



# Ultra-Compact Piezoelectric Rotary 3-Axis Gimbal Stage for Precision Motion

Introducing the ROMO-3AX-SYS the world's smallest lightweight piezoelectric rotary 3-axis gimbal platform designed for superior precision and expanded functionality for advanced applications.

## Key Advantages of ROMO-3AX-SYS System

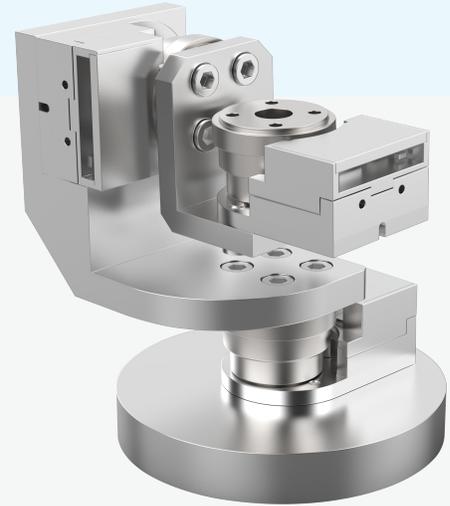
- Compact light weight design
- Superior Resolution:  $<30 \mu\text{rad}$  (  $0.0017^\circ$  per step ) =  $>200,000$  steps per full rotation
- Max Speed:  $> 600$  rpm
- Fast Response Time:  $\approx 30 \mu\text{s}$
- Low Voltage Design: 5 V DC
- Zero power consumption in hold mode
- Encoder (optional): 6.1 mrad close loop resolution

## Design Principle

The ROMO-3AX-SYS system integrates three precision miniature rotary piezomotors (PMC Model# ROMO) into a compact rotary 3-axis gimbal stage, providing precise multi-axis motion in an ultra-small footprint. It is ideal for space-limited applications where silent operation, zero backlash, and sub-microradian resolution are required. The ROMO-3AX-SYS offers reliable, high-precision control for industries where traditional stepper or servo motors are too bulky, heavy or generate electromagnetic interference, making it ideal for next-generation motion solutions in photonics, life sciences, miniature drones and precision instrumentation.

## Electronic Driver Supports UART & I2C

The electronic driver is designed to offer an economical interface for user control. Motion of the motor is achieved via PWM (Pulse Width Modulation) control signals. The driver PCB also supports I2C interface. The driver PCB is pre-programmed for software configurability, optimizing drive signals and integrating controls. Motor operation can be finely regulated through closed-loop control using an optional encoder factory-installed on the actuator.



## Typical Applications

### PHOTONICS AND OPTICS

- Laser beam alignment and steering
- Fiber optic alignment for telecom or laboratory systems
- Optical switching and MEMS device positioning

### MICROSCOPY AND LIFE SCIENCES

- Automated sample positioning and scanning
- Focus adjustment for imaging systems
- Compact stages for fluorescence or confocal microscopy

### TEST AND MEASUREMENT

- Sensor and probe positioning in lab automation
- Fine calibration of microelectronic components
- Alignment in spectrometry or interferometry setups

### DRONE & PORTABLE EMBEDDED DEVICES

- Field-deployable optical or analytical instruments
- Medical devices requiring ultra-compact motion systems



## ROMO-3AX-SYS System Specifications

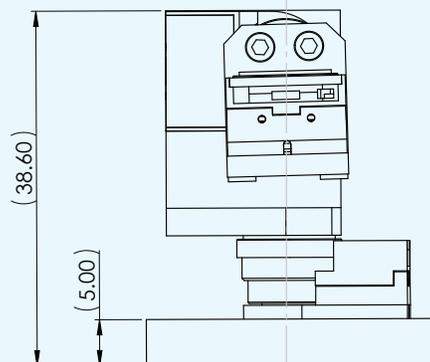
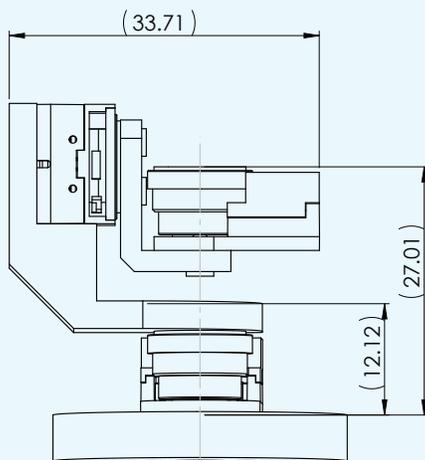
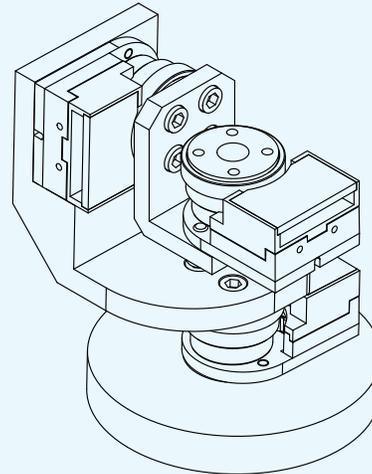
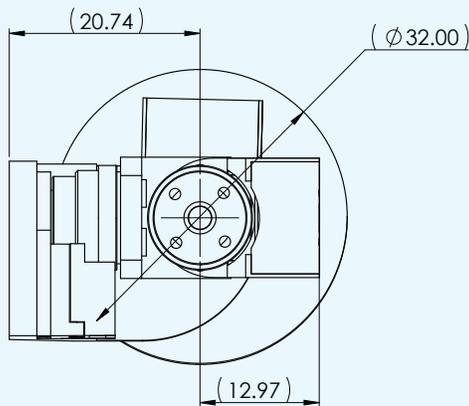
Motor Model #	ROMO-3AX-SYS (no encoder) or ROMO-3AX-E-SYS (with encoder)
Actuator Type	Rotary Piezoelectric Motor (Hollow Shaft)
Control Type (no encoder)	Open-Loop (no encoder)
Control Type (with encoder)	Python™ API software included with Closed-Loop System
Actuator Dimensions (hollow shaft)	13 × 23.0 × 8.15 mm (Model# ROMO) 13 × 23.0 × 9.15 mm (Model # ROMO-E)
System Weight	15.0 g non-encoder model or 17.0 g encoder models
Rotor Diameter	13 mm
Hollow Shaft Diameter	2.5 mm
Rotor Runout	≤50 μm
Maximum Axial Load	200 g
Maximum Radial Load	200 g
Moment of Inertia	29.2 g·mm <sup>2</sup>
Self-Braking Torque	5 mNm
Stall Torque	4 mNm
Power Supply Voltage	7.5 V DC (5.0 V encoder version)
Max Current (over velocity range)	30 mA – 300 mA
Frequency Response	4 kHz
Actuator Response Time	30 s
Encoder Type	Magnetic
Max Speed	600 rpm
Angular Backlash	30 μrad
Angular Hysteresis	30 μrad
Minimum Angular Step	30 μrad
Minimum Encoder-Controlled Angular Step	6.1 mrad (Encoder Model Only)
Encoder Resolution (after quadrature)	1,024 ppr (Encoder Model Only)
Uni-directional Repeatability	6.1 mrad (Encoder Model Only)
Operating Temperature	-20 °C to +80 °C

## Ordering Information

Part Number	Description
ROMO-3AX-SYS	Includes: 3-Axis positioning system (non-encoder version), 3 X Driver PCB's, I2C adapter board, Raspberry Pi Controller interface with LCD Display and Python API, I20/240 VAC to 5 VDC power adapter and cables.
ROMO-E-3AX-SYS	Includes: 3-Axis positioning system (with optical encoders), 3 X Driver PCB's, I2C adapter board, Raspberry Pi Controller interface with LCD Display and Python API close-loop software, I20/240 VAC to 5 VDC power adapter and cables.

## ROMO-3AX-SYS System dimensional drawings

STANDARD VERSION (Dimensions in mm)



## 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.