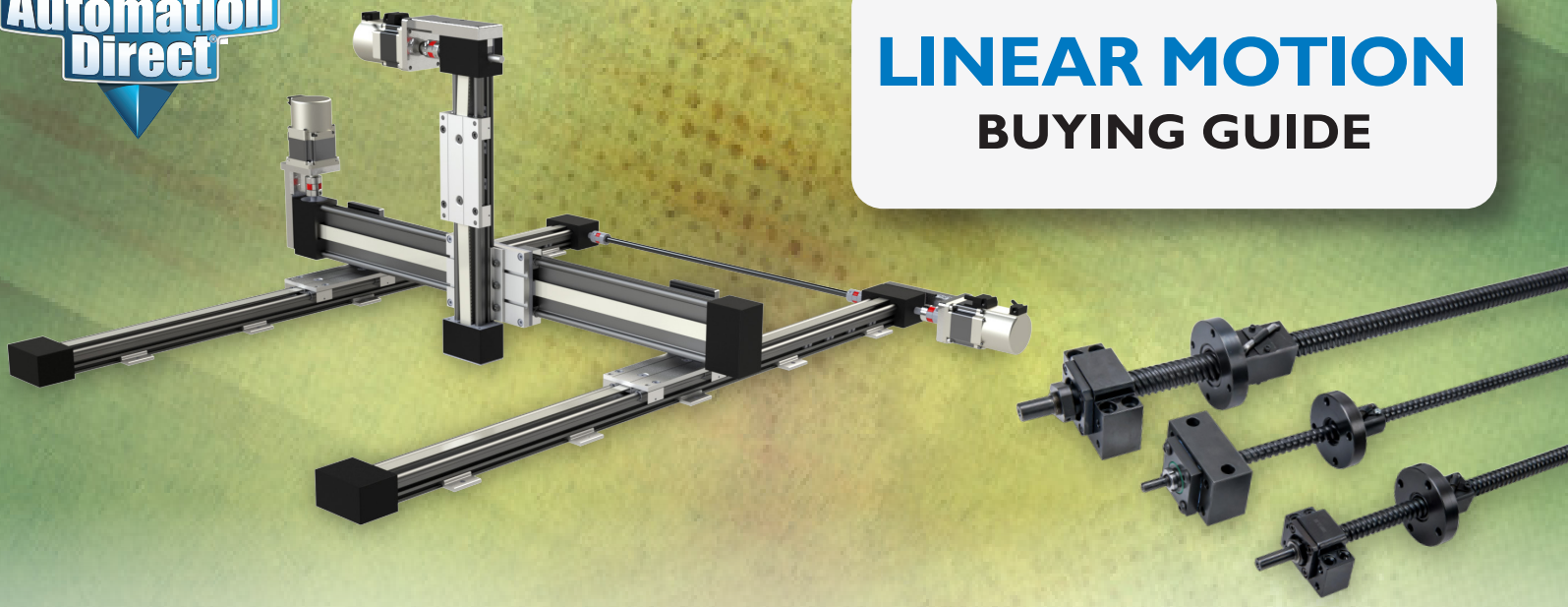
# LINEAR MOTION
## BUYING GUIDE



## WHAT DO THEY DO?

Linear motion components convert rotary power into controlled linear movement for positioning, transport, or mechanical operations. They are fundamental to many automated processes, delivering precision, repeatability, and efficiency in industrial environments.

### Topics



### Core Components

- **Ball Screw Actuators**: Use ball bearings in a threaded screw to convert rotary motion into precise linear travel with high load capacity.
- **Lead Screw Actuators**: Employ threaded shafts without ball bearings for smoother, quieter movement and lower maintenance in moderate-load applications.
- **Belt Driven Actuators**: Use reinforced belts for rapid, long stroke movements with minimal backlash, ideal for high-speed positioning where moderate accuracy is sufficient.
- **Undriven Linear Slides**: Provide manual or gravity-fed movement guided by hardened rails, supporting accurate alignment without powered motion.
- **Linear Bearings/Rails**: Offer high-speed guidance for moving assemblies, ensuring stability and precise travel across the motion path.
- **Internal Carriages/Guides**: Run inside actuator housings to support payloads and maintain accurate motion alignment under varying loads.
- **External Carriages/Guides**: Mount outside rails or track systems for versatile load handling, often used with modular guide assemblies.
- **Guide Tracks with Slides**: Combine slide profiles and sliding elements in a compact package for manual or motorized positioning tasks.
- **Linear Shafts**: Provide rigid, precision-ground or aluminum bars as drive or support elements within bearing and carriage systems.
- **Linear Shaft Bearings**: House shaft interfaces for smooth, durable movement along support bars in repetitive motion setups.
- **Stepper Motor Linear Actuators**: Integrate stepper motors directly with linear drive elements for compact, controllable motion without separate coupling.
- **Helical Racks and Pinions**: Pinions mesh with rack systems to convert rotary motor output into smooth linear travel with reduced vibration.

Understanding these mechanisms allows for selecting the right configuration to match speed, load, and precision requirements. Proper selection ensures long service life, reliable performance, and compatibility with automation systems.

# APPLICATIONS

Linear motion systems drive precise movement in manufacturing, robotics, and assembly. Selecting the right actuator or guide is key to efficiency and reliability. Applications range from heavy-duty positioning to delicate automated processes.

**Automated Packaging & Cartoning Lines:** High-speed belt-driven actuators deliver fast, smooth indexing and pick-and-place motion over long strokes, making them ideal for high-throughput carton handling and case transfer operations.

**CNC Routers & Light Machining Centers:** Precision ball screws and hardened rails deliver smooth motion, stiffness, and repeatable accuracy across X-Y-Z axes for cutting operations.

**Robotic Welding & Assembly Cells:** Linear guides and rack-and-pinion systems support long-stroke, high-load motion for robot positioning and part transfer.

