LinTech ®

Miniature Profile Rails

Welcome to *LINTECH* ®

Our local technical support group consists of Automation Specialists located throughout the World. These Automation Specialists are experienced in the use of electronic and mechanical motion control products. They are well trained on the performance capabilities of *LINTECH* positioning components.

LINTECH is constantly designing new products and improving upon the many options available with our standard products. Whether it is a standard or custom positioning system required, visit our website, call, or e-mail us. We look forward to hearing from you.

Visit our website, or call us for the location of the nearest Automation Specialist in your area:

LINTECH ®

1845 Enterprise Way
Monrovia, CA. 91016
Toll Free: (800) 435 - 7494
Phone: (626) 358 - 0110
Fax: (626) 303 - 2035

Web Site: **www.LintechMotion.com**
E-Mail: **Lintech@LintechMotion.com**

For over 42 years *LINTECH* has designed, engineered, and manufactured linear positioning components for use in a wide range of applications. Whether it is a standard positioning component or a custom positioning assembly, *LINTECH* takes great pride in manufacturing a quality product.

At *LINTECH* we are proud to provide the motion control user with this product guide. It was developed to assist you with the design, selection, and implementation of mechanical positioning components.

Depending on the requirements, standard positioning components can often be assembled and shipped in less than 2 weeks. Custom positioning assemblies require a different approach. We evaluate your special application, use our many years of experience to guide you, and then manufacture a quality product designed to meet your performance specifications.

LINTECH's technical support consists of a well trained inside customer service department, an experienced application engineering staff, and a versatile machining facility.

Table of Contents

MR Series Profile Rail

* 2 rows of re-circulating balls
* Equal loading in all directions
* Dust proof design
* SS bearing, rail, and balls
* Self lube reservoir *standard*

Bearing Design Overview

The MR series design incorporates two rows of re-circulating balls arranged in the 45° contact angle with the raceway. The rigidity under moment and torsional loads is increased by this design. Larger ball size is used to enhance the load capabilities. This design offers equal loading in all directions while providing smooth motion.

MR Series
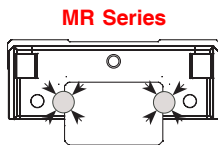
Block Preload

Preload refers to the internal clearance between the bearing and the rail. The MR are standard with a light preload which enhances stiffness and torsional resistance.

Block Height and Width Variance

This is the maximum variation of two blocks on a rail at the same location on the rail. The height deviation is (H_v) and the width deviation is (W_v).
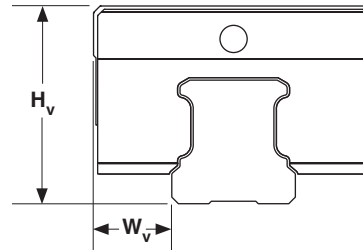
Model	H_v (microns)	W_v (microns)
MR12	15	20

Accuracy of Running Parallelism

The overall error in parallelism between the reference planes of the rail and block, as the block is moving along the rail over the full travel length.

Mounting Surface Requirement

The overall accuracy of the profile assembly will be dependent upon the accuracy of the mounting surface. Thus, the mounting surface flatness should be equal to or better than the running parallelism specification of the series. Surface should be ground to reach a surface roughness of Ra1.6. Accuracy and smoothness will also be affected by the parallelism of a two rail configuration. Precision machined mounting shoulders should be utilized as a reference for the two rails. Either side of the rail can be used as the reference surface against this shoulder.

Linear Bearing Load Capacities

Static Loads are forces applied to the linear bearing in a motion-less state. If a static load rating of a particular linear bearing is exceeded it can result in permanent depressions in the bearing and rail which can cause the system to not operate smoothly, or fail prematurely.

Some static forces will be known and can be accounted for (i.e. drilling, insertion, stamping, engraving, etc.). Other unexpected forces that are difficult to determine could come from vibrations, impacts, or inertial forces.

Linear Bearing Load Capacities

To ensure proper life, external forces should never come close to the static load rating. Repeated forces at or near the maximum rating can fatigue the elements causing premature failure. Thus, a safety factor should be considered to account for these forces. Also by using a safety factor, extra unforeseen loads that arise within an application sometime in the future, would not affect the bearing and rail chosen.

