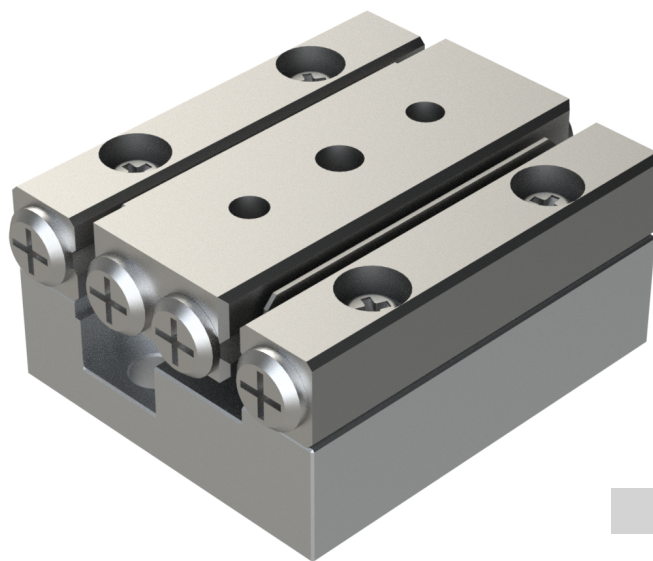


PP-18

Series



Piezo Positioning Stage Reference Manual (Open and Closed Loop Versions)

PP-18

Piezo Positioner Stage

Reference Manual

Rev 1.5

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1. Introduction

1.1 Product Description

The PP-18 is a low cost linear piezo stage with miniature crossed roller bearings, which assure high stiffness. It utilizes our patented multi-phase motor resulting in high speed (> 2 mm/s) and high blocking force (> 1.5 N). An integrated encoder provides excellent repeatability. The PP-18 is compatible with the MMC-100, MMC-110 and NanoDrive controllers.

Features:

- Travel range of up to 51 mm
- 40 nm closed loop encoder resolution standard
- Load capacity up to 0.5 kg (horizontal orientation)
- Crossed roller bearing
- Low profile, 10 mm height, 17 mm wide

1.2 Piezo Motor – (PM-001)

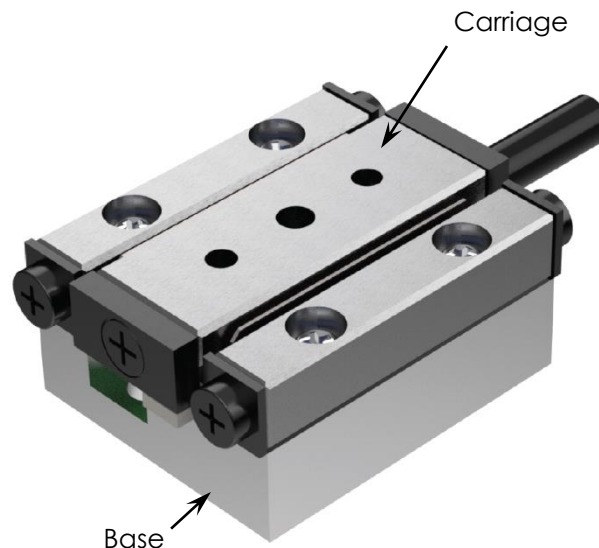


Figure 1-A. PPS-18, Piezo Motor

1.3 Recommended Controllers

The following controller that is available from MICRONIX USA for piezo stages:

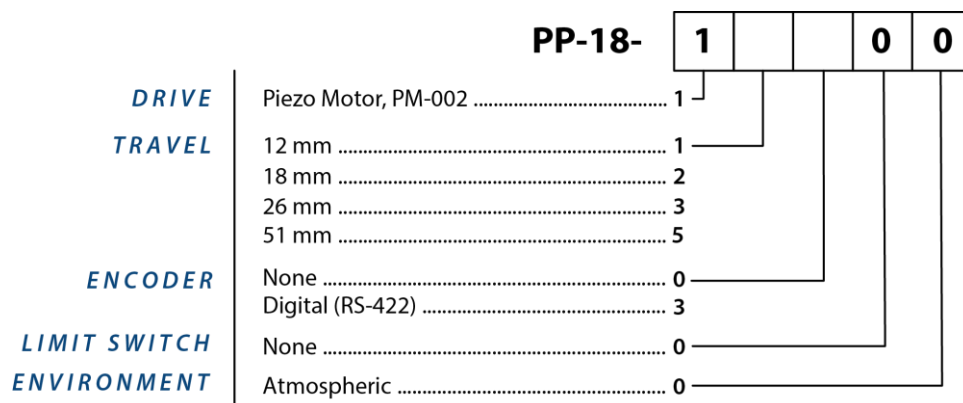
- MMC-100
- MMC-110
- NanoDrive

1.4 Technical Data

See Datasheet.

2. Model Configurations

2.1 PP-18 Order Numbers



Contact MICRONIX USA for custom applications and stacking configurations.

3. Preparing to Install the PP-18 Stage

3.1 Installation Preparation

When mounting the stage, it is important to consider the flatness of the mounting surface, as the stage will conform to the shape of that surface and affect the stage's performance and structural integrity. It is required to have a mounting surface with flatness less than the overall specified flatness of the base.

The stage is calibrated and guaranteed to be within specification at 20°C ± 5°C unless otherwise specified. Be sure to use the stage under the following conditions:

- Mount to a clean surface which is free of debris, burrs or dings with a flatness to be less than the flatness of the base as specified on the product datasheet.
- An indoor atmosphere free of corrosive gases, excessive dust, and condensation.
- Temperature range of 5 - 40°C.
- Relative humidity between 20 - 80%.
- Locate away from water, heat, and electrical noise.

3.2 Package Contents

If the 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:

- PP-18 Linear Stage
- Reference Manual
- Any other previously agreed upon components such as a controller.

4. Installing the PP-18 Stage

Refer to Section 4.1.1 for general mounting, 4.1.2 for XY Mounting. Additional brackets and screws may be required for custom applications, see Section 6 for stacking configuration examples.

4.1 PP-18 Installation

4.1.1 General Mounting

Recommended general mounting pattern sample can be found in 5.1.

1. Align the stage to the mounting surface using at least two M1.5 x 6mm dowel pins.
2. Move the carriage to access the mounting holes. Secure the stage to the mounting surface using at least two M2 socket head cap screws at 0.22 Nm recommended torque.

Please note, it is possible to move the carriage manually without damaging the stage.

