PIglide RB Linear Air Bearing User Manual

Document# A10XD001

For the A-10X.XXX Series of Non-motorized Linear Air Bearings

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1. Introduction

The PIglide RB Linear Air Bearing is a family of passive air bearings that provide frictionless motion in one linear degree of freedom. This product is non-motorized.

2. Warnings

WARNING: The air bearing should never be moved without the air supply turned on. Forcing the carriage to slide along the bar without the air supply turned on my damage the bearing.

This air bearing is a highly accurate precision instrument. The non-contact nature of air bearings will provide years of accurate and reliable use if treated properly. Keep the bearing clean and avoid any shocks, drops or bumps that can cause scratches, dings or distortion of the bearing.

3. Air Supply

A clean, filtered, regulated air supply is critical to proper operation of the bearing. We recommend the purchase of a PI Air Preparation Kit (series A-80x.xxx) to be used with your air bearing.

We recommended filtering using 0.5 micron filters or better. Unless the air supply is from a dry nitrogen tank, coalescing filters or dryers should also be used to remove oil and water vapor. A regulator is recommended to optimize the air flow into the bearing for the application loading. The air bearing will operate with pressure ranging from 40 psi to 90 psi, depending on the load applied. It is generally recommended to set the pressure at least 10 psi higher than the pressure required for the bearing to resist all loading without making contact (this can be observed by watching to see that the bearing still moves with zero friction with the load applied). Operating at pressures higher than this will ensure margin for overloads, but the bearing will consume more air. If the pressure is set too high, the bearing may vibrate and you may hear an audible buzz. If this happens, reduce the air pressure.

4. Unpacking

Carefully unpack the air bearing and other components from the shipping packaging. Inspect the contents for signs of damage. If there is any sign of damage or missing parts, contact PI immediately. Keep all packaging materials in case the product needs to be returned.

5. Scope of Delivery

The system will include the following components:

1. Linear Air Bearing, Part# A-10x.xxx (See order for model #).
2. Mounting feet kit ((if ordered - optional accessory, Part# A-10x.MNT, see order for model #.)
3. Air preparation kit (if ordered - optional accessory, see separate User Manual)

6. Product Overview

A linear air bearing consists of two main components, shown in the schematic below:

1. Bar
2. Carriage

The items in blue move relative to the item in grey.

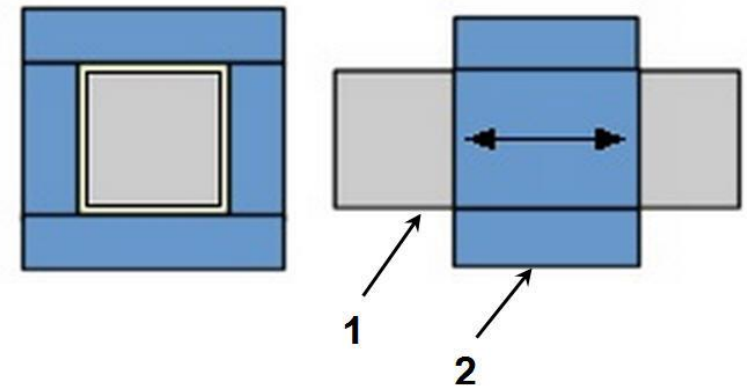


Figure 1 – Linear Air Bearing Schematic

Either the table or the bar can be held stationary while the other moves. Mounting features are provided on both the top and bottom tables of the carriage as well as the bar. Optional mounting feet can be used to mount the bar to a platform.

