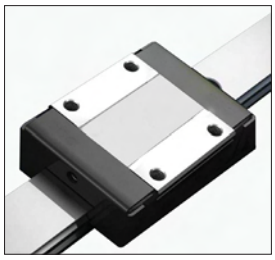
LINTECH®

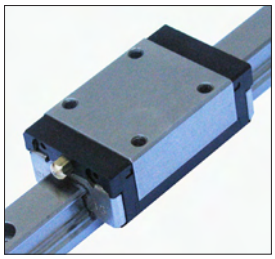
Profile Rail Components

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*

AR & HR Series Profile Rail

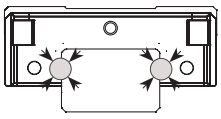


* 4 rows of re-circulating balls
* Equal loading in all directions
* Dust proof design
* Alloy steel bearing, rail, and balls
* Self lube reservoir *optional*

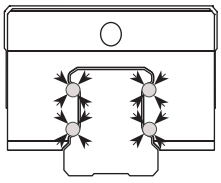
Bearing Design Overview

The MR, AR & HR series design incorporates two or four 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



AR & HR Series

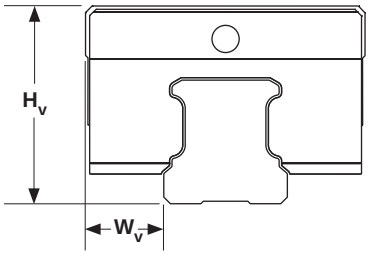


Block Preload

Preload refers to the internal clearance between the bearing and the rail. The MR, AR & HR 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
AR15 & HR25	15	15

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. See charts on pages 4, 6 and 8 for the MR, AR & HR accuracy parallelism charts.

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.

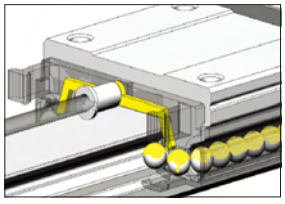
Recommended Linear Bearing Dynamic Safety Factors

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.

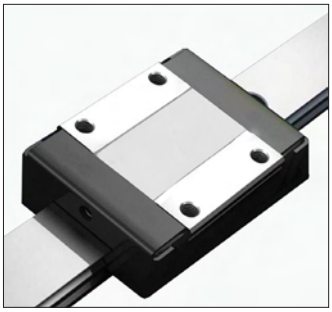
The AR15 or HR 25 standard block is not equipped with the self lube feature, but this feature is available as an option. The bearing can be filled with an oil lubricant. To lubricate the AR, HR or MR bearing, a syringe can be inserted into the lube port (on either end) once the plug is removed as shown 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
AR15	2.00	SYR-15
HR25	3.60	SYR-25

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

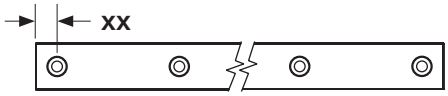
Block Ends
SL - Seals, both ends with self lube

Block Clearance
V1 - Light Preload

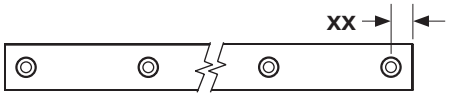
Number of Blocks
2 - Number of blocks on each rail

Rail Length
xxxx - Overall rail length (mm)

Start Hole
xx - Distance from end (mm)

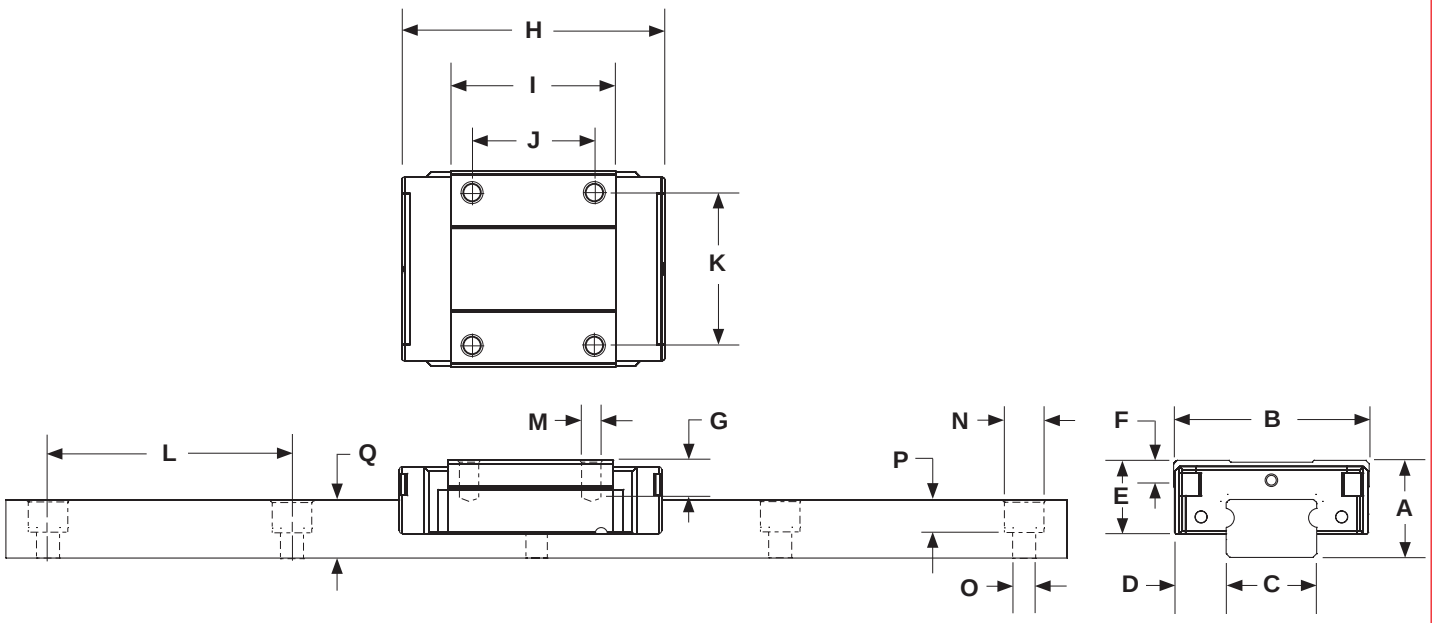


End Hole
xx - Distance from end (mm)



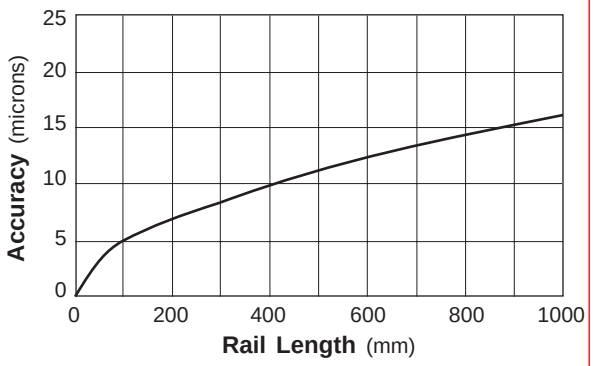
Dimensions & Specifications:

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

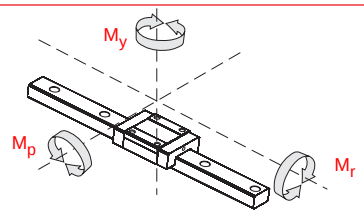


Other	For Block or Rail
Height Tolerance	+/- 25 microns
Width Tolerance	+/- 25 microns
Block Clearance	0 to - 5 microns
Block Style	Self Lube, seals on both ends
Block and Rail Material	440 Stainless Steel
Maximum Speed & Acceleration	3 m/s, 25 m/s^2
Friction Coefficient	< 0.003
Seal Drag	< 0.4 N
Operation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

