Transfer Engineering and Manufacturing Inc.
Model DBLOP and DBLOM, Linear-Only
Precision Magnetic Manipulator
Users Manual

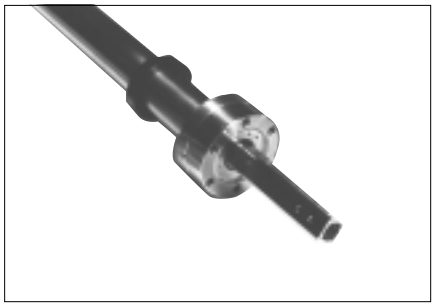
Table Of Contents

DBLOP/M-12/00

Transfer Engineering and Manufacturing, Inc.
47697 Westinghouse Drive, Suite 100
Fremont, CA 94539-7401
Ph: (510) 651-3000
Fax: (510) 651-3090
E-mail: team@transferengineering.com

Transfer Engineering
and Manufacturing, Inc.

Purpose and Scope



This document is a users manual for the Transfer Engineering and Manufacturing Model DBLOP-XX and DBLOM-XX Precision Magnetically-coupled Manipulators (PMMs). This family of products includes a wide variety of unique overall sizes (footprints) which have common set-up and operational principles. This manual contains information on the theory of operation as well as instructions for installation, alignment, and maintenance of these magnetic manipulators.

Theory of Operation

The Model DBLOP-XX or DBLOM-XX, linear-only, magnetically-coupled manipulator (commonly referred to as a sample transporter) is a device which allows for the movement of substrates or other samples within a vacuum system through a welded stainless steel tube. Powerful magnets outside the vacuum system maintained within a housing (magnet carriage) interact with magnetic material inside the vacuum system to allow the motion outside the vacuum to be transferred within.

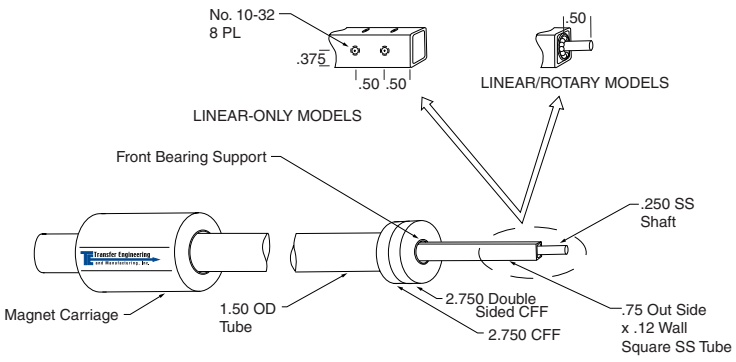
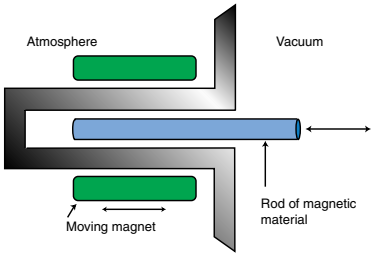


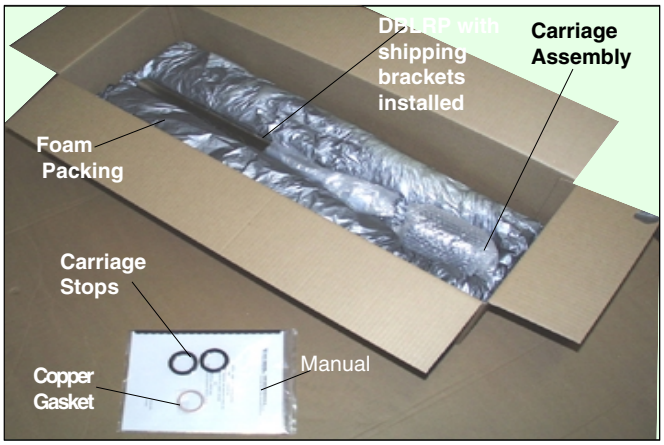
Diagram 1. Linear Only and Linear/Rotary Precision Magnetic Manipulator



The mechanism inside the vacuum system (follower assembly) travels in parallel with the outer magnet case supported by bearings which ride along the inside diameter of the tube and center the square tube at the front flange providing linear motion. Diagram 1 is a schematic representation of a Model DBLOP/DBLRP-XX with labelling for the major sub-assemblies. These manipulators are covered under U.S. Patent Number 5,105,932.

Unpacking

The manipulators are shipped in corrugated cardboard boxes firmly packed in foam to protect the product during shipment. In some instances, including overseas shipments, this box will be housed within a wooden crate.

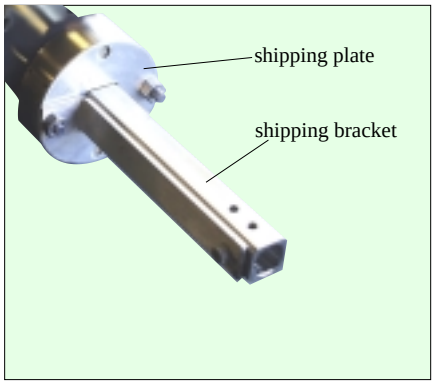


Inspect the box and/or crate for damage which may have occurred during shipment. If it is apparent that the outer wall of the box has been broken through, take a picture of the damage to the box before unpacking and call Transfer Engineering, at 510-651-3000, immediately.

Each box will contain the manipulator outer tube assembly with front bearing assembly attached and internal follower assembly supported by shipping fixtures. The magnet carriage will be individually wrapped, and a bag containing the manual and carriage stops is included. In many instances, accessory devices which mount to the magnetic manipulator will also be included in the box.

