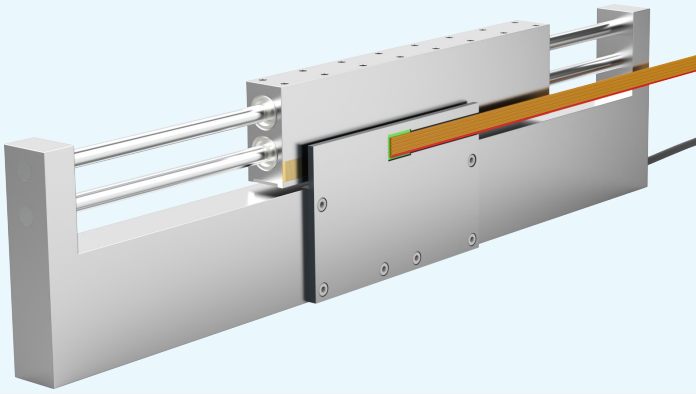
PMC
PIEZO
MOTOR COMPANY

Linear Piezomotor LRMO-150

Piezo Motor Company's novel series of linear piezoelectric motors represents a quantum leap in design construction of compact, high-precision, performance linear motor technologies. This new range of linear motors combines extended travel range, superior nanometer precision and ultrafast response at a very economical cost.



Performance and Benefits of LRMO-150 Linear Motor

EXTENDED STROKE — 150 mm (Custom Lengths Available)

The LRMO-150 provides a standard 150 mm stroke length with custom stroke options available to suit specific application requirements.

ULTRA-FINE RESOLUTION

Delivers a open loop step size as small as **0.04 µm** at full thrust or holding force — achieving up to **25,000 precise steps per mm** of linear motion. In close loop control (with optional factory-fitted encoder) the controlled step size is 2.66 µm. Contact PMC for other encoder options.

FAST RESPONSE TIME

Motion begins within **20–30 µs**, significantly faster than typical stepper motors, which require approximately **5 ms** to initiate movement.

HIGH FORCE-TO-WEIGHT RATIO

Combining compact dimensions with exceptional output, these motors deliver **superior force density** compared with stepper or lead-screw actuators.

ENERGY-EFFICIENT PERFORMANCE

Consumes **zero power** in the hold position and only **0.5 W at 1 mm/s**, enabling highly efficient duty cycles and reduced system power demands.

ELECTROMAGNETIC IMMUNITY

Piezo Motor Company actuators are **immune to EMI and RF interference** and generate **no emissions**, making them ideal for **sensitive or MRI-compatible applications.**

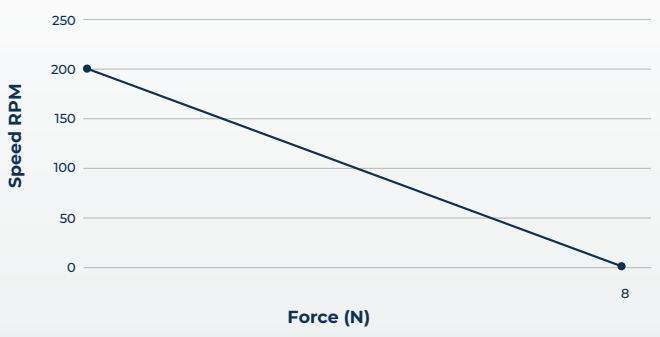
LIGHTWEIGHT CONSTRUCTION

With **no copper windings, iron laminations, or permanent magnets,** the LRMO-150 delivers **exceptional performance-to-mass ratio,** perfectly suited for **weight-critical systems.**

UNIQUE PROPERTIES

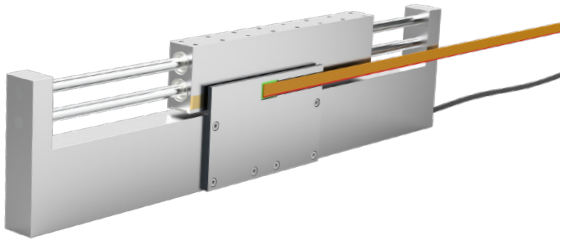
- Lightweight
- Low voltage
- 25,000 steps per mm of travel
- Superior precision and resolution
- 150 mm travel range (Custom Lengths Available)
- Six orders of magnitude speed dynamic range
- Silent operation in continuous mode
- Ultra-Fast response time with superior start-stop characteristics
- High force for size
- Energy efficient, zero power consumption in hold mode

