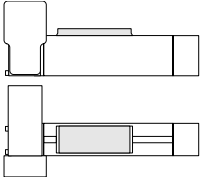
Rodless Actuators

3. Motor Orientation

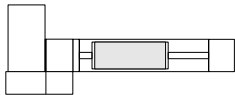
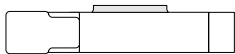
Dimensional drawings start on page B-124.

Belt Drive Models

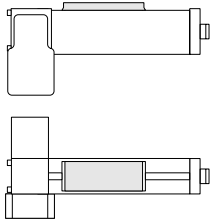
AR - Over Right



BR - Behind Right



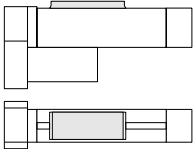
CR - Under Right



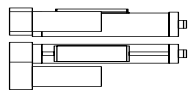
For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify AL, BL, CL.

Screw Drive Models

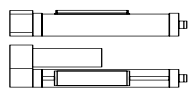
P - Parallel Underneath



PR - Parallel Right Side



PL - Parallel Left Side



I - Inline

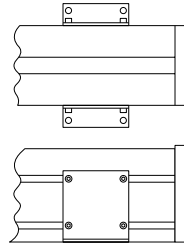


4. Mounting

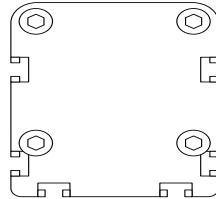
Dimensional drawings start on page B-127.

Actuator

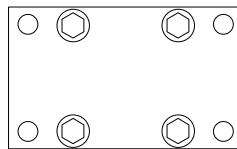
A - Angle Brackets



B - T-Nuts



C - Front and Rear Flanges



Option C (flanges) available only with -P screw-drive actuators.

Carriage

S - Single carriage

D - Dual carriage (screw-driven actuators). Includes a second free-floating carriage.

Dnn - Dual carriage (belt-driven actuators). Includes a second carriage rigidly fixed to the driven carriage.

nn is the distance between carriage centers (minimum distance is 10").

Be sure to order additional travel length to account for the second carriage and the distance between the two carriages.

English/Metric

Specifies actuator mounting and carriage option with Metric (M) or English (E) mounting provisions.

5. Other Options

BS - Holding Brake

75 in-lb electrically released brake mounted on the lead screw shaft. *Available with screw drive parallel models only. Not available with mounting option C (flanges).*

EMK - Encoder

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

GL - Left Lube Port

Lube access ports on left side of actuator allow easy re-lubrication of moving parts.

GR - Right Lube Port

Lube access ports on right side of actuator allow easy re-lubrication of moving parts.

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

- RP1 Normally open Hall-effect
- RP2 Normally closed Hall-effect
- RPS-1 Normally open reed
- RPS-2 Normally closed reed

Additional T-Nuts

TNR4-M - One pair Metric

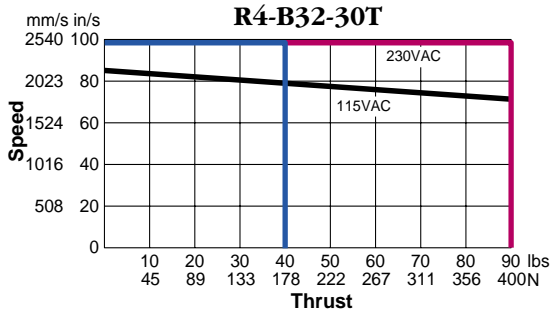
TNR4-E - One pair English

7. Compatible Controls

Model	Description
<i>NextStep</i>	Microstepping drive
S6002	2-axis microstepping drive
S6961	<i>IDEAL</i> TM microstepping programmable Smart Drive
S6962	2-axis <i>IDEAL</i> TM microstepping Smart Drive
<i>SmartStep</i>	1-axis <i>IDEAL</i> TM programmable microstepping Smart Drive

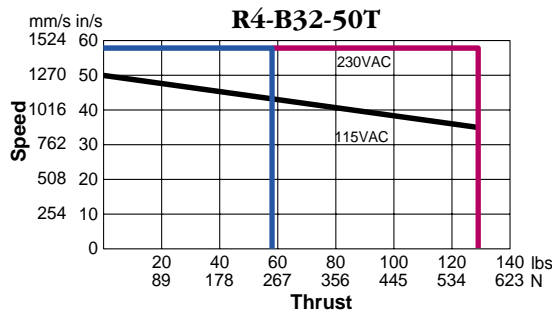


Belt-Drive Models



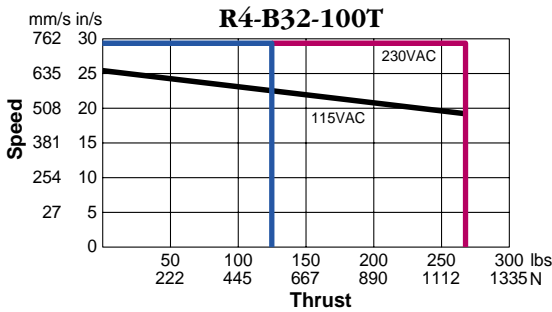
R4-B32-30T: 3:1 Timing Belt, 7.4 inch/rev Belt

Max. No-Load Accel.	770 in/s ²	19.5 m/s ²
Travel per Motor Rev	2.47 in	62.74 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R4-B32-50T: 5:1 Helical Gears, 7.4 inch/rev Belt

Max. No-Load Accel.	770 in/s ²	19.5 m/s ²
Travel per Motor Rev	1.45 in	36.83 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R4-B32-100T: 10:1 Helical Gears, 7.4 inch/rev Belt

Max. No-Load Accel.	770 in/s ²	19.5 m/s ²
Travel per Motor Rev	0.74 in	18.80 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm

■ Continuous duty region
(230 VAC/115VAC)
(max rms torque, over
any 10 minute interval)

■ Intermittent duty max region
(max 2 second duration)



- Performance using B8000 Series Controls.
- Accuracy will be affected by belt stretch under heavier loads.

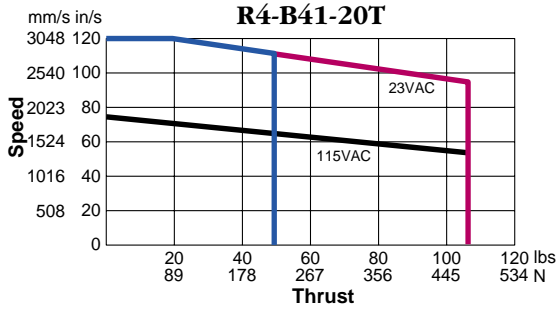


Performance

Rodless Actuator
300 lbs Payload
Brushless Servo

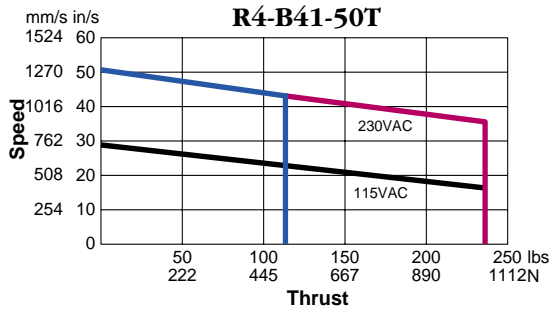
R4-B

Belt-Drive Models



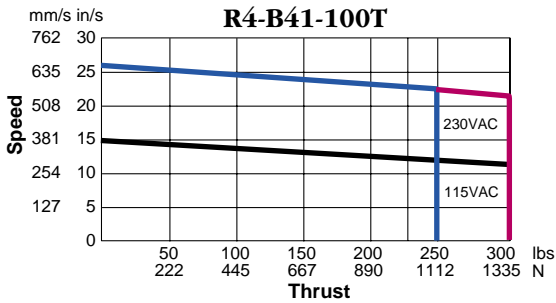
R4-B41-20T: 2:1 Timing Belt, 7.4 inch/rev Belt

Max. No-Load Accel.	770 in/s ²	19.5 m/s ²
Travel per Motor Rev	3.71 in	94.23 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R4-B41-50T: 5:1 Helical Gears, 7.4 inch/rev Belt

Max. No-Load Accel.	770 in/s ²	19.5 m/s ²
Travel per Motor Rev	1.45 in	36.83 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



R4-B41-100T: 10:1 Helical Gears, 7.4 inch/rev Belt

Max. No-Load Accel.	770 in/s ²	19.5 m/s ²
Travel per Motor Rev	0.74 in	18.80 mm
Repeatability	±0.003 in	±0.08 mm
Belt Accuracy	±0.010 in/ft	±0.25 mm



Rodless Actuators



- Performance using B8000 Series Controls.
- * Accuracy will be affected by belt stretch under heavier loads.

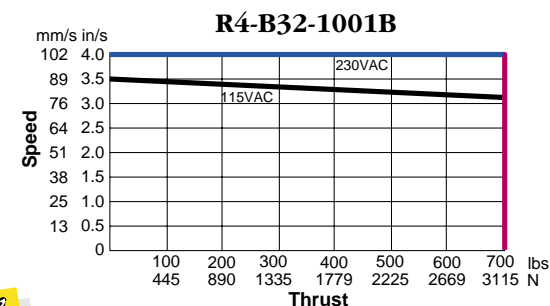
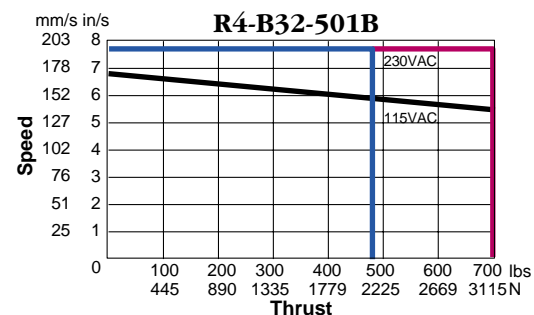
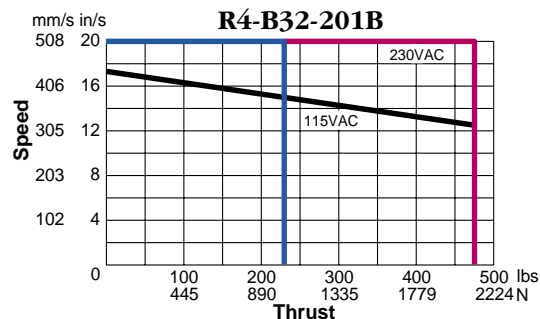
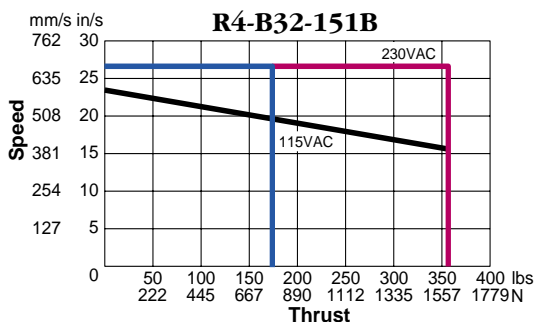
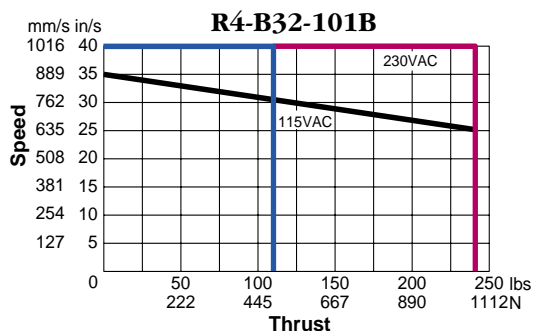


To configure your system see page B-122.



