

Linear Piezomotor **LRMO-LG Series**

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

Performance and Benefits of LRMO-LG Series Rotary Motors

IMPROVED RESOLUTION

With a control step size of just 0.05 μm at full thrust or holding force, these linear motors offer 20,000 steps per mm of control.

FASTER REACTION TIME

Within 20 μs to 30 μs the piezo motor has made its first step, and motion has commenced compared to a stepper motor with a typical 5 ms to start motion.

HIGH-FORCE DENSITY

For their size and weight, these motors offer superior force density, particularly when compared with stepper and lead screw solutions.

ENERGY AND COST SAVINGS

The piezo motor consumes zero power at holding force and very low power at slow speed (0.06 W at 1 mm/s), yielding the possibility of very efficient overall duty.

SPECIAL PROPERTIES

Piezo Motor Company motors are immune to EMI and RF interference and have no emissions, making them ideal for a range of sensitive applications. For specialized applications (including MRI) please contact our technical team.

ECONOMICAL DESIGN

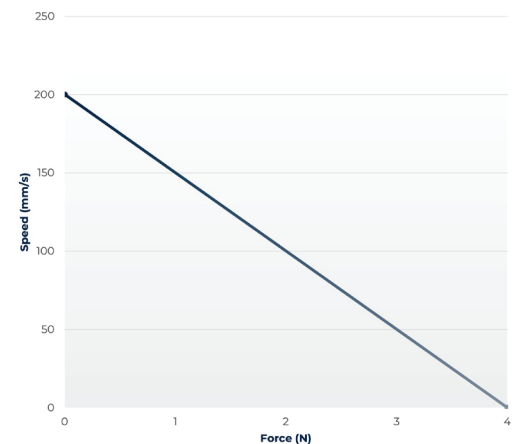
The innovative design and patent-protected technology packaged in stable reinforced thermoplastic makes this high-performing automation affordable for OEM equipment designers.

LIGHTWEIGHT

Our piezo motor contains no copper windings, iron laminations, or permanent magnets and is significantly more powerful by weight than EM solutions. This makes them ideally suited to weight-critical applications.

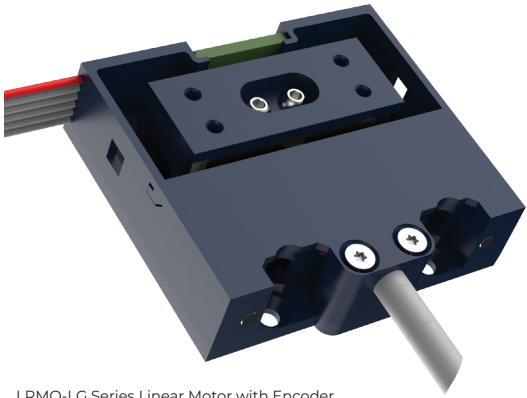
UNIQUE PROPERTIES

- Lightweight
- Low voltage
- 20,000 steps per mm of control
- Superior precision and resolution
- 9 mm travel range
- 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
- Stepping and Continuous mode of operation