**Material Handling & Conveyor Transfer Systems:** Maintenance-free shafts, polymer bearings, and belt actuators provide reliable linear motion in dirty, high-cycle logistics environments.

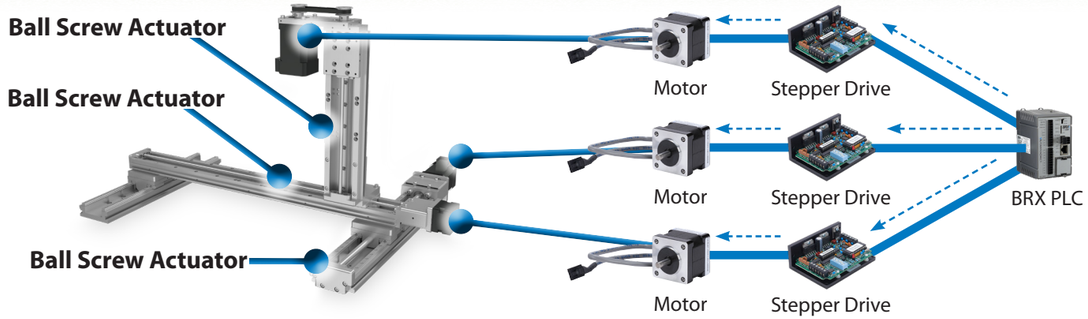
**Semiconductor & Electronics Assembly Equipment:** Fine-lead ball screws and precision guides enable accurate, low-vibration positioning for PCB handling and inspection stages.

**Automated Inspection & Test Equipment:** Quiet, lubrication-free linear motion ensures smooth, controlled positioning for sensors and probes in clean or sensitive environments.

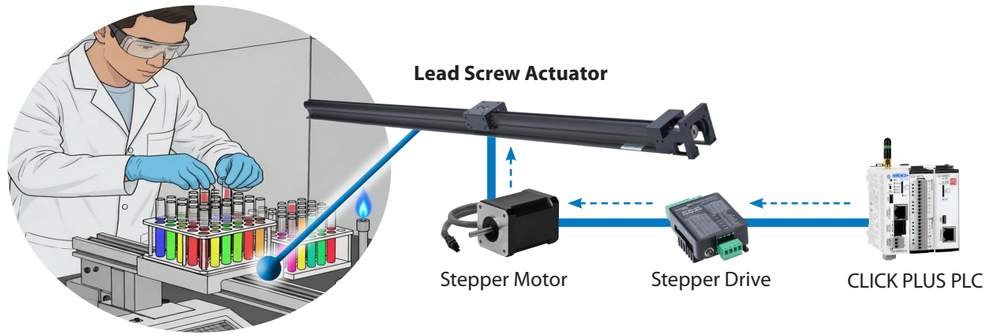


# APPLICATIONS: EXAMPLES

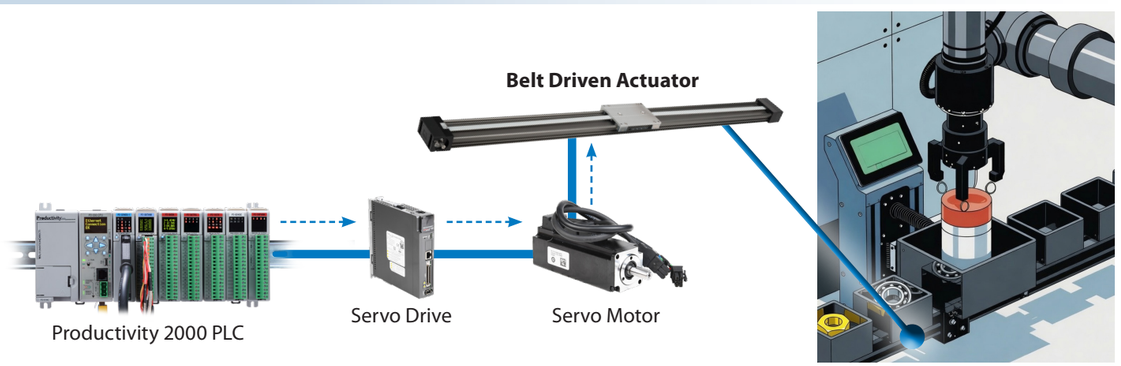
- **Precision CNC Positioning**: Ball screw driven linear actuators reliably move tooling to specified coordinates in CNC systems. They provide high repeatability and minimal backlash for precision manufacturing tasks requiring exact alignment.




- **Automated Laboratory Equipment**: Lead screw actuators provide precise, controlled motion for sample manipulation in lab automation systems. Their inherent efficiency and fine positioning capability support steady, repeatable movement of test specimens during sensitive processes.

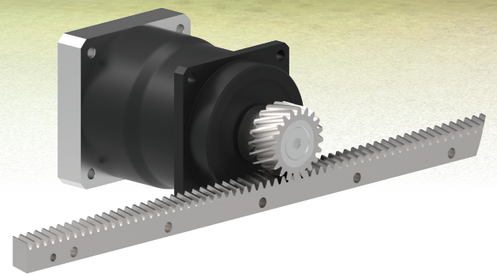



- **High-Speed Sorting**: Belt driven actuators rapidly shuttle carriers in packaging lines. Their ability to sustain quick, continuous cycles supports operations needing efficient material flow and rapid part changes.



# HOW TO CHOOSE

When selecting linear motion components, consider load, speed, precision, and integration requirements. Matching actuator or guide type to application demands ensures reliable, efficient performance. The right choice maximizes service life and reduces downtime.



