LIMO

Linear Motion

D

Introduction

Introduction and Features of Linear Motion

Precision Linear Actuators

Compact Linear Actuators DRL Series

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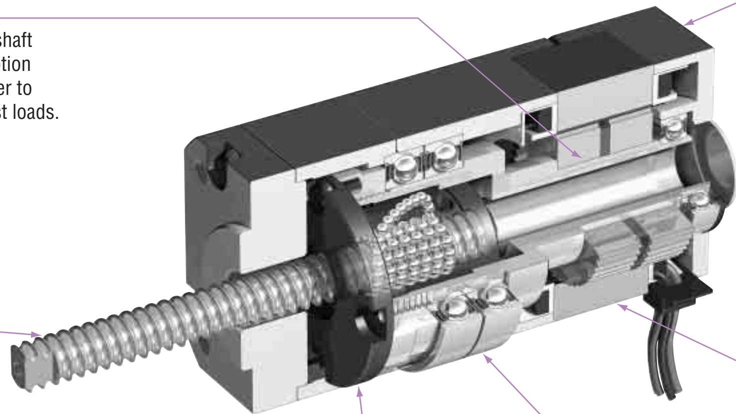


Features

The **DRL** Series linear actuator is a self-contained package consisting of a 5-phase stepping motor with a hollow shaft rotor connected to a ball screw nut. The actuator uses a microstepping driver to deliver extremely precise positioning.

- The compact and lightweight body houses the rotating components as well as the linear motion mechanism of the stepping motor. The **DRL** Series helps to achieve a significant reduction in the size of your equipment and system.
- The hollow rotor shaft incorporates large bore bearings to directly handle thrust loads. Minimizing the number of the parts involved in linear conversion results in higher reliability.
- Eliminates the need to design, acquire and assemble the parts necessary to convert rotary to linear motion.

Construction

Motor

The 5-phase stepping motor offers high-resolution and low-vibration.

Driver

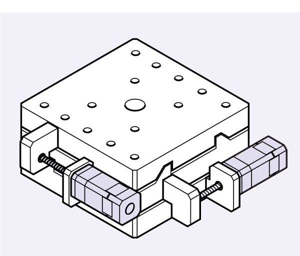
The driver features microstepping electronics that electronically divide the basic step angle of the motor, thus enabling higher resolution and lower vibration operation at low speeds.

Ball Screw

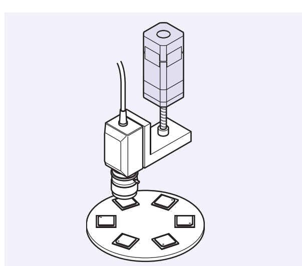
Both rolled and ground ball screws are available, depending on the accuracy required.

Application Examples

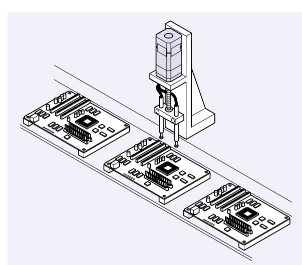
◆ Drive mechanism for a precision X-Y stage (micrometer head X-Y stage)



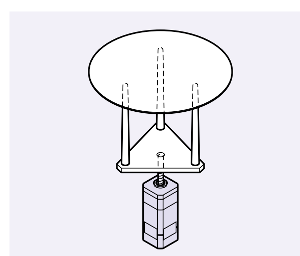
◆ Focusing a CCD camera



◆ Centering a substrate



◆ Silicon wafer pin lifter



Rack & Pinion

Linear Heads LH Series

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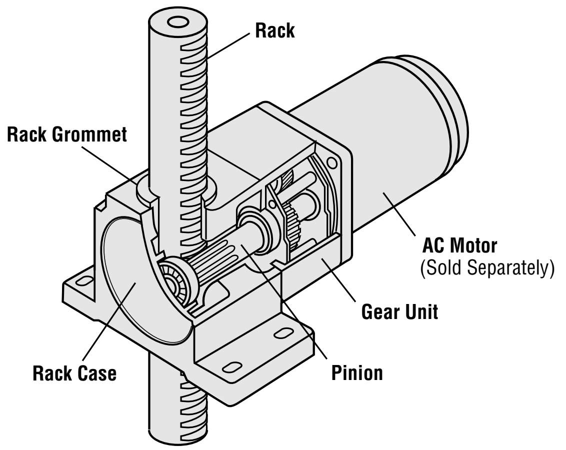


Features

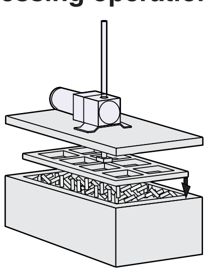
Linear heads are linear motion rack-and-pinion units for use with standard AC motors.

- Depending on the type of motor coupled directly to the linear head, various types of movements are possible.
- A wide range of products are available.
- Motors for direct coupling to the linear heads are sold separately.
- Decimal gearheads which reduce the basic speed by 10:1 are available.