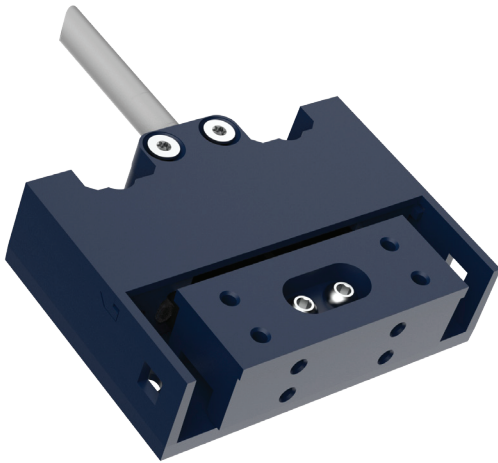


Speed-Force Curve for LRMO-LG Series Linear Motor

LRMO-LG Series



LRMO-LG Series Linear Motor with Encoder



LRMO-LG Series Linear Standard Motor

MOTOR SPECIFICATIONS

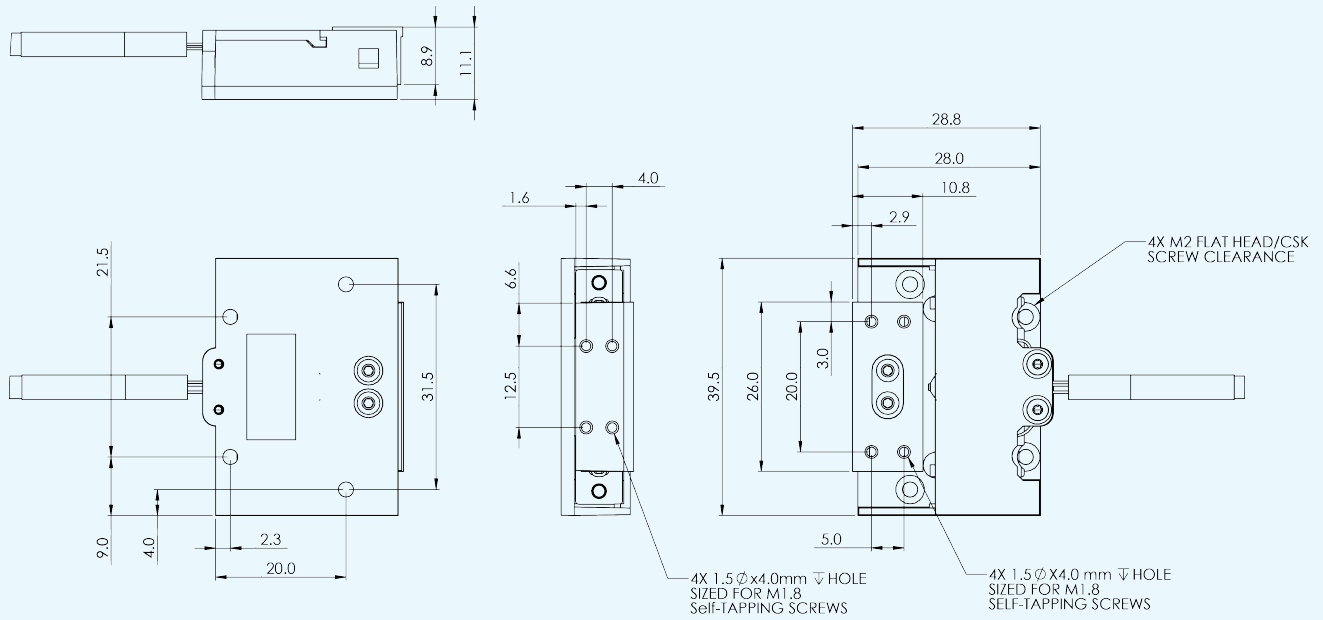
	Standard	Encoder
Driver Board P/N	ROLR-LG-PCB	ROLR-LG-CL-PCB
Power Supply Voltage	12 V	12 V
Push/Pull Force	≥ 4.0 N	≥ 4.0 N
Self-Braking Force	≥ 4.0 N	≥ 4.0 N
Motor Response Time	$\approx 30\mu\text{s}$	$\approx 30\mu\text{s}$
Max Speed	200 mm/s	140 mm/s
Travel Range	9.0 mm	9.0 mm
Minimum Linear Step	$< 0.04 \mu\text{m}$	$< 0.04 \mu\text{m}$
Encoder Resolution (after quadrature)	N/A	2.66 μm
Minimum Controlled Linear Step	N/A	2.66 μm
Uni-directional Repeatability	N/A	2.66 μm
Linear Backlash at Change of Direction	$\leq 0.1 \mu\text{m}$	$\leq 0.1 \mu\text{m}$
Elastic stiffness	≈ 220 mN/ μm	≈ 220 mN/ μm
Linear Hysteresis	$\leq 2.0 \mu\text{m}$	$\leq 2.0 \mu\text{m}$
Pitch	$\leq 450 \mu\text{Rad}$	$\leq 450 \mu\text{Rad}$
Maximum Moment Mx	0.07 Nm	0.07 Nm
Roll	$\leq 225 \mu\text{Rad}$	$\leq 225 \mu\text{Rad}$
Maximum Moment My	0.12 Nm	0.12 Nm
Yaw	$\leq 450 \mu\text{Rad}$	$\leq 450 \mu\text{Rad}$
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)	400 g	400 g
Max Current over velocity range	350 mA	350 mA
Motor Weight	22 g	25 g
Motor Dimensions	40x31x11 mm	40x31x11 mm
Driver PCB Dimensions	40x63x25 mm	40x63x25 mm
Driver PCB Weight	25 g	25 g