Recommended Linear Bearing Static Safety Factors

Operation Conditions	Loading Type	Min. Safety Factor
Stationary	No applied impact or vibration loads.	1.0 - 2.5
	Small impact or vibration loads are present.	2.5 - 4.0
	High impact or vibration loads are present.	4.0 - 6.0

Example: *Application calls for an external 1000 N of force being applied to a part (weight = 500 N) that is mounted to a bearing block. The block will be at rest. There will be a small impact to the part as the force is first being applied.*

From above chart use a 3.0 safety factor

total load		safety factor		select a bearing that has a static capacity greater than this value
(1000 + 500)	x	3	=	**4.5 kN** (1,102.5 lbs)

Dynamic Loads exert a force upon the bearings while in motion. Every linear bearing has a load capacity associated with it that is based upon the number of km (or inches) traveled. Therefore, in order to select bearings that will last the required travel life, the forces acting upon the bearings must be reviewed. Once the force on the heaviest loaded bearing is determined, and a safety factor is selected, the life of that bearing can be determined using the below equation.

$$L = \left[\frac{R}{F \times S} \right]^3 \times B$$

- **L** = expected travel life in Km or (inches)
- **R** = rated dynamic load capacity of bearing at 50 Km or (2 million inches)
- **F** = user applied axial load kN or (lbs)
- **B** = 50 Km or (2,000,000 inches)
- **S** = Safety factor

Safety factors should always be used when calculating the life of a linear bearing. Changing loads, speeds, acceleration rates, environments and lack of lubrication produce forces (stresses) acting upon the bearings that are hard to quantify. These type of variable loads cannot be calculated precisely. Thus, a safety factor should be applied to account for loads which could fatigue the system and cause premature failure.

Recommended Linear Bearing Dynamic Safety Factors

Impacts or Vibration	Speed (in/sec)	Acceleration (G's)	Min. Safety Factor
None	< 5	< 0.25	1.0 - 2.0
Small	5 - 10	0.25 - 0.50	2.0 - 3.0
Medium	10 - 20	0.50 - 1.00	3.0 - 4.0
Large	20 - 50	1.00 - 1.50	4.0 - 6.0
Very Large	> 50	> 1.50	6.0 - 8.0

Lubrication

The bearings and rails require lubrication for proper, long term operation. Lubrication will decrease system friction, wear, and the potential for oxidation. The MR12 comes standard with a self lube feature which has a reservoir filled with oil within the block. This reservoir can be refilled with a syringe for the approriate bearing. A safe lubrication interval can only be determined by observation of your particular application, but should not exceed one year. Since the bearing is sealed, this lubricant stays within the bearing block.

To lubricate the MR bearing, a syringe can be inserted into the lube port (on either end) once the plug is removed as shown below. The chart shows the recommended volume of oil, and also the syringe part numbers. Syringes can be purchased, and come with 10 ml of ISO V32-68 oil.
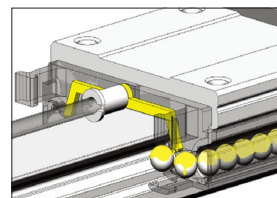
Model	Lube Volume (ml)	Syringe Number
MR12	0.41	SYR-12

Retaining of Balls in the Block

There are balls within the bearings that re-circulate to carry the load. Loss of any of these balls can affect ratings and overall smoothness of operation. These blocks do have a retainer provision for the balls to reduce the likelihood of loss if the block is removed from the rail. However, it is recommended that the **plastic arbor rail** be used whenever the block is removed from the rail, since rough handling or dropping has the potential to jettison balls.

* Miniature Rail
* 2 rows of re-circulating balls
* Equal loading in all directions
* Dust proof design
* SS bearing, rail, and balls
* Self lube reservoir *standard*

MR 12 M N SL V1 - 2 - 320 - 10 - 10

Series Type

   MR - Mini profile rail

Profile Size

   12 - 12 mm size

Rail Width

   M - Standard Style

Block Length

   N - Standard Style

Block Ends

   SL - Seals, both ends with self lube

Block Clearance

   V1 - Light Preload

Number of Blocks

   2 - Number of blocks on each rail

Rail Length

   xxxx - Overall rail length (mm)