1. Load Requirements: Determine static and dynamic load ratings to ensure the actuator or guide can handle operational forces without premature wear.
2. Travel Length: Choose a model with stroke capacity that meets or slightly exceeds your maximum required travel distance.
3. Motion Speed: Match actuator drive type to required speed; belt drives excel at low-friction, screws offer controlled movement.
4. Drive Method: Choose the drive type based on required precision, speed, and load—ball screws offer higher accuracy, while lead screws, belts, or slides suit simpler motion needs.
5. Duty Cycle: Evaluate percentage of time under motion to ensure actuator thermal limits and wear resistance suit the application.
6. Environmental Conditions: Account for dust, moisture, or chemicals; select sealed or corrosion-resistant components when exposure is likely.
7. Mounting Constraints: Review available machine space and mounting patterns to ensure physical compatibility with your equipment.
8. Motor Compatibility: Confirm flange size and coupling options align with chosen servo or stepper motor specifications.
9. Maintenance Access: Favor designs that simplify lubrication, component replacement, or alignment in your production setting.
10. Vibration Sensitivity: Choose rigid designs or damping accessories for processes requiring minimal vibration transmission.
11. Horizontal vs Vertical: Understand that vertical lifts require higher holding force and may need brakes or self-locking screws.
12. Budget Constraints: Weigh initial cost against lifecycle value; robust designs may lower long-term maintenance and downtime costs.
13. Scalability: Select systems with modular options if you anticipate future travel length or load increases.
14. Integration with Controls: Check encoder, sensor, or switch compatibility to ensure smooth integration with automation systems.

| Actuator Type | Ideal Motor Type | Why |
|---|---|---|
| **Ball Screw** | Servo or Stepper | Precision positioning requires controlled motion |
| **Lead Screw** | Stepper | Lower speed and cost align well |
| **Belt-Driven** | Servo | High-speed benefits from dynamic control |

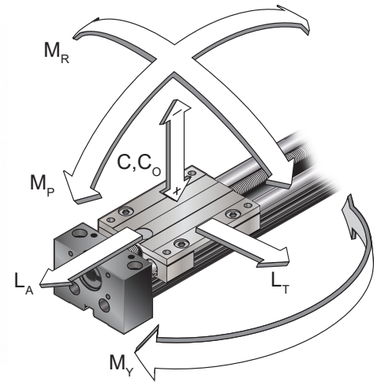


# LOAD AND MOMENTS IN LINEAR MOTION

When selecting a linear motion solution, it's important to understand how loads and moments act on the system. Proper evaluation helps prevent premature wear, accuracy issues, and unexpected failure.

**LINEAR LOADS**

1. $L_A$ ⟷ (AXIAL LOAD)
2. $L_T$ ⟷ (LATERAL LOAD)
3. $C, C_0$ ↕ (DYNAMIC, STATIC LOADS)




**MOMENT LOADS**

4. $M_R$ ↻ (ROLL)
5. $M_P$ ↻ (PITCH)
6. $M_Y$ ↻ (YAW)

## Linear Loads

**Axial**:
Axial load acts along the direction of travel of the actuator. This is typically the primary working load and is often the highest rated capacity of a linear motion system.

***Common example:*** Pushing or lifting a load straight along the axis.

**Lateral**:
Lateral load acts perpendicular to the direction of travel. Excessive lateral loads can increase friction, reduce accuracy, and shorten bearing life.

***Common example:*** Side forces caused by off-center mounting or tooling weight.

## Moment Loads

In these cases, note the axial arrow ($L_A$) as the direction of travel.

**Roll**:
Rotation around the axis of travel. Typically caused by asymmetric loading or twisting forces.

**Pitch**:
Rotation around the horizontal axis perpendicular to travel. Often caused by loads mounted forward or backward from the carriage.

**Yaw**:
Rotation around the vertical axis. Common in wide tooling or unevenly distributed loads.

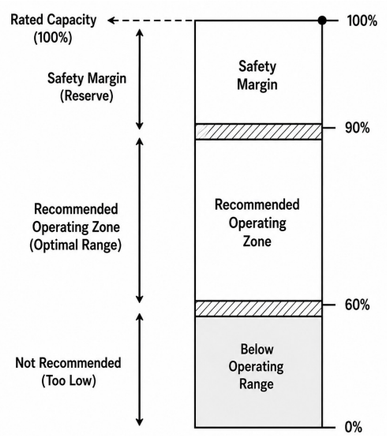
## Safety Margin

Published load and moment ratings represent maximum values under ideal conditions. Real-world applications include vibration, shock, misalignment, and wear.

**Best Practice**:
Design with a safety margin by keeping actual loads and moments well below maximum ratings.

**General Guidelines**:

- Distribute loads as close to the carriage center as possible
- Minimize overhung loads and long moment arms
- Use larger actuators or dual guides when moments are high
- Allow margin for future changes or added tooling