Principle of operation

Piezo Motor Company's rotary piezo motors work on a patented principle of excitation of ultrasonic standing waves within a piezoelectric resonator. The resulting superposition of two orthogonal ultrasonic waves causes elliptical movement of the resonator tip which drives the rotor (for more details visit piezomotion.com). Piezo Motor Company's electronic driver's have been designed to provide an economical user-control interface. Each driver PCB is preprogrammed 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.

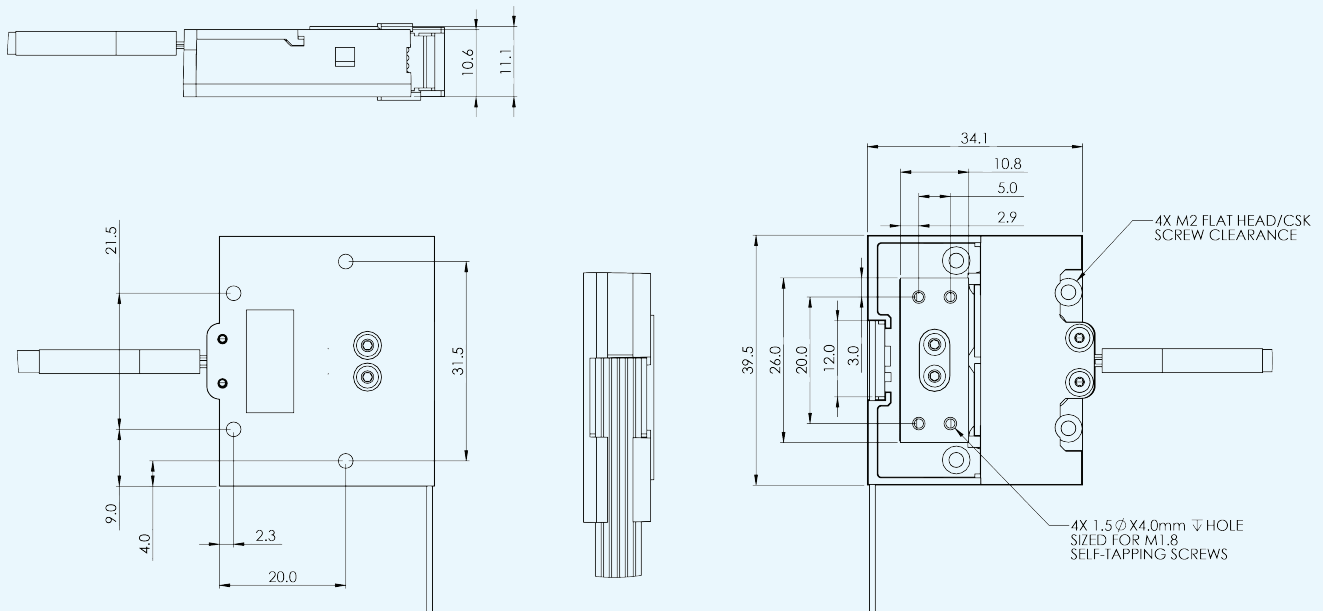
LRMO-LG Series dimensional drawings

STANDARD MODEL



NOTES:
1. ALL DIMENSIONS IN MILLIMETERS (mm) UNLESS OTHERWISE SPECIFIED.
2. DIMENSIONS (IN PARENTHESIS) FOR REFERENCE ONLY.