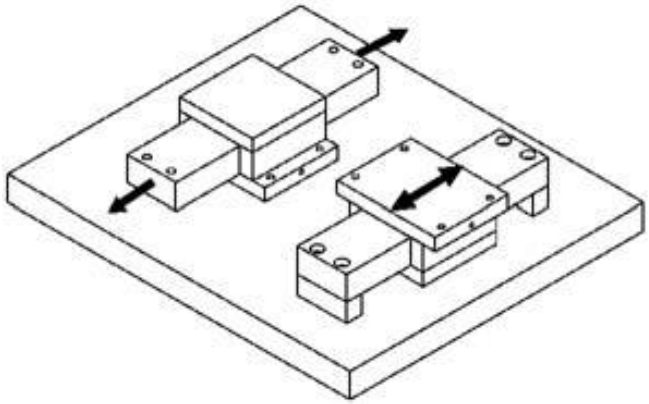


Figure 2 – Mounting Configurations

7. Installation & Assembly

1. Make sure the air bearing is clean and free of debris, dust, and damage.
2. Mount the air bearing to your installation fixture or base. The mounting surface should be flat to 1µm per 50mm (or better) or the bearing's performance may be degraded.
   a. For stationary bar: Mount the bar to your platform using the holes at each end of the bar and the optional mounting feet if purchased.
   b. For stationary carriage: Mount the carriage to your platform using the threaded holes in the top or bottom table of the carriage
3. Connect the air supply line to the air fitting attached to the carriage. Use 4mm or 6mm OD flexible pneumatic tubing (depending on the model of bearing purchased).
4. Mount the air preparation kit (if so ordered) in a location convenient to the facility compressed air supply and within 3 meters of the air bearing. If a longer air supply line run is needed, a larger diameter tube may be required. Contact PI if needed.
5. Connect the facility air supply to the input port of the air preparation kit. (if so ordered)
6. Connect the air bearing supply tube to the output port of the air preparation kit. (if so ordered)
7. Turn on the air supply and check that the table of the bearing floats freely.
8. Adjust the pressure regulator knob on the air preparation kit until the pressure indicator dial reads the desired pressure (80 psi / 550 kPa is nominal).
9. Turn the air supply off.
10. Mount your payload to the bearing. Be sure the interface of the payload is flat to 1µm per 50mm (or better) or the bearing's performance may be degraded.
11. Turn the air supply on to operate the bearing.

Figure 3 – RB Linear Air Bearing – shown with optional mounting feet

8. Moving the Air Inlet

The air inlet location can be changed by the user if needed.

In the standard factory configuration, the air fitting is installed on one side of the carriage, and the alternate port, located on the opposite side of the carriage, is plugged with a sealed screw.

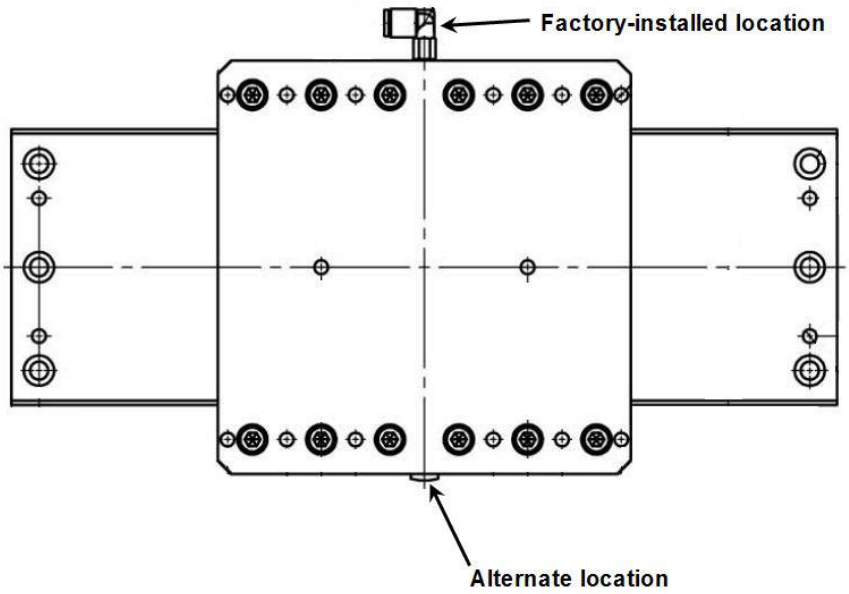


Figure 4 – Inlet fitting location

To change the inlet fitting to the alternate location, simply swap the locations of seal screw and the air fitting. Make sure the air supply is turned off and the air line is disconnected from the bearing before doing so.

1. To remove the air fitting, use a small wrench to loosen the brass part of the air fitting from the carriage by turning counter-clockwise.

Figure 5 – Air inlet fitting

2. Remove the seal screw from the side of the bearing carriage using a small Philips head screwdriver.

Figure 6 – Seal screw

3. Install the air fitting into the alternate port on the side of the carriage previously covered by the seal screw. Carefully thread the fitting into the hole by hand, and then tighten using a small wrench. DO NOT OVERTIGHTEN.
4. Install the seal screw into the primary port and tighten using the screwdriver. DO NOT OVERTIGHTEN.
5. Reconnect the air line and turn on the air supply. Check for leaks and adjust the fitting as needed.

9. Changing the Air Inlet Fitting

The RB linear bearing is supplied with fittings for either English or metric flexible tubing.

The tubing sizes for each model bearing:

Model	English O.D.	Metric O.D.
A-101	5/32”	4mm
A-102 thru A-109	1/4"	6mm

To change the fitting from English to metric (or vice versa), remove the fitting and replace it with the desired size, following the instruction in the prior section.

If you need to replace the fitting with a size not supplied by PI, make sure to use a fitting with an M5x0.8 male thread to properly adapt to the bearing carriage.

10. Storage

When not in use, the air supply can be shut off and the bearing can carry its design load. However, it is important to make sure that no movement takes place.

Cover the bearing to prevent dust and other particles from accumulating on the exposed surfaces.