NOTE: It is strongly recommended that the box that the item is shipped in is saved for future use. In cases where periodic maintenance is necessary, or damage during use occurs, there may be a requirement to return the unit to the factory.

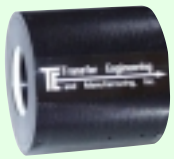
Once the items listed above have been removed from the shipping container, the unit is normally ready to be installed onto the vacuum system. In some specific instances, there may be accessories to be added to the manipulator follower assembly before installation of the manipulator onto the vacuum system.



Before installation, remove the two shipping brackets and the hardware which attach them, and store them in a safe place for possible reuse should this unit need to be shipped in the future. Please refer to the **SHIPPING INSTRUCTIONS** section (page 12) of the manual for instructions on proper procedures to ship this product.

System Assembly

The magnet carriage can be installed and oriented on the manipulator before or after the unit is attached to the vacuum system. In many cases, it is awkward and cumbersome to have this on the tube assembly during installation, and it may be desirable to install this part later. Please

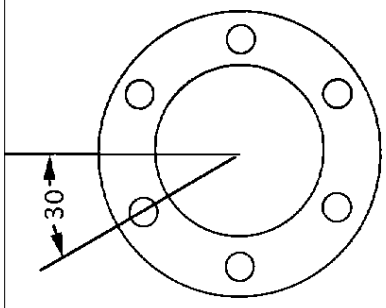


DBLOP/M Carriage Assembly

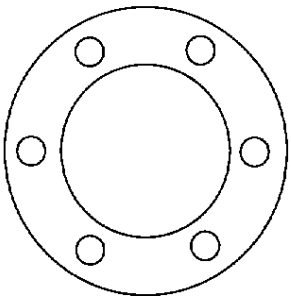
refer to the **CARRIAGE INSTALLATION AND REMOVAL** section of this manual (pages 7-9) for further instructions before proceeding.

The product is shipped with a new copper gasket in place between the front bearing and tube assemblies, and a new copper gasket is provided. In instances where the manipulator is shipped as part of a MASCOT Loadlock™, or some other application where a copper gasket is not required, Viton® gaskets will be used.

NOTE: The magnetic manipulator must be oriented correctly with respect to the forces being exerted on it. In most cases, the operation of the system is hortizontal with respect to the floor, and this load is the follower assembly itself and the sample, and the force acting on it is gravity. For vertical applications, please call the factory if there is a specific load direction. The following instructions for orientation refer to the most common case, horizontal to floor, mentioned above.



Hole Pattern A



Hole Pattern B

Diagram 2 - Two Hole Patterns for Front Bearing Assemblies

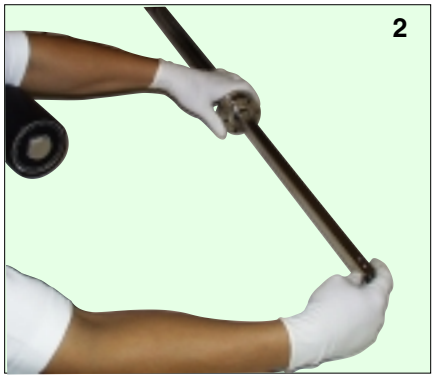
These manipulators are designed with two specific bolt hole patterns into the front bearing assembly for cases where the manipulator is attached to a fixed flange. Please review Diagram 2 for these two bolt hole orientations. In cases where the vacuum system flange is rotatable, this point is irrelevant. When a purchase order is placed, hole pattern A or B can be requested. If no request has been made, the system will be shipped in bolt hole pattern A. The following process must be followed to change from hole pattern A to B. This reconfigures the front bearing assembly 30° from the shipped orientation. Use UHV handling practices and procedures with appropriate tools and clean workspace. Refer to the following diagrams for visual assistance.

Viton is a Registered trademark of E.I. Dupont de Nemours and Co., Inc.

Steps to Changing Front Bearing Assembly Hole Pattern

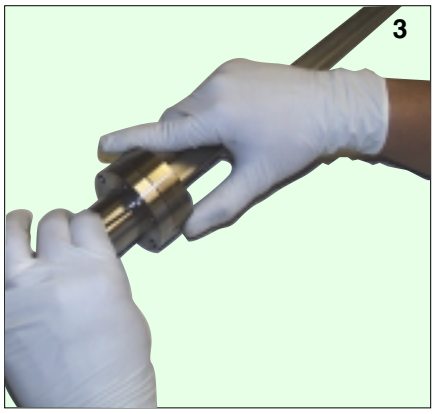
1 With the PMM on a clean stable workbench or table top, de-couple and remove the carriage assembly, if it has been installed.

CAUTION: The coupling force between the carriage and follower assembly is significant, therefore it may require more force than anticipated to de-couple the carriage.

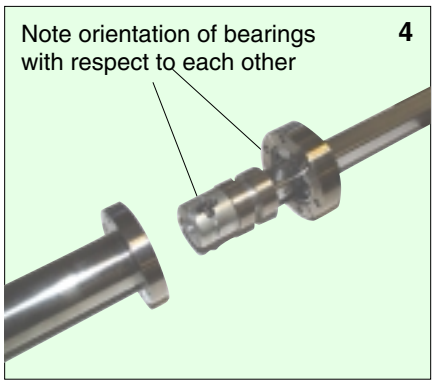


2 With the front bearing assembly still in place, pull the follower assembly so that it is fully extended.

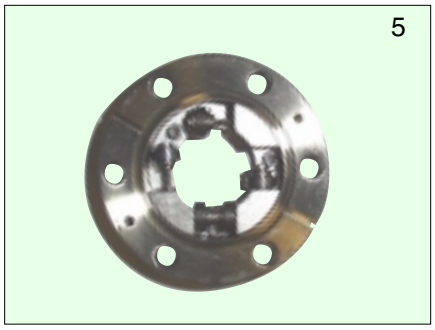
NOTE: Leaving the front bearing assembly in place as the follower is extended centers the follower and prevents damage to the inside wall of the tube assembly.