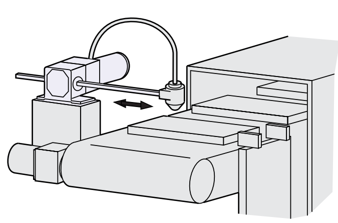
Application Examples

Linear heads provide a linear drive mechanism that can be used in a variety of applications for simpler mechanism design and easier wiring.

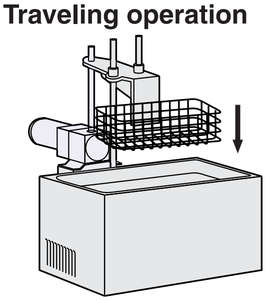
◆ Pressing operation



◆ Reversing operation



◆ Traveling operation



Construction

Linear heads use reduction gears to reduce motor speed and increase motor torque, while a reliable and low cost rack-and-pinion mechanism converts rotational motion into linear motion. The direction of rack movement is determined by the direction of motor rotation. When the rack reaches either end, it is necessary to reverse the direction of rack movement by changing the direction of motor rotation. Since linear heads do not have an automatic stop/reverse mechanism, it is necessary to attach limit switches or sensors to change the direction of motor rotation.

Motor

The ideal way to change the direction of rack movement instantaneously is to use a reversible motor.

Rack

Solid-drawn S45C steel is gear-cut and given a nitride finish to reduce sliding friction and provide rust-resistance.

Rack Grommet

The rack is supported by two grommets made by an oilless metal.

Note:
If the end of the rack should advance into the rack case and the rack is supported by only one grommet, it might cause the mechanism to malfunction. The rack movement should always be reversed before the edge of the rack reaches the rack grommet.

How to Read the Specifications Table

Example Guide Actuator Specifications

Model			DRL28PA1G-03D	DRL28PB1G-03D
Motor Type			5-Phase Stepping Motor	
① Drive Method			Rolled Ball Screw	Ground Ball Screw
② Maximum Transportable Mass	lb. (kg)	Horizontal (See Figure A)	2.2 (1)	2.2 (1)
③ Maximum Transportable Mass	lb. (kg)	Vertical (See Figure B)	3.3 (1.5)	3.3 (1.5)
④ Acceleration	ft./s² (m/s²)		0.66 (0.2)	0.66 (0.2)
④ Acceleration/Deceleration Rate (Basic)	ms/kHz		10 or more	10 or more
⑤ Maximum Speed	in./s (mm/s)		0.94 (24)	0.94 (24)
⑥ Maximum Thrust Force	lb. (N)		6.7 (30)	6.7 (30)
⑦ Maximum Holding Force at Excitation	lb. (N)		6.7 (30)	6.7 (30)
⑧ Holding Force at Non-Excitation	lb. (N)		0	0
⑨ Maximum Load Inertia	oz-in (N·m)		M_P: 0 M_Y: 0 M_R: 0	M_P: 0 M_Y: 0 M_R: 0
⑩ Repetitive Positioning Accuracy	in. (mm)		±0.00079 (0.02)	① ±0.00039 (0.01) ② ±0.00079 (0.02)
⑪ Lost Motion	in. (mm)		0.0039 (0.1)	0.002 (0.05)
⑫ Resolution (Basic)	in. (mm)		0.000079 (0.002)	0.000079 (0.002)
⑬ Lead	in. (mm)		0.039 (1)	0.039 (1)
⑭ Stroke	in. (mm)		1.18 (30)	1.18 (30)
Weight	lb. (kg)		0.55 (0.25)	0.55 (0.25)
Ambient Temperature			32 °F~+104 °F (0 °C~+40 °C)	

① Drive Method
Mechanism used to convert motor rotation to linear motion.

② Maximum Transportable Mass (Horizontal direction)
Maximum mass that can be moved under rated conditions in the horizontal direction.
For the standard type the thrust force is reduced by the amount of frictional resistance of the sliding surface and the mass of a guide.

③ Maximum Transportable Mass (Vertical direction)
Maximum mass that can be moved under rated conditions in the vertical direction.

④ Acceleration
Maximum acceleration rate allowed to move with the maximum transportable mass in the horizontal direction.

⑤ Maximum Speed
Maximum speed allowed to be moved with the maximum transportable mass.

⑥ Maximum Thrust Force
Maximum thrust force at constant speed with no load.

⑦ Maximum Holding Force at Excitation
Maximum holding force with the power on.

⑧ Holding Force at Non-Excitation
Maximum holding force with the power off.

⑨ Maximum Load Inertia
Maximum force that can be applied to the guide when the center of gravity of the actuator and load has an offset.

⑩ Repetitive Positioning Accuracy
Error when moving to same position to the same direction.

⑪ Lost Motion
Positioning error that occurs when positioning to a specific point in the opposite direction.

⑫ Resolution
Distance the motor moves with one step pulse input.

⑬ Lead
Distance the motor moves in one resolution.

⑭ Stroke
Maximum distance the load can be moved.