LRMO-150
SPEED V FORCE CURVE

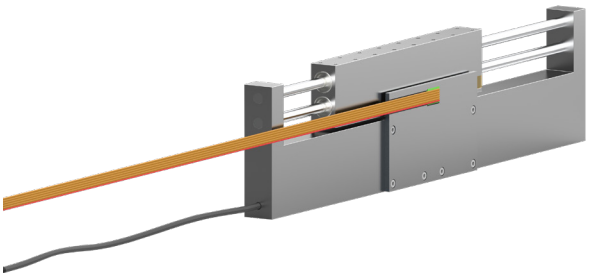


Speed-Force Curve for LRMO-150 Linear Motor

LRMO-150



LRMO-150 Series Linear Motor
without Encoder



LRMO-150 Series Linear Motor
with Encoder

MOTOR SPECIFICATIONS

	Standard	Encoder
Driver Board P/N	ROLR-150-PCB	ROLR-150-PCB
Power Supply Voltage	12 V	12 V
Push/Pull Force	≥ 8.0 N	≥ 8.0 N
Self-Braking Force	≥ 10.0 N	≥ 10.0 N
Motor Response Time	≈30µs	≈30µs
Max Speed	200 mm/s	200 mm/s
Travel Range	150.0 mm	150.0 mm
Minimum Linear Step	<0.04 µm	<0.04 µm
Encoder Resolution (after quadrature)	N/A	2.6 µm
Minimum Controlled Linear Step	N/A	2.6 µm
Uni-directional Repeatability	N/A	2.6 µm
Linear Backlash at Change of Direction	≤ 1 µm	≤ 1 µm
Elastic stiffness	≈ 220 mN/µm	≈ 220 mN/µm
Linear Hysteresis	≤ 2.0 µm	≤ 2.0 µm
Pitch	≤450 µRad	≤450 µRad
Maximum Moment Mx	0.07 Nm	0.07 Nm
Roll	≤225 µRad	≤225 µRad
Maximum Moment My	0.12 Nm	0.12 Nm
Yaw	≤450 µRad	≤450 µRad
Maximum Moment Mz	0.9 Nm	0.9 Nm
Vertical Runout	3.0 µm	3.0 µm
Horizontal Runout	6.0 µm	6.0 µm
Frequency Response	4 kHz	4 kHz
Operating Temperature	-20 to 80 °C	-20 to 80 °C
Maximum Load (at listed specification)	1 kg	1 kg
Max Current over velocity range	1.2 A	1.2 A
Motor Weight	500 g	500 g
Motor Dimensions	321x77x20 mm	321x77x20 mm
Driver PCB Dimensions	40x63x25 mm	40x63x25 mm
Driver PCB Weight	25 g	25 g

Principle of operation

Piezo Motor Company's linear piezo motors work on a principle of excitation of ultrasonic standing waves within a piezoelectric resonator. Piezo Motor Company's electronic drivers have been designed to provide an economical user-control interface. Each driver PCB is pre-programmed for the specific motor model and is software configurable to provide optimization of drive signals and integrated controls. Closed-loop control of the motor is achieved via an encoder mounted on the motor.

Motor control

The control of the LRMO-150 Linear Motor is straightforward, each motor requires a driver board. This board will convert desired motion input instructions to the necessary electrical processes using specific frequency and amplitude values. This creates excitation of the piezo resonator and makes the motor perform the desired motion. For motors with a encoder, a daughter board is attached to the driver board to provide both closed-loop feedback as well as serial interfacing for external programming capabilities via Piezo Motor Company's software or serial commands.

