

Linear Actuators Catalog

R2A - R4 Series Rodless Actuators






KOLLMORGEN®

Because Motion Matters™

Linear Actuation & Positioning Systems

Kollmorgen offers a comprehensive range of linear actuator products including electric cylinders, rodless actuators, and precision tables to meet a wide range of application requirements. For actuator products not included in this catalog go to www.kollmorgen.com for information about other Kollmorgen linear positioning products.

(Products highlighted are included in this catalog).

	Model	Product Family	General Information
	Electric Cylinders ¹	EC1 EC2 EC3 EC4 EC5 N2	<ul style="list-style-type: none"> • Highest Force (Thrust) • Clean, Hydraulic Replacement • Compact Cross Section • Extends into Work Area
	Rodless Actuators (screw drive)	R2A R3 R4	<ul style="list-style-type: none"> • High Force (Thrust) • High Repeatability • Long Travel • Load Carrying Capability
	Rodless Actuators (belt drive)	R2A R3 R4	<ul style="list-style-type: none"> • Very High Speed • Quiet Operation • Long Travel • Load Carrying Capability
	Precision Tables	DS4 DS6	<ul style="list-style-type: none"> • High Accuracy & Repeatability • Low Maintenance, Long Life • High Moment Loads

Electric Cylinders (EC)

Primarily designed to apply a force through an extendable rod, electric cylinders are a clean and efficient replacement for hydraulic actuators and pneumatic cylinders, and an alternative to many types of linear transmissions. A wide variety of mounting and coupling alternatives significantly increases their problem solving potential.

Rodless Actuators

Long travel, quiet operation, and high moment loading differentiates rodless actuators from other mechanical transmissions.

Precision Tables

Positioning tables are used when accurate and repeatable motion is critical (1 part per 10,000 or better). These tables offer a wide variety of single and multi-axis configurations, open and closed frame tables, ball or lead screw driven, and overhung and constant support for Kollmorgen geometry configurations.

Model	Max Speed ³ In/s (mm/s)	Max Thrust ^{2,3} Lb (N)	Repeatability ^{4,5} In (mm)	Max Payload Lb (kg)	Max Travel In (mm)
Electric Cylinders ¹	52.5 (1330)	5620 (25,000)	to 0.0005 (0.013)	Note 1	59.1 (1500)
Rodless Actuators (screw drive)	39 (1000)	700 (3110)	to 0.0005 (0.013)	300 (136)	108 (2743)
Rodless Actuators (belt drive)	118 (3000)	300 (1330)	to 0.004 (0.10)	300 (136)	108 (2743)
Precision Tables	32.5 (825)	440 (1960)	3 microns (commer- cial grade) / 1.3 microns (precision grade)	794 (360)	79 (2000)

Notes:

1. Electric cylinders are designed primarily for thrust application where loads are supported externally.
2. Thrust ratings are based on mechanical limits rather than motor limits unless indicated otherwise.
3. Max speed and max thrust ratings are not necessarily available simultaneously
4. Repeatability is dependent on feedback resolution, load, friction, and drive gain settings.
5. Repeatability is unidirectional unless otherwise specified

▶ Rodless Series Linear Actuators



Kollmorgen's

Rodless Series Linear Actuator Systems provide performance and versatility in a compact package.

- Travel lengths from 6 to 108 inches provide solutions to a wide range of applications.
- Precision ball screw drive, with 0.2, 0.25, 0.5 and 1.0 inch leads, offers high speed and efficiency, excellent repeatability and accuracy.
- Lead screws and bronze nuts with 0.125 and 0.2 inch leads offer quiet operation and self locking.
- Belt drive versions offer the highest speed when speed instead of thrust is of greatest importance.
- Easily configurable modular design and option set, including a variety of motor mounting orientations, motor sizes and type, drive options, reducer ratios, feedback options, limit/home sensor types and shaft brakes allow the R Series to be customized to meet your specific requirements.

Standard Configurable Rodless Linear Actuator Designs:

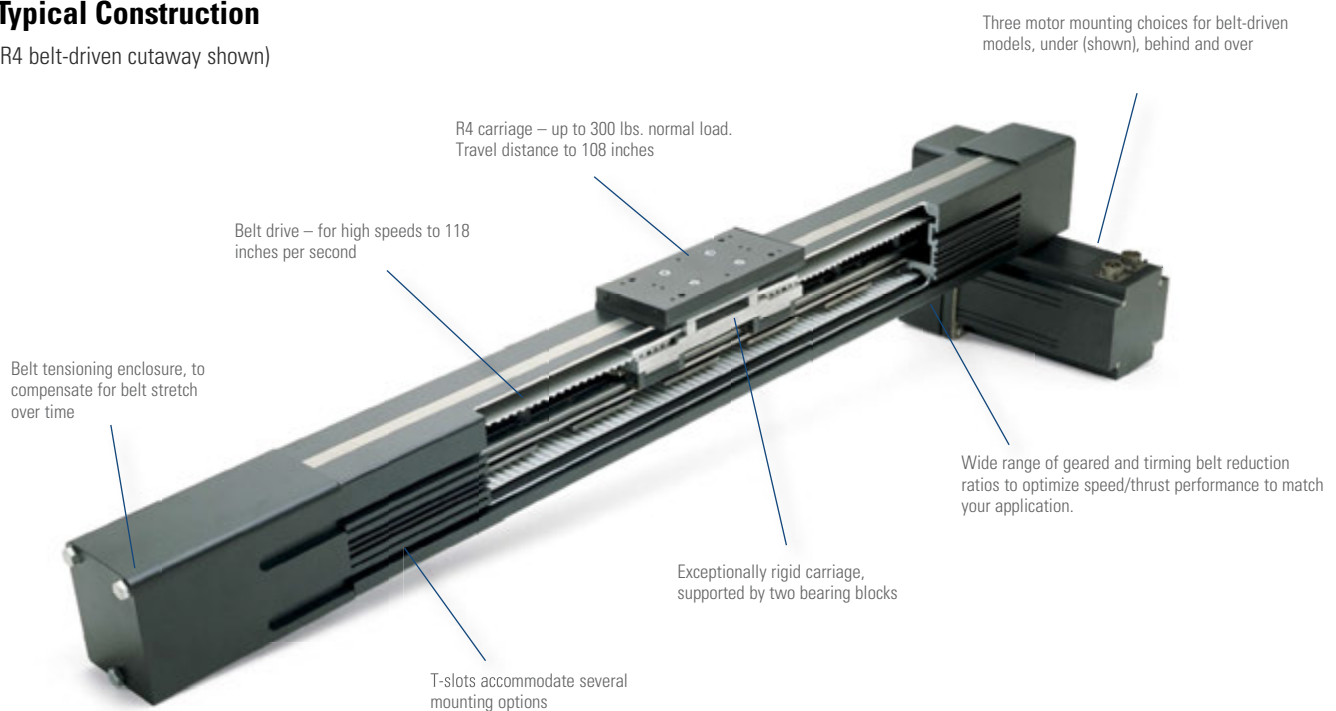
R Series	
Servo Motor options	AKM23, AKM42, AKM52
Stepper Motor options	T22, T31, T32, T41
Transport Method	Ball Screw (1, 2, 4, 5 [rev/in] pitch) Lead Screw (5 and 8 [rev/in] pitch) Transport Belt
Integrated Gearing	Timing Belt (1:1, 1.5:1, 2:1, 3:1 ratios) Helical Gear (3.1:1, 3.5:1, 5:1, 7:1, 10:1, 12:1 ratios) Inline (direct coupled)
Mounting Types	3 Parallel Mounts 1 Inline Mount
Stroke Lengths	Standard Stroke (6 to 108 in.) Custom Stroke Lengths Available

Use Rodless Linear Actuators 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.
- A complete, compact linear position system.

Typical Construction

(R4 belt-driven cutaway shown)



R Series Linear Actuators

- Designed for load carrying up to 300 lbs.
- Ball screw, lead screw or belt-driven transmission
- Integrated load carrying support bearing
- Integrated seal strip
- English and Metric carriage mounting
- Speeds up to 118 in/sec
- Motor options: AKM brushless servo motors or T series stepper motors
- Available in 3 power ranges: R2A, R3, R4

Rodless Series Linear Actuators

Mechanical Drive Comparison

The following chart will help pinpoint which linear drive mechanism is right for your application. Kollmorgen offers many positioner options, such as brakes, encoders, lubrication ports, preloaded nuts, and precision ground screws, that may help you meet your specification. If these standard options do not meet your requirements, please contact Kollmorgen for information regarding custom solutions.

Considerations	Lead Screw	Ball screw	Belt Drive
Noise	Quiet	Noisy	Quiet
Back Driving	Self locking	Easily backdrives	Easily backdrives
Backlash	Increases with wear	Constant throughout screw life	Can increase with wear or stretching of belt
Repeatability	+/- 0.001	+/- 0.001	+/- 0.010
Duty Cycle	Moderate max. 60%	High max. 100%	High max. 100%
Mechanical Efficiency	Low Bronze Nut - 40%	High 90%	High 90%
Life and Mechanical Wear	Shorter life due to high friction	Longer	Longer
Shock Loads	Higher	Lower	Low
Smoothness	Smooth operation at lower speeds	Smooth operation at all speeds	Smooth operation at all speeds
Speed	Low	High	Higher
Cost	\$\$\$ Moderate	\$\$\$ Moderate	\$\$\$ Moderate



