# 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.

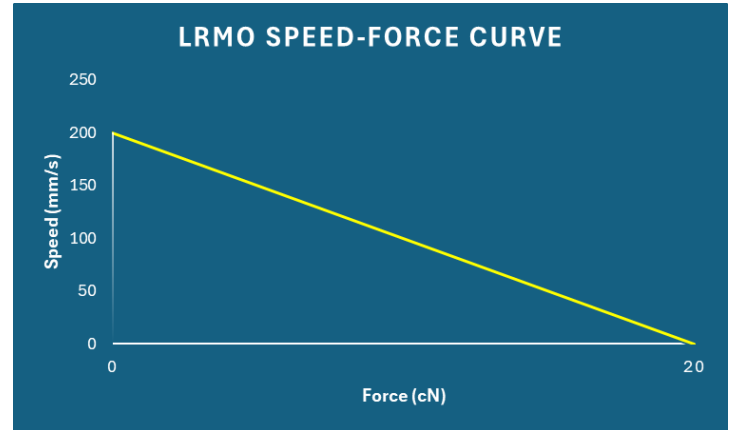## Closed-Loop (Feed-Back Control) System with Python™ API

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.
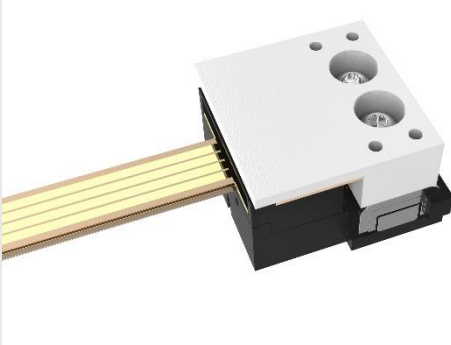
Python API Closed-Loop Control System

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.**

LRMO SPEED-FORCE CURVE

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.

Technical Specifications

Power Supply Voltage	5.0 V DC
Push/Pull Force	≥0.2 N
Self-Braking Force	≥0.25 N
Motor Response Time	≈30 µs
Travel Range	9.0 mm
Max Speed (continuous mode)	≥150 mm/s
Minimum Linear Step	<0.04 µm (<40 nm)
Encoder Resolution (after quadrature) *	2.66 µm
Minimum Controlled Linear Step*	2.66 µm
Uni-directional Repeatability	2.66 µm
Linear Backlash at Change of Direction	<0.1 µm
Elastic Stiffness	≈200 mN/µm
Linear Hysteresis	<2.0 µm
Pitch	<1 mrad
Maximum Moment Mx	0.07 Nm
Roll	<0.5 mrad
Maximum Moment My	0.12 Nm
Yaw	<1 mrad
Maximum Moment Mz	0.9 Nm
Vertical Runout	3.0 µm
Horizontal Runout	6.0 µm
Frequency Response	4 kHz
Operating Temperature	-20 °C to 80 °C
Maximum Load (at listed specification)	20 g
Maximum Tolerable Load	4.2 kgf
Max Current (continuous mode)	300 mA
Max. Current at the velocity 10mm/s (PWM mode)	30-40 mA
Motor Weight	4.7 g
Motor Dimensions	16.3x16.6x10.4 mm
Driver PCB Dimensions	31x28x9.6 mm
Drive PCB Weight	6.8 g

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