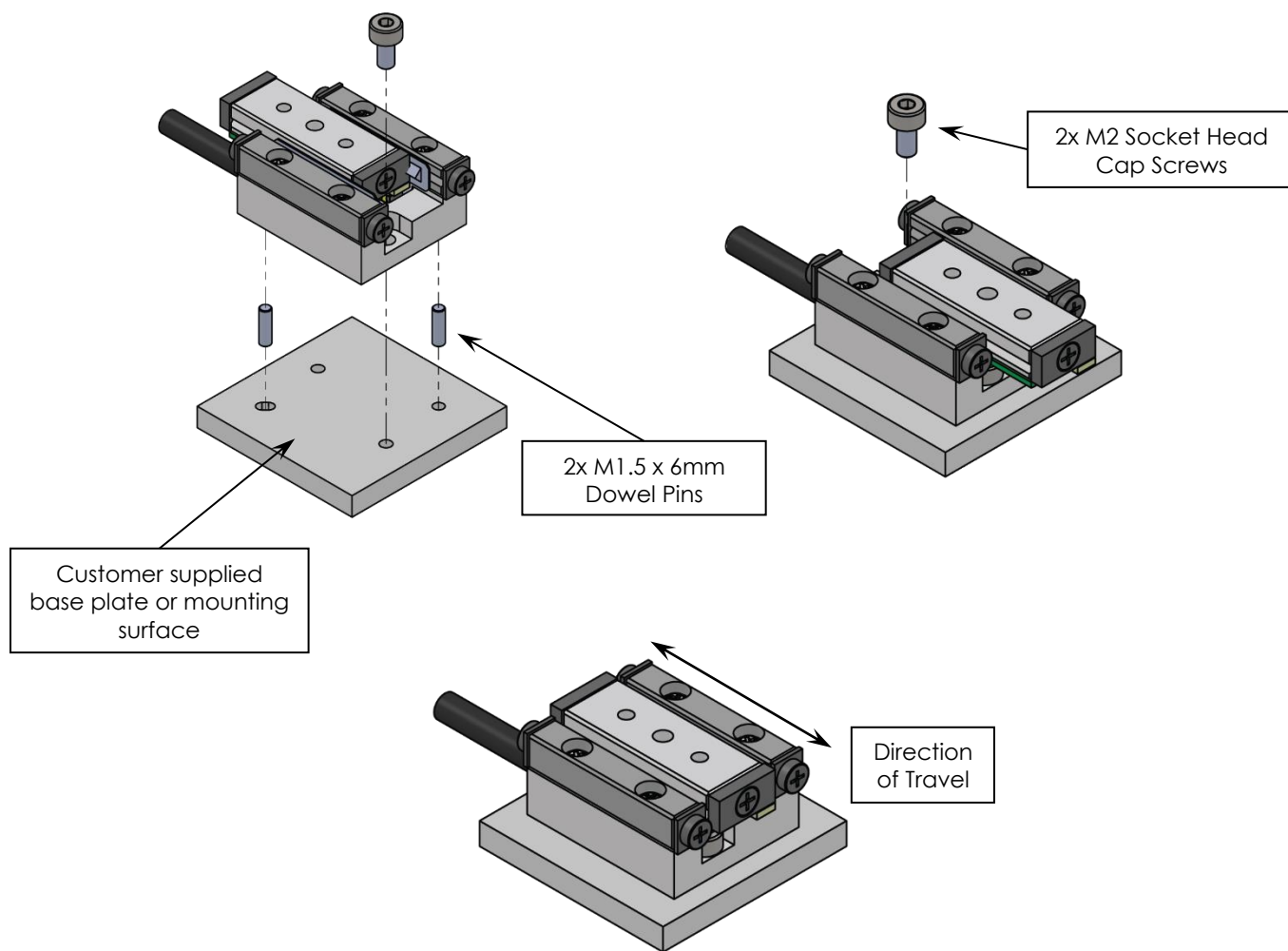


Figure 4-A. PP-18 Installation

4.1.2 X-Y Mounting

An adapter plate is required for PP-18 XY mounting. Contact MICRONIX USA for additional or custom adapter brackets.