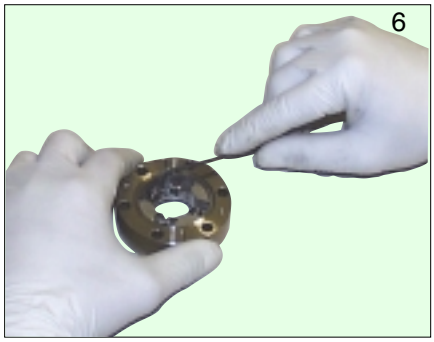


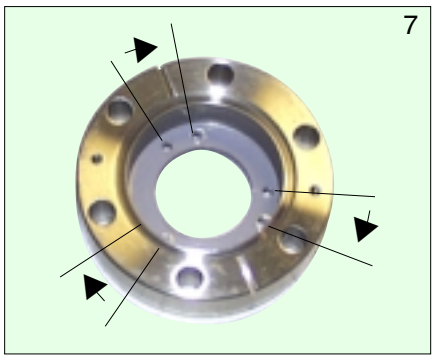
3 Remove the two 4-40 X 5/8" socket cap screws which attach the front bearing assembly to the tube assembly.

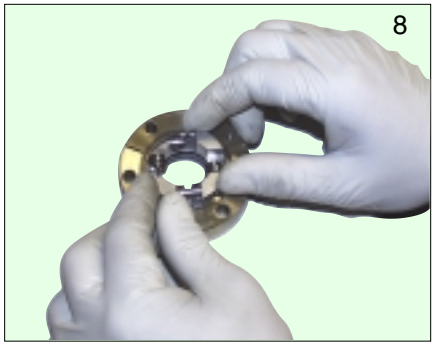


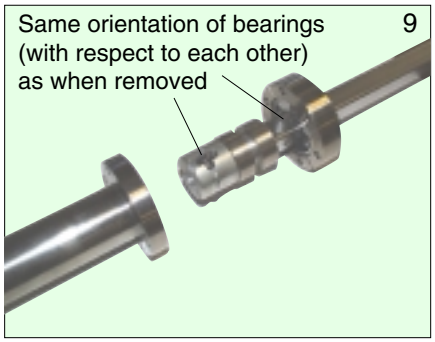
4 Remove the follower assembly from the inside of the tube assembly with the front bearing still in contact with the square tube. Take notice of the orientation of the bearings on the follower assembly with respect to the bearings on the front bearing assembly since that orientation will need to be re-established once the re-orientation is complete. Slide the front bearing assembly off of the square tube.











5 Place the front bearing assembly, bearing side up, on a tabletop or other workspace.

6 Remove the three 4-40 X 3/16" microsealed socket cap screws and lockwashers. This may require that the assembly inside the flange be lifted out as the lower screw is removed. Be careful not to lose the small spacers located between the front bearing frame and the flange, which provide venting between the two flat surfaces.

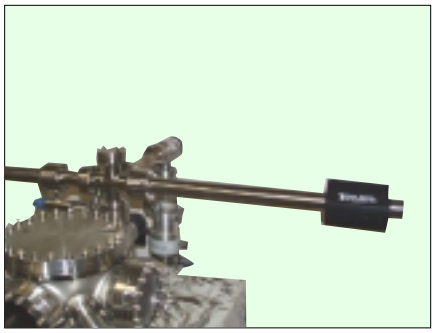
7 Place the spacers over the holes which are 30° clockwise from the holes that they were located over.

8 Place the front bearing frame assembly back into the flange, also rotated 30° clockwise, and tighten down the screws which attach it to the flange.

9 The front bearing assembly must now be slid back over the square tube of the follower assembly in the **same orientation that it was removed.**

10 Insert the follower assembly into the tube until the front bearing flange mates with the tube assembly flange. Attach the two together with the 4-40 screws removed in step 3, then slide the follower assembly entirely into the tube. Be sure that there is a new gasket or O-ring in place between the two flanges before installing the manipulator on the vacuum system.

The orientation has now been modified to match hole pattern B.



Install the manipulator onto the vacuum system using standard UHV or HV practices where applicable. T he **flange edge scribed with a "T" will be at the top unless you have changed the hole pattern described on Page 5**. Face-to-face tightening of the bolts is a safe practice for good sealing where torque specifications are not available.

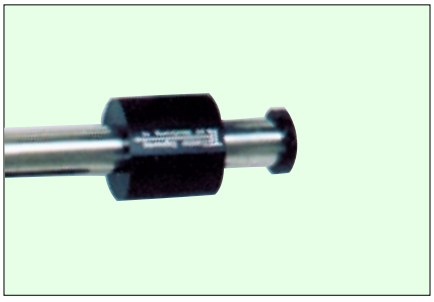
Once the tube and front bearing assemblies have been installed onto the vacuum system, the magnet carriage can be installed, if that process has not yet occurred.

Installation of Carriage Assembly

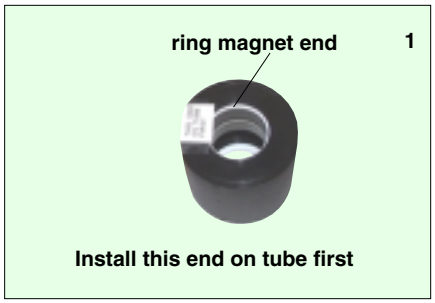
The installation of the carriage may occur either before or after the manipulator is mounted to the vacuum system.