11. Cleaning

To clean the bearing, we recommend using isopropanol or acetone and a clean lint-free cloth or wipe. Apply the cleaning agent to the cloth and wipe down all of the air bearing surfaces. When cleaning the air bearing we recommend that you leave the air supply on, to help blow any particles out of the bearing and prevent particles from entering the nozzles. Be especially careful of fingerprints on the bearing surfaces as they attract dust and may tarnish the bearing finish.

12. Product Specifications

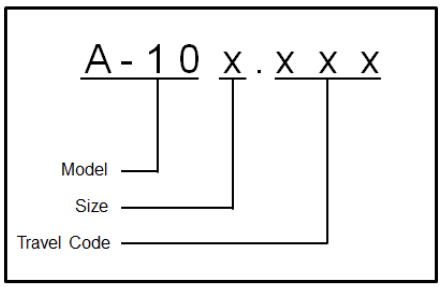
Model	Table Size (mm x mm)	Travels (mm)	Load Capacity (N [lb_f])		Carriage Mass (kg)	Bar Mass (kg) X = travel in mm
			Normal	Lateral		
A-101	50 x 50	50 - 200	130 [29]	75 [17]	0.19	X*0.001+0.077
A-102	50 x 100	50 - 300	260 [58]	260 [58]	0.42	X*0.002+.214
A-103	75 x 75	50 - 300	350 [79]	195 [44]	0.60	X*0.003+.340
A-104	75 x 115	50 - 300	540 [121]	540 [121]	1.10	X*0.006+0.834
A-105	100 x 100	50 - 300	630 [142]	370 [83]	1.48	X*0.006+0.846
A-106	100 x 150	50 - 600	950 [214]	950 [214]	2.61	X*0.010+2.105
A-107	150 x 150	50 - 750	1580 [355]	790 [178]	4.07	X*0.014+2.682
A-108	200 x 200	50 - 1000	2950 [663]	1475 [332]	8.70	X*0.027+6.609
A-109	300 x 300	50 - 1000	7600 [1709]	2210 [497]	20.34	X*0.046+15.931

Precision		Travels to 300 mm	Travels to 600 mm	Travels to 1000 mm
Straightness & Flatness	Short-term	0.5µm / 25mm		
	Overall	2.5 µm	5.0 µm	10.0 µm
Stability	+/- 0.05 µm			
Pitch & Yaw	Short-term	0.25 arc-sec / 25 mm		
	Overall	2.0 arc-sec	4.0 arc-sec	6.0 arc-sec
Operating Pressure	550 kPa (80 psi) nominal			
Air Consumption	< 28 liters/minute (1.0 SCFM)			
Air Quality	▪ Particulates filtered to 1.0 µm or better: ISO 8573-1 Class 1 ▪ Oil-free: ISO 8573-1 Class 1 ▪ Dry (-15 °C dew point): ISO 8573-1 Class 3			

Notes:

1. Load capacities assume supply pressure of 80 psi. Contact PI to determine load capacity if alternate supply pressures are required.
2. Precision specifications are dependent on quality of mounting surfaces, payload, orientation, and external forces on the bearing. Please consult PI for application-specific parameters. Values shown are static (zero velocity during measurement).