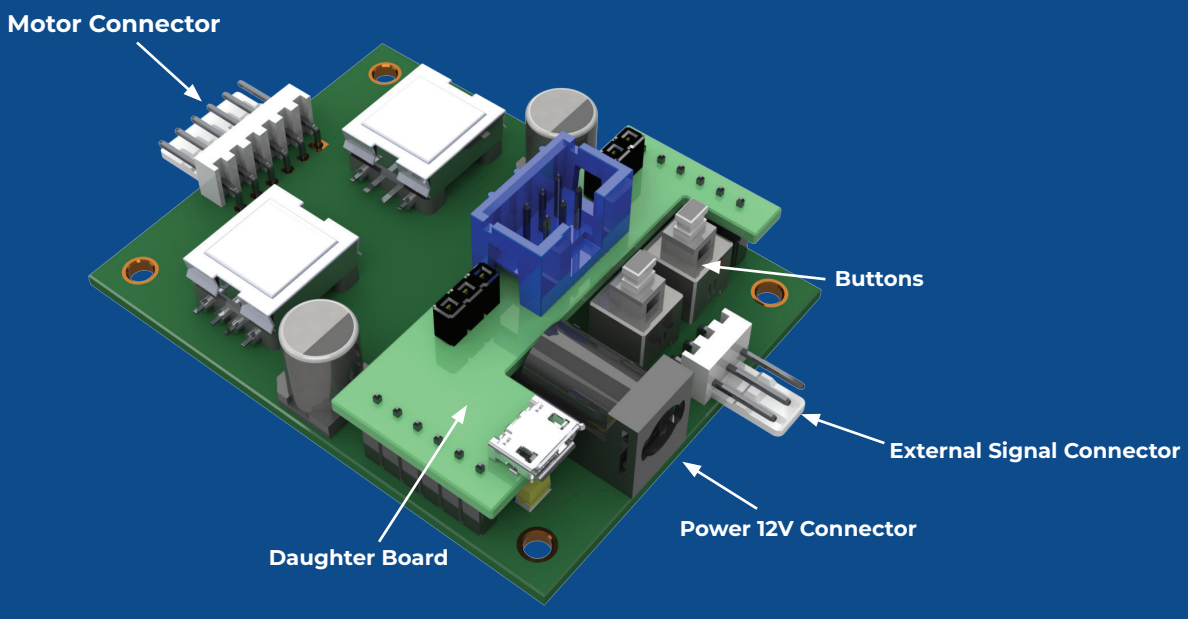
OPEN LOOP

The driver board can be controlled using an external signal source PWM (Pulse Width Modulation) mode. Control signals are applied to the External Signal Connector to generate the desired motion and speed. Control of speed using PWM is implemented by varying the pulse duration and repetition rate of input signals onto the two directional control pins. Size of step is determined by the pulse duration, and speed is determined by pulse rate. The minimum pulse duration is approximately 30 µs.

CLOSED-LOOP

Pre-programmed motion control algorithms enable the implementation of several commands for specific motion control. The key commands are for defining the speed and the movement to a defined position. These commands are resident within a library which can be accessed using either Piezo Motor Company's control software or via the serial port using TTL serial commands. Motor Control can also be implemented with Python commands using Piezo Motor Company's Motor API.

Electronic PCB Driver for LRMO-150 Series Piezomotors



ELECTRONIC DRIVER

Control architecture & options

Piezo Motor Company motors are available as a basic motor or with a fitted encoder. Piezo Motor Company electronic drivers are available as open-loop or closed-loop drivers which are fitted with an encoder daughter board. Motors can be simply controlled in open-loop mode with several options for achieving closed-loop motion control.

	Open-Loop Driver	Closed-Loop Driver with Encoder board
Base Motor	Open-Loop Control or third party controller command motor with PWM control and close control loop with external sensor	
Motor with Encoder	Open-Loop control or third-party controller command motor position with PWM control. User closes control loop via encoder	Motor Control using Piezo Motor Company's Windows(R) control software or Python API via third-party controller or TTL Serial Port Commands

DRIVER BOARDS LRMO-150 SERIES

Model	ROLR-LG-PCB	ROLR-LG-PCB
Part Number	ROLR-LG-PCB (Standard)	ROLR-LG-CL-PCB (Encoder)
Description	Standard 12 VDC Driver board for LRMO-LG	Close-Loop Driver PCB 12 VDC LRMO-E-LG

Evaluation Kits

Full range of evaluation kits available. Each kit includes motor, driver board pcb, cables, 5 VDC or 7.5 VDC power adapter & user manual. Encoder kit version also includes factory-fitted magnetic encoder with cable and connector.

ORDERING INFORMATION

Motor Type	LRMO-150 (without encoder)	LRMO-E-150 (with encoder)
Model	LRMO-150-KIT	LRMO-E-150-KIT
Part Number	LRMO-150-0291	LRMO-150-1291
Encoder	without Encoder	with Optical Encoder
Enclosure	Metal Enclosure	Metal Enclosure
Resolution	40 nm = 20,000 steps per mm of travel	40 nm = 20,000 steps per mm of travel
Max Speed	>0.2 m/s	>0.2 m/s
Response Time	< 30 µs	< 30 µs
Supply	12 V DC	12 V DC

For OEM and custom inquires, contact us at info@piezomotorco.com

About Piezo Motor Company LLC

Founded in 2024, Piezo Motor Company is at the forefront of innovation in the design and manufacturing of piezoelectric motors. Headquartered in the USA, we have a global reach through a network of international distributors, delivering cutting-edge technology to clients worldwide.

Our team comprises highly skilled experts with extensive experience in piezoelectric motor and actuator design and physics. We are passionate about harnessing the unique properties of piezoelectric materials to create motors that offer unmatched precision, efficiency, and reliability. Our solutions are tailored to meet the diverse needs of industries ranging from medical devices to aerospace and robotics.

We pride ourselves on our commitment to excellence and innovation, continuously pushing the boundaries of what piezoelectric technology can achieve. Our dedication to research and development ensures that we remain leaders in this dynamic field, providing our clients with the most advanced and effective solutions available. Join us on our journey as we revolutionize the world of motion control with piezoelectric technology.

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