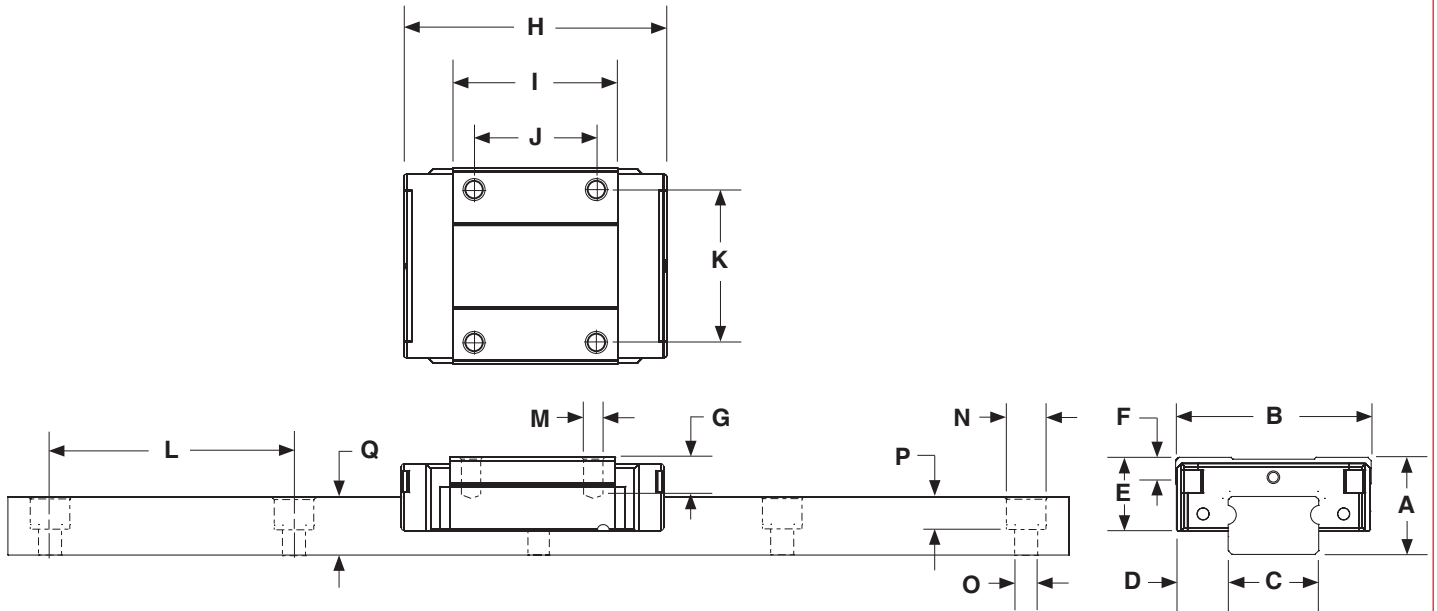**Start Hole**

   xx - Distance from end (mm)

End Hole

   xx - Distance from end (mm)

Dimensions & Specifications:

Model Number	Dimensions (mm)														Block Weight (kg)	Rail Weight (kg/m)
	A	B	C	D	E	F	M x G	H	I	J	K	L	Q	N x O x P		
MR12	13	27	12	7.5	10	4.3	M3 x 3.5	35.4	22	15	20	25	7.5	6 x 3.5 x 4.5	0.034	0.602

Other	For Block or Rail	Accuracy of Running Parallelism
Height Tolerance	+/- 25 microns	
Width Tolerance	+/- 25 microns	
Block Clearance	0 to - 5 microns	
Block Style	Self Lube, seals on both ends	
Block and Rail Material	440 Stainless Steel	
Maximum Speed & Acceleration	3 m/s, 25 m/s^2	
Friction Coefficient	< 0.003	
Seal Drag	< 0.4 N	
Operation Temperature	- 40 to + 80 degrees C	
Maximum Rail Length	1000 mm (longer lengths available with butt joints)	

Model Number	Dynamic Load Capacity (kN @ 50 km)	Static Load Capacity (kN)	Static Roll Moment M_r (Nm)	Static Pitch & Yaw Moment M_p & M_y (Nm)
MR12	2.908	3.465	21.50	12.90

Note: 1 kN = 102 kg or 225 lbs

Unit Conversions

Torque Conversions

Present Units	Convert To	Multiply By
Gram-centimeters	newton-meters -------	0.0000981
Gram-centimeters	ounce-inches ---------	0.0138874
Gram-centimeters	pound-inches ---------	0.000868
Gram-centimeters	pound-feet ------------	0.0000723
Newton-meters	gram-centimeters ----	10,197.162
Newton-meters	ounce-inches ---------	141.612
Newton-meters	pound-inches ---------	8.85
Newton-meters	pound-feet ------------	0.73756
Ounce-inches	gram-centimeters ----	72.0077
Ounce-inches	newton-meters -------	0.007062
Ounce-inches	pound-inches ---------	0.0625
Ounce-inches	pound-feet ------------	0.005208
Pound-inches	gram-centimeters ----	1,152.0
Pound-inches	newton-meters -------	0.11299
Pound-inches	ounce-inches ---------	16.0
Pound-inches	pound-feet ------------	0.08333
Pound-feet	gram-centimeters ----	13,825.5
Pound-feet	newton-meters -------	1.3558
Pound-feet	ounce-inches ---------	192.0
Pound-feet	pound-inches ---------	12.0