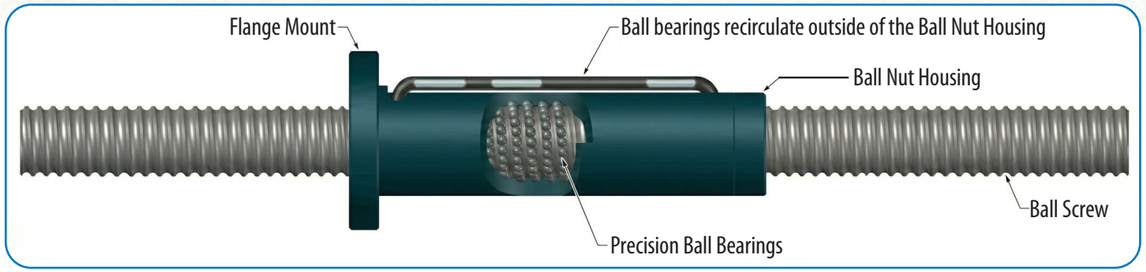
# PRODUCT CATEGORY OVERVIEW

| Product Category | What it Does | When to Choose This | Typical Applications | Key Selection Factors |
|---|---|---|---|---|
| **Ball Screw Driven Linear Actuators** | Uses a ball screw inside a slide to deliver smooth, precise, and efficient linear motion. | You need high accuracy, repeatability, and the ability to handle heavier loads. | Precision positioning, automated assembly, inspection systems | Accuracy needs, load weight, speed vs. force tradeoff, duty cycle |
| **Lead Screw Driven Linear Actuators** | Uses a lead screw for controlled linear motion with good holding capability. | You want a cost-effective solution with solid positioning and self-locking characteristics. | Vertical positioning, light automation, adjustment systems | Load, required precision, speed requirements, need for holding without power |
| **Stepper Motor Linear Actuators** | Precise linear motion driven directly by a stepper motor for controlled, repeatable moves. | You need straightforward positioning control without adding a separate motor and drive system. | Medical devices, lab automation, small positioning systems, valves | Required precision, stroke length, load, control compatibility |
| **Belt Driven Linear Actuators** | Uses a belt system to move loads quickly over longer distances. | You need high speed and long travel, with moderate accuracy. | Material handling, packaging lines, gantry systems | Travel length, speed, load weight, positioning accuracy |
| **Undriven Linear Slides** | Provides guided linear motion without a built-in drive system. | You already have a drive (cylinder, motor, etc.) and just need guidance and support. | Guided pneumatic systems, custom automation builds | Load support, alignment needs, travel length, compatibility with external drive |
| **Ball Screws & Ball Nuts** | Convert rotary motion into smooth, efficient linear movement with high accuracy. | You are building a custom system and need strong, precise positioning. | Custom automation, machine axes, lifting systems, indexing applications | Load capacity, required precision, travel speed vs. force (lead), mounting design |
| **Linear Guide & Rail Systems** | Provide rigid, highly accurate linear guidance along a fixed rail path. | You need maximum stiffness, accuracy, and smooth motion for guided loads. | Gantry systems, automation frames, precision machinery, multi-axis systems | Load direction, rigidity, rail length, environment (dust, debris) |
| **Precision Ground Linear Shaft Systems** | Hardened round shafts with bearings for smooth, accurate linear motion. | You need better precision and durability than aluminum systems, but with simpler setup than rail systems. | Automated fixtures, test stands, packaging equipment, mid-precision machinery | Shaft size, load capacity, alignment requirements, desired accuracy |
| **Aluminum Linear Shaft Systems** | Lightweight linear motion system designed for basic guidance and support. | You need an economical solution for lighter loads and lower precision applications. | Light-duty automation, DIY systems, basic conveyors, packaging support | Load limits, stiffness needs, cost sensitivity, weight constraints |
| **Helical Racks and Pinions** | Use gear-driven motion to move loads linearly over long distances. | You need continuous travel over longer lengths or higher speeds than screws can provide. | Large gantries, material handling systems, robotics axes | Travel length, speed requirements, load force, positioning accuracy |



# PRODUCT LINEUP

## BALL SCREW DRIVEN LINEAR ACTUATORS



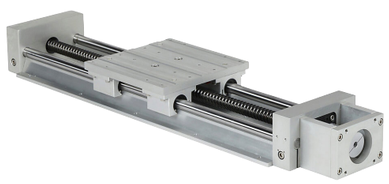

| Series Name | Best For | Key Attributes | Primary Benefit |
|---|---|---|---|
| **LAHP Series** | High-precision positioning with repeatable motion | Efficient ball screw drive, good speed/accuracy balance, supports stepper/servo motors | Reliable precision performance for general automation |
| **LARS Series** | Heavy-duty applications with high loads and rigidity needs | Dual shaft support, high stiffness, built for continuous duty | Maximum stability and load capacity for demanding applications |

### LAHP SERIES BALL SCREW DRIVEN ACTUATORS

**STARTING AT $1,302.00**

Built for precision and performance, LAHP series ball screw actuators deliver efficient, repeatable motion with higher speeds and duty cycles. They're the go-to when accuracy, stiffness, and long-term reliability matter.

- Supports NEMA stepper and SureServo motor mounting and multi axis builds
- Positioning accuracy down to ±0.039mm with repeatability around ±0.05mm
- Max linear speed up to 0.150 m/s depending on stroke and pitch
- Travel range from 52mm to 910mm with multiple frame widths from 50 to 120mm
- Ball screw pitches of 3mm and 10mm to balance thrust vs speed
- Load ratings up to 350 N axial and 480 N lateral with strong moment capacity
- Ball screw efficiency near 90 percent for reduced friction and energy loss



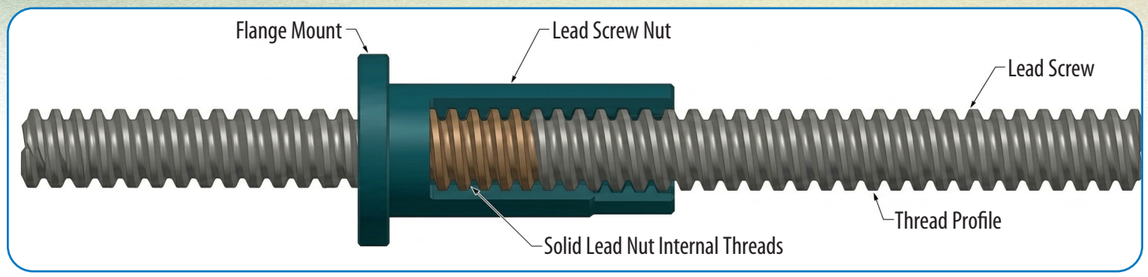
### LARS SERIES BALL SCREW DRIVEN ACTUATORS

**STARTING AT $3,157.00**

LARS series ball screw actuators are designed for heavy loads and tough jobs. Dual shaft support and a rugged build make them a reliable choice when stability and payload capacity matter most.

