

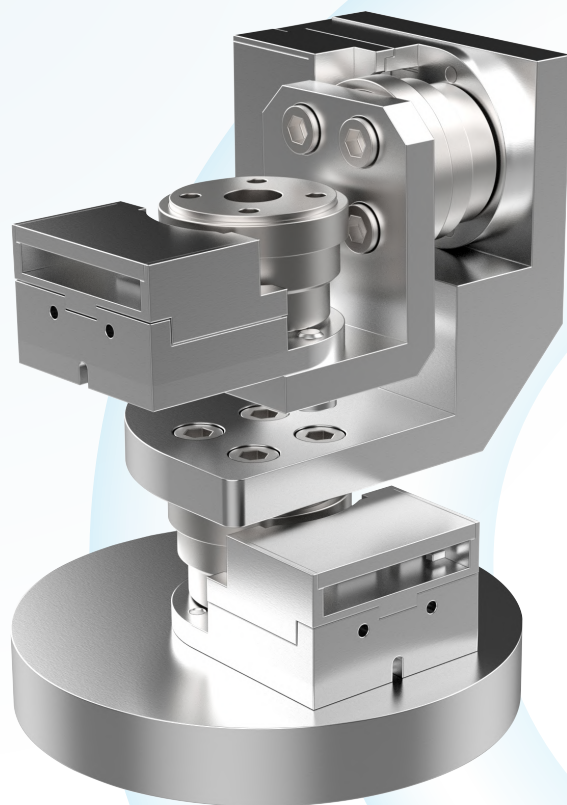


www.piezomotors.com

ROMO-3AX

Ultra-Compact Rotary 3-Axis Gimbal Stage

Innovation In The Design And
Manufacturing Of Piezoelectric Motors

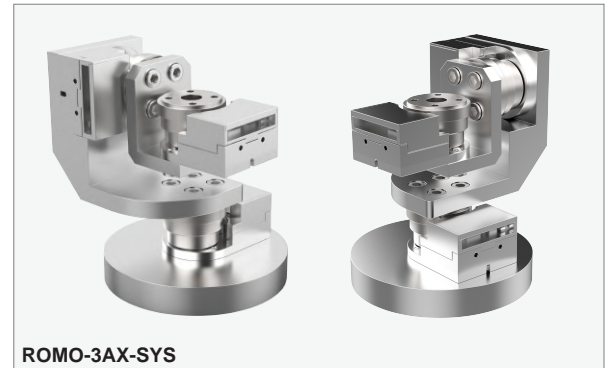


ROMO-3AX System

Ultra-Compact Rotary 3-Axis Gimbal Stage

INTRODUCTION

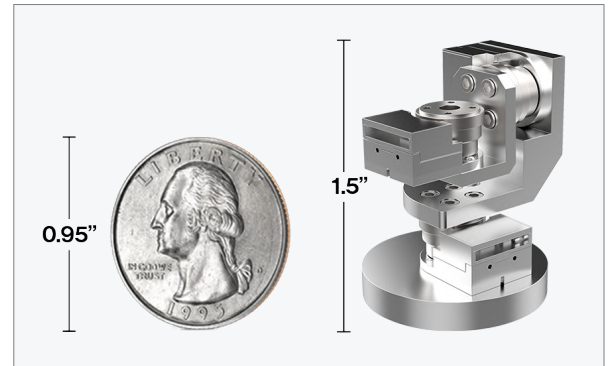
Piezo Motor Company's ROMO-3AX series is one of the world's smallest lightweight piezoelectric rotary 3-axis gimbal platform designed for superior precision and expanded functionality for advanced applications. The ROMO-3AX-SYS system integrates three precision miniature hollow-shaft rotary piezomotors (PMC Model# ROMO) into a compact rotary 3-axis gimbal stage, providing precise multi-axis motion in an ultra-small footprint.



PRINCIPLE OF OPERATION

US Patent Number 12,143,036

The ROMO-3AX system integrates three precision miniature hollow-shaft 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. Ideal for next-generation motion solutions in photonics, life sciences, miniature drones and precision instrumentation.



PERFORMANCE & BENEFITS

- Sub-micron positional resolution.
- Compact, lightweight machined aluminum design
- Stepping and continuous modes of motion on each axis.
- Silent operation and low-voltage (5.0 V DC) drive.
- Open-loop and closed-loop (encoder feedback) models

KEY FEATURES

- Compact lightweight design
- Superior Resolution:
<math><30 \mu\text{rad}</math> (0.0017° 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

ROMO-N-3AX

Rotary 3-Axis Gimbal Stage

3-Axis Gimbal Stage | No Encoder



ROMO-N-3AX (Top View)



ROMO-N-3AX (Side View)

INTRODUCTION

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

MOTOR SPECIFICATIONS

Power Supply Voltage	7.5 V DC
Control Type	Open-Loop
Stall Torque	4 mNm
Self-Braking Torque	5 mNm
Actuator Response Time	30 μ s
Max Speed	600 rpm
Minimum Angular Step	30 μ rad
Angular Backlash	30 μ rad
Angular Hysteresis	30 μ rad
Frequency Response	4 kHz
Operating Temperature	-20 °C to 80 °C
Maximum Axial Load	200 g
Maximum Radial Load	200 g
Moment of Inertia	29.2 g \cdot mm ²
Max Current over velocity range	30 mA – 300 mA
Rotor Runout	\leq 50 μ m
Rotor Diameter	13 mm
Encoder Type	Magnetic

DIMENSIONS & WEIGHT

Actuator Type	ROMO (Hollow Shaft)
Actuator Dimensions (no shaft)	13 x 23.0 x 8.15 mm
Motor Weight	15.0 g

ORDERING INFORMATION

Model	Encoder	Part Number	Kit Number*
ROMO-N-3AX	No	ROMO-M3AX-0391-0000	ROMO-M3AX-0391-0000

*Evaluation Kit Includes ROMO-3AX Positioning System, 3 Driver PCBs, i2c adapter board, Raspberry Pi Controller LCD Display, Python API, 120/220 VAC to 5V DC power adapters and cables.

ROMO-E-3AX

Rotary 3-Axis Gimbal Stage With Encoder

3-Axis Gimbal Stage | With Encoder



ROMO-E-3AX (Top View)



ROMO-E-3AX (Side View)

INTRODUCTION

One of the world's smallest lightweight piezoelectric rotary 3-axis gimbal platform with factory-fitted magnetic encoders.

MOTOR SPECIFICATIONS

Power Supply Voltage	5.0 V DC
Control Type	Python™ API software included with Closed-Loop System
Stall Torque	4 mNm
Self-Braking Torque	5 mNm
Actuator Response Time	30 μ s
Max Speed	600 rpm
Minimum Angular Step	30 μ rad
Encoder Resolution (after quadrature)	1,024 ppr
Minimum Controlled Angular Step	6.1 mrad
Uni-directional Repeatability	6.1 mrad
Angular Backlash	30 μ rad
Angular Hysteresis	30 μ rad
Frequency Response	4 kHz
Operating Temperature	-20 °C to 80 °C
Maximum Axial Load	200 g
Maximum Radial Load	200 g
Moment of Inertia	29.2 g·mm ²
Max Current over velocity range	30 mA – 300 mA
Rotor Runout	\leq 50 μ m
Rotor Diameter	13 mm
Encoder Type	Magnetic

DIMENSIONS & WEIGHT

Actuator Type	ROMO-E (Hollow Shaft)
Actuator Dimensions (no shaft)	13 x 23.0 x 9.15 mm
Motor Weight	17.0 g

ORDERING INFORMATION

Model	Encoder	Part Number	Kit Number*
ROMO-E-3AX	Yes	ROMO-M3AX-1391-0000	ROMO-M3AX-1391-0000

*Evaluation Kit Includes ROMO-3AX-E-SYS positioning system (with optical encoders), 3 X Driver PCB's, I2C adapter board, Raspberry Pi Controller with LCD Display and Python API close-loop software, 120/240 VAC to 5 VDC power adapters and cables.

ROMO-N-3AX & ROMO-E-3AX

I²C / API Command Summary Commands

Open-loop & Closed-loop



SYSTEM CONTROL OVERVIEW (OPEN-LOOP & CLOSE-LOOP OPERATION)

- **ROMO-N-3AX (Open-Loop)** - Motion controlled via PWM signals, timing, and drive current. No encoder feedback; position determined indirectly via command duration and calibration. Simple, compact, high-speed architecture without feedback electronics.
- **ROMO-E-3AX (Closed-Loop)** - Real-time encoder feedback (6.1 mrad resolution) on every axis enables homing and absolute positioning through the PMC Python API. Velocity stabilised across 0.01–200 mm/s. Precise, repeatable, fully programmable multi-axis control.

ROMO-N-3AX - I²C / API Command Summary (Open-Loop)

Command	Function
PiezoMotor(Number_I2C_Bus)	Creates the motor controller object on the specified I ² C bus (typically 1)
Move(address, param)	Executes directional motion (continuous or PWM-based)
MotorType(address, motorType)	Sets actuator type (Linear / Rotary)
PWMTimeSettings(address, direction, duty_cycle_percent, frequency_Hz)	Configures PWM timing (step behaviour)
PWMGeneratorSettings(address, direction, run_motor_periods, period_of_PWM, prescale)	Advanced PWM control
Current(address, current)	Sets motor drive current
setAddress(address, new_address)	Changes I ² C address

ROMO-E-3AX - I²C / API Command Summary (Close-Loop)

Command	Function
PiezoMotor(Number_I2C_Bus)	Creates the motor controller object on the specified I ² C bus (typically 1)
Home(address)	Executes homing routine and blocks until complete
getPosition(address)	Reads back axis position and returns value in μm
Position(address, value)	Commands absolute position in μm (blocks until complete)
Velocity(address, value)	Sets velocity (mm/s)
Move(address, action)	Open-loop direction command (Left / Right / Stop)
setPWMsettings(address, duty_cycle_percent, frequency_Hz)	Configures PWM duty cycle and frequency
setAddress(address, new_address)	Changes I ² C address

Performance Chart and Ordering Information



Motor/Driver Part Configurations

PART NUMBERS & EVALUATION KIT DETAILS

Model	Part Number	Evaluation Kit Description
ROMO-N-3AX	ROMO-M3AX-0391-0000	ROMO-3AX Positioning System (based on ROMO non-encoder version), 3 Driver PCBs, i2c adapter board, complete kit with, Raspberyy Pi Controller LCD Display, Python API, cables and 120/220 VAC to 5V DC power adapter and cables)
ROMO-E-3AX	ROMO-M3AX-1391-0000	ROMO-E-3AX Positioning System with Python Software control (based on ROMO-E closed loop encoder version), 3 Driver PCBs, i2c adapter board, complete kit with, Raspberyy Pi Controller LCD Display, Python API, cables and 120/220 VAC to 5V DC power adapter and cables)
USB-12C Cable	I2CX-CABL-0290-0000	USB-to-I ² C interface cable – optional accessory enabling direct PC control of ROMO-3AX systems as an alternative to Raspberry Pi. Delivers reliable I ² C communication with full multi-axis addressing support.

For custom inquires, contact us at info@piezomotors.com

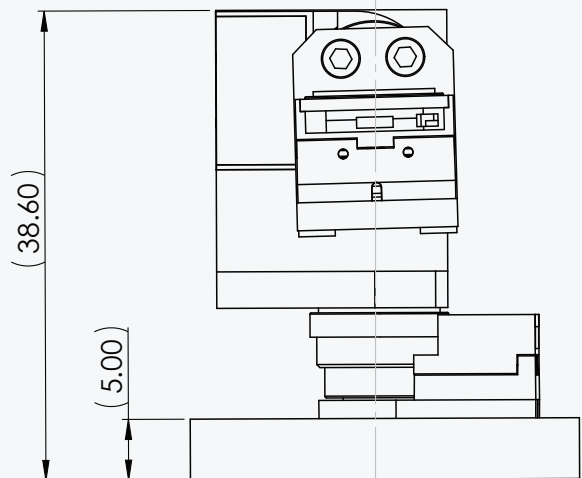
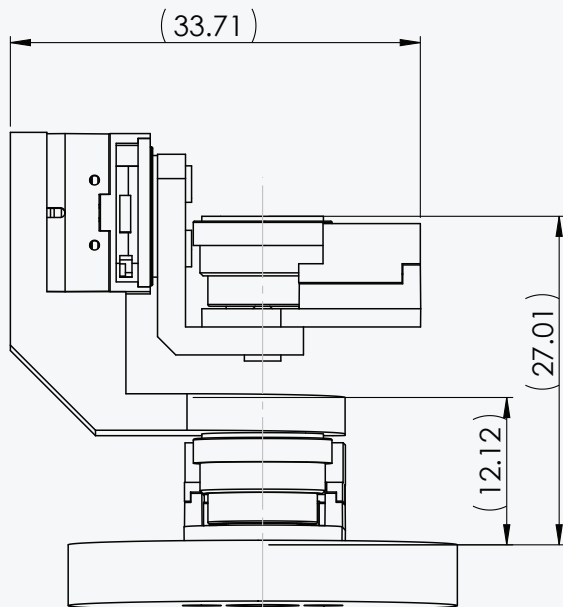
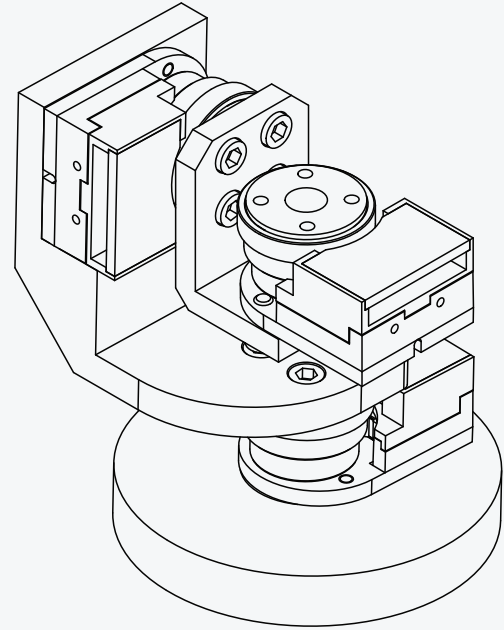
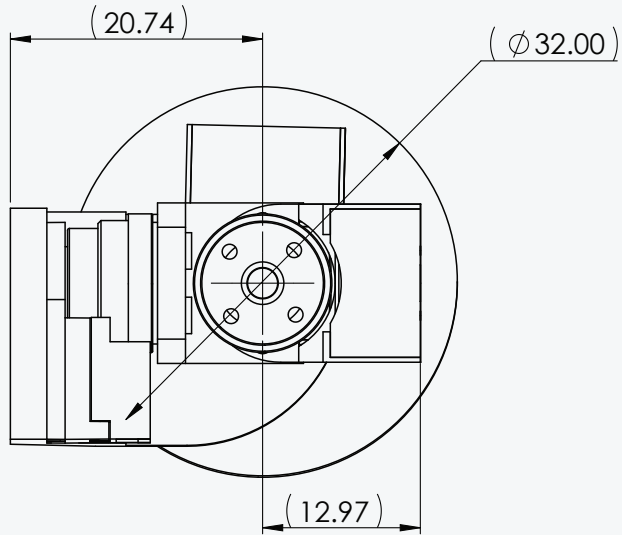
Mechanical Drawings

ROMO-N-3AX

Standard and Encoder Models | All Dimensions in mm



STANDARD MODEL



Dimensions in mm

Why Piezo Motors?

ROMO Series vs. Conventional Motor Technologies



TECHNOLOGY COMPARISON

Feature	ROMO Series	DC Motor	Stepper Motor	Voice Coil
Zero holding power	✓ Zero current	— Continuous draw	— Current in hold	— Current in hold
Self-braking torque	✓ ≥ 5 mNm	— None	— Detent only	— None
Hollow shaft	✓ 2.5 mm I.D.	— Not standard	— Not standard	— N/A
Non-magnetic*	✓ Yes	— No	— No	✓ Yes
Sub-30 μ s response	✓ ~ 30 μ s	■ \sim ms range	■ Step limited	✓ Fast
Size / torque ratio	✓ Excellent	■ Good	■ Moderate	— Low
Silent operation	✓ Yes	■ Brushless: yes	■ Acoustic noise	✓ Yes
Positional resolution	✓ 30 μ rad	■ Encoder limited	■ Step limited	■ Sensor limited
Gearbox required	✓ No	■ Often yes	✓ No	✓ No
Voltage	✓ 5 V	■ Varies	■ Varies	■ Varies

*Contact PMC for details

ABOUT PIEZO MOTOR COMPANY

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.

CONTACT US: Order an evaluation kit or contact our engineering team to discuss your application.

Email: sales@piezomotors.com | **Web:** www.piezomotors.com | **Address:** Boca Raton, FL 33496

Location	Phone	Email
USA	+1 855 600 9666	sales@piezomotors.com
Europe	+44 7921 812476	kevin.thompson@piezomotors.com
Asia	+91 98606 24731	devendra@piezomotors.com

Applications



The ROMO-3AX series is engineered for demanding OEM applications where precision, compactness, and energy efficiency are critical. The hollow shaft, zero holding-power consumption, and sub-30 μ s response time open up design possibilities that are not achievable with conventional electromagnetic motors.

PHOTONICS & FIBER OPTICS

Polarisation control, variable attenuators, wavelength-selective switches.

SCIENTIFIC INSTRUMENTATION

Cryogenic stages, vacuum-compatible mechanisms, spectroscopy platforms.

MICROSCOPY & IMAGING

Objective turrets, polarisation rotators, confocal beam scanners.

ROBOTICS & AUTOMATION

Pick-and-place, collaborative robot joints, gripper mechanisms.

MEDICAL & DIAGNOSTIC

OCT scanners, surgical robotics, drug delivery micro-pumps

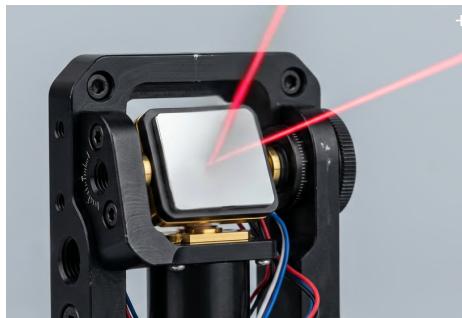
AEROSPACE & DEFENCE

Antenna pointing, gimbal drives, electro-optical payloads.



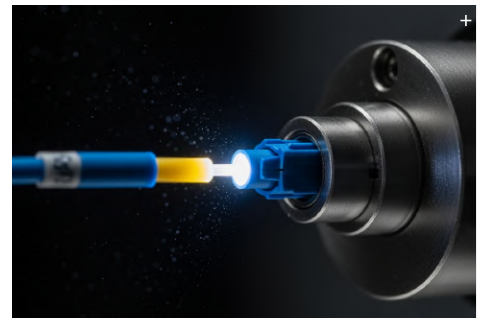
OPTICAL FILTER WHEELS

Fast, silent filter changes in microscopy and spectroscopy.



BEAM STEERING

Precision angular adjustment of optical paths and mirrors.



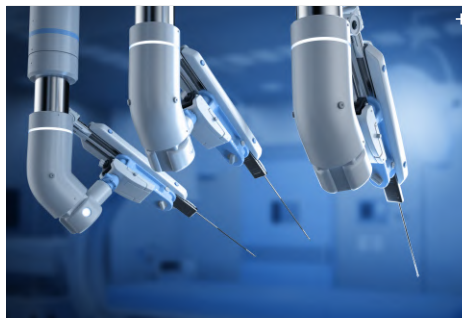
FIBRE ALIGNMENT

Sub- μ rad alignment of fibre optic components.



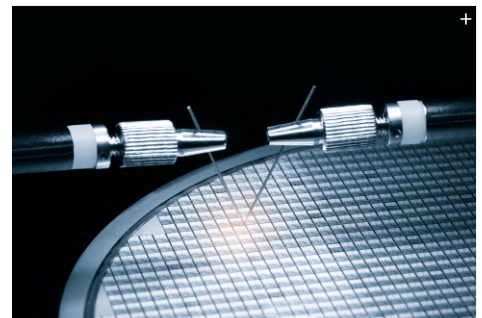
MICRO ROBOTICS

Compact direct-drive joints and end-effectors.



MEDICAL DEVICES

Drug delivery, lab-on-chip, and surgical robotics.



SEMICONDUCTOR

Wafer handling and mask alignment systems.

+ = Stock Image