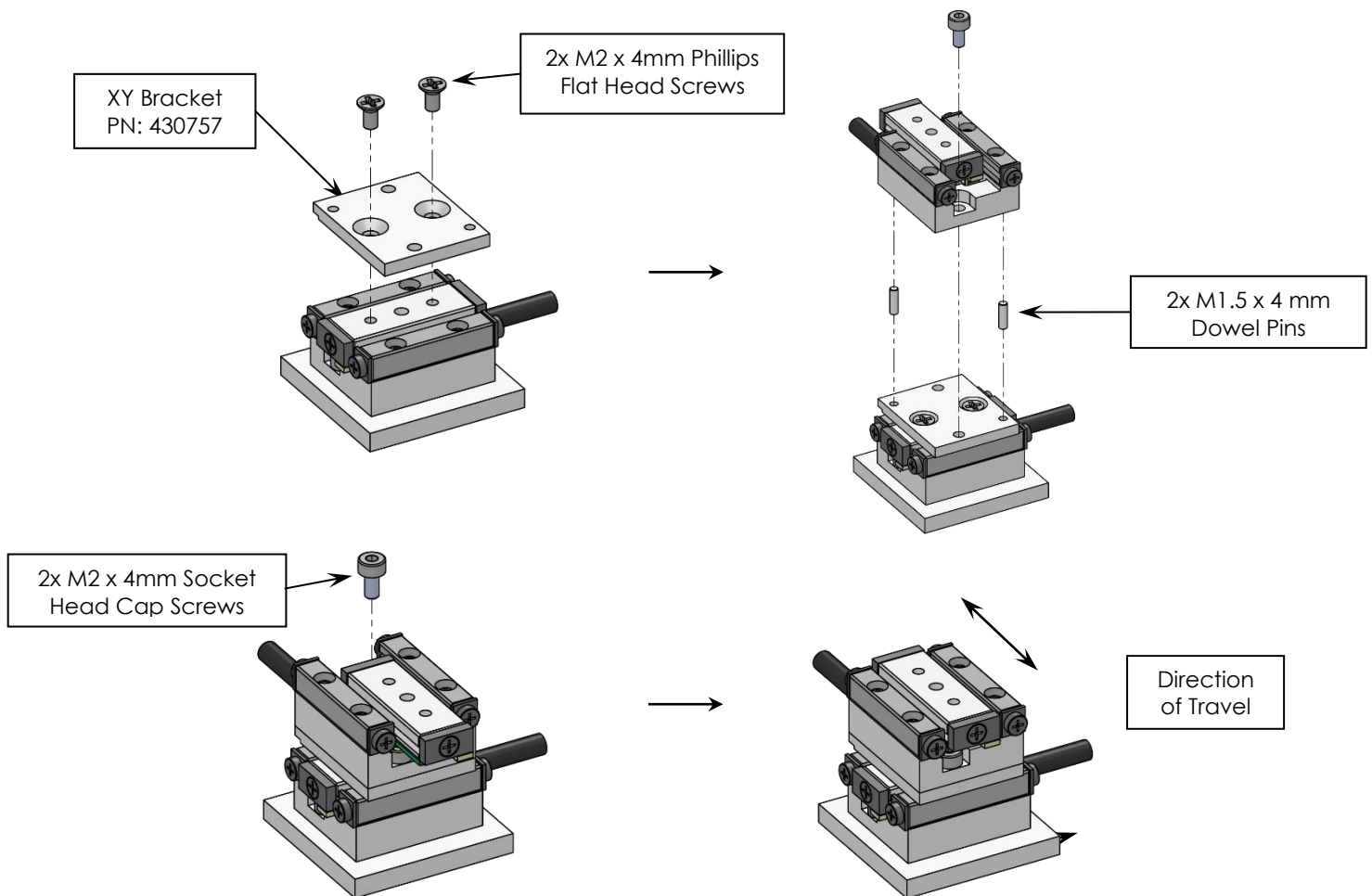
- A. Install the bottom stage to the mounting surface as shown in Section 4.1.1.
- B. Install the XY Bracket (PN: 430757, L20 shown) to the top of the stage using two M2 x 4 mm Phillips flat head screws at 0.22 Nm recommended torque.

Note: Do not use screws longer than specified to avoid damage to the bearings.

- C. Align the stage onto the XY bracket using two M1.5 x 4 mm dowel pins and move the carriage to access the mounting holes. Secure the stage using two M2 x 4 mm socket head cap screws at 0.22 Nm recommended torque.

Note: Do not use screws longer than specified to avoid damage to the bearings

Please note, it is possible to move the carriage manually without damaging the stage.