Distance Conversions

Present Units	Convert To	Multiply By
Arc-minutes	degrees -----------	0.016666
Arc-seconds	degrees -----------	0.000277
Centimeters	inches -----------	0.3937
Centimeters	feet --------------	0.03280
Centimeters	microns ----------	10,000.0
Degrees	arc-minutes -----	60.0
Degrees	arc-seconds -----	3,600.0
Degrees	radians ----------	0.017453
Feet	centimeters ------	30.48
Feet	meters -----------	0.3048
Inches	centimeters -----	2.54
Inches	Km --------------	0.0000254
Inches	meters ----------	0.0254
Inches	microns ----------	25,400.0
Inches	millimeters -----	25.4
Km	inches -----------	39,370.0
Meters	feet -------------	3.2808
Meters	inches -----------	39.37
Meters	microns ----------	1,000,000.0
Microns	centimeters -----	0.0001
Microns	inches -----------	0.00003937
Microns	meters -----------	0.000001
Microns	millimeters -----	0.001
Millimeters	inches -----------	0.03937
Millimeters	microns ---------	1,000.0
Radians	degrees -----------	57.295779

Inertia Conversions

Present Units	Convert To	Multiply By
Gram-cm^2	ounce-inches^2 ----	0.00546745
Gram-cm^2	ounce-inch-sec^2 --	0.000014161
Gram-cm^2	pound-inches^2 ----	0.000341716
Gram-cm^2	pound-inch-sec^2 --	0.000000885
Gram-cm^2	pound-feet-sec^2 --	0.000000074
Ounce-inches^2	gram-cm^2 ---------	182.901
Ounce-inches^2	ounce-inch-sec^2 --	0.00259008
Ounce-inches^2	pound-inches^2 ----	0.0625
Ounce-inches^2	pound-inch-sec^2 --	0.00016188
Ounce-inches^2	pound-feet-sec^2 --	0.00001349
Ounce-inch-sec^2	gram-cm^2 ---------	70,615.4
Ounce-inch-sec^2	ounce-inches^2 ----	386.0
Ounce-inch-sec^2	pound-inches^2 ----	24.13045
Ounce-inch-sec^2	pound-inch-sec^2 --	0.0625
Ounce-inch-sec^2	pound-feet-sec^2 ---	0.00520833
Pound-inches^2	gram-cm^2 ---------	2,926.41
Pound-inches^2	ounce-inches^2 ----	16.0
Pound-inches^2	ounce-inch-sec^2 --	0.0414413
Pound-inches^2	pound-inch-sec^2 --	0.00259008
Pound-inches^2	pound-feet-sec^2 --	0.00021584
Pound-inch-sec^2	gram-cm^2 ---------	1,129,850.0
Pound-inch-sec^2	ounce-inches^2 ----	6,177.4
Pound-inch-sec^2	ounce-inch-sec^2 --	16.0
Pound-inch-sec^2	pound-inches^2 ---	386.0
Pound-inch-sec^2	pound-feet-sec^2 --	0.0833333
Pound-feet-sec^2	gram-cm^2 ---------	13,558,200.0
Pound-feet-sec^2	ounce-inches^2 ---	74,128.9
Pound-feet-sec^2	ounce-inch-sec^2 --	192.0
Pound-feet-sec^2	pound-inches^2 ---	4,633.06
Pound-feet-sec^2	pound-inch-sec^2 -	12.0

Load Conversions

Present Units	Convert To	Multiply By
Grams	newtons -----------------	0.009806
Grams	ounces -------------------	0.03528
Grams	pounds -----------------	0.002204
Kilograms	pounds -----------------	2.2046
Newtons	grams -------------------	101.971
Newtons	ounces -----------------	3.59692
Newtons	pounds -----------------	0.224808
Ounces	grams -------------------	28.3495
Ounces	newtons ----------------	0.27802
Ounces	pounds -----------------	0.0625
Pounds	grams -------------------	453.592
Pounds	kilograms ---------------	0.45359
Pounds	newtons ----------------	4.44824
Pounds	ounces -----------------	16.0
Pounds	tons --------------------	0.0005
Tons	pounds -----------------	2,000.0

Terms of Sale

To Order

Any standard, or custom, product from $L_{IN}T_{ECH}$ may be ordered by mail, email, on-line, phone, or fax from an Automation Specialist in your area. To obtain the name of your local Automation Specialist call:

$L_{IN}T_{ECH}$ ®

1845 Enterprise Way
Monrovia, CA 91016

Toll Free: (800) 435 - 7494
Phone: (626) 358 - 0110
Fax: (626) 303 - 2035

Web Site: www.LintechMotion.com
E-Mail: Lintech@LintechMotion.com

All required options should be reviewed using the part numbering guide for each model series. Your local Automation Specialist or factory personnel can assist you with any questions you may have.