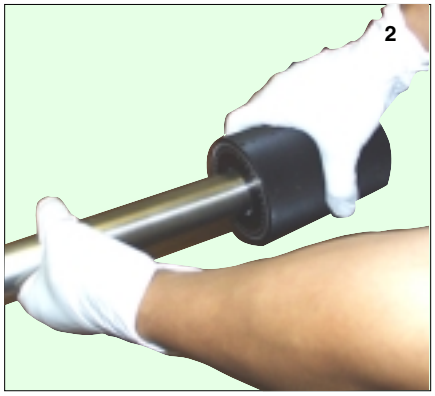
CAUTION: The coupling force between the carriage and follower is significant, and as the process takes place, the follower will accelerate quickly to couple with the carriage. Therefore, delicate devices or samples should not be mounted to the manipulator end when this takes place or possible damage may occur.

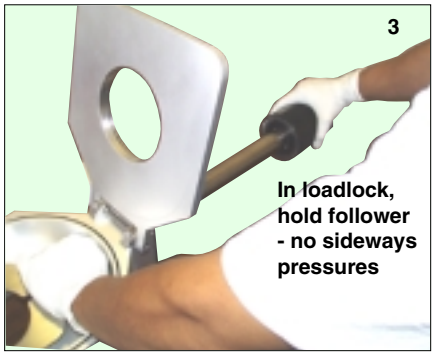
Installation of the carriage assembly involves sliding the carriage onto the tube assembly and then coupling the carriage to the follower assembly. The coupling referred to here is the interaction between the magnetic field of the carriage assembly magnets with the magnetic material inside the tube assembly.

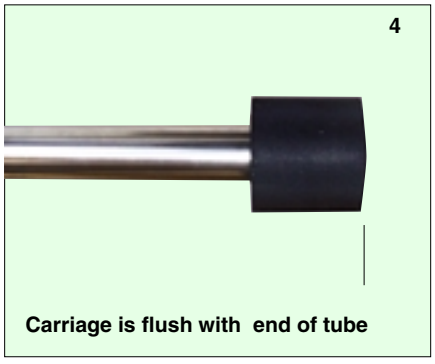


There is **only one correct orientation**, of the carriage assemblies onto the magnetic manipulators even though there are stable magnetic couplings in several different locations. The following process will allow for the correct coupling and see the diagram provided for assistance.









1 Slide the end of the carriage assembly with the two ring magnets onto the end of the tube first. This end will arrive from the factory labelled "*This end on tube first*".

2 Slowly slide the magnet carriage forward until the second polymer sleeve slides over the tube. If the follower assembly is fully retracted, it will jump to the first coupling position and the interaction will be apparent.

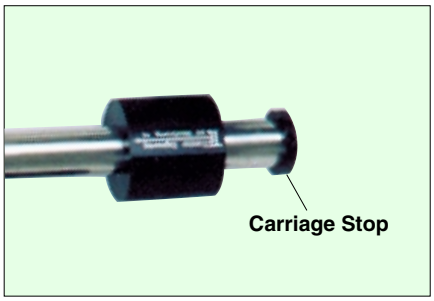
3 For applications where the follower can be gripped, with a gloved hand, hold the follower assembly in place, exerting no side forces on it. Side forces on the internal follower assembly can damage the bearings in the front bearing assembly.

For applications where the follower cannot be gripped, the follower assembly must be allowed to push against some object like a gate valve.

4 Push the carriage farther onto the tube. This will exert a linear force on the follower, which must be held in place. The carriage will break the coupling with the first magnet, then jump to the next coupling point.

The carriage will fit snugly onto the tube with only a small amount of play. As the manipulator is operated, the polymer rings which ride along the outside diameter of the tube will wear, increasing the free play of the carriage.

To check that the manipulator is correctly coupled to the follower assembly, retract the manipulator to is least extended position, and check the dimension shown in the photo 4 which shows the distance



between the rear surface of the carriage and the end of the tube. For DBLOP-XX manipulators, the carriage is flush with the end or may even extend slightly beyond the end of the tube. DBLOM magnet carriages will be flush with the end of the tube. Most users place a carriage stop at the end.

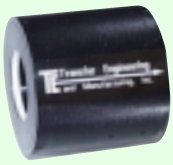
Removal of Carriage Assembly

To remove the carriage assembly, the manipulator must first be in its' fully retracted position. That position is defined as the position where the manipulator is in its' least extended position, and the follower assembly inside the tube is pulled up against the inside surface of the tube cap.

Removing the carriage requires a force of approximately 30 lbs., and the release is a quick motion. Pull the magnet case off the tube being careful not to exert any side motions on the case.

Bakeout

WARNING: The maximum bakeout temperature is 250°C. The carriage assembly must be removed.



REMOVE Carriage before baking.

The carriage assembly **must be removed in order to bake** the entire manipulator. Please read the *REMOVAL OF CARRIAGE ASSEMBLY* section above for instructions before beginning. Bakeout of the manipulator with the magnet case in place can occur, but the magnet carriage itself must not exceed 70° C or permanent loss of magnetism to the unit will occur and the warranty will be void. The manipulator will need to return to the factory for repair.

With the carriage assembly removed, the DBLOP/M-XX manipulators are constructed entirely of non-polymeric materials, so they can be kept at temperature as long as desired. For maximum removal of water vapor (the most prevalent gas to be pumped away), a 24 hr. bakeout at 220°C is recommended.

COOL FOR 24 HOURS AFTER BAKEOUT

WARNING: The manipulator must be allowed to cool a minimum of 24 hours after removal of heat before operation. Due to the fact that the internal assembly cools at a very slow rate, a temperature differential will exist soon after heat is removed. Even though the tube assembly may be cool to the touch, the internal parts may be near the bakeout temperature, and the expansion of the follower could cause damage to the tube if the unit is operated.

Maintenance

The Model DBLOP-XX and the DBLOM-XX, Precision Magnetic Manipulators are both transfer arms with linear only motion, however, there are differences in construction requiring different maintenance procedures. Regular maintenance will increase the life and insure proper operation. Should the time occur when repair is required or refurbishment desired, contact Transfer Engineering for information and costs involved in the refurbishment program. Refurbishment would normally include a complete inspection with replacement of all bearings, replace worn parts (as needed), thorough cleaning, bake-out and final test.

NOTE: The Model DBLOP magnetic carriage rides on polymeric bushings (outside of vacuum). Periodic adjustment of these polymer sleeves is absolutely required for proper operation and prolonged life of this device. Adjustment procedures follow. Use the photos provided for assistance in this adjustment.

1 Remove one of the 4-40 x 1/4" socket cap screws that holds the end cap to the magnet carriage.
CAUTION: For the end cap on the end of the carriage closest to the ring magnetics, the magnetic force will tend to push the end cap out of the recess where it resides. Use of a clamp to hold the end cap in place is needed for this adjustment.

2 Insert the 0.050" allen wrench into the hole exposed by the removed screw, and slightly tighten down on the remaining screw. This screw pushes against the teflon sleeve which rides along the tube assembly

3 Following this adjustment, reinsert the 4-40 socket cap screw.

4 Move to the next hole on that end of the magnet carriage, and repeat the steps above. Repeat the process on the last hole at that end of the carriage.

5 Once one end of the magnet case has been adjusted, move to the other end of the carriage and repeat the process.

IMPORTANT

For proper operation and long life of the manipulator, adjusting the magnet carriage evenly, so that it is concentric with the tube, is critical. This may require some fine adjusting by following the process above several times in order to get it adjusted correctly. Observing the exposed section of teflon ring within the end cap against the tube while rotating the magnet case is the best way to determine the concentricity of the magnet case on the tube assembly.

NOTE: On the Model DBLOP, the use of a light lubricant like WD-40 on the outside surface of the tube assembly will reduce wear on the polymer rings, and allow operation with less force. Before any bake-out is to take place, this lubricant should be cleaned off of the surface.

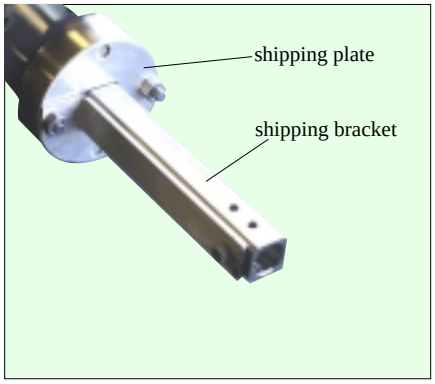
Model DBLOM, Linear-Only Precision Magnetic Manipulator Maintenance Procedures

The Model DBLOM-XX, Precision Magnetic Manipulator carriage rides on ball bearings and requires no routine adjustment maintenance other than general inspection to see that the unit is operating well. However, if the unit has a heavy duty cycle or is used in a production environment, it may be desirable for a preventative maintenance schedule to be established. The PMM would then be removed from the system and returned to Transfer Engineering for a complete refurbishment. Refurbishment would normally include a complete inspection, replacement of all bearings, replace worn parts (if needed), thorough cleaning, bake-out and final test. Contact Transfer Engineering for a quote on cost of refurbishment or to schedule a refurbishment for a quick turn-around time.

Shipping Instructions

The Precision Magnetic Manipulator is a fine tuned, delicate instrument which must be carefully packaged for any shipment. If possible, it is a good idea to retain the box and foam that the manipulator arrives in, or if that is not available, the manipulator should be packaged in a manner similar to the way it arrived from the factory.

Proper packaging consists of 4-6 " of appropriate density foam surrounding the manipulator tube and carriage assembly, with the carriage assembly removed, wrapped and separated from the manipulator by at least 4-6". Corrugated cardboard boxes of appropriate strength rating are adequate.



The manipulator requires installation of the two shipping brackets that it arrived with to prevent damage to the bearings. The carriage must be removed. See the photo to the left for proper installation of the shipping brackets. **Shipping the unit without the shipping brackets will void the warranty.**

Please call Transfer Engineering if a unit needs to be returned for a Return Material Authorization number, and the shipping brackets if they have not been retained.

Shipping checklist:

- ❑ Remove magnet carriage from manipulator
- ❑ Install shipping brackets correctly
- ❑ Package securely
  - Sufficient padding
  - Securely separate carriage from tube
- ❑ Call factory for RMA Number — 510.651.3000
- ❑ Shipping Address:

Transfer Engineering and Manufacturing, Inc.
2199 Warm Springs Court, Suite 1
Fremont, CA 94539

Other Cautions

The carriage assembly contains several strong rare-earth magnets which can cause damage to any devices sensitive to strong magnetic fields — computer disk drives, monitors, floppy disks, credit cards, etc. Care must be taken when the carriage is handled, as magnetic materials will be strongly attracted to this assembly when it is off the unit. Magnetic fields at the carriage are in the order of 20-30 gauss, but drop to the level of the Earth's field at about 1 foot from the unit.

The tube assembly is fabricated from relatively thin-wall stainless steel tubing which is easily damaged by unnecessary pressures exerted on it. This includes squeezing or leaning on the tube. Any distortion of the tube wall will cause the failure of the unit.

The follower assembly contains miniature precision ball bearings which can easily fail with the introduction of any foreign materials. This includes materials flaking from the manipulator tube which have been deposited there during sputtering, or other sample related materials which could enter the tube assembly during the retraction of the manipulator.

Please call Transfer Engineering and Manufacturing with any questions involving the performance, installation or maintenance of the magnetic manipulators described in this manual. We can be reached at 510. 651.3000 or by e-mail at team@transferengineering.com.

Warranty Statement

Basic Warranty

Except as otherwise provided herein, the Seller warrants to Buyer that the equipment sold hereunder, whether it is new equipment or remanufactured (reconditioned) equipment, is, at the time of shipment, as Buyer's sole exclusive remedy under this warranty Seller agrees either to repair or replace, at Seller's sole option and free of part charge to Buyer, any part or parts of such equipment which, under proper and normal conditions of use provide to be defective within twelve (12) months from the date of shipment by the Buyer. Warranty period for equipment requiring installation by Seller will commence on completion of standard installation services. If customer delays installation beyond forty-five (45) days after delivery, the warranty period will commence to run forty-five (45) days after delivery. After installation, any realignment, readjustment, recleaning, or recalibration, provided they do not relate to a proven defect in material or workmanship, shall be performed only at Seller's then current rates for service.

Exclusions and Limitations.

(i) It is recognized that some parts by their nature (expendable items), may not function one year, therefore, exclusined from the foregoing warranty are parts mentioned in the applicable operating manual.

(ii) The foregoing warranty excludes certain major items or accessories specifically indicated on applicable price lists or quotations, as to which Seller passes to the Buyer whatever warranty is provided to Seller by the Manufacturer or the specific warranty indicated by the price list or quotation.

(iii) This warranty does not cover loss, damage, or defects resulting from transportation to the buyer's facility, improper or inadequate maintenance by Buyer, buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the equipment or improper site preparation and maintenance.

Product Service

(i) All claims must be brought to attention of Seller within thirty (30) days of the failure to perform.

(ii) Seller at his option may require the product to be returned to the factory, transportation prepaird, for repair.

Refund of Purchase Price

(i) In lieu of the foregoing, Seller may at anytime elect, in its sole discretion, to discharge its warranty by accepting the return of such equipment and refunding any portion of the purchase price paid by Buyer.

Precision Magnetic Manipulators

HV and UHV TRANSFER SYSTEMS

- **Patented independent linear/rotary motion increases versatility**
- **Rugged, reliable with repeatable accuracy**
- **High decoupling force**
- **Horizontal or vertical operation**
- **Customer specified transfer lengths**
- **All metal internal construction**
- **Customized units available**

Transfer Engineering and Manufacturing, Inc. offers a family of precise magnetically operated linear, rotary, and linear and/or rotary motion sample manipulation systems for use in high vacuum, ultra-high vacuum or other controlled environments.

Precision Magnetic Manipulators (PMMs) are manufactured with all-metal internal construction and bakeable to 250°C.

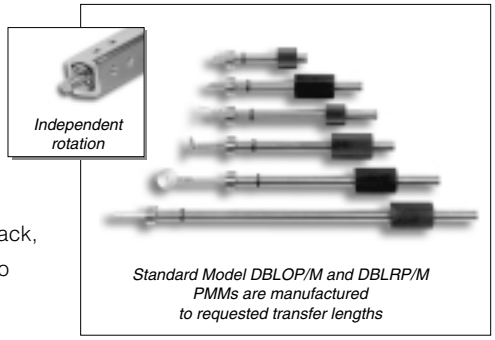
Three main branches of the PMM family are available and each can be easily customized. Styles available are —

- Standard PMMs with increased force and torque beyond typical magnetically-coupled transfer arms.
- The PMM-Lite is less-complex and of lower cost for situations requiring simple linear and rotary motion.
- Rotary-Only units provide versatile, reliable and precise rotary motion into a sealed chamber.
- Customized units are designed for a wide range of custom or special transfer systems.

LINEAR OR LINEAR/ROTARY PRECISION MAGNETIC MANIPULATORS

Standard, Models DBLOP/DBLOM and DBLRP/DBLRM

Our manipulators handle more axial force and torque and exhibit better compliance and load carrying capability than typically expected from a magnetically-coupled feedthrough. This increased force and torque results in greater tactile feedback, lower backlash and a greater ability to overcome friction. Modern rare earth magnets and a unique design were used to develop manipulators with this unusually high performance.



Standard Model DBLOP/M and DBLRP/M PMMs are manufactured to requested transfer lengths

Independence of linear and rotary motion is the key to versatility in these systems.

Transfer Engineering and Manufacturing, Inc.

2199 Warm Springs Court, Suite 1
Fremont, CA 94539
Phone 510.651.3000
Fax 510.651.3090
team@transferengineering.com
http://www.transferengineering.com

The round rotation shaft is contained within a square linear motion shaft and rotates independently. In the linear direction, both shafts move together. Rotary motion and linear motion can be used in combination or separately, providing numerous potential variations of sample movement. Examples include locking devices for sample transfer, clamping devices, vertical lift mechanisms and rotatable stages.

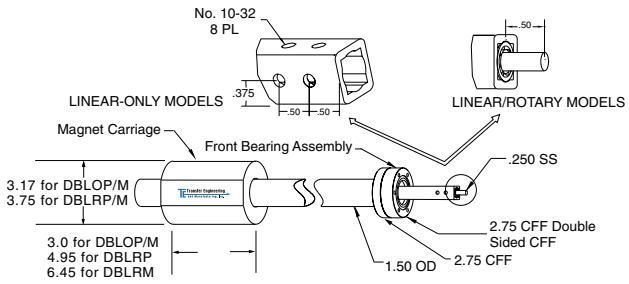
These PMMs are manufactured as linear-only or linear/rotary models. Two are linear-only models, DBLOM–XX and DBLOP–XX (XX is the stroke length in inches). Two are linear/rotary models, DBLRM–XX and DBLRP–XX. All models have UHV all-metal internal construction.

Models DBLOM–XX and DBLRM–XX use all metal construction throughout, and as a result, have very low stiction. These models are intended for manipulator applications where very good tactical feedback is desired and for high duty-cycle applications.

Models DBLOP–XX and DBLRP–XX use polymeric bearings in the carriage outside the vacuum, and as a result, have a slightly higher stiction than the metal bearing units. They are intended for sample transferring and similar functions where the slight amount of stiction is preferred. This construction is a more economical design than the external metal bearing units.

Specifications are listed on page 3.

DIAGRAM OF MODELS DBLOP/M AND DBLRP/M



Model DBLRP/M Linear/Rotary

Model DBLOP/M Linear-Only

PMM-Lite, Model MASLR

The PMM-Lite™ is a single-shaft precision magnetic manipulator that is ideal for situations that require a less sophisticated range of motion than those offered by the standard PMMs. It is ideal for applications requiring conventional linear and/or rotary motions with high linear force and torque. Examples include uncomplicated translation motion and simple loadlocks.

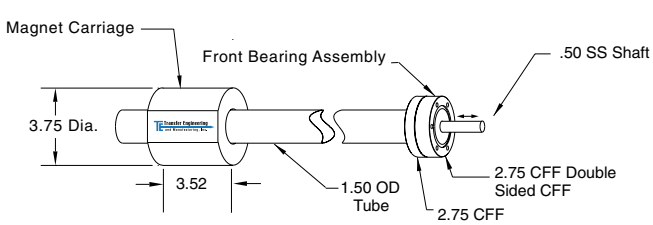
The PMM-Lite, Model MASLR-XX, combines the linear and rotary motions into a single-shaft simplifying the construction and making it a less expensive alternative to the standard PMMs.

The PMM-Lite offers very competitive linear force and torque to that of other conventional manipulators. The PMM-Lite has the same solid "feel" of the standard Transfer Engineering precision magnetic manipulators and provides good tactile feedback for accurate sample manipulation.

Retaining the UHV characteristics of the standard PMM, the PMM-Lite has only metal parts exposed to vacuum and can be baked to 250°C with the magnet carriage removed. It was designed with low maintenance in mind.

Specifications are listed on page 3.

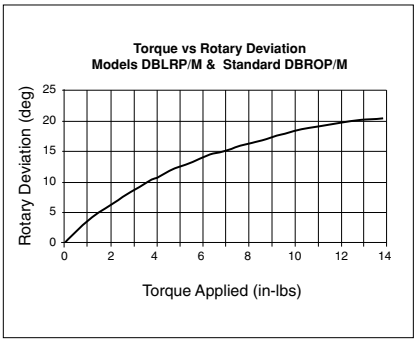
DIAGRAM OF PMM-LITE, MODEL MASLR

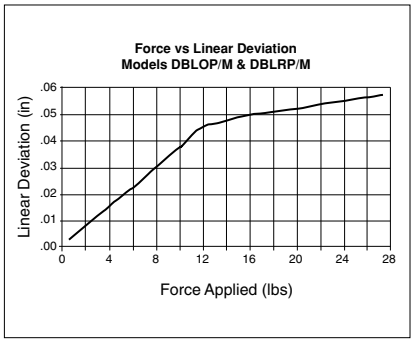


Model MASLR, PMM-Lite Linear/Rotary

SPECIFICATIONS AND DESCRIPTION

PMM MODEL	DBLRP/DBLRM	DBLOP/DBLOM	MASLR	DBROP/DBROM
PERFORMANCE				
High linear force	26 lbs	26 lbs	13 lbs	N/A
Tight linear compliance	0.0035 in/lb	0.0025 in/lb	0.0050 in/lb	N/A
Rotary torque	12 in-lb	N/A	8 in-lb	Std. 15 in-lb
Rotary compliance	2 degrees/in-lb	N/A	4 degrees/in-lb	Std. 2 degrees/in-lb
Low droop - spring constant = $(XX)^3/10^6$				
➡ For a 12" stroke	0.002"/lb	0.002"/lb	0.062"/lb	N/A
➡ For a 24" stroke	0.014"/lb	0.014"/lb	0.49"/lb	N/A
➡ For a 36" stroke	0.047"/lb	0.047"/lb	1.67"/lb	N/A
➡ For a 48" stroke	0.110"/lb	0.110"/lb	3.95"/lb	N/A
Bake Temperature with magnet removed	250°C	250°C	250°C	250°C
DESCRIPTION				
Material				
➡ Flange, outer tube and square main shaft	304ss	304ss	304ss	304ss
➡ Actuator Housing	Anodized Al	Anodized Al	Anodized Al	Anodized Al
➡ Rare Earth Magnets	NdFeB	NdFeB	NdFeB	NdFeB
Number of shafts	2	1	1	Std. - 1 Solid or hollow
Motions	Linear and/or Rotation	Linear-Only	Linear/Rotation	Rotation-Only
Length	(XX) + 9.53"	(XX) + 6.53"	(XX) + 6.53" (maximum length recommended is 36")	Model dependent
Minimum extension	.75" square tube 0" .25" ø shaft 0.5"	.75" square tube 0"	.50" ø shaft 1.0"	Std. round shaft 1.0"
Mounting	2.75" OD CFF	2.75" OD CFF	2.75" OD CFF	2.75" OD CFF
Weight	~15 pounds	~12 pounds	~10 pounds	~10 pounds
Options/Accessories	Motor drives Rho-theta stage KLAMP VMTEX and ALHCS ALDEF	Motor drives	External drive Linear guide Rotation lock Motor drives	Ceramic bearings Motorization Limit switches





DBLOP – linear-only external polymeric bearings
DBLOM – linear-only external metal metal bearings
DBLRP – linear-rotary polymeric external bearings
DBLRM – linear-rotary external metal bearings
DBROP – rotary-only external polymeric bearings
DBROM – rotary-only external metal bearings

XX – length of linear travel

Precision Magnetic Manipulators are covered by U.S. Patent Number 5,105,932.

Specifications subject to change without notice.

ROTARY-ONLY, MODEL DBROM

The Transfer Engineering Rotary-Only, Model DBROP/M, precision magnetic manipulator has no stroke length. The Rotary-Only PMM provides a versatile, reliable and precise solution to the general problem of introducing rotary motion into a sealed chamber eliminating rotary mechanical feedthroughs with high failure rates.

Various styles of Model DBROM Rotary-Only

The Rotary-Only PMMs exhibit a high breakaway torque, a tight angular compliance and, as an option, you may request extremely accurate (±0.3 degrees) coupling. Similar to the standard PMMs, Model DBROP has polymeric bearings in the carriage assembly for more economical conventional applications and DBROM has all metal construction for motorization or high-duty cycles.

The innovative design of the Rotary-Only incorporates all welded stainless steel tubing to avoid wear-related leaks, outgassing of residual oils and burping. It provides an extremely reliable, positive vacuum and gas seal. There are no failure modes that result in a rotary-seal leak. The Rotary-Only can withstand a heat load while in operation and can be baked at 250°C. Rotary-Only PMMs are impervious to most liquids and gases and offer a built in clutch.

A wide range of user specified options are available. These include the size and number of shafts, choice of shaft material, length of shaft, ceramic bearings, choice of hollow or solid shaft, and end details such as flats, threaded, etc.

Common UHV and high-vacuum applications for the Rotary-Onlys include activating shutters, rotating sample carriers, driving gimbal mechanisms, selecting targets, rotating wafers, coupling power into controlled environments (glove box fans), etc.

Specifications are listed on page 3.

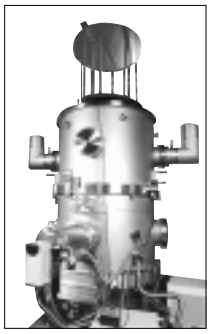
CUSTOMIZED PMM SYSTEMS

Each of the Transfer Engineering PMMs can be customized in length, extensions, etc. to meet customer requirements.

Examples of special customized units that have been provided are —

- Compact PMMs for HV applications where a smaller, more compact unit is desirable
- Robust PMMs with reinforced tubing, added bearings, and mounted on a 4.5" CFF for heavy -duty, automated use
- Very high force PMMs with internal magnets for HV applications
- Model DHDRH, dual shaft rotary-only
- Hollow-shafts for electrical feedthrus

PMMs can be motorized for computer control and/or with a remote joystick or keypad. If this brochure does not list the exact unit for your requirements, please give us a call as we may have designed something similar. New systems are continually being developed to meet our customers needs.



This custom system has motor driven PMMs and was designed to vertically lift then lower and seal an internal 500 pound chamber

About Transfer Engineering & Mfg, Inc.

Transfer Engineering and Manufacturing provides innovative products for OEM, Production Facility and R&D/University Lab customers in the Semiconductor, Media, Sputter Deposition and R&D markets. TEAMs core expertise is in the handling, transporting, positioning, and manipulation of samples, semiconductor wafers, substrates, flat panels, and other materials with precision and reliability in HV, UHV, ultra-clean and other challenging controlled environments.

Product lines include —

- Linear, Rotary and Linear/Rotary Precision Magnetic Manipulators
- Sample transfer & loadlock systems including the MASCOT MESC-compatible wafer transport system
- HV and UHV heating and/or cooling assemblies
- Motion and placement systems
- Automated loadlock systems
- Custom systems

At Transfer Engineering we believe the key to providing the best product solution is to work closely with customers to understand their process and objectives and to involve them in the product design to ensure that goals are met. Contact us for technical information or a quotation.

☎ 510.651.3000

510.651.3090

team@transferengineering.com

Transfer Engineering & Manufacturing
2199 Warm Springs Court, Suite 1
Fremont, CA 94539

www.transferengineering.com

Transfer Engineering and Manufacturing, Inc.

TEAM DS-101 8/01

Transfer Engineering and Manufacturing, Inc.
2199 Warm Springs Court, Suite 1
Fremont, CA 94539
Tel: (510)651-3000
Fax: (510)651-3090

Transfer Engineering welcomes feedback from customers. If you have suggested modifications/additions or a comment to this manual or TEAM product, please do not hesitate to FAX or e-mail us. You can also contact us through our web site: www.transferengineering.com.

FAX FAX FAX FAX FAX FAX FAX FAX FAX FAX

To:	Customer Service
Organization:	Transfer Engineering and Manufacturing, Inc.
Fax No:	510-651-3090
E-mail:	team@transferengineering.com
Date:	
Sender:	
Organization:	
Fax or E-mail:	

Message: