

MPA-20

Series



Micro Precision Actuator, UHV Reference Manual

MPA-20

Linear Actuator

Reference Manual

Rev 2.02

MICRONIX USA, LLC
Tel: 949-480-0538
Fax: 949-480-0538
Email: info@micronixusa.com
<http://micronixusa.com>

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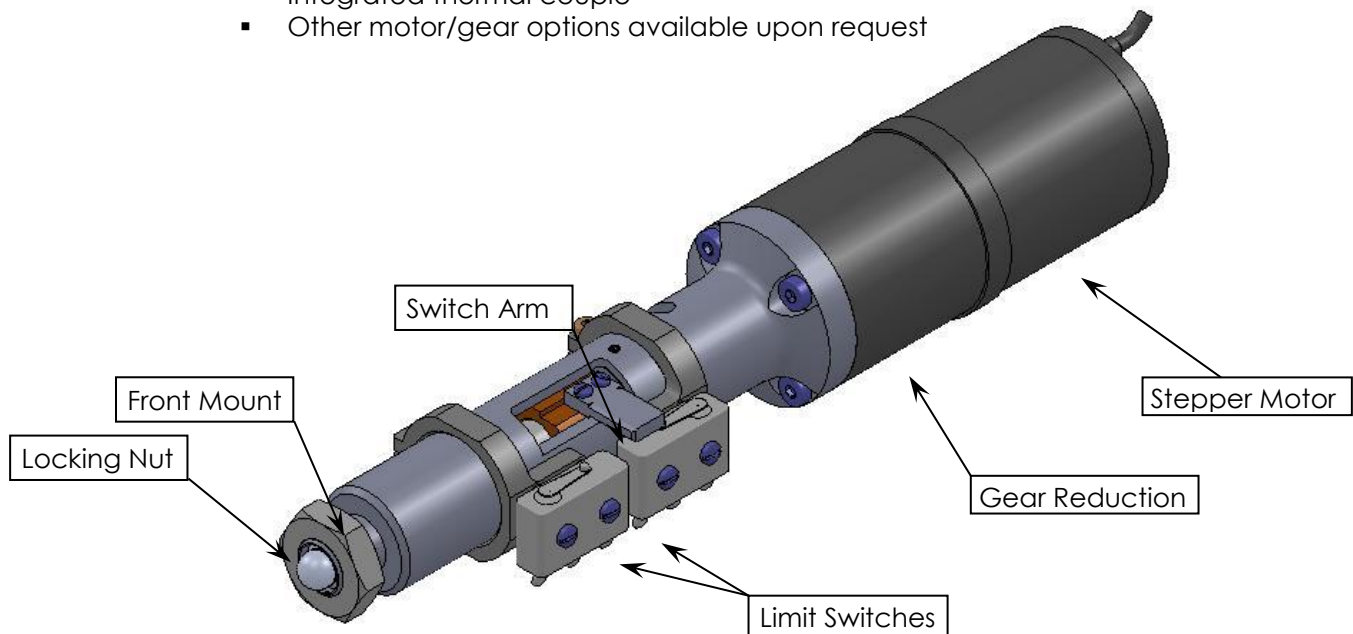
1. Introduction

1.1 Product Description

The MPA-20 linear actuator is specifically designed for applications with ultra-high vacuum (10^{-9} mbar) conditions. Typical applications include actuation of manual drive stages and mirror mounts. It utilizes a 2-phase stepper motor and two hermetically sealed mechanical limit switches. The MPA-20 is compatible with the MMC-200 controller.

Features:

- Travel range of 12 mm
- Gear reduction 4:1
- Hermetically sealed limit switches, UHV compatible
- Force max. 100 N
- Integrated thermal couple
- Other motor/gear options available upon request



1.2 Recommended Controllers

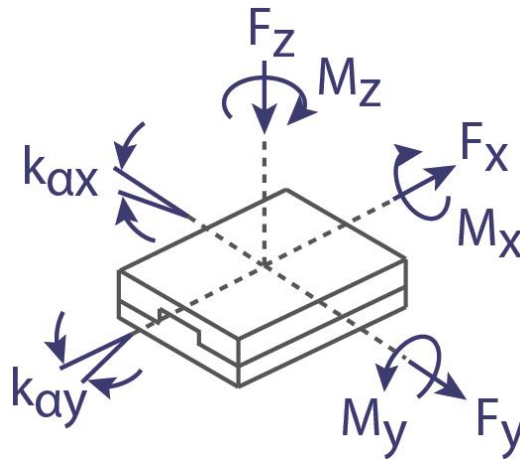
The following controllers are available from MICRONIX USA:

- MMC-200

1.3 Technical Data

Motor	SM-005
Screw Pitch (mm)	0.5
Gear Ratio	4:1
Speed Max. (mm/sec)	1.25
Resolution Calculated (μ m)	0.625 (with micro-stepping)
Resolution Typical (μ m)	0.1
Bi-directional Repeatability (μ m)	± 1
Uni-directional Repeatability (μ m)	1

1.4 Load Characteristics



Load Characteristics	$F_{x(N)}$	$F_{y(N)}$	$F_{z(N)}$	$M_{x(Nm)}$	$M_{y(Nm)}$	$M_{z(Nm)}$	k	k
SM-005	100	10	10	-	-	-	-	-

2. Model Configurations

2.1 MPA-20 Order Numbers

Order No.	MPA-20-	1	1	0	1	9
SM-005		1				
12 mm		1				
None		0				
Mechanical		1				
Ultra-High Vacuum, 10 ⁻⁹ mbar		9				

Contact MICRONIX USA for custom versions.

3. Preparing to Install the MPA-20

3.1 Installation Preparation

The actuator is calibrated and guaranteed to be within specification at 20°C $\pm 5^{\circ}\text{C}$. Be sure to use the actuator under the following conditions:

- Mount to a clean and flat surface which is free of debris, burrs or dings
- An indoor atmosphere free of corrosive gases, excessive dust, and condensation
- Temperature range of 0-40°C
- Relative humidity between 20-80%
- Locate away from water, heat, and electrical noise

3.2 Package Contents

If product is damaged or there are missing components, contact MICRONIX USA immediately. Do not discard product packaging in case of return shipment.

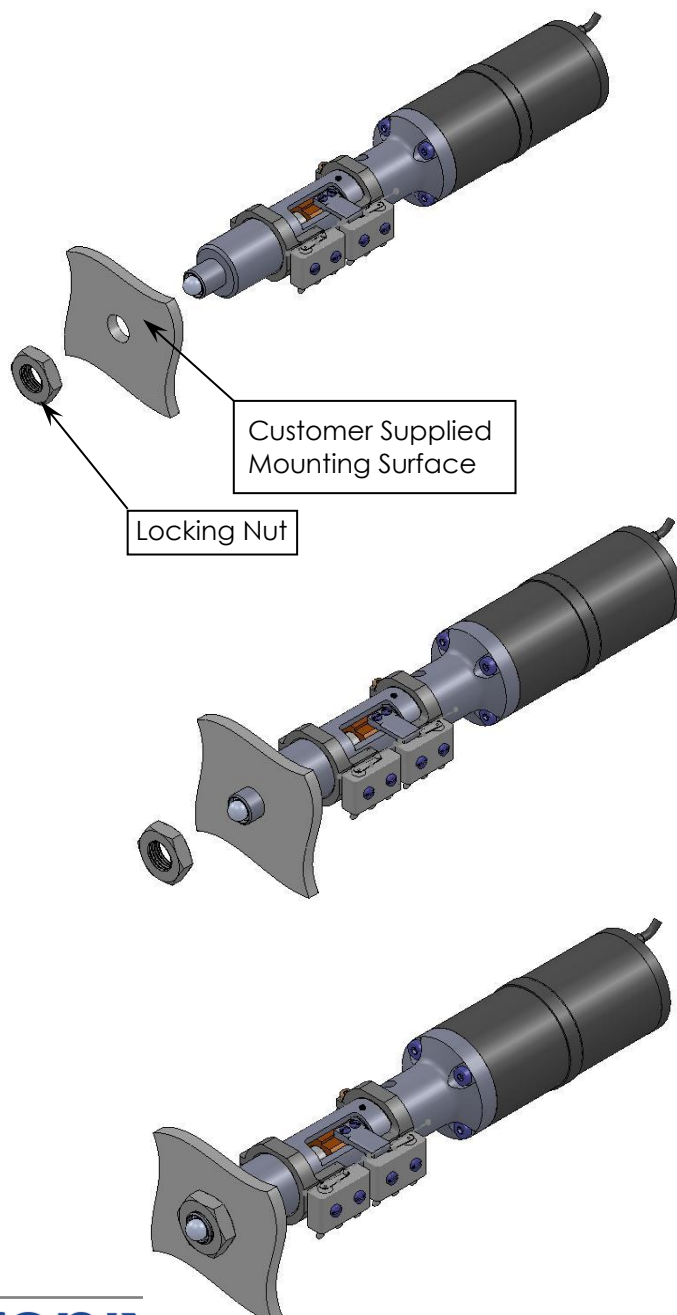
Package Should Contain:

- MPA-20 Linear Actuator
- Locking Nut
- Reference Manual
- Any other previously agreed upon components such as a controller and cable

4. Installing the MPA-20

4.1 MPA-20 12 mm Installation

The MPA-20 can be installed to motorize manual drives, mirror mounts or other applications. While installing, support the MPA-20 by holding the motor/gear reduction unit to avoid applying torque to the housing. In place of the spherical actuator tip, a 4-40 thread may be used for pulling applications. When preparing the stage for vacuum environments, take the necessary precautions (such as wearing gloves, clean room and clothing, etc.) when handling the stage as to avoid any contaminants.



Requires:
1x MPA-20 Linear Actuator
1x Locking Nut
1x 17mm Hex Wrench (not supplied)

1. Unscrew Locking Nut from MPA-20

2. Insert MPA-20 into Mounting Surface

3. Tighten Locking Nut using 17mm wrench

5. Technical Specifications

5.1 Electrical Connections

5.1.1 Motor Pinout & Cable

Pin	Description
1	Motor Phase A+
2	Motor Phase A-
3	Motor Phase B+
4	Motor Phase B-
5	Limit Switch Common
6	Limit Switch (near motor)
7	Limit Switch +
8	Thermal Element -
9	Thermal Element +

For compatibility with MICRONIX USA controllers, Pin 5, 7 and shield are internally connected. Negative limit only, positive limit is connected to Ground.

Limit Switch Common (pin 5) is connected to ground in MICRONIX USA controllers.

5.1.2 Stepper Motor

Motor Type	2 Phase Bipolar
Phase Current	1.2 A max.
Step Angle	1.8 °
Steps	200
Leadscrew Pitch	0.5 mm/rev
Gear Reduction	4:1
Resolution/Full step	0.625 μ m

5.2 Limit Switches

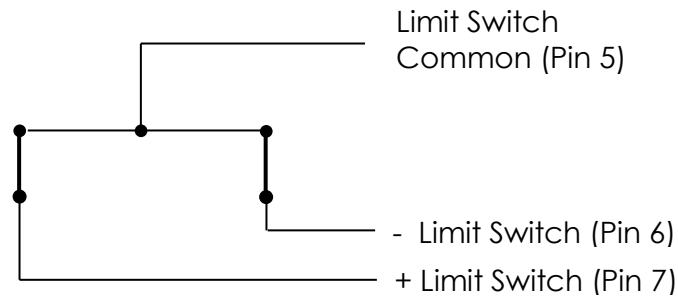
The mechanical limit switches are normally closed (when not activated) and should be connected to a compatible controller that recognizes these settings. Failure to properly set up the limit switches in the controller will result in physical damage to the MPA-20 Linear Actuator.

The mechanical limit switches are factory calibrated for a minimum travel of 12mm (when the switches are initially activated). Customer adjustment of the limit switches is not recommended. For custom travel lengths, please contact MICRONIX USA.

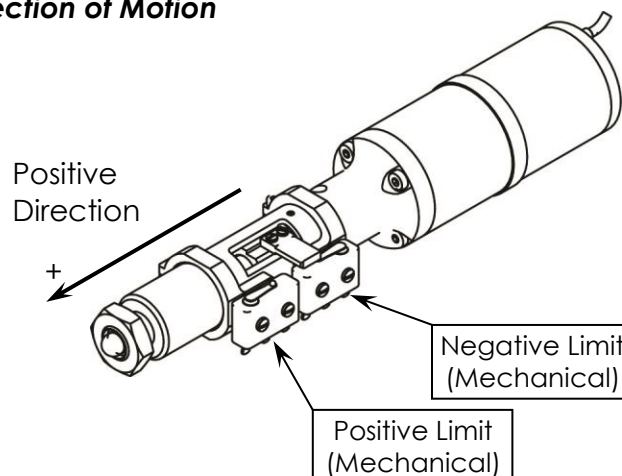
5.2.1 Electrical Specification

Contact Rating	1A at 28V
Contact Type	Open collector (NPN) Normally Closed
Operating Temperature	-184 to +260 °C

5.2.2 Limit Switch Schematic

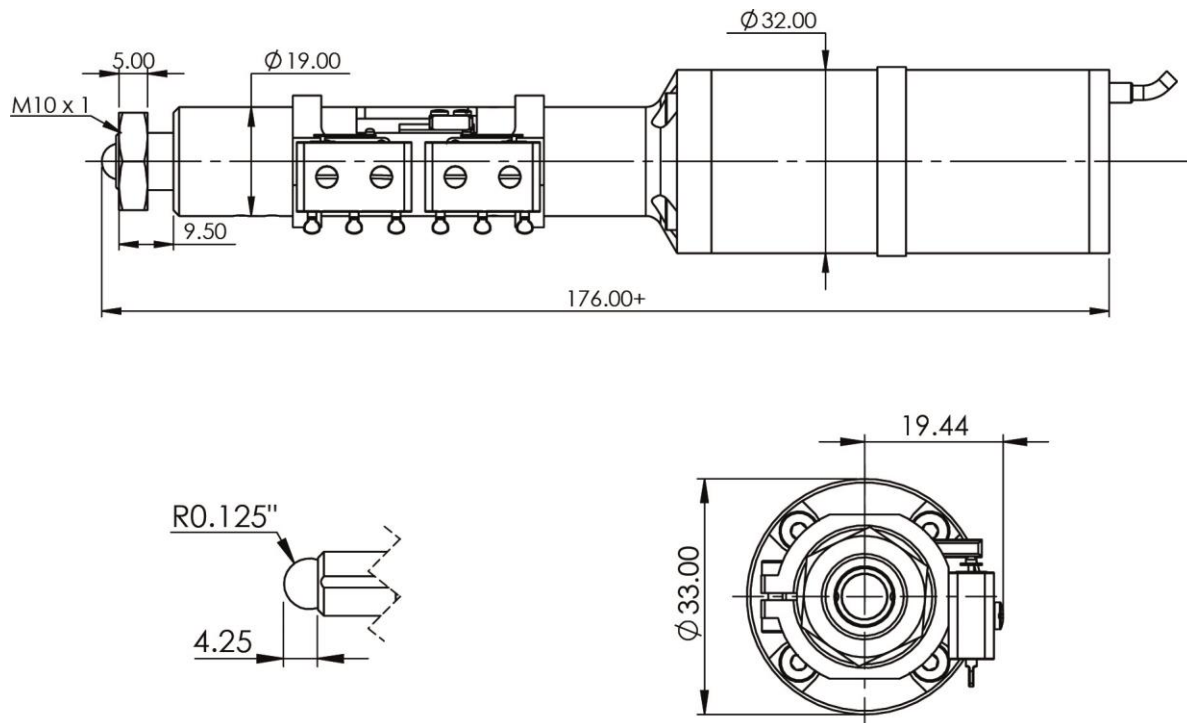


5.2.3 Direction of Motion



5.3 Dimensions

5.3.1 MPA-20 12 mm



6. Supplementary Information

6.1 Maintenance

- The MPA-20 linear actuator is a delicate mechanical device and should be handled with care. Do not drop or mishandle the actuator.
- Keep hands clear of all moving parts while the actuator is in motion to avoid personal injury.
- Follow the *Safe Operating Environment* requirements and use proper cable management to ensure a clean and safe operating environment.
- The MPA-20 is designed to support axial loads only, do not apply radial loads.
- Allow for easy access to the stage in case of servicing.

6.2 Units and Conventions

All measurements in this document are in the metric system of units.

Metric Unit	English Unit
1 millimeter	0.0394 inches
1 micron	0.0000394 inches
1 Newton	0.2248 lbs.
1 Newton-meter	8.85 in-lbs.