- Designed for heavy loads with high rigidity from fully supported round shafts
- Ball screw drive with 0.2 inch pitch delivers strong thrust and controlled motion
- Travel options of 12 inches and 24 inches for mid range positioning applications
- High stiffness reduces deflection under load compared to compact rail systems
- Compatible with NEMA 23 motors for higher torque applications
- Built for repetitive motion and long duty cycles typical in industrial automation

# LEAD SCREW DRIVEN LINEAR ACTUATORS



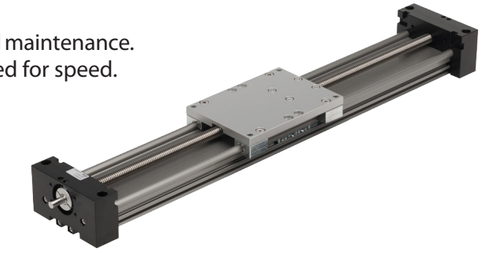

| Series Name | Best For | Key Attributes | Primary Benefit |
|---|---|---|---|
| SAW Series | Simple, low-speed motion with minimal maintenance | Basic design, smooth motion, maintenance-free operation | Most economical and easiest to use |
| LAVL Series | General-purpose automation in tougher environments | Durable design, low maintenance, handles dirt/wet conditions | Reliable everyday performance with less upkeep |
| LAHP Series | Mid-range applications needing rigidity without high speed | Strong frame, good positioning consistency, versatile platform | Balanced performance at lower cost than ball screw versions |
| LACP Series | Compact systems with light loads and limited space | Slim design, lightweight, flexible travel options | Easy integration in tight spaces |

## SAW SERIES LEAD SCREW DRIVEN ACTUATORS

**STARTING AT $381.00**

SAW series actuators focus on smooth, low-speed motion with minimal maintenance. They are a solid pick when reliability and simplicity outweigh the need for speed.

- Capable of configuration as a multi-axis gantry system
- Max linear speed of 0.15 m/s suited for controlled positioning
- Stroke capability up to 750mm for mid-range travel applications
- Maintenance-free design using dry running igus polymer nut
- Stainless steel lead screw improves corrosion resistance and life
- Low backlash design supports consistent positioning performance



## LAVL SERIES LEAD SCREW DRIVEN ACTUATORS

**STARTING AT $1,038.00**

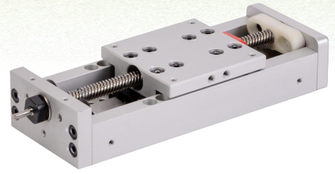
LAVL series lead screw actuators are built to handle everyday automation tasks, especially in environments where maintenance needs to be minimal.

- Travel range from 6 inches to 24 inches for compact automation systems
- Lead screw pitch options of 0.2 inch and 0.5 inch for application flexibility
- Maintenance-free operation with reduced part count and polymer sliding elements
- Designed for consistent performance in dirty or wet conditions
- Integrated aluminum base with built-in slide surfaces simplifies construction
- Supports NEMA 17 motors, with upgrade path to NEMA 23
- Integrated sensor mounting grooves on both sides for easy setup



## LAHP SERIES LEAD SCREW DRIVEN ACTUATORS

**STARTING AT $1,050.00**



LAHP series lead screw actuators provide a cost-conscious option built on a rigid platform. They balance accuracy and performance for applications that do not require high-speed operation.

- Positioning accuracy down to ±0.013mm with anti-backlash nut design
- Lead screw efficiency approximately 60 percent for a balance of cost and performance
- Max linear speed approximately 0.085 m/s for controlled motion
- Travel range from 52mm to 910mm using same platform as ball screw units
- 0.25 inch lead screw pitch for consistent motion and thrust control
- Compatible with stepper and servo motor mounting options

## LACP SERIES LEAD SCREW DRIVEN ACTUATORS

**STARTING AT $1,485.00**

LACP series lead screw actuators are compact, lightweight, and easy to integrate. They handle light duty motion where space is tight and simplicity is key.

- Compact width near 2.03 inches for tight installations
- Travel lengths from 6 inches to 36 inches for flexible small system design
- Lead screw pitch options of 0.5 inch or 1 inch for speed or thrust tuning
- Designed for light loads with efficient packaging of guidance and drive
- Compatible with NEMA 17 motors, with NEMA 23 possible using different coupling
- Hard coated aluminum rail improves wear resistance in harsh or wet environments
- Self contained design reduces assembly time and part count

# STEPPER MOTOR LINEAR ACTUATORS

| Series Name | Best For | Key Attributes | Primary Benefit |
|---|---|---|---|
| SureStep Series | Simple, cost-effective positioning with minimal components | Integrated motor + lead screw, compact, multiple lead options | Fastest way to add precise linear motion without building a system |

## SURESTEP STEPPER MOTOR LINEAR ACTUATORS

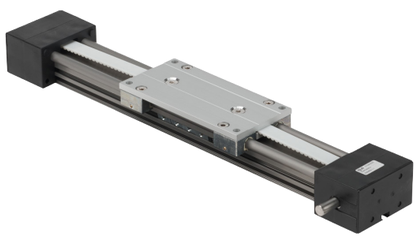
**STARTING AT $129.00**

SureStep linear actuators combine a stepper motor and lead screw into one compact unit. They are a simple, cost-effective way to get precise linear motion without building a full actuator assembly.

- Thrust capability up to 193 lb for moderate load positioning
- Max linear speeds up to 18 in/sec depending on lead selection
- Wide range of lead options from 0.25 in/rev to 1.0 in/rev and 1.25 to 10.5 mm/rev
- Available in NEMA 17 and NEMA 23 frame sizes to match torque needs
- Standard stroke lengths of 6, 9, and 12 inches simplify selection
- Integrated stainless steel lead screw reduces components and simplifies design
- Maintenance-free operation with long-life polymer nut
- Optional encoder-ready configurations for closed loop control

# BELT DRIVEN LINEAR ACTUATORS

| Series Name | Best For | Key Attributes | Primary Benefit |
|---|---|---|---|
| ZLW Series | Long travel and high-speed movement | High-speed capability, long stroke lengths, low maintenance | Best choice for moving loads quickly over distance |



## ZLW SERIES BELT DRIVEN ACTUATORS

**STARTING AT $452.00**

ZLW series belt driven actuators are built for speed and long travel. They are ideal when moving parts quickly across larger distances is more important than tight precision control.