Model Configurations



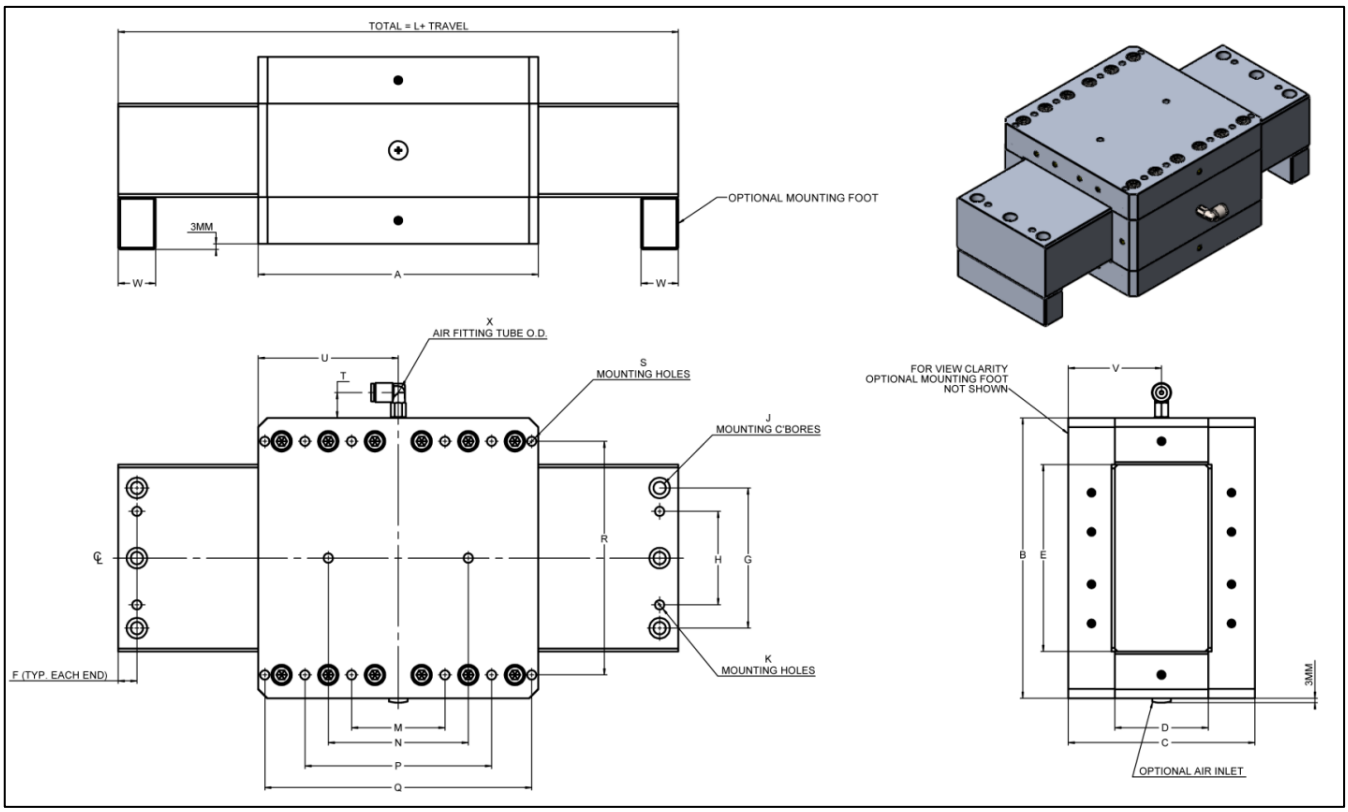
Travel Codes

Code	Travel (mm)
050	50
100	100
150	150
200	200
300	300
450	450
600	600
750	750
A00	1000

Construction Materials

Hardcoat aluminum, stainless steel fasteners
Alternate materials are available upon request. Please contact PI for a quote.

Dimensions



Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	X
A-101	50	50	35	15	25	5	15	CL	4x M3	2x M3	80	15	40	N/A	N/A	40	6x M3	12	21	30	4 (5/32”)
A-102	100	50	45	25	25	5	15	CL	4x M3	2x M3	130	15	40	60	N/A	40	10x M3	12	46	40	6 (1/4”)
A-103	75	75	55	25	45	7.5	30	12.5	4x M5	2x M5	115	35	N/A	N/A	N/A	60	4x M5	14	37.5	47.5	6 (1/4”)
A-104	115	75	75	45	45	7.5	30	12.5	4x M5	2x M5	155	50	N/A	N/A	N/A	60	4x M5	14	57.5	67.5	6 (1/4”)
A-105	100	100	75	35	60	10	40	20	4x M6	2x M6	150	50	N/A	N/A	N/A	80	4x M6	14	50	37.5	6 (1/4”)
A-106	150	100	100	60	60	10	40	20	4x M6	2x M6	200	50	N/A	110	N/A	80	8x M6	14	75	50	6 (1/4”)
A-107	150	150	100	50	100	10	75	50	6x M6	4x M6	200	50	N/A	110	N/A	125	8x M6	14	75	50	6 (1/4”)
A-108	200	200	130	70	140	10	100	50	6x M6	4x M6	250	50	N/A	150	N/A	170	8x M6	14	100	65	6 (1/4”)
A-109	300	300	140	70	240	10	200	100	6x M6	4x M6	350	50	N/A	150	250	270	12x M6	14	150	65	6 (1/4”)

Figure 7 - A-10X Series Dimensions (mm)

Accessories

Mounting-Foot Kits. Used to mount the bar for moving-carriage operation. 2 feet per kit. Sold separately.			
Part #	**Compatible with model:**	**Width “W” (mm)**	**Mass per pair (kg)**
A-101.MNT	A-101.xxx	10	0.03
A-102.MNT	A-102.xxx	10	0.03
A-103.MNT	A-103.xxx	15	0.08
A-104.MNT	A-104.xxx	15	0.08
A-105.MNT	A-105.xxx	20	0.13
A-106.MNT	A-106.xxx	20	0.13
A-107.MNT	A-107.xxx	20	0.27
A-108.MNT	A-108.xxx	20	0.46
A-109.MNT	A-109.xxx	20	0.94

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13. Disclaimers

PI continually improves its product offerings, and listed options and specifications may be superseded at any time. Refer to the most recent edition of the product datasheets at:
http://www.pi-usa.us/products/Air_Bearing_Stages/

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