High Speed Ball Screw Models

Rodless Actuators



R4-B32-101B-P: 1:1 Timing Belt, 1 rev/inch Ballscrew
R4-B32-101B-I: 1:1 Inline Coupling, 1 rev/inch Ballscrew

Min. Backdrive Load	15 lbs	67 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R4-B32-151B: 1.5:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R4-B32-201B: 2:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R4-B32-501B: 5:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	50 lbs	222 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R4-B32-1001B: 10:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	312 in/s ²	7.9 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

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

1B	40.0	35.4	28.4	19.5	14.2	10.8	8.5	6.9	Critical Speed (in/sec)
	6 thru 36	42	48	60	72	84	96	108	Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



To configure your system see page B-122.



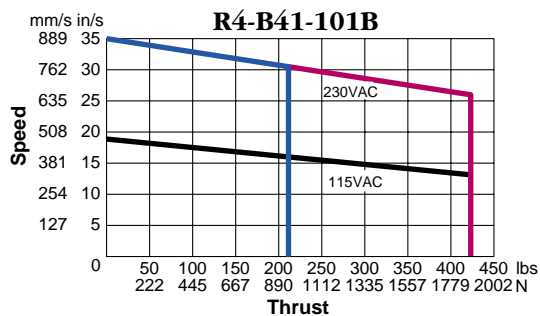


Performance

Rodless Actuator
300 lbs Payload
Brushless Servo

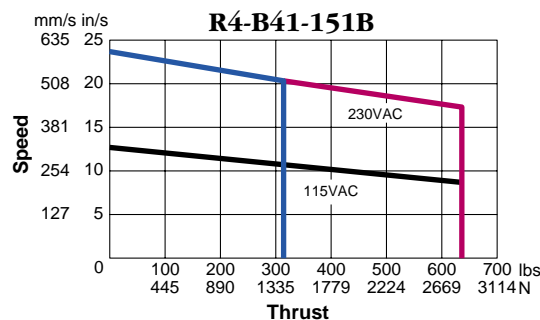
R4-B

High Speed Ball Screw Models



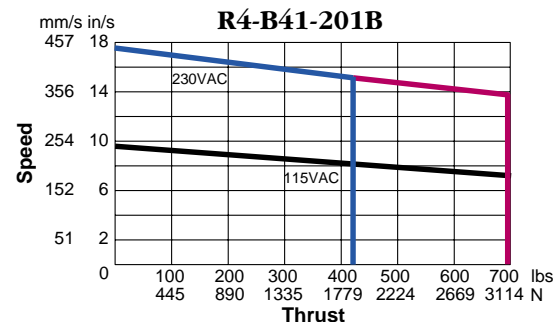
R4-B41-101B-P: 1:1 Timing Belt, 1 rev/inch Ballscrew
R4-B41-101B-I: 1:1 Inline Coupling, 1 rev/inch Ballscrew

Min. Backdrive Load	15 lbs	67 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



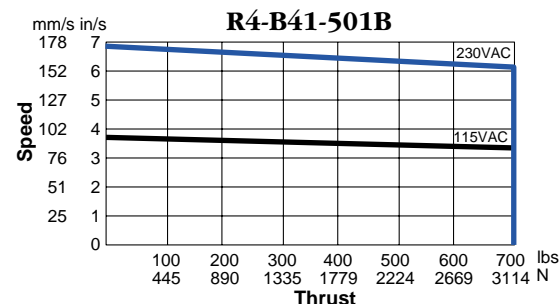
R4-B41-151B: 1.5:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



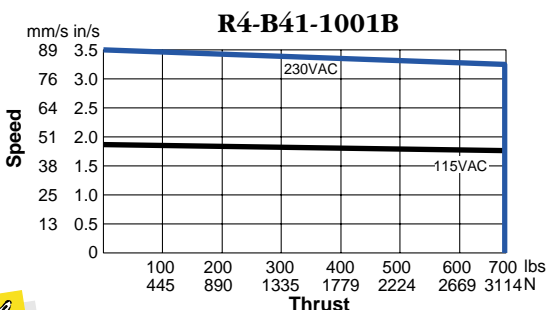
R4-B41-201B: 2:1 Timing Belt, 1 rev/inch Ballscrew

Min. Backdrive Load	20 lbs	89 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-B41-501B: 5:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	50 lbs	222 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm



R4-B41-1001B: 10:1 Helical Gears, 1 rev/inch Ballscrew

Min. Backdrive Load	100 lbs	445 N
Max. No-Load Accel.	266 in/s ²	6.8 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

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

1B

Stroke (inches)	6 thru 36	42	48	60	72	84	96	108	Critical Speed (in/sec)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	40.0, 35.4, 28.4, 19.5, 14.2, 10.8, 8.5, 6.9
Column Load Limit (lbs)									

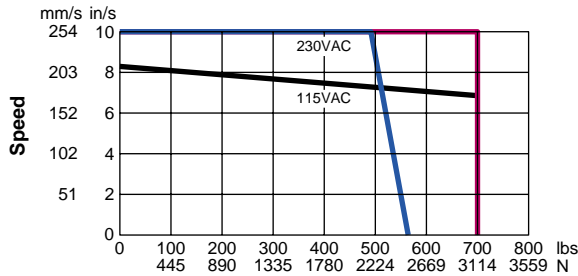


To configure your system see page B-122.



Ball Screw Models

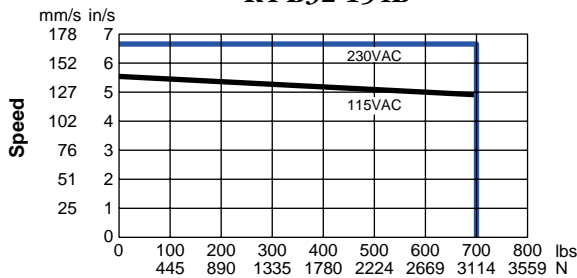
R4-B32-104B



R4-B32-104B-P: 1:1 Timing Belt, 4 rev/inch Ballscrew
R4-B32-104B-I: 1:1 Inline Coupling, 4 rev/inch Ballscrew

Min. Backdrive Load	75 lbs	334 N
Max. No-Load Accel.	308 in/s ²	7.8 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

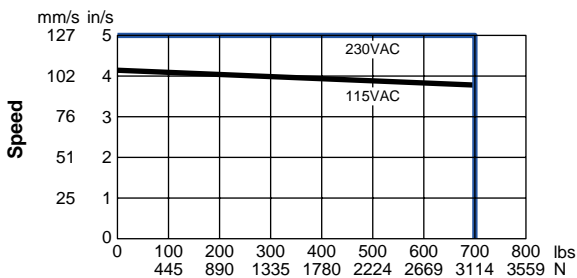
R4-B32-154B



R4-B32-154B: 1.5:1 Timing Belt, 4 rev/inch Ballscrew

Min. Backdrive Load	85 lbs	378 N
Max. No-Load Accel.	317 in/s ²	8.1 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

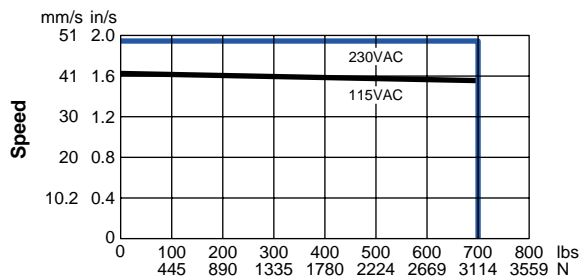
R4-B32-204B



R4-B32-204B: 2:1 Timing Belt, 4 rev/inch Ballscrew


Min. Backdrive Load	90 lbs	400 N
Max. No-Load Accel.	137 in/s ²	3.5 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm


R4-B32-504B



R4-B32-504B: 5:1 Helical Gears, 4 rev/inch Ballscrew

Min. Backdrive Load	225 lbs	1001 N
Max. No-Load Accel.	294 in/s ²	7.5 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

 Continuous duty region (230 VAC/115VAC) (max rms torque, over any 10 minute interval)

 Intermittent duty max region (max 2 second duration)

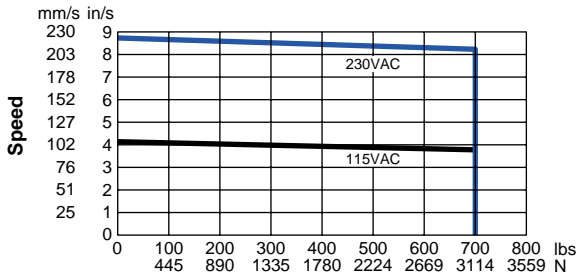
• Performance using B8000 Series Controls.





Ball Screw Models

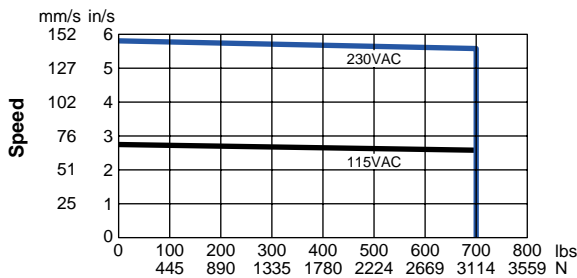
R4-B41-104B



R4-B41-104B-P: 1:1 Timing Belt, 4 rev/inch Ballscrew
 R4-B41-104B-I: 1:1 Inline Coupling, 4 rev/inch Ballscrew

Min. Backdrive Load	75 lbs	334 N
Max. No-Load Accel.	380 in/s ²	9.65 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

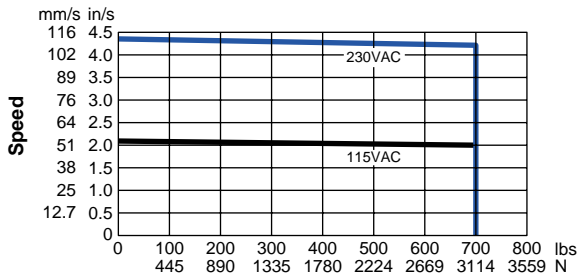
R4-B41-154B



R4-B41-154B: 1.5:1 Timing Belt, 4 rev/inch Ballscrew

Min. Backdrive Load	85 lbs	378 N
Max. No-Load Accel.	345 in/s ²	8.8 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

R4-B41-204B



R4-B41-204B: 2:1 Timing Belt, 4 rev/inch Ballscrew

Min. Backdrive Load	90 lbs	400 N
Max. No-Load Accel.	290 in/s ²	7.4 m/s ²
Backlash	0.015 in	0.38 mm
Repeatability	±0.001 in	±0.025 mm
Lead Accuracy	±0.005 in/ft	±0.13 mm

 Continuous duty region (230 VAC/115VAC) (max rms torque, over any 10 minute interval)

 Intermittent duty max region (max 2 second duration)



To configure your system see page B-122.

• Performance using B8000 Series Controls.

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

	10.0	8.8	7.1	4.9	3.6	2.7	2.1	1.7	Critical Speed (in/sec)
4B	6 thru 36	42	48	60	72	84	96	108	Stroke (inches)
	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Column Load Limit (lbs)



How To Order

Steps to Ordering a Complete R4-B System

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

- found the R4-B Base Model that meets your speed, thrust and repeatability requirements (pages B-116 to B-121), with a comfortable safety margin,
- verified that the R4-B meets your carriage loading requirements, and
- chosen a control compatible with the B32 or B41 motor.

IDC recommends using the application data form on pages B-13 to B-15. Your local IDC Distributor and our Applications Engineering Department are available to help with your selection.

1. Base Model (Motor and Transmission)

Choose the model with sufficient speed and thrust with a comfortable safety margin.

Belt driven units generally move light loads at high speed over longer lengths. Screw driven units are recommended for high thrust and vertical applications.

The B32 and B41 motors feature rugged and environmentally protected IP65 construction. Both motors include a 2000 line incremental encoder and 12 ft [3.7 m] MS style motor and encoder connectors.

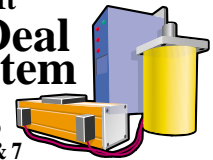
2. Stroke Length

When specifying stroke length, it is best to oversize by one standard length. Extra length allows controlled emergency stopping when an end-of-travel limit switch is reached, without impacting the physical end of stroke.

In-between lengths are also available. Specify stroke lengths in whole numbers of inches.

Make It
An **IDEAL**
System

See Intro
Pages 6 & 7



1 Base Model				2 Stroke Length		3 Motor Orientation		4 Mounting			5 Options
Belt Drive Models											
R4	Motor	Drive Ratio	Belt					Actuator Carriage			
			T					Foot	Single	English	
	R4-B32-30T			6	48	AR	Over Right*	A	S	E	BM24/BM115/ BM240
	R4-B32-50T			12	60	BR	Behind Right	B	D _{nm}	M	Brake on Motor
	R4-B32-100T			18	72	CR	Under Right	T-Nuts	Double	Metric	GL
	R4-B41-20T			24	84	AL	Over Left*	nm = distance between carriage centers			Left Lube Port
	R4-B41-50T			30	96	BL	Behind Left				GR
	R4-B41-100T			36	108	CL	Under Left				Right Lube Port
				42			*Only with B32 motor				
Screw Drive Models											
R4	Motor	Drive Ratio	Screw					Actuator Carriage			
								Foot	Single	English	
	Ball Screw			6	48	I	In-line (only with 10 ratio)	A	S	E	BM24/BM115/ BM240
	R4-B32-101B	R4-B32-104B		12	60	P	Parallel Under*	B	D	M	Brake on Motor
	R4-B32-151B	R4-B32-154B		18	72	PR	Parallel Right	T-Nuts	Double	Metric	BS24/BS115/ BS240
	R4-B32-201B	R4-B32-204B		24	84	PL	Parallel Left	C			Brake on Screw
	R4-B32-501B	R4-B32-504B		30	96		*Only with X34, X42, B32 motors	Flanges			GL
	R4-B32-1001B	R4-B32-1004B		36	108						Left Lube Port
	R4-B41-101B	R4-B41-104B		42							GR
	R4-B41-151B	R4-B41-154B									Right Lube Port
	R4-B41-201B	R4-B41-204B									
	R4-B41-501B	R4-B41-504B									
	R4-B41-1001B	R4-B41-1004B									





How To Order

Rodless Actuator
300 lbs Payload
Brushless Servo

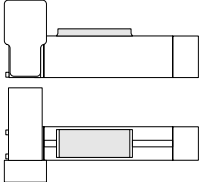
R4-B

3. Motor Orientation

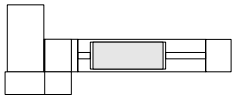
Dimensional drawings start on page B-124.

Belt Drive Models

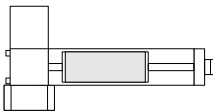
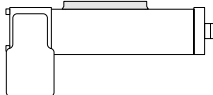
AR – Over Right



BR – Behind Right



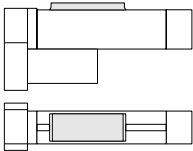
CR – Under Right



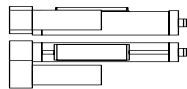
For belt drive models with the drive housing to the left side of the actuator and motor orientation reversed, specify AL, BL, CL.

Screw Drive Models

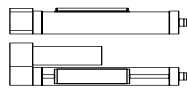
P – Parallel Underneath



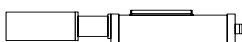
PR – Parallel Right Side



PL – Parallel Left Side



I – In-Line

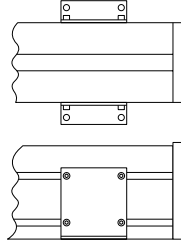


4. Mounting

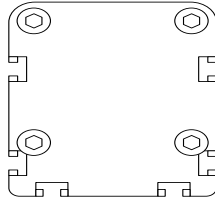
Dimensional drawings start on page B-127.

Actuator

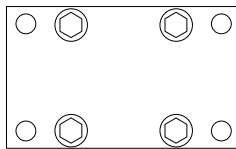
A – Angle Brackets



B – T-Nuts



C – Front and Rear Flanges



Option C (flanges) available only with -P screw-drive actuators.

Carriage

S – Single carriage

D – Dual carriage (screw-driven actuators). Includes a second free-floating carriage.

Dnn – Dual carriage (belt-driven actuators). Includes a second carriage rigidly fixed to the driven carriage.

nn is the distance between carriage centers (minimum distance is 10").

Be sure to order additional travel length to account for the second carriage and the distance between the two carriages.

English/Metric

Specifies actuator mounting and carriage option with Metric (M) or English (E) mounting provisions.

5. Other Options

BM – Motor Holding Brake

240 in-lb holding brake mounted on B41 motor, or 60 in-lbs holding brake mounted on B32 motor.

BS – Holding Brake

75 in-lb electrically released brake mounted on the lead screw shaft. *Available with screw drive parallel models only. Not available with mounting option C (flanges).*

GL – Left Lube Port

Lube access ports on left side of actuator allow easy re-lubrication of moving parts.

GR – Right Lube Port

Lube access ports on right side of actuator allow easy re-lubrication of moving parts.

6. Accessories

Magnetic Position Sensors

Position sensors are available for stopping position indication, for changing direction or speed, end-of-travel sensing, etc.

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

RP1 Normally open Hall-effect

RP2 Normally closed Hall-effect

RPS-1 Normally open reed

RPS-2 Normally closed reed

Additional T-Nuts

TNR4-M – One pair Metric

TNR4-E – One pair English

7. Compatible Controls

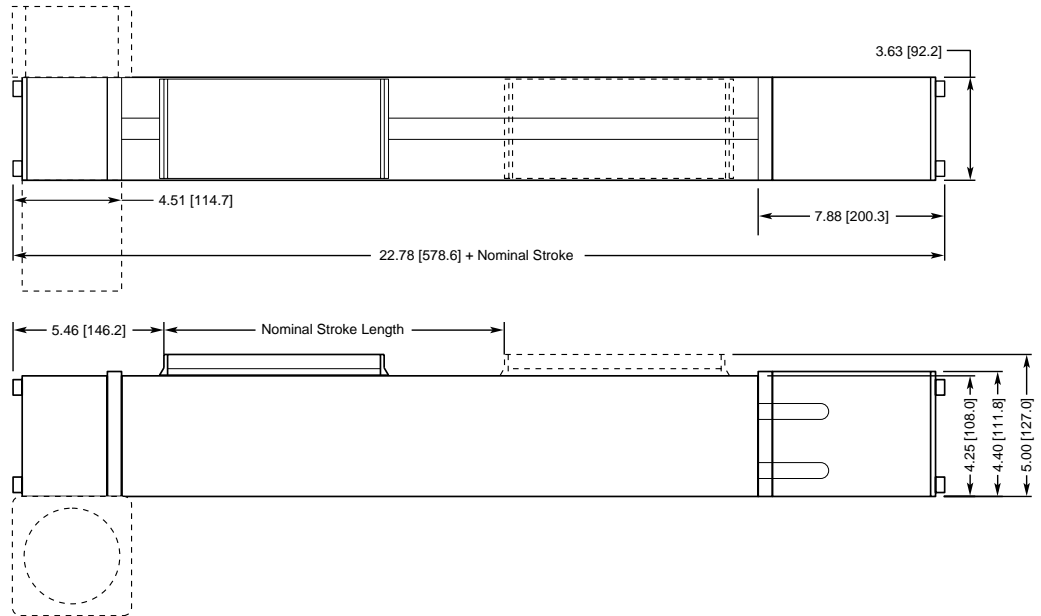
Model	Description
B8001	Digital servo drive
B8961	<i>IDEAL™</i> Programmable digital servo Smart Drive
B8962	2-axis <i>IDEAL™</i> Programmable digital servo Smart Drive

Rodless Actuators

Dimensions

Rodless Actuators

- AutoCAD® drawings available on diskette
- Six motor orientations shown below & right
- Include motor dimensions; see pages B-128 - B-130



Motor Orientation Options

-AL Over Left

S33 and B32 Motors

Compatible Mountings

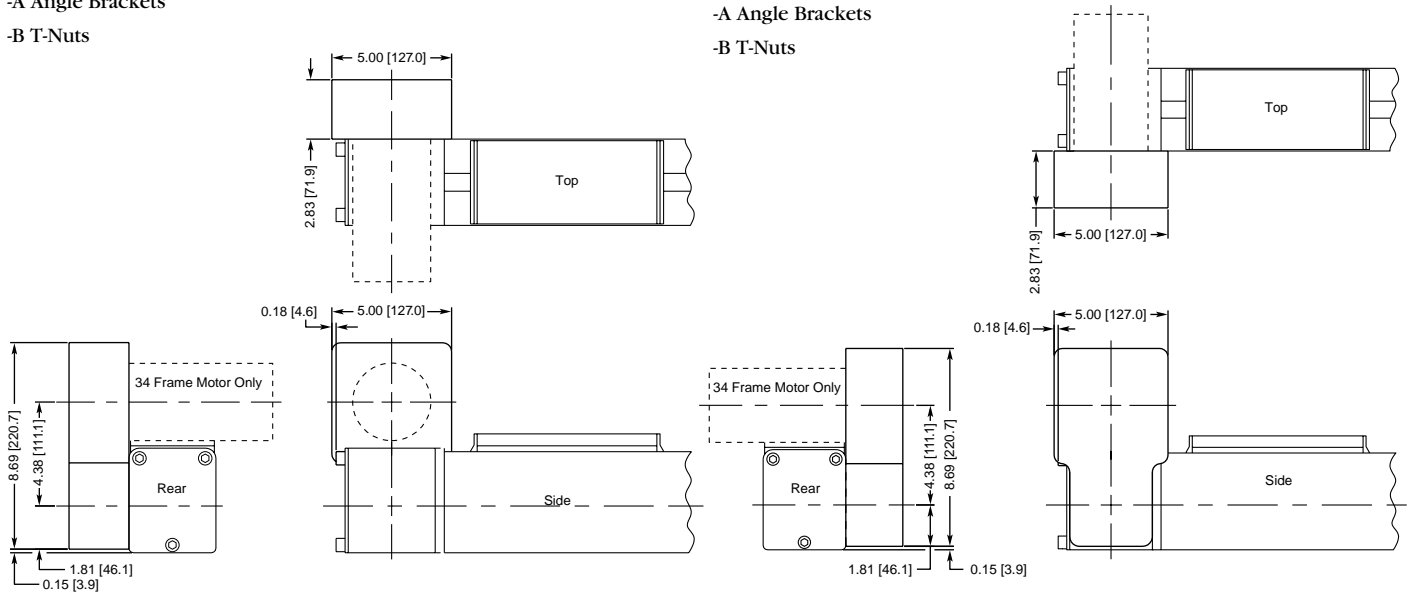
- A Angle Brackets
- B T-Nuts

-AR Over Right

S33 and B32 Motors Only

Compatible Mountings

- A Angle Brackets
- B T-Nuts

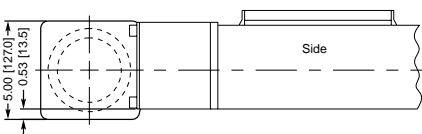
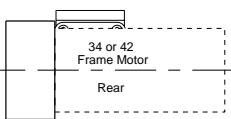
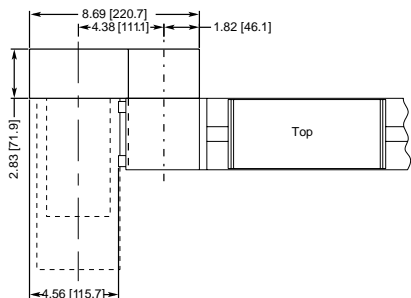


Belt Drive Dimensions

-BL Behind Left

Compatible Mountings

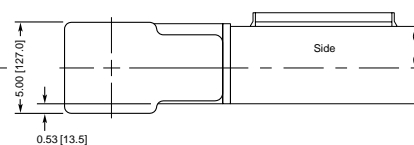
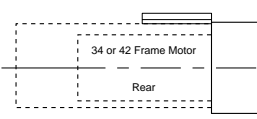
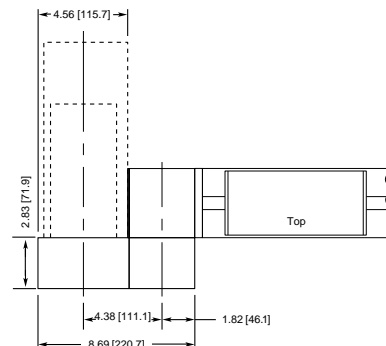
- A Angle Brackets
- B T-Nuts



-BR Behind Right

Compatible Mountings

- A Angle Brackets
- B T-Nuts

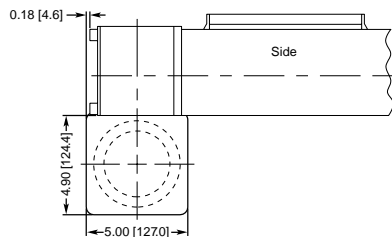
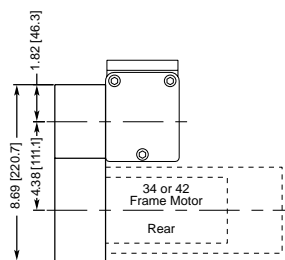
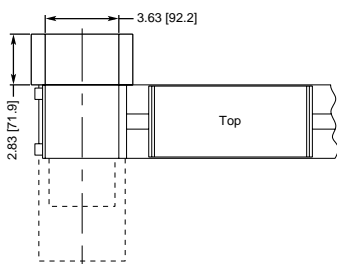


Rodless Actuators

-CL Under Left

Compatible Mountings

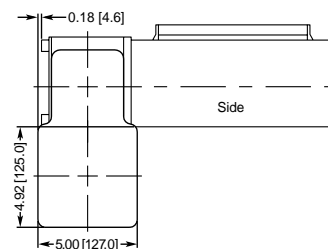
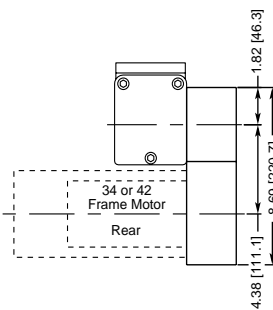
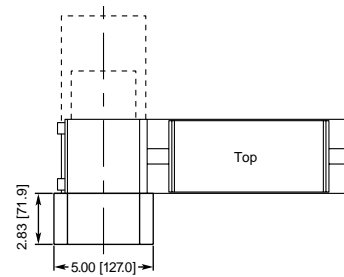
- A Angle Brackets
- B T-Nuts



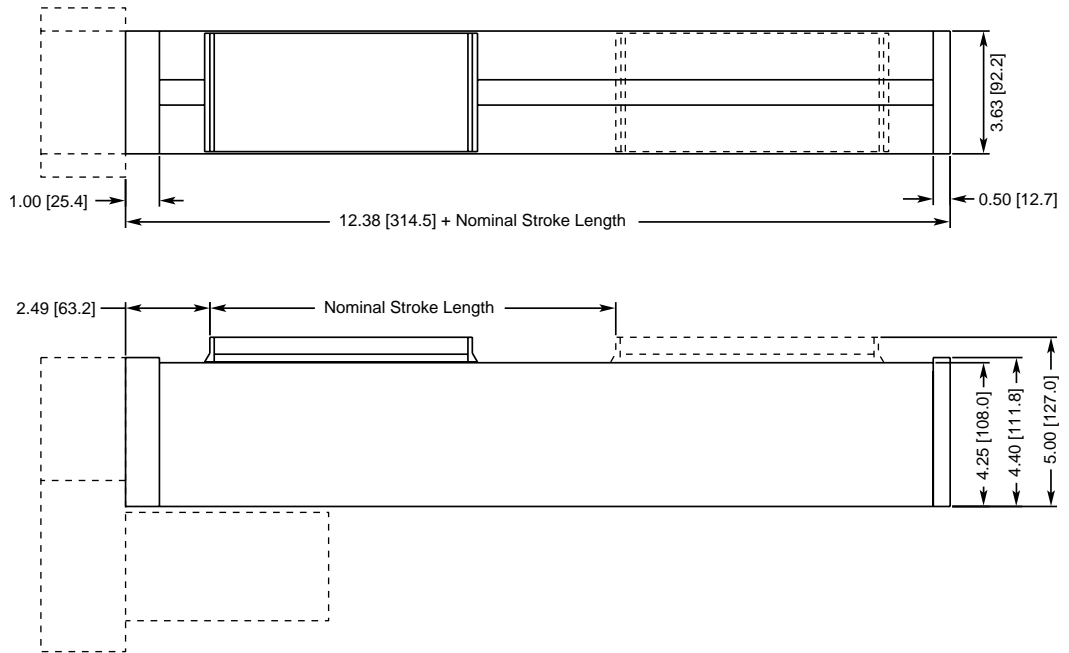
-CR Under Right

Compatible Mountings

- A Angle Brackets
- B T-Nuts



Dimensions



Rodless Actuators

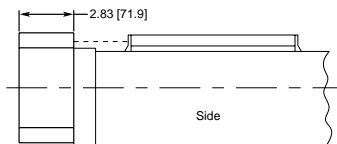
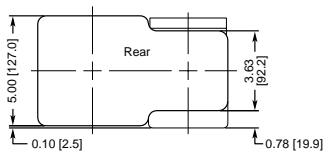
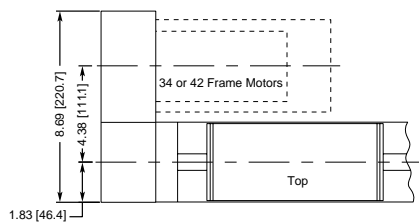
- AutoCAD® drawings available on diskette
- Four motor orientations shown below
- Include motor dimensions; see pages B-128 - B-130

Motor Orientation Options

-PL Parallel Left Side

Compatible Mountings

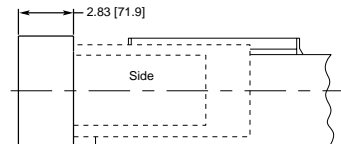
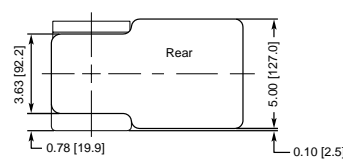
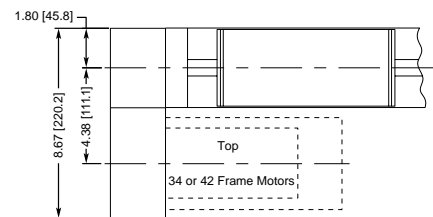
- A Angle Brackets
- B T-Nuts



-PR Parallel Right Side

Compatible Mountings

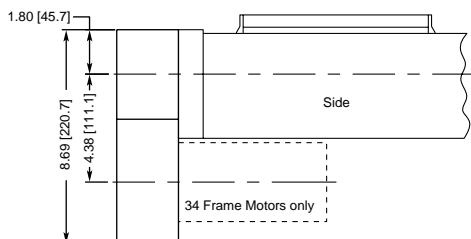
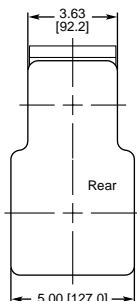
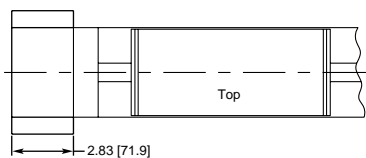
- A Angle Brackets
- B T-Nuts



-P Parallel Below

Compatible Mountings

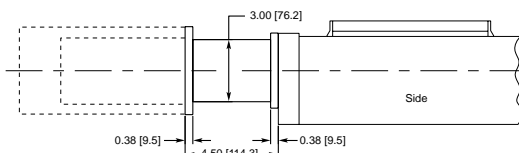
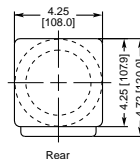
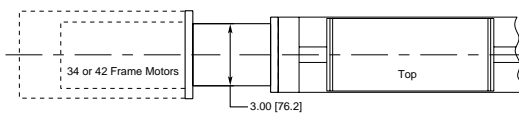
- A Angle Brackets
- B T-Nuts
- C Flanges



-I In-Line

Compatible Mountings

- A Angle Brackets
- B T-Nuts



Mounting Option Dimensions

Rodless Actuator

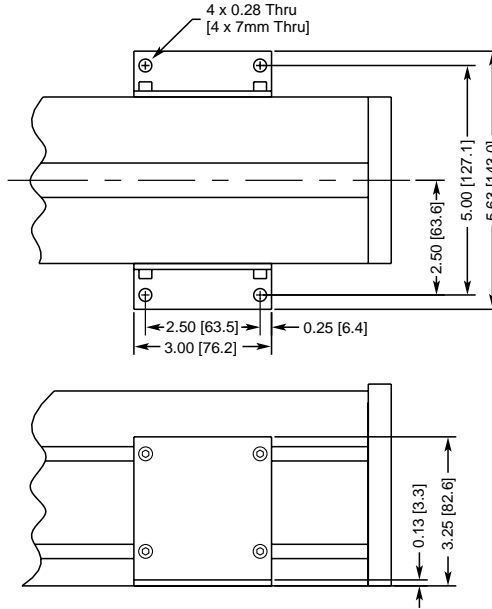
R4

Rodless Actuators

-A Adjustable Angle Brackets

Compatible Motor Orientations

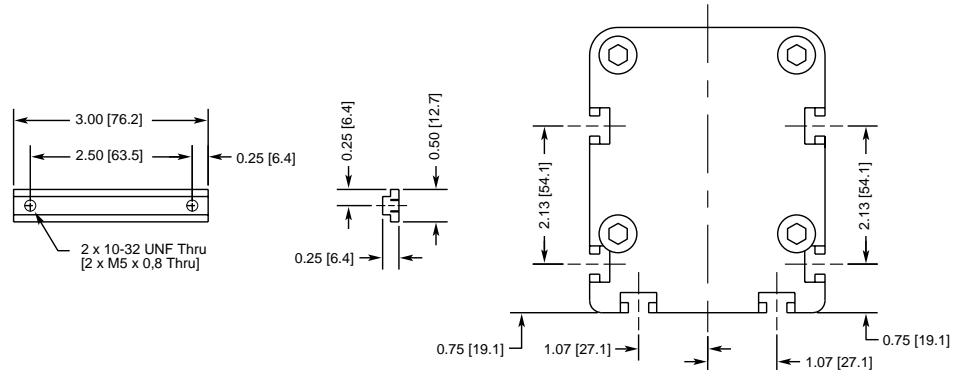
Belt	Screw
-AR	-P
-AL	-PR
-BR	-PL
-BL	-I
-CR	
-CL	



Stroke	No. of Angle Brackets
0-18	4
19-36	6
37-48	8
49-72	10
73-108	12

-B Adjustable T-Nuts

Belt	Screw
-AR	-P
-AL	-PR
-BR	-PL
-BL	-I
-CR	
-CL	

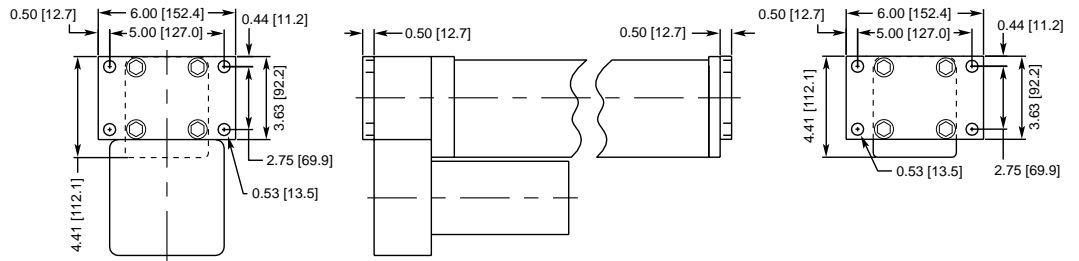


Stroke	Pairs of T-Nuts
0-18	4
19-36	6
37-48	8
49-72	10
73-108	12

-C Front & Rear Rectangular Flanges

Screw Driven Models Only

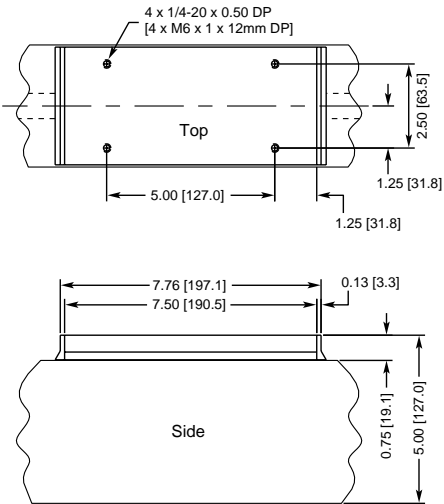
Belt	Screw
not available	-P



Carriage Dimensions

Dimensions

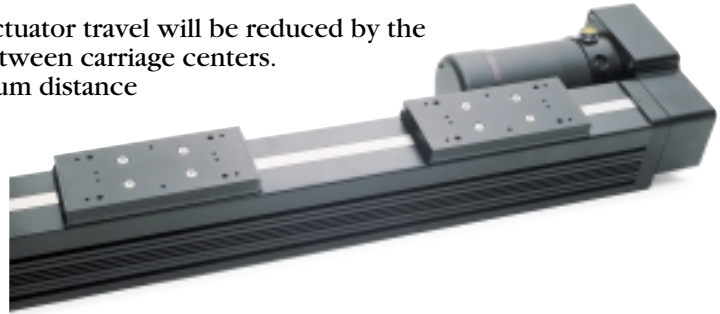
- □ S □ Single Carriage Option



- □ **Dm** □ **Dual Carriage Option**
(*nn* is the distance between carriage centers.
Omit for screw-driven actuators.)

Increase carriage capacity by supporting the load at two separate locations. For screw-driven actuators, the second carriage is attached to the internal rail bearings, but is not driven by the leadscrew. For belt-driven actuators, the second carriage is attached to the internal rail bearings and is also rigidly fixed to the driven carriage. In this case, the distance between carriage centers needs to be specified in the part number.

- Available actuator travel will be reduced by the distance between carriage centers. The minimum distance between carriage centers is 10 in [250 mm].



Motor Specifications

H4 Series

Inductance
Terminal Resistance
Hipot Breakdown Voltage
Current
 Continuous
 Peak
Torque Constant
Voltage Constant
No Load Speed
Connections

User Cabling

Anticipated Life of Brushes
Temperature

Permanent magnet 2-pole, 160 volt DC motor; replaceable brushes

12 mH
1.5 Ohms $\pm 20\%$
500 VAC
160 VDC max

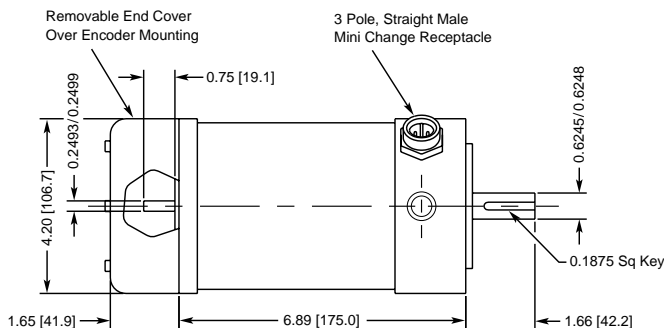
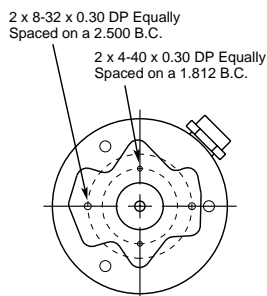
5 A max
16 A max
67 oz-in/Amp
49 V/Krpm
3,200 rpm

Quick Disconnect: 3 contact receptacle, including case ground, in anodized aluminum shell, includes 12 ft cable with molded plug

16 AWG (less than 50 ft [15m]), 14 AWG (50-100 ft [15-30m]), 10 AWG (100-200 ft [30-60m])

3 Pole, Straight Male Mini Change Receptacle

5 million cycles; 5,000 hours
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 performance curves for system duty ratings.