- Max linear speed up to 1.5 m/s for high-throughput systems
- Stroke lengths up to 1000mm for long travel applications
- 83 to 85 percent (approx.) efficiency range for reduced power consumption
- Position accuracy approximately ±0.2mm with repeatability near the same range
- Polyurethane belt reinforced by steel cords, with 70mm belt pitch
- Load ratings up to 4800 N static and 500 N dynamic depending on model
- Hard anodized aluminum rail with dry running bearings reduces maintenance

# UNDRIVEN LINEAR SLIDES

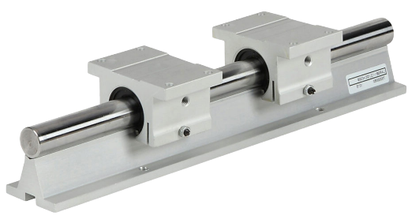
| Series Name | Best For | Key Attributes | Primary Benefit |
|---|---|---|---|
| LARS Series | Heavy loads with external drive systems | High load capacity, rigid shaft design, stable motion | Strong support for custom-built heavy-duty systems |
| LAHP Series | Precise guidance with external motion source | High accuracy, rigid structure, compatible with many actuators | Drop-in precision guidance for custom automation |

## LARS SERIES UNDRIVEN LINEAR SLIDES

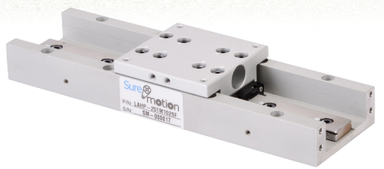
**STARTING AT $354.00**

LARS series undriven slides are built for heavy loads and strong support. They provide stable linear motion guidance for custom driven systems.

- High load capacity enabled by fully supported round shaft design
- Travel options from 12 inches to 36 inches for mid range linear guidance
- Low deflection under load improves positioning stability
- Linear ball bearing system delivers smooth motion under high load
- Compatible with custom drive systems such as belt, rack, or screw







## LAHP SERIES UNDRIVEN LINEAR SLIDES

**STARTING AT $652.00**

LAHP series undriven slides provide rigid, precise linear guidance without a built-in drive. They are ideal when motion control comes from an external system.

- Max linear speed up to 1.5 m/s when paired with external drive
- Same load ratings as driven LAHP actuators with up to 350 N axial and 480 N lateral
- Travel range from 52mm to 910mm for flexible system design
- Strong moment load capacity supports multi axis assemblies
- Drop-in compatibility with LAHP actuator mounting and gantry systems
- High-precision linear guides ensure smooth, accurate motion

# BALL SCREWS AND BALL NUTS

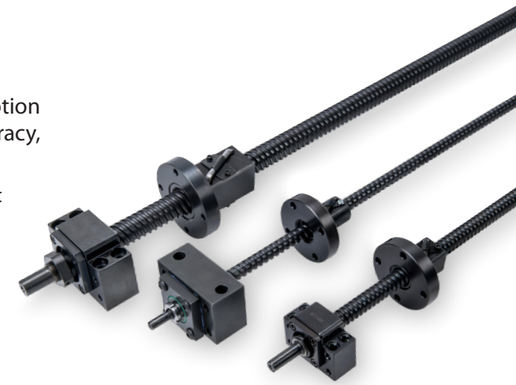
| Series Name | Best For | Key Attributes | Primary Benefit |
|---|---|---|---|
| R Series | Custom systems requiring high precision and efficiency | High efficiency, multiple sizes/leads, durable construction | Flexible, high-performance motion building block |

## R SERIES BALL SCREWS AND BALL NUTS

**STARTING AT $19.00**

R series ball screws and nuts deliver high-efficiency, precision linear motion for custom systems. These are a strong choice when you need speed, accuracy, and long life in a configurable package.

- Mechanical efficiency greater than 90 percent reduces motor load and heat
- Lead accuracy of ±0.007 in/ft supports precise positioning
- Dynamic load ratings up to 3400 lbf and static ratings up to 21000 lbf
- Diameters from 3/8 inch to 1 inch and lengths from 24 inches to 72 inches for application breadth
- Multiple lead options allow tuning for speed vs thrust
- Case hardened 1045 steel construction with Rc 56 to 60 hardness
- Factory-matched ball nuts ensure proper fit and load distribution
- Optional safety springs and wiper kits improve performance in dirty environments



# LINEAR GUIDES AND RAIL SYSTEMS

| Series Name | Best For | Key Attributes | Primary Benefit |
|---|---|---|---|
| **WON Linear Bearings and Rails** | High-load, high-precision motion systems | Rigid rails, recirculating bearings, high load capacity | Foundation for precise, repeatable motion |
| **LU Series Internal Carriages and Guides** | Light-duty applications in tight or imperfect setups | Enclosed design, compact, tolerant of misalignment | Easy-to-use and forgiving in small systems |
| **PBC Guide Tracks with Slides** | Harsh environments needing low maintenance | Self-lubricating, corrosion-resistant, quiet operation | Reliable motion where maintenance is difficult |
| **LV Series External Carriages and Guides** | Higher loads in dirty or exposed environments | Open design, debris-resistant wheels, durable construction | Maintains performance in real-world industrial conditions |

## WON LINEAR BEARINGS AND RAILS

**STARTING AT $18.50**

WON linear bearings and rails provide rigid, low-friction motion for heavy loads. They are the foundation for precise, repeatable linear positioning in industrial automation.

