

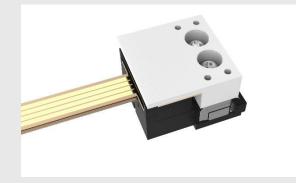
LRMO-E Series - Miniature Piezoelectric Linear Actuators with encoder

Introducing our new range of compact, lightweight linear piezoelectric actuators, with factory-fitted optical encoder designed to deliver superior precision and expanded functionality for advanced applications.

Closed-Loop (Feed-Back Control) System with Python™ API

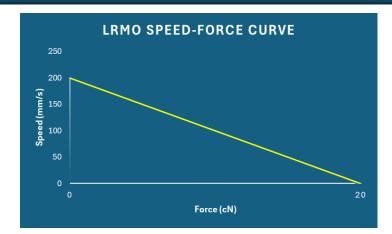
Key Advantages

- New US patented design.
- Superior stability of velocity control.
- Flexible pcb electrical connection facilitates system integration.
- Economical construction using thermoplastics for reliability and affordability.
- Unmatched precision and resolution.
- Ultra-fast response times and exceptional start-stop capabilities.
- High force density relative to size, provides excellent alternative to stepper lead screw designs.
- Stepping and continuous modes of operation with silent operation.
- Low power and low voltage requirement.



Python API Closed-Loop Control System

LRMO-E-CL comes complete and ready to use. Includes, motor/encoder, electronic driver PCB, USB to Micro USB adapter, cable and Python API software. **Contact your sales representative for further details.**



Motion Control using Python API

The LRMO-E-CL is a closed system in which feedback control is achieved using a fully integrated proprietary Python API.

Key Features include:

- **Closed-Loop Feedback Control:** Utilizes encoder feedback for precision control. Run Python scripts for precise motion control.
- High Performance: Ultra-fast <30 µs Response Time, ≥ 0.25 N Self-Braking Force, Motor Resolution 40 nm, Encoder Resolution 2.66 µ, Max speeds > 150 mm/s
- Low Voltage & Low Current: 5 V DC, 30 mA to 300 mA (max)
- Versatile Operation: Supports stepping and continuous modes.
- Easy Integration: Connect driver PCB/Piezomotor to computer via USB.

Example Python API Commands:

- Home (direction) Moves the motor to the zero position.
- getPosition() Retrieves current motor position in encoder pulses.
- Velocity(value) Sets motor speed (0.01 150 mm/s).
- *Move(action)* Moves motor Left/Right or Stops.
- Position(value) Moves motor to a specific position in microns (μ) (encoder resolution 2.6 μ).
- setPWMsettings(duty_cycle_percent, frequency_Hz) Configures velocity by PWM parameters.

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Piezo Motor Company LLC. Boca Raton Florida 33431, USA Email. <u>info@piezomotorco.com</u>

Technical Specifications

Power Supply Voltage5.0 V DCPush/Pull Force≥0.2 NSelf-Braking Force≥0.25 NMotor Response Time≈30 µsTravel Range9.0 mmMax Speed (continuous mode)≥150 mm/sMinimum Linear Step<0.04 µm (<40 nm)Encoder Resolution (after quadrature)*2.66 µmMinimum Controlled Linear Step*2.66 µmLinear Backlash at Change of Direction<0.1 µmElastic Stiffness<2.00 mN/µmLinear Hysteresis<2.0 µmPitch<1 mradMaximum Moment Mx0.07 NmRoll<0.12 NmYaw<1 mradMaximum Moment Mz0.9 NmVertical Runout3.0 µmHorizontal Runout6.0 µmFrequency Response4 kHzOperating Temperature-20 °C to 80 °CMaximum Load (at listed specification)300 mAMaximum Tolerable Load4.2 kgfMax Current at the velocity 10mm/s (PWM mode)30-40 mAMotor Weight4.7 gMotor Dimensions31x28x9.6 mmDrive PCB Uniciest6.0 c	•	
Self-Braking Force≥0.25 NMotor Response Time≈30 µsTravel Range9.0 mmMax Speed (continuous mode)≥150 mm/sMinimum Linear Step<0.04 µm (<40 nm)	Power Supply Voltage	5.0 V DC
International protectInternational protectMotor Response Time≈30 μsTravel Range9.0 mmMax Speed (continuous mode)≥150 mm/sMinimum Linear Step<0.04 μm (<40 nm)	Push/Pull Force	≥0.2 N
Travel Range9.0 mmMax Speed (continuous mode)\$150 mm/sMinimum Linear Step<0.04 μm (<40 nm)	Self-Braking Force	≥0.25 N
Max Speed (continuous mode)≥150 mm/sMinimum Linear Step<0.04 μm (<40 nm)	Motor Response Time	≈30 µs
Minimum Linear Step<0.04 μm (<40 nm)Encoder Resolution (after quadrature) *2.66 μmMinimum Controlled Linear Step *2.66 μmUni-directional Repeatability2.66 μmLinear Backlash at Change of Direction<0.1 μm	Travel Range	9.0 mm
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quadrature) *.Minimum Controlled Linear Step*2.66 μmUni-directional Repeatability2.66 μmLinear Backlash at Change of Direction<0.1 μm	Minimum Linear Step	<0.04 µm (<40 nm)
Uni-directional Repeatability2.66 μmLinear Backlash at Change of Direction<0.1 μm		2.66 μm
Linear Backlash at Change of Direction<0.1 μmElastic Stiffness≈200 mN/μmLinear Hysteresis<2.0 μm	Minimum Controlled Linear Step*	2.66 µm
Direction×200 mN/μmElastic Stiffness≈200 mN/μmLinear Hysteresis<2.0 μm	Uni-directional Repeatability	2.66 µm
Linear Hysteresis<2.0 μmPitch<1 mrad	_	<0.1 µm
Pitch<1 mradMaximum Moment Mx0.07 NmRoll<0.5 mrad	Elastic Stiffness	≈200 mN/µm
Maximum Moment Mx0.07 NmRoll<0.5 mrad	Linear Hysteresis	<2.0 μm
Roll<0.5 mradMaximum Moment My0.12 NmYaw<1 mrad	Pitch	<1 mrad
Maximum Moment My0.12 NmYaw<1 mrad	Maximum Moment Mx	0.07 Nm
Yaw<1 mradMaximum Moment Mz0.9 NmVertical Runout3.0 μmHorizontal Runout6.0 μmFrequency Response4 kHzOperating Temperature-20 °C to 80 °CMaximum Load (at listed specification)20 gMaximum Tolerable Load4.2 kgfMax Current (continuous mode)300 mAMax. Current at the velocity 10mm/s (PWM mode)30-40 mAMotor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm	Roll	<0.5 mrad
Maximum Moment Mz0.9 NmVertical Runout3.0 μmHorizontal Runout6.0 μmFrequency Response4 kHzOperating Temperature-20 °C to 80 °CMaximum Load (at listed specification)20 gMaximum Tolerable Load4.2 kgfMax Current (continuous mode)300 mAMax. Current at the velocity 10mm/s (PWM mode)30-40 mAMotor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm	Maximum Moment My	0.12 Nm
Vertical Runout3.0 μmHorizontal Runout6.0 μmFrequency Response4 kHzOperating Temperature-20 °C to 80 °CMaximum Load (at listed specification)20 gMaximum Tolerable Load4.2 kgfMax Current (continuous mode)300 mAMax. Current at the velocity 10mm/s (PWM mode)30-40 mAMotor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm	Yaw	<1 mrad
Horizontal Runout6.0 μmFrequency Response4 kHzOperating Temperature-20 °C to 80 °CMaximum Load (at listed specification)20 gMaximum Tolerable Load4.2 kgfMax Current (continuous mode)300 mAMax. Current at the velocity 10mm/s (PWM mode)30-40 mAMotor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm	Maximum Moment Mz	0.9 Nm
Frequency Response4 kHzOperating Temperature-20 °C to 80 °CMaximum Load (at listed specification)20 gMaximum Tolerable Load4.2 kgfMax Current (continuous mode)300 mAMax. Current at the velocity 10mm/s (PWM mode)30-40 mAMotor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm	Vertical Runout	3.0 µm
Operating Temperature-20 °C to 80 °CMaximum Load (at listed specification)20 gMaximum Tolerable Load4.2 kgfMax Current (continuous mode)300 mAMax. Current at the velocity 10mm/s (PWM mode)30-40 mAMotor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm	Horizontal Runout	6.0 μm
Maximum Load (at listed specification)20 gMaximum Tolerable Load4.2 kgfMax Current (continuous mode)300 mAMax. Current at the velocity 10mm/s (PWM mode)30-40 mAMotor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm	Frequency Response	4 kHz
specification)	Operating Temperature	-20 °C to 80 °C
Maximum Tolerable Load4.2 kgfMax Current (continuous mode)300 mAMax. Current at the velocity 10mm/s (PWM mode)30-40 mAMotor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm		20 g
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(PWM mode)Motor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm	Max Current (continuous mode)	300 mA
Motor Weight4.7 gMotor Dimensions16.3x16.6x10.4 mmDriver PCB Dimensions31x28x9.6 mm		30-40 mA
Driver PCB Dimensions 31x28x9.6 mm	• •	4.7 g
	Motor Dimensions	16.3x16.6x10.4 mm
Drive DCD Weight	Driver PCB Dimensions	31x28x9.6 mm
Drive PCB Weight 6.8 g	Drive PCB Weight	689

*Model with factory installed optical encoder

Mechanical Drawings





Schematic drawing (mm) of LRMO-E with factory installed encoder).





LRMO-E-CL Electronic Driver PCB

Ordering Information		
Part Number	Description	
	Linear motor with encoder closed-loop	
LRMO-011-1271-CL	System Evaluation Kit. Includes:	
	motor/encoder, electronic driver PCB,	
	Micro USB to USB (5 V) adapter cable,	
	cables and Python API software	

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