Delivery

All shipping promises are made in good faith. Any shipping dates appearing on acknowledgments of orders or given to a customer in any other manner are approximate. Where the customer delays in supplying information necessary to proceeding with an order, the date of shipment may be extended accordingly. Standard products from $L_{IN}T_{ECH}$ are usually available for delivery within 1 to 6 weeks of receipt of a purchase order. However, component shortages, labor disputes, or any other unforeseen circumstance may delay the delivery of an order. $L_{IN}T_{ECH}$ shall not be held liable under any circumstance. All products are shipped F.O.B. Monrovia, CA. $L_{IN}T_{ECH}$ packages all standard and custom products carefully. However, $L_{IN}T_{ECH}$ is not liable for damage incurred during shipment. Contact the carrier immediately if damage to a package or shipment is noticed upon receipt of such shipment.

Payment Terms

Unless otherwise specified, payment shall be made by C.O.D, credit card (AMEX, Visa, or Master Card), or net thirty (30) days (pending credit approval) from date of shipment of the items purchased hereunder in U.S. currency. $L_{IN}T_{ECH}$ reserves the right to require deposit payments on non-standard items, customs, or product built to Buyer's designs or specifications. Amounts not timely paid shall bear interest at the rate of 1.5% for each month or a portion thereof that Buyer is late in making payments. No responsibility is assumed by $L_{IN}T_{ECH}$ for damages arising from delivery delays, fires, strikes, material shortages, accidents, or any other cause whatsoever, and purchase orders are accepted subject only to these conditions irrespective of statements or stipulations on purchase orders.

Minimum Order Amount

$L_{IN}T_{ECH}$ requires a minimum of $30 List Price U.S. currency on all orders.

Warranty

All $L_{IN}T_{ECH}$ products are guaranteed to be free from defects in material and workmanship, under normal use, for a period of one year after date of shipment. This warranty covers the repair or replacement of a product when it is sent prepaid to $L_{IN}T_{ECH}$. $L_{IN}T_{ECH}$ does not assume liability for installation, abuse, alteration, insufficient application data provided for a design, or misuse of any positioning system. Products furnished by LINTECH, but not manufactured by $L_{IN}T_{ECH}$ (motors, gearheads, encoders, amplifiers, etc....), are subject to the manufacturers standard warranty terms and conditions.

Returns

Any product requiring a return to $L_{IN}T_{ECH}$ (for warranty or non-warranty repair) requires pre-approval from the factory prior to shipment. Contact the customer service department at (800) 435-7494 in order to obtain a RMA (Return Materials Authorization) number. At that time, please have your system Model & Serial numbers available, along with the reason for the return. The RMA number should be clearly marked on the returned package label and your packing list, or shipping document. Return product freight prepaid in its original package or one with comparable protection. $L_{IN}T_{ECH}$ will not accept return shipments sent freight collect. Product damage incurred during return shipment, from poor packaging, will not be warranted by $L_{IN}T_{ECH}$. Keeping original packing materials is recommended until initial inspection and testing is completed.

Dimensions and Product Changes

Published dimensions shown in $L_{IN}T_{ECH}$ catalogs are known to be accurate at time of printing. $L_{IN}T_{ECH}$ shall not be held liable, under any circumstances, for any wrongly documented dimension or specification. Changes in design are made whenever $L_{IN}T_{ECH}$ believes its products will improve by the change. No obligation to incorporate these changes in units manufactured prior to a change will be assumed.

Cancellations

All items entered for production and on which a cancellation is requested shall be paid for on the basis of actual cost of labor, materials, and supplies applied to the production of such items plus proper overhead expenses determined in accordance with good accounting practice, plus 25% of the total of such cost and expenses; provided that such cost and expense plus 25% shall in no case exceed 100% of the quoted price of original order. Upon cancellation, $L_{IN}T_{ECH}$ may dispose of materials used in the manufacture of cancelled order as it sees fit.