- Load capacity up to 74,600 N supports heavy industrial applications
- Recirculating ball bearings provide low friction and smooth motion
- Precision ground rails ensure tight tolerances and alignment
- Available in 11 sizes with rail lengths up to 1000mm
- Hardened rails with HRC 58 to 64 improve wear life
- Multiple block styles including flanged and rectangular options

## LU SERIES INTERNAL CARRIAGES AND GUIDES

**STARTING AT $22.00**

LU series internal carriage systems are compact and forgiving. They are purpose built for light-duty motion where space is tight and alignment is not perfect.

- Designed for light load applications, up to 169N, with guided motion inside enclosed tracks
- Enclosed track design protects wheels from debris and accidental contact
- Crowned and double V wheel options help compensate for misalignment
- Maintenance-free operation eliminates lubrication
- Rail lengths up to 1520mm with extendable configurations
- Selection of carriage sizes and profiles for flexibility
- Compact design fits space-constrained assemblies

## PBC GUIDE TRACKS WITH SLIDES

**STARTING AT $48.50**

PBC guide tracks with slides deliver smooth, maintenance-free motion in tough environments. They are a strong option when temperature, contamination, or uptime drive the decision.

- Load capacity up to 8200 N supports moderate to heavy loads
- Operating temperature range from -400°F to 400°F handles extreme environments
- Self-lubricating PTFE FrelonGOLD sliding surface reduces maintenance
- Ceramic coated aluminum track improves wear resistance and reduces weight
- Lengths up to 2000mm across seven sizes support larger systems
- Quiet operation with built-in vibration damping
- Shock-resistant construction improves durability



## LV SERIES EXTERNAL CARRIAGES AND GUIDES

**STARTING AT $65.00**

LV series external carriage systems are built for higher loads and heavy industrial environments. They stay reliable when debris, exposure, and heavy use are part of the job.

- Load capacity up to 4700 N supports significantly higher loads than internal systems
- Open track design allows operation in dirty or contaminated environments
- V wheel design sheds debris during motion to maintain smooth travel
- Integrated lubrication supports long service life
- Rail lengths up to 1256mm with extendable mounting
- Selection of carriage sizes and profiles for flexibility
- External layout simplifies inspection and maintenance

# LINEAR SHAFTS AND BEARINGS

| Series Name | Best For | Key Attributes | Primary Benefit |
|---|---|---|---|
| **PBC Linear Precision Ground Shafts** | Building accurate, rigid linear motion systems | Precision-ground shafts, multiple materials, round or supported styles | Provides the straight, stable foundation needed for smooth linear travel. |
| **igus Aluminum Linear Shafts** | Lightweight linear motion systems in clean, wet, or corrosive environments | Aluminum construction, corrosion resistant, available in multiple lengths and shaft styles | Reduces system weight while providing reliable, lubrication-free shaft support. |
| **PBC Linear Shaft Bearings** | General-purpose precision linear motion | Plain or ball-bearing options, self-aligning designs, high-accuracy versions available | Lets users balance accuracy, load capacity, and durability for their application. |
| **igus Bearings** | Maintenance-free linear motion in dirty, wet, or hard-to-service applications | Self-lubricating polymer design, self-aligning options, multiple material choices, chemical resistant | Eliminates lubrication requirements while delivering smooth, dependable motion. |
| **PBC Linear Shaft Supports** | Supporting and reinforcing linear shafts | Simple mounting, broad shaft compatibility, reduces shaft deflection | Improves alignment and system stability for more consistent performance. |

## PBC LINEAR PRECISION GROUND SHAFTS

**STARTING AT $4.75**

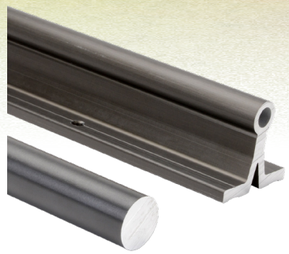
PBC linear precision ground shafts provide rigid support for linear sliding motion where straightness and dimensional consistency are critical. These shafts are engineered for smooth travel and dependable performance in precision motion applications.

- Carbon steel or stainless steel versions to match strength and corrosion requirements
- Precision ground construction delivers consistent shaft diameter and straightness to support linear sliding loads
- Diameters from .25 inch to 1.25 inches
- Standard lengths from 6 inches to 36 inches
- Round and fully supported shaft styles
- Compatible with plain, ball, and roller style shaft bearings

## IGUS ALUMINUM LINEAR SHAFTS

**STARTING AT $11.50**

igus linear shafts provide lightweight, corrosion-resistant support for guided motion systems. Designed to pair with polymer linear bearings, these shafts deliver reliable performance in clean, wet, or dirty environments without external lubrication.



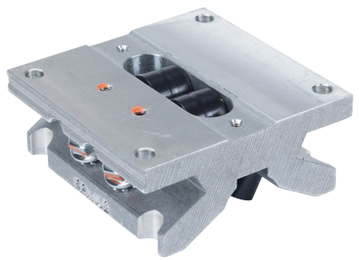
- 6061-T6 aluminum shafts with hard-anodized surface hardness of 450 to 550 HV
- Diameters from .25 inch to 1 inch
- 250mm, 500mm, and 1000mm lengths support compact or extended layouts
- Round and fully supported shaft styles accommodate different load and deflection needs
- Lightweight aluminum reduces system mass and inertia compared to steel shafts

## PBC LINEAR SHAFT BEARINGS

**STARTING AT $16.00**

PBC linear shaft bearings provide smooth, controlled motion when paired with precision ground shafts. Multiple bearing technologies are available to support accuracy, load capacity, and long service life across a wide range of applications.

- Maintenance-free plain bearings or rolling element ball bearings
- Plain bearings feature a self-lubricating Frelon liner to reduce maintenance
- Ball bearing models use heat-treated rolling elements for extended life
- Precision models offer running clearance as tight as 0.001 inch (0.025mm)
- Open or closed bearing styles
- Flange-mounted assemblies include built-in self-alignment in all directions



Roller pillow blocks are designed for high-speed, high-rigidity linear motion and perform well in demanding environments where contamination resistance is important.