Comments
<p>Lead Screw: Sliding nut design provides quiet operation.</p> <p>Ball screw: Transmits audible noise as balls recirculate through nut during motion.</p> <p>Belt Drive: The neoprene cover of the belt provides noise dampening. The support bearing will generate some noise.</p>
<p>Lead Screw: Good for vertical applications.</p> <p>Ball screw: May require brake or holding device when no holding torque is applied to the screw.</p> <p>Belt Drive: May require brake or holding device when no holding torque is applied to the drive pulley.</p>
<p>Lead Screw: Considered worn-out when backlash exceeds 0.020". Typically 0.006" when shipped from factory.</p> <p>Ball screw: Typically constant at 0.006" (screw/nut only).</p> <p>Belt Drive: Typically at 0.010" when shipped. Can be adjusted to compensate for wear or stretching.</p>
<p>Lead Screw: Low duty cycle due to high friction from sliding surface design.</p> <p>Ball screw: High screw efficiency and low friction allow high duty cycle.</p> <p>Belt Drive: High efficiency provides low heating and high duty cycle.</p>
<p>Lead Screw: Low efficiency sliding friction surfaces.</p> <p>Ball screw: High efficiency smooth rolling contact.</p>
<p>Lead Screw: Mechanical wear is function of duty cycle, load and speed.</p> <p>Ball screw: Virtually no mechanical wear when operated within rated load specifications.</p> <p>Belt Drive: High efficiency contributes to long life. Drive belts can be easily replaced to extend system life.</p>
<p>Lead Screw: Better suited because of larger surface area.</p> <p>Ball screw: Brinelling of steel balls limits shock load capability.</p> <p>Belt Drive: Shock loads can cause fatigue and stretching of drive belts.</p>
<p>Lead Screw: At extreme low speeds, units have a tendency to stop/start stutter (due to friction).</p> <p>Ball screw: Generally smoother than lead screw types through the entire speed range.</p> <p>Belt Drive: 180° engagement of belt provides continuous smooth contact throughout the speed range.</p>
<p>Lead Screw: Extreme speeds and accelerations can generate excessive heat and deform the screw.</p> <p>Ball screw: Can achieve higher speeds than the lead screw due to the efficiency of the ballnut vs. the sliding contact of the solid nut. Speeds in excess of ratings can deform screw.</p> <p>Belt Drive: Each revolution of the drive pulley provides several inches of travel. Speeds up to 118 in/sec can be achieved.</p>

Rodless Actuator Servo Systems

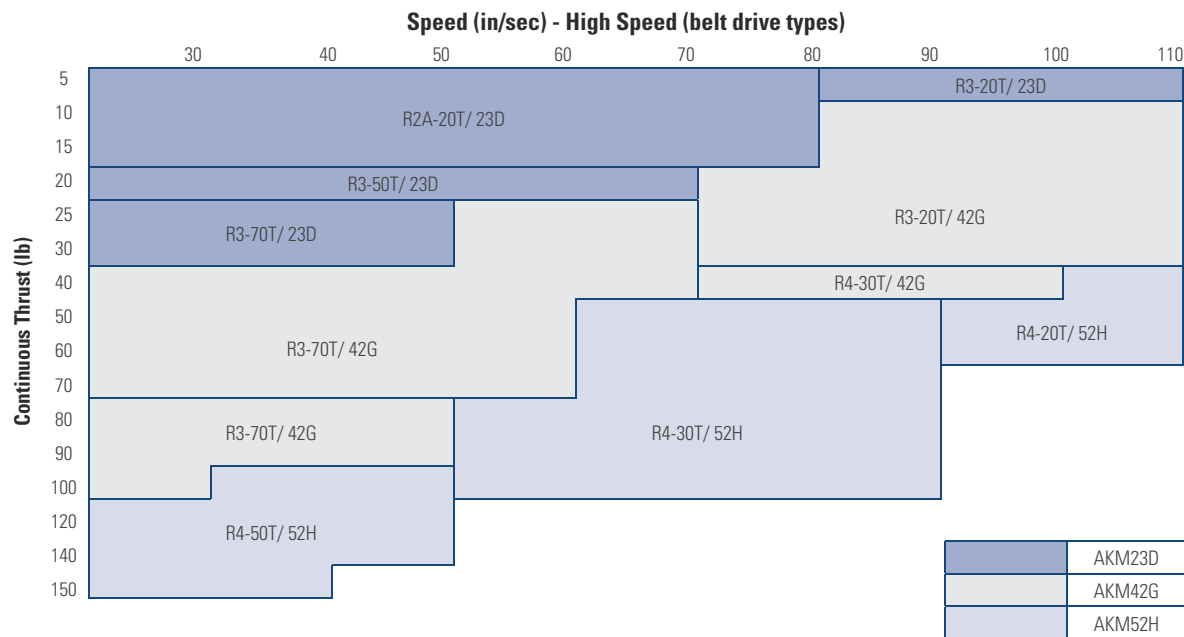
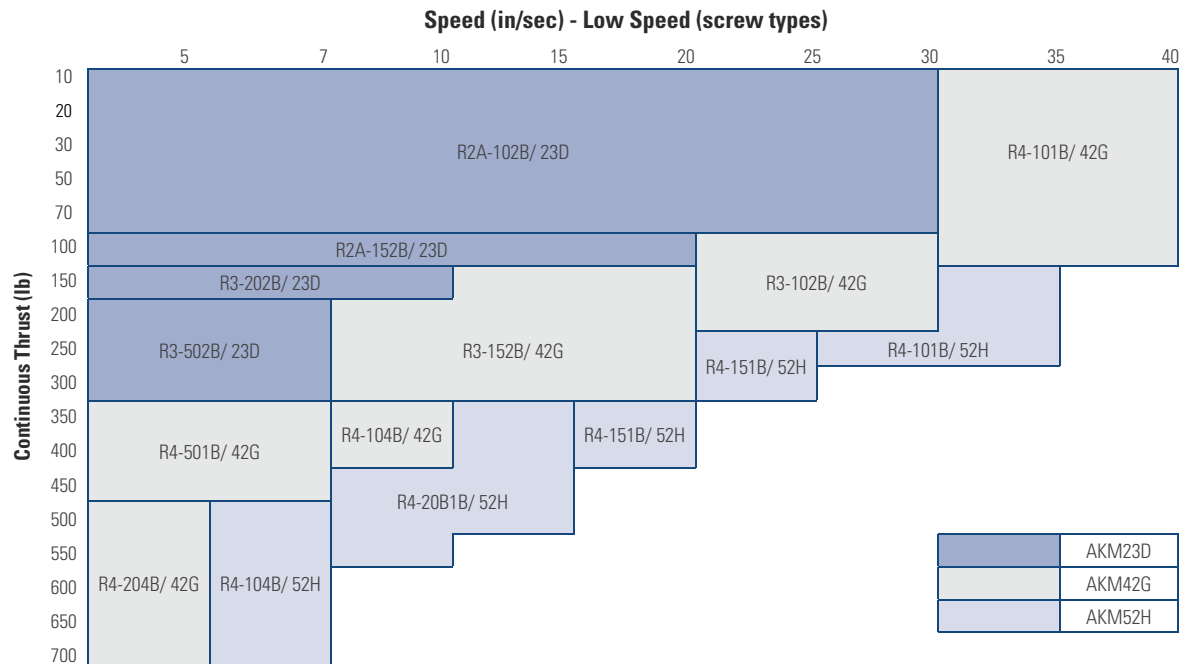
The Rodless Linear Actuator Servo Systems are offered with the Advanced Kollmorgen Drive (AKD®) series to provide the optimum combination of performance and price. Let your application and system requirements determine what AKD option configuration integrates best.

- Single vendor solution for the complete electro-mechanical system ensures system interoperability and single dedicated worldwide motion-control supplier for support.
- The Rodless Linear Actuator Servo Systems are available in drive and control technologies ranging from simple and intuitive positioning drives to fully programmable IEC 61131 based control systems.
- The Rodless Linear Actuator Servo Systems leverage Kollmorgen's AKD diverse option configurations and AKM brushless servo motors for complete system flexibility and to support positioning and guiding a load for the lowest system cost.
- The Precision Table Servo Systems have the flexibility for multi-axis configurations including XY, XZ, and XYZ and Gantry configurations.



Flexible Drive Universal Control Options & Power Range	AKD 115 / 230 / 400 / 460 Vac
	• Base Unit: Analog torque and velocity, CanOpen®, step and direction, encoder following
	• Network Option Cards
	• EtherCAT®, SynqNet®, Modbus®/TCP, and CANopen®
	• Simple Positioning System - Motion Task, Linked Motion Task, ACCEL/DECEL control, S-curve - Incremental, absolute positioning, Jog mode and more

Servo Motor System Quick Selection Guide



Quick Selection Guide Reference

1. Select Chart for application speed range
Top chart - Low speeds, up to 40 in/sec
Bottom Chart - High speeds, up to 118 in/sec
2. Select system by required continuous thrust (lb) and required rated speed (in/sec.)

Other application considerations (stroke length, system resolution, inertia ratio, desired safety margins, note pages, etc) may result in selection of a different system. For additional AKD® system specifications see page 17.

Performance data represents continuous thrust (lb) at rated speed (in/s)
Based on AKD drive with 240 Vac, 3 phase supply.