ENCODER MODEL



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1. ALL DIMENSIONS IN MILLIMETERS (mm) UNLESS OTHERWISE SPECIFIED.
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Motor control

The control of the LRMO-LG 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 an 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.

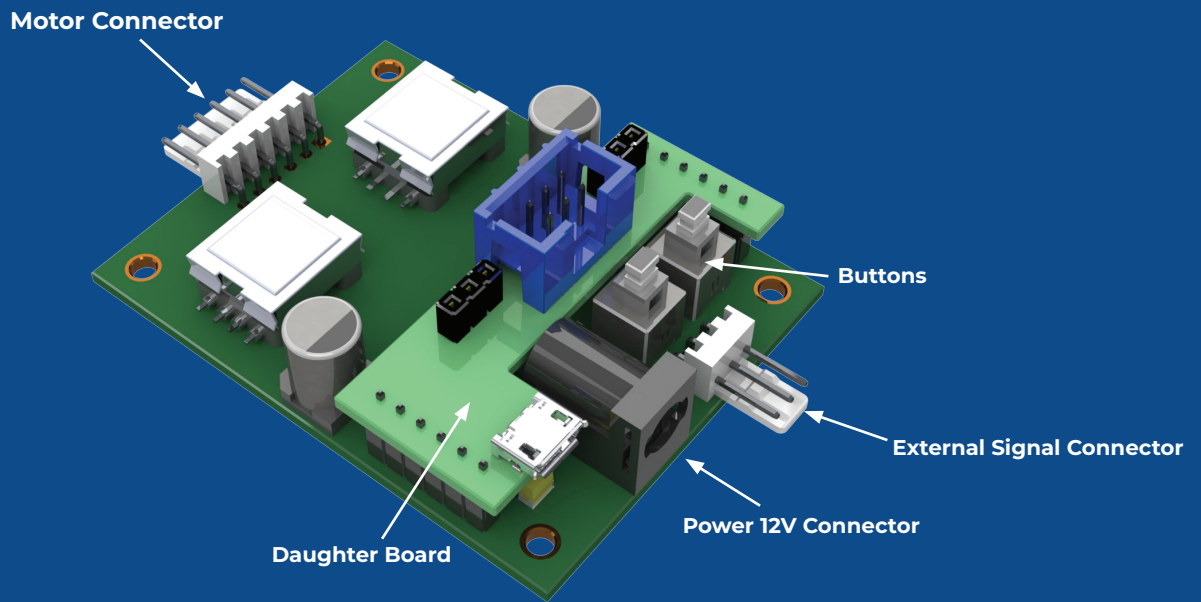
OPEN LOOP

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 rotation 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 μ s.

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-LG 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. To learn more, visit <https://piezomotors.com/products/>

	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 with PWM control and close control loop Piezo Motor Company Encoder output	Motor Control with: Piezo Motor Company's Control Software on Windows OS device or Piezo Motor Company Python API on third party controller or TTL Serial Port Commands

DRIVER BOARDS ROMO-LG & LRMO-LG 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 ROMO-LG and LRMO-LG	Close-Loop Driver PCB 12 VDC for use with ROMO-E-LG and 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-LG	LRMO-E-LG
Model	LRMO-LG	LRMO-E-LG
Part Number	LRMO-011-0280	LRMO-011-1280
Encoder	without Encoder	with Optical Encoder
Enclosure	Plastic Enclosure	Plastic Enclosure
Resolution	50 nm = 20,000 steps per mm of travel	50 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
Kit Ordering Number	LRMO-LG-KIT	LRMO-E-LG-KIT
Part	LRMO-011-0281	LRMO-011-1281
Supply (Kit)	110/240 VAC to 12 V DC power adapter	110/240 V AC to 12 V DC power adapter
Includes	Linear motor with Plastic Enclosure; power adapter, cables	Linear Motor with encoder; power adapter, cables

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.