Motor Specifications

Rodless Actuator

R4

S33 Series

Inductance (windings)

Hipot Breakdown

Connections

User Cabling

Temperature

1.8° permanent magnet hybrid step motor

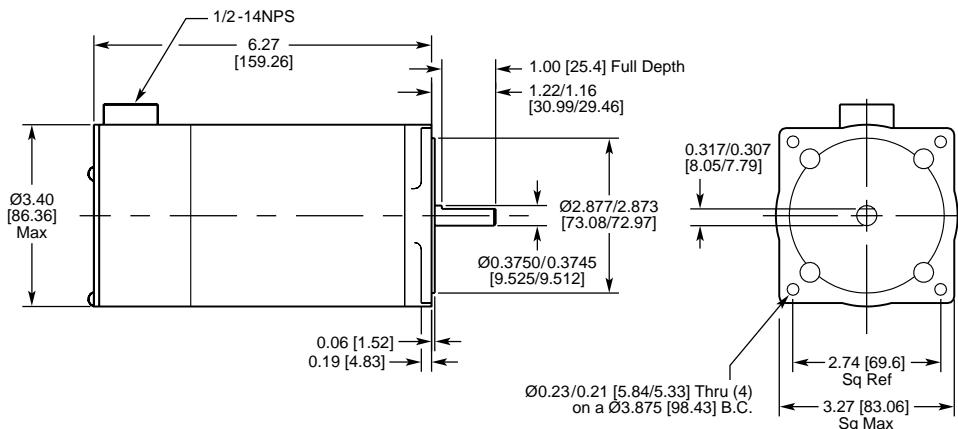
10 mH in series, 2.5 mH in parallel

750 VAC

S33N: 8 leads, 8" long each. S33T/S33V: Quick disconnect receptacle in anodized aluminum shell; includes 12 ft [3.7 m] cable with molded plug

20 AWG (less than 100 ft [30m]), 18 AWG (100-200 ft [30-60m])

212°F [100°C] Maximum allowable motor 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.



S42 Series

Inductance (windings)

Hipot Breakdown

Connections

User Cabling

Temperature

1.8° permanent magnet hybrid step motor

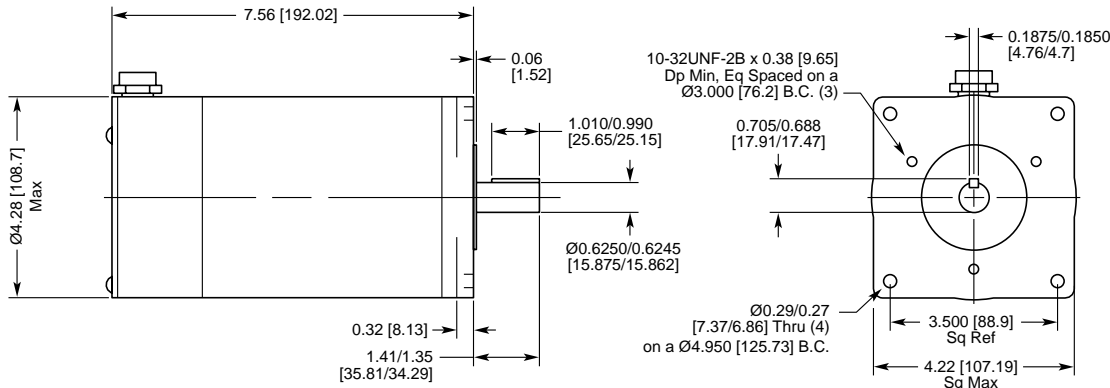
7 mH in series, 1.75 mH in parallel

750 VAC

S42T/S42V: Quick disconnect receptacle in anodized aluminum shell; includes 12 ft [3.7 m] cable with molded plug

20 AWG (less than 100 ft [30m]), 18 AWG (100-200 ft [30-60m])

212°F [100°C] Maximum allowable motor 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.



Rodless Actuators



B32 Series

Winding Data

Inductance	9.8 mH ±10%
Terminal Resistance	3.4 ohms ±10%
Torque Constant	6.2 in-lbs/Amp

Torque Output

Continuous	25 in-lbs [2.8 N-m]
Peak	105 in-lbs [11.9 N-m]
Rotor Inertia	0.0010 in-lb-sec ² [1.13 kg-cm ²]

Connections

Rare earth magnet brushless servo motor

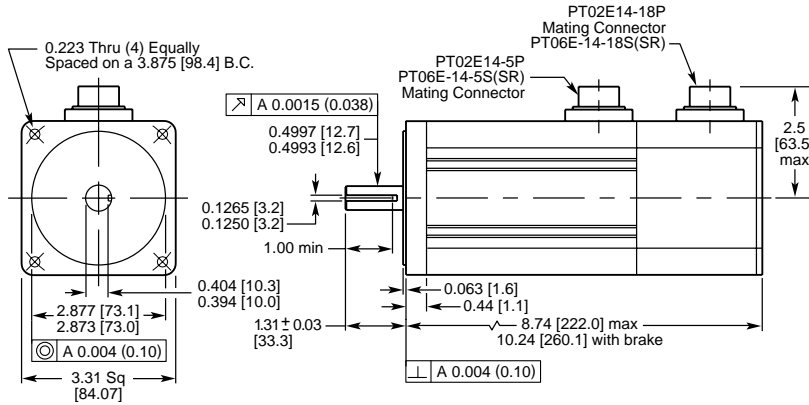
MS-type connectors for motor windings and encoder including 12 foot [3.7 m] cables with mating connectors

Temperature

212°F [100°C] Maximum allowable motor case temperature

Environmental

Rugged IP65 dust and waterproof construction



B41 Series

Winding Data

Inductance	24 mH ±10%
Terminal Resistance	3.6 ohms ±10%
Torque Constant	11.7 in-lbs/Amp

Torque Output

Continuous	48 in-lbs [5.4 N-m]
Peak	190 in-lbs [21.5 N-m]
Rotor Inertia	0.0026 in-lb-sec ² [2.9 kg-cm ²]

Connections

Rare earth magnet brushless servo motor

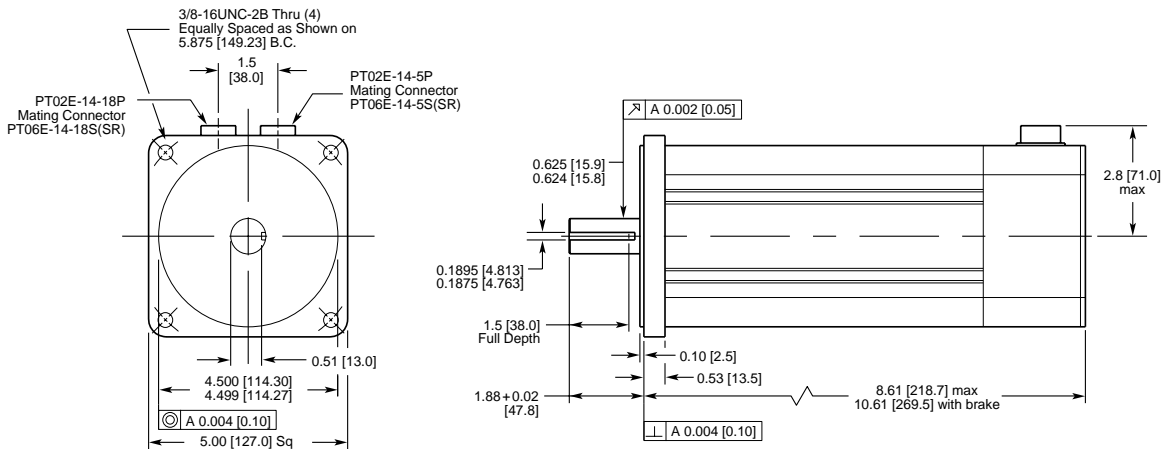
MS-type connectors for motor windings and encoder including 12 foot [3.7 m] cables with mating connectors

Temperature

212°F [100°C] Maximum allowable motor case temperature

Environmental

Rugged IP65 dust and waterproof construction



Brake Option

The -BS and -BM brake options are typically used with rodless actuators employing ball screw or belt drive assemblies. The electrically released, spring set brake prevents backdriven when the unit is at rest, or in case of a power failure.

When power is applied, the brake releases and the actuator 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 mounting options. But if the belt fails, the brake will be inoperative.

-BS available with:

(Screw driven models only)

- R2A-D, R2A-H, R2A-P/S, R2A-BN
- R3-D, R3-H, R3-P/S, R3-B
- R4-H4, R4-S, R4-B

-BM available with:

- R2A-H, R2A-B
- R3-H, R3-B
- R4-H4, R4-B

Specifications

-BS Leadscrew Brake Option

Mounting Location	Leadscrew (see diagram)
Voltage	24 VDC (-BS24), 115 VAC (-BS), 230 VAC (-BS230)
Current	0.11 Amps (R2A & R3 Series), 0.14 Amps (R4 Series)
Brake Holding Torque	20 in-lbs [2.2 N-m] (R2A & R3 Series), 75 in-lbs [8.4 N-m] (R4 Series)
Cable Length	12 feet [3.7 m]
Holding Force	See table below

Specifications

-BM Motor Brake Option

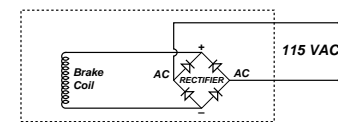
Mounting Location	Motor Shaft
Voltage w/H Motor	24 VDC (-BM24), 115 VAC (-BM), 230 VAC (-BM230)
Voltage w/B Motor	24 VDC only (-BM)
Cable Length	12 feet [3.7 m]
Holding Torque	Depends on reduction ratio
Holding Force	See table below

	Screw Type	Pitch	Holding Without Brake lbs	[N]	Holding With -BS Option lbs	[N]
R2A & R3 Series						
2B/2A	Ball	2	10	[45]	240	[1100]
5B	Ball	5	20	[89]	300	[1330]
5A	Acme	5	100-300*	[440-1330]	300	[1330]
R4 Series						
1B	Ball	1	15-100	[66-440]	550	[2400]
4B	Ball	4	75-450	[330-2000]	200	[3110]

Notes:

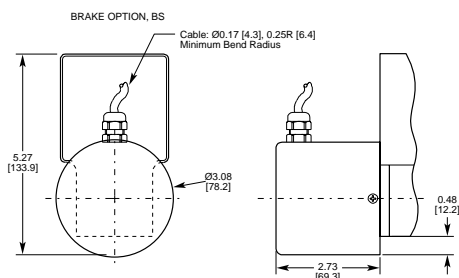
- The -BS option is not available with -I inline models.
- The -BS option is not compatible with the Rectangular Flange mounting option.
- The -BS and -BM brakes should only be used to hold static loads which are already stopped. It is not designed for dynamic braking applications.
- High vibration in a machine may cause an acme screw to backdrive at lower values than indicated here. In such applications, a brake may be necessary.

Connections

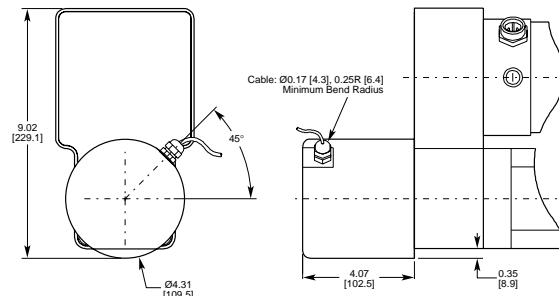


Dimensions in [mm]

R2A/R3 Series



R4 Series



Encoder Option

The -EMK option provides an incremental 1000 line rotary encoder coupled to the rear shaft of the motor.

IDC is standardizing on the 1000 line encoder as against the 500 line encoders previously supplied. The 500 line encoders are still available by using the -EM option.

Encoders are typically used with IDC's programmable microstepping motor controls, like the SmartStep for example, to improve system accuracy and provide stall detection.

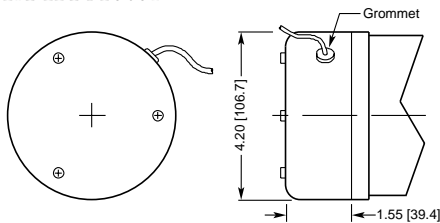
Encoders are also commonly used with displays to provide position information, or to provide position feedback to the user's controller.

-EMK/EM available with:

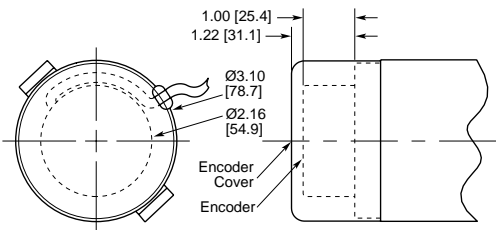
- R2A-D, R2A-H, R2A-S
- R3-D, R3-H, R3-S
- R4-H4, R4-S

Dimension Examples

R4-H4 Motor



R2A-H/R3-H Motor



Connections

Case	Braided Shield
5VDC	White
Ground	Black
A+	Red
A-	Pink
B+	Green
B-	Blue
Z+	Yellow
Z-	Orange

Electrical

Output Format

Incremental, dual square wave quadrature, with index.

Pulse Per Revolution

- EMK option
- EM option

4000 quadrature (1000 line), one index
2000 quadrature (500 line), one index

Supply Voltage

5VDC $\pm 10\%$

Current Requirements

140 mA max.

Frequency

100 kHz pre-quadrature, max.

Mechanical

Outline Dimensions

See diagram

Speed

4000 rpm max

Weight

6 oz [0.17 kg]

Cable

12 ft [3.7] cable standard

Environmental

Operating Temperature

14° to 158°F [-10° to 70°C]

Storage Temperature

-4° to 176°F [-20° to 80°C]

Housing

Drip-proof

Vibration

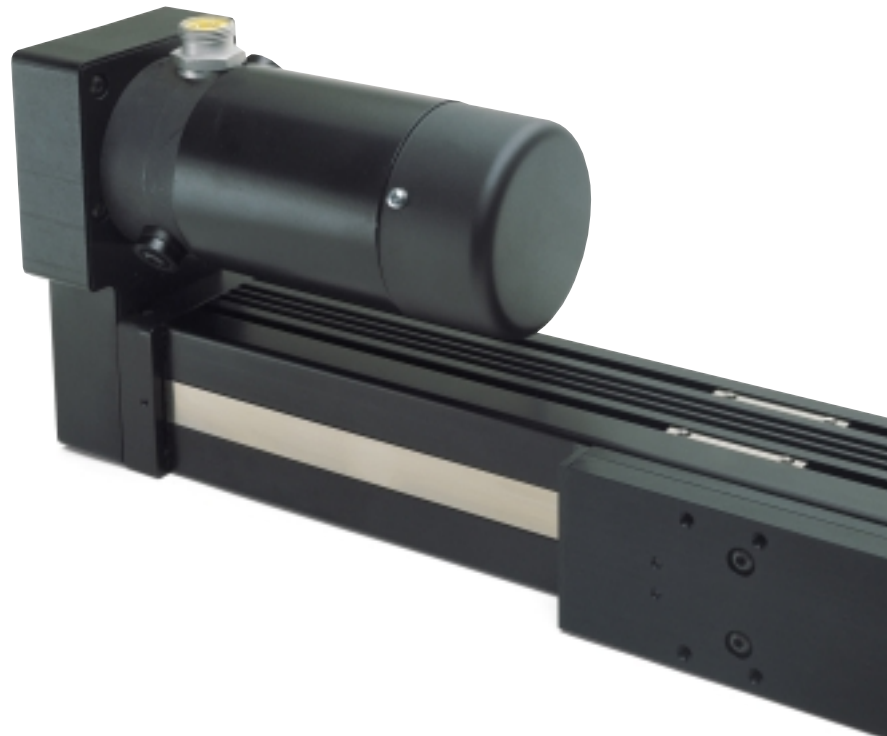
10 to 200 Hz @ 5Gs for 2 hours

Shock

100G for 6 ms

Notes:

- R4S33 and R4S42 actuators: the encoder is contained within the motor rear housing, and does not increase the overall length of the motor.
- The encoder cable can be extended by the customer to a maximum length of 200 feet [61 m]. High quality shielded, twisted pair cable must be used.
- All brushless servo actuators (R4B23, R4B32 and R4B41) already include an encoder.



Quick Disconnect Option

The -Q quick disconnect option provides the machine builder a convenient method of connecting the motor to the control. A male receptacle is installed on the motor provides the quick disconnect interface. The -Q option includes a 12 foot [3.7 m] motor/control cable with mating molded quick disconnect plug.

Some actuator models include the quick disconnect without specifying -Q in the model number. Review the “How to Order” section for your specific model for details.

Optional (-Q)

- R2A-D, R2A-H

Standard

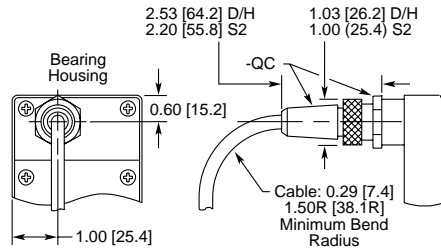
- R2A-S23(V/T)
- R2A-S23(V/T), R3-S33(V/T)
- R4-H4, R4-S33(V/T), R4-S42(V/T)

Features

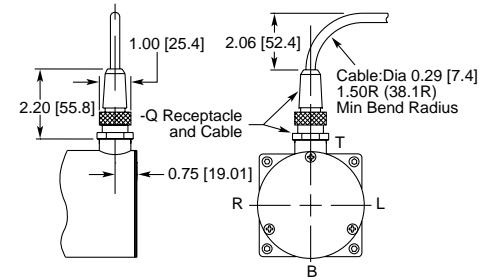
- R2A-H, R3-H, R4-H4: 3 conductor cable (2 motor conductors and a chassis ground).
- R2A-S23, R3-S33, R4-S33, R4-S42: 5 conductor cable (4 motor conductors and chassis ground).
- Keyed to prevent mis-wiring.
- Forms a contaminant resistant seal to protect the conductors from the environment.
- 12 ft [3.7m] cable included.

Dimension Examples

Shown on R2A Actuator



Shown on S32 and S33 Motor



Notes:

- To order a spare or replacement 12 foot [3.7 m] cable: R4-H4: Use part number QF1-12; R4-S: Use part number QF3-12.
- Contact the factory if custom quick disconnect mounting locations are required.
- R3 and R4 actuators: The quick disconnect receptacle is mounted directly to the motor. For mounting location, see the particular motor's mounting dimensions.
- R2A-B23, R3-B23, R3-B32, R4-B32, R4-B41: both motor and encoder signals are connected with MS-type connectors carrying all power and feedback signals.



Lube Port Option

The -GL and -GR lube port option provides the user with a simple method of re-lubricating the moving parts within the R3 and R4 series rodless actuators.

One lube access port is drilled into the left side of the actuator extrusion in the case of the -GL option, and into the right side of the actuator in the case of the -GR option, looking from the motor side to the non-motor side. This port will be located half way along the extrusion piece.

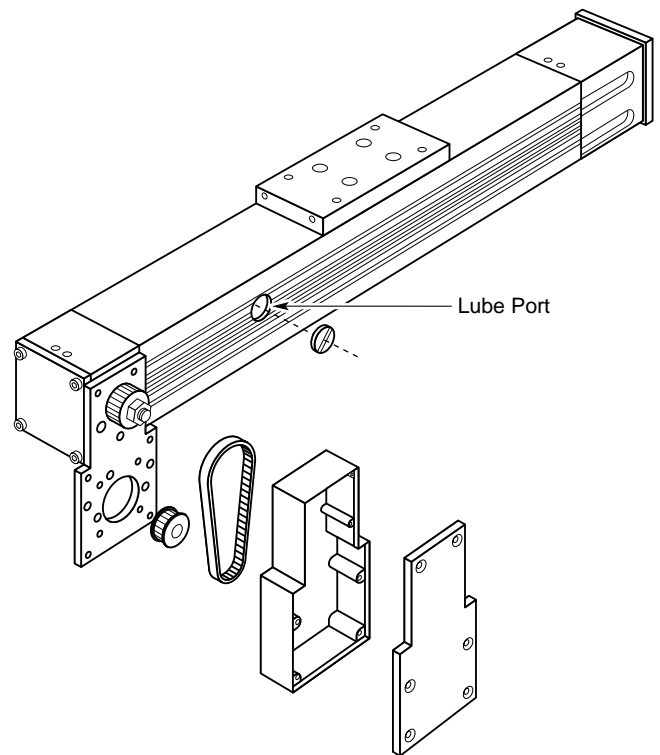
On belt driven actuators, the option allows field lubrication of the linear bearing blocks, the carriage seal strip, and the speed reducer gears. On screw driven actuators, the option also allows lubrication of the ball screw or acme screw, and the leadscrew thrust bearings.

-GL and -GR available with:

- All R3 series actuators
- All R4 series actuators

Notes:

- **This option is recommended for high cycle applications that will exceed 4 million inches of travel.**
- Re-lubrication can maximize the life of the actuator for the given loading conditions.
- Rodless actuators are factory lubricated for 4 million inches (100 kilometers) of travel.
- As a general rule, the factory lubricant (without re-lube) is good for about 10% of the life available with re-lubrication.



-GR option shown

Magnetic Position Sensors

R Series rodless actuators are equipped with position indicating magnets installed internally on both sides of the carriage guide assembly. Four non-contacting position sensors are available to sense the magnet as the carriage passes by.

All four position sensors mount directly to standard R Series actuators. Two sensors, RPS-1 and RP1, are normally open switches. Two, RPS-2 and RP2, are normally closed switches. Type RPS sensors consist of a reed switch, and type RP 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 has traveled beyond its normal safe operating region, and is nearing its physical end of stroke. The controller immediately brings the cylinder to a stop to prevent physical contact, and to avoid potential damage to the actuator, to the load, or to the machine. 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. They also use position sensors for changing speed during a move, usually to reduce cylinder speed before reaching the final stopping position for greater repeatability.

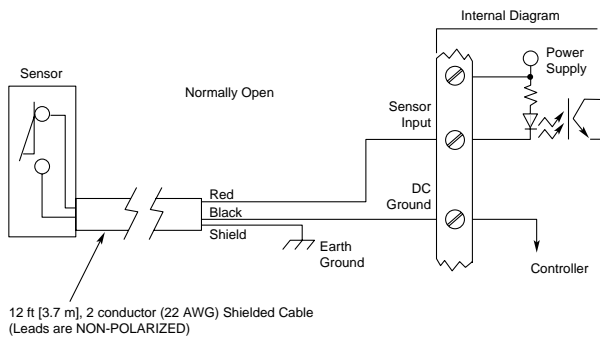
Programmable position controls use a position sensor to establish a home, or zero reference position.



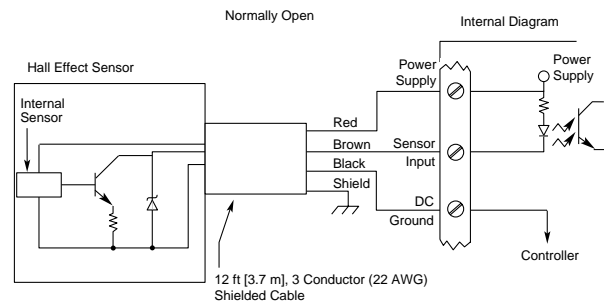
Position Sensor Specifications

	RPS-1	RPS-2	RP1	RP2
Switch Type	Mechanical Reed		Hall-effect	
Output Type	Contact closure		Open collector, sinking output	
Connection	Normally open	Normally closed	Normally open	Normally closed
Number of Leads	2		3	
Supply				
Voltage	n/a		8-28VDC	
Current	n/a		22mA	
Power	n/a		0.6W	
Output				
DC Voltage max	100VDC	100VDC	8-28VDC	
AC Voltage max	100VAC	100VAC	AC not allowed	
Current max	250mA	200mA	40mA	
Power max	7W	2W	1.1W	
Operating Temperature	-22° to 212°F [-30° to 100°C]		-4° to 140°F [-20° to 60°C]	
Storage Temperature	-22° to 212°F [-30° to 100°C]		-22° to 176°F [-30° to 80°C]	
Humidity Rating	0 to 95% non-condensing		0 to 95% non-condensing	

Wiring for RPS-1 and RPS-2



Wiring for RP1 and RP2



Comparison of Hall-Effect and Reed Switches

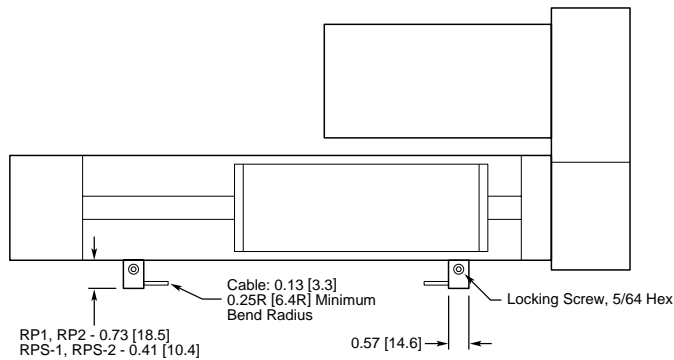
RPS-1 and RPS-2 Reed Switch

- More noise immune (EMI)
- Does not require a power supply
- Operates over a wider temperature range
- Slightly lower cost
- Does not work with inductive loads
- Switches AC voltages

RP1 and RP2 Hall-Effect Switch

- LED visually indicates state of switch
- Higher tolerance to vibration
- Greater durability and reliability (no moving parts)
- Requires external DC power. Available on IDC controls.

Position Sensor Mounting



Notes:

- All sensors include a 12-foot [3.7 m] shielded cable.
- Position sensors can be mounted along either side of a rodless actuator.
- Recommended minimum distance between switches is 0.65 inches [17 mm].
- Using position sensors for end-of-travel protection reduces effective travel distance.

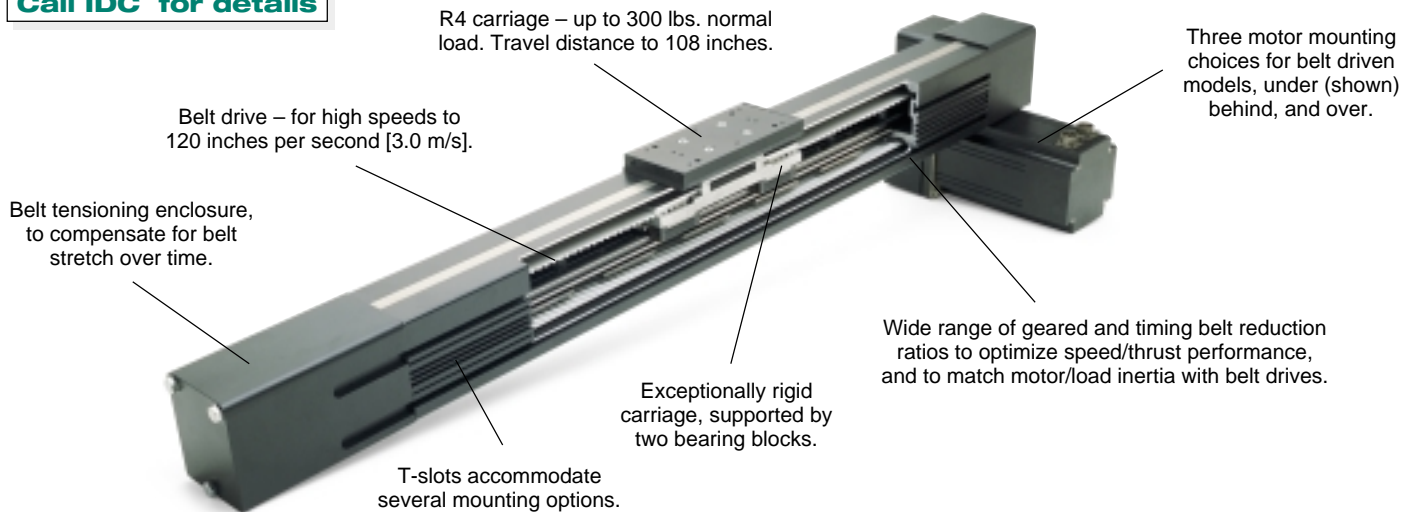
Ordering Information

Model Description

RP1	Normally open Hall-effect switch
RP2	Normally closed Hall-effect switch
RPS-1	Normally open reed contact switch
RPS-2	Normally closed reed contact switch

More Solutions . . .

Call IDC for details



More Options

If one of our more than 150,000 standard catalog configurations isn't just right, one of these options or modifications may be the answer. If not, call IDC for *more* solutions . . . we're flexible and fast to respond.

- BM Brakes – electrically released brake mounted to the motor rather than the lead-screw shaft. This multiplies holding force, but it also will not hold the load if a belt or gear reduction fails. Speed (and therefore power) is limited.
- Ground Ballscrews – available for applications requiring higher absolute accuracy.

Also Available

- Custom Mounting – help to retrofit an existing actuator, quicken your installation time, or reduce your cost to install.
- Custom lead screws.
- Custom drive ratios.
- Custom cabling; quick disconnects, etc.
- RnX Series – lets you specify your motor with an R Series actuator.
- Gear motors for smooth low speed applications available.
- Multi-axis systems – The modular R Series is suited for gantry XY, XZ and XYZ configurations for your pick-and-place and coordinated motion applications. Please refer to the Cartesian Systems section of the catalog on page D-1 for more details.