- Large cam follower bearings with side shields help exclude contaminants
- Linear travel speeds up to 7.6 m/s (25 ft/s)
- Well suited for joined shaft applications
- Optimized for horizontal installations with downward loading
- Single-style pillow blocks can operate on curved shafts
- Corrosion-resistant bearing design supports long service life
- Assemblies include built-in self-alignment in all directions

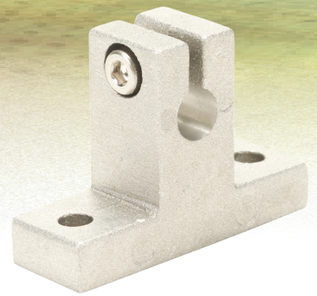
## IGUS BEARINGS

**STARTING AT $17.00**

igus linear shaft bearings offer a maintenance-free alternative to traditional ball bearings for aluminum shafting. Engineered polymer designs provide consistent motion, chemical resistance, and long service life without lubrication.


- DryLin R linear plain bearings are dimensionally interchangeable with industry standard linear ball bearings
- Self-aligning options help compensate for shaft misalignment and mounting variation
- iglide plain bearings available in J, G300, and T500 materials for low-friction, general purpose, or high-temperature use
- Operating temperature range from -148°F to 482°F, material dependent
- Permissible static surface pressure up to 21,760 psi, depending on bearing material
- Available in five common mounting configurations to simplify installation





## PBC LINEAR SHAFT SUPPORTS

**STARTING AT $21.50**

PBC linear shaft supports stabilize and reinforce round shafts to reduce deflection and maintain alignment. These components help ensure consistent performance in linear motion systems.

- Designed for end or intermediate shaft support
- Compatible with any round shaft material
- Available for shaft diameters from .25 inch to 1.25 inches
- Simple designs support easy installation

# RACKS AND PINIONS

| Series Name | Best For | Key Attributes | Primary Benefit |
|---|---|---|---|
| GAM Helical Racks | Long-distance travel beyond actuator stroke limits | Helical gearing, modular 1-meter sections, scalable length | Ideal for very long travel applications while maintaining smooth, quiet motion. |
| GAM Helical Pinions | Driving rack-and-pinion linear motion systems | Compatible with SureMotion stepper and gearbox outputs, multiple mounting styles | Provides a matched drive solution for precise rack-and-pinion motion. |
| GAM Helical Rack Installation Gauges | Accurate installation of multi-section rack systems | Matches rack pitch modules, simplifies alignment | Helps ensure precise rack installation and smoother system performance. |

## GAM HELICAL RACKS

**STARTING AT $224.00**

GAM helical racks are high precision for smooth and quiet operation. Multiple rack sections can be installed to construct the length needed for your application.

- Module pitches of 1.5, 2.0 and 3.0
- 100 to 200 tooth sections, all in 1 meter lengths

## GAM HELICAL PINIONS

**STARTING AT $442.00**

GAM helical pinions are designed to be mounted to the output shaft of SureGear stepper or servo gearboxes.

- Hardened to work with ISO 10 hardened rack
- Module pitches of 1.5, 2.0 and 3.0
- Tooth counts from 18 to 40 teeth
- Mounting options available include keyed shaft, bolt-through, and set screw styles

## GAM HELICAL RACK INSTALLATION GAUGES

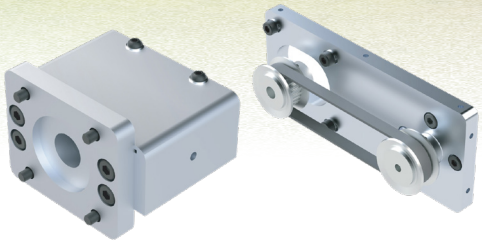
**STARTING AT $64.00**

GAM helical rack installation gauges are used to ensure precise installation of racks when multiple rack sections are used. Select the gauge that matches the pitch module of the associated rack: 1.5, 2.0 or 3.0.

# ACCESSORIES

## LINEAR MOTION SLIDE AND ACTUATOR ACCESSORIES

Accessories for linear motion slides and actuators include motor mounts, mounting adapters and plates, sensors and sensor brackets, replacement lead screw nuts, and drive couplings.



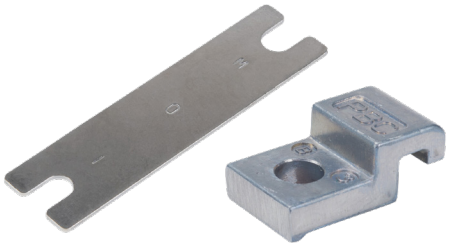
## STEPPER MOTOR LINEAR ACTUATOR ACCESSORIES

Accessories for stepper motor linear motion applications help with the installation and upkeep. They include a variety of replacement lead screw nuts and stepper motor extension cables.

## BALL SCREW AND BALL NUT ACCESSORIES

Ball screw and ball nut accessories support proper installation, alignment, and long-term performance of linear motion systems. These components simplify integration, protect assemblies, and help maintain consistent operation in demanding industrial environments.

- Mounting components that aid accurate alignment and repeatable positioning
- End supports and hardware to handle axial loads and improve rigidity
- Protective accessories that help reduce contamination and wear



## LINEAR GUIDES & RAIL SYSTEM ACCESSORIES

Accessories for linear guides and rail systems include include the required tensioning tools for internal and external guide rail carriages as well as mounting clamps for guide tracks.

- LUACC-x for use with LU carriages
- LVCACC-x for use with LVC carriages
- UGT040A-TC-x for use with UGT series guide tracks

**This buying guide was drafted with AI assistance and edited by the AutomationDirect Technical Marketing Team*