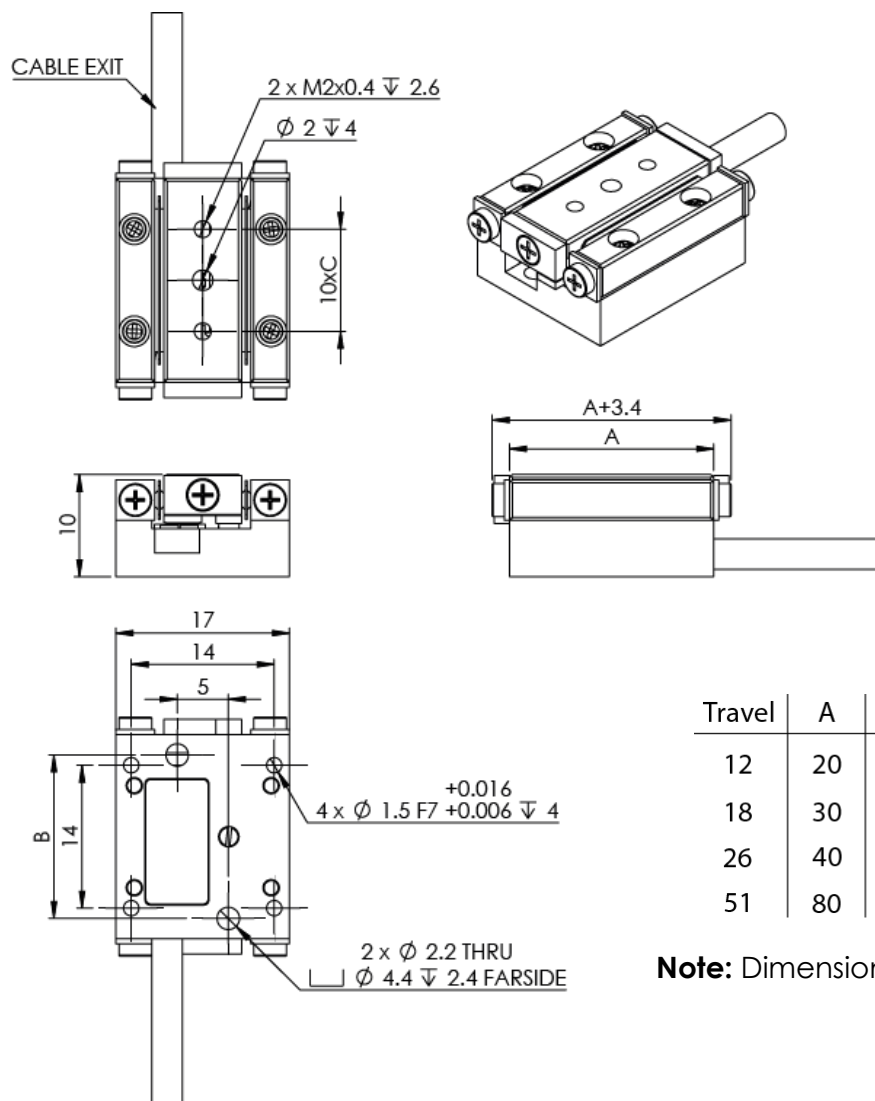


Figure

4-B. PP-18 XY Mounting Installation

Note: Stages assembled in an XY configuration in factory do not require disassembly for base mounting

5. Dimensions

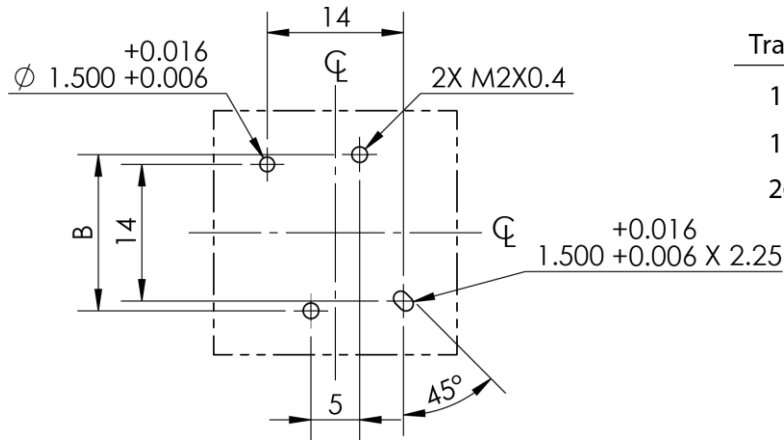


Travel	A	B	C
12	20	16	1
18	30	16	2
26	40	36	3
51	80	50	7

Note: Dimensions in millimeters

5.1 Recommended General Mounting Pattern

It is recommended to use a slot-hole dowel pin pattern for alignment.



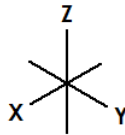
Travel	B
12	16
18	16
26	36

6. Stacking

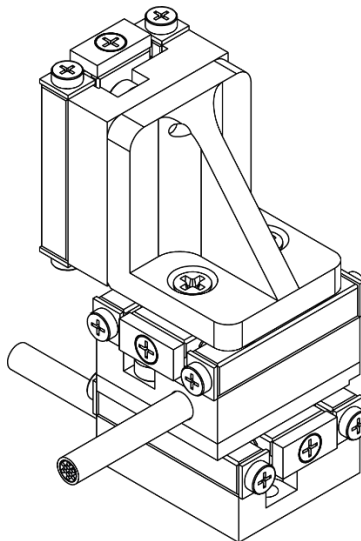
Configurations

6.1 Configurations Examples *(additional configurations available upon request)*

- Additional configurations available upon request
- Positioning according to:



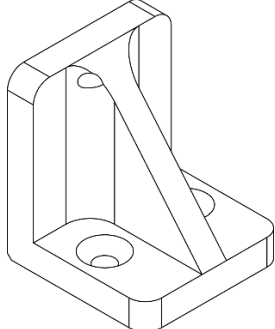
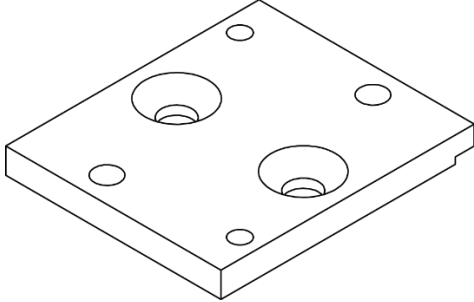
Using Z-Bracket (P/N: 430753) and XY-Bracket (P/N: 430757)



X-Y-Z
PP-18

6.2 Accessories

430753 Z-Bracket Adapter Plate L20mm	430757 XY Bracket L20mm
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<p>Used to adapt the PP-18 in XZ mounting configurations.</p>	<p>Used to adapt PP-18 L20 in XY</p>								
<p>Also available:</p> <table border="1" data-bbox="305 625 803 703"> <tr> <td>430814</td> <td>PP-18 L30</td> </tr> <tr> <td>430816</td> <td>PP-18 L30, L40</td> </tr> </table>	430814	PP-18 L30	430816	PP-18 L30, L40	<p>Also available:</p> <table border="1" data-bbox="836 625 1339 703"> <tr> <td>430815</td> <td>PP-18 L30</td> </tr> <tr> <td>430758</td> <td>PP-18 L40</td> </tr> </table>	430815	PP-18 L30	430758	PP-18 L40
430814	PP-18 L30								
430816	PP-18 L30, L40								
430815	PP-18 L30								
430758	PP-18 L40								

7. Connecting the PP-18 Stage

7.1 Atmospheric Environments

7.1.1 Open Loop, Atmospheric Wiring Diagram

Connecting the PP-18 in open loop, only requires that the motor cable be connected to a compatible controller. No other cables or components are needed. Connect the stage as shown below.

Cable Descriptions:

A. Motor Cable (Male Dsub 9 Pin, 1.5m PVC Black Cable)

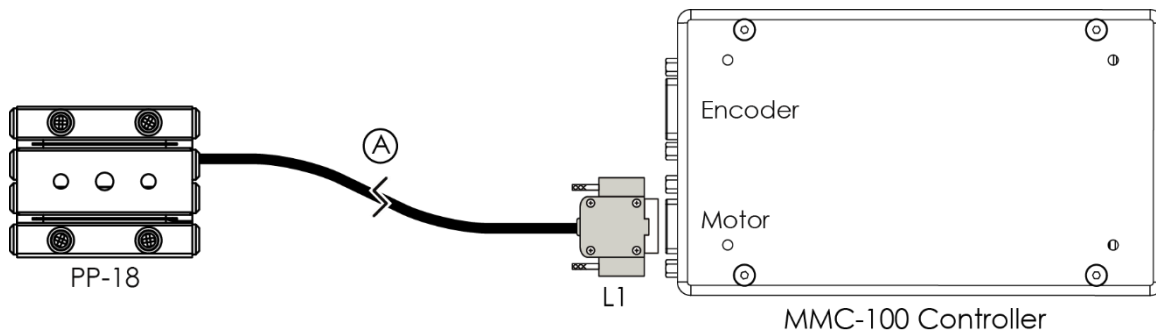
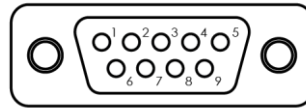


Figure 7-A. PP-18, Open Loop, Atmospheric Wiring Diagram

7.1.1.1 Piezo Motor Atmospheric Open Loop Pinout

Pinout for PP-18-1X000		Cable A Dsub9M
Description:	Color	L1
Phase 1	Red	1
Phase 2	White (Green TP)	2
Ground	Black/Green	5
Shield	-	Casing

Motor



Dsub9M - Front View
9 Pin Male Connector

7.1.2 Digital Encoder, Atmospheric Wiring Diagram

For a PP-18 with a digital encoder, connect the stage as shown below using the supplied 15 HD to two 9 pin cables to connect the motor and encoder to the controller.

PP-18 Cable Descriptions:

- A. PP-18 Cable (Male Dsub HD 15 Pin Connector, 1.5m, PVC Black Cable)
- B. Motor Cable (Female Dsub HD 15 Pin to Male Dsub 9 Pin, 6" PVC Black Cable)
- C. Encoder Cable (Female Dsub HD 15 Pin to Female Dsub 9 Pin, 6" PVC Black Cable)

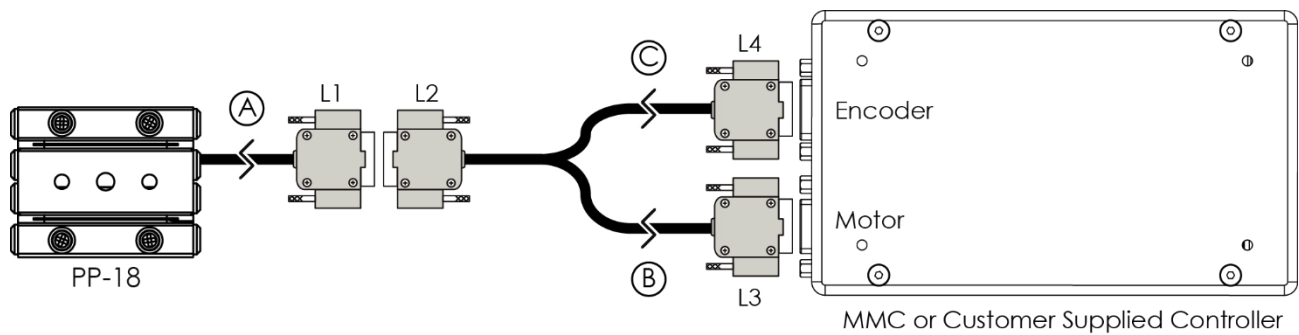
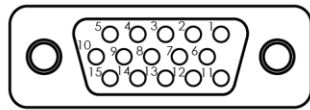


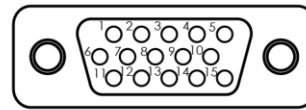
Figure 7-B. PP-18, Open Loop, Atmospheric Wiring Diagram

7.1.2.1 Piezo Motor Atmospheric Open Loop Pinout

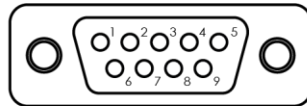
Pinout for PP-18-1X300		Cable A		Cable B		Cable C	
		Dsub HD15M	Dsub HD15F	Dsub9M	Dsub9F	Dsub9F	
Motor	Description:	Color	L1	L2	Color	L3	L4
	Phase 1	Red	1	1	Red	1	-
	Phase 2	White (Green TP)	2	2	White (Green TP)	2	-
	Ground	Black/Green	5	5	Black/Green	5	-
	Shield	-	Casing	Casing	-	Casing	-
Encoder	A+	Brown	8	8	Brown	-	1
	B+	Blue	9	9	Blue	-	2
	Index+	Violet	10	10	Violet	-	3
	GND	Grey	12	12	Grey	-	4
	+5V	White (Grey TP)	11	11	White (Grey TP)	-	5
	A-	White (Brown TP)	13	13	White (Brown TP)	-	6
	B-	White (Blue TP)	14	14	White (Blue TP)	-	7
	Index-	White (Violet TP)	15	15	White (Violet TP)	-	8
Shield	-	Casing	Casing	-	-	Casing	



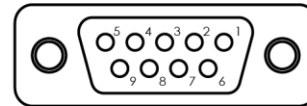
HD15F - Front View
15 Pin High Density Female Connector



HD15M - Front View
15 Pin High Density Male Connector



Dsub9M - Front View
9 Pin Male Connector



Dsub9F - Front View
9 Pin Female Connector

8. Supplementary Information

8.1 Maintenance and Personal Safety

- The PP-18 series of linear piezo stages utilizes a maintenance free design. Do not modify the stage or perform any maintenance unless specifically instructed to do so by MICRONIX USA personal. If the stage is not performing up to the original specifications, please contact MICRONIX USA.
- The PP-18 linear piezo stage is a precision mechanical device and should be handled with care. Do not drop or mishandle the stage.
- Do not touch the bearings with bare hands, as this will contaminate and jeopardize the performance of the stage.
- Follow the *Installation Preparation* requirements and use proper cable management to ensure a clean and safe operating environment.

8.2 Units and Conventions

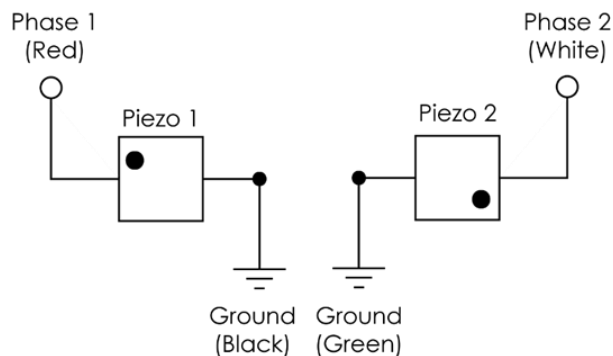
All measurements in this document are in the metric system of units.

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

A. Appendix

A.1 2 Phase Piezo Motor Wiring Diagram



A.1.1 Piezo Operating and Electrical Specifications

Voltage	60V maximum
Capacitance	150nf ±15%
Operating Temperature	50°C maximum

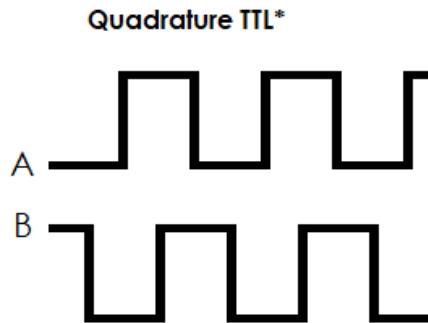
A.2 Using the Inductive Encoder

The PP-18 will utilize an inductive encoder for position feedback, providing a robust solution free of possible light interference. Encoder resolution can be set as low as 18nm.

A.2.1 Encoder Operating and Electrical Specifications

Power Supply	5VDC 5% @ 50mA (No outputs terminated) @ 80mA (A, B, I terminated) @ 20mA (sensor only)
Resolution	38 nm (other resolutions available 19 – 150 μm)

A.2.2 Output Signals



*Output signals are differential. Inverse signals are not shown for clarity

A.3 Legacy 2 Phase Piezo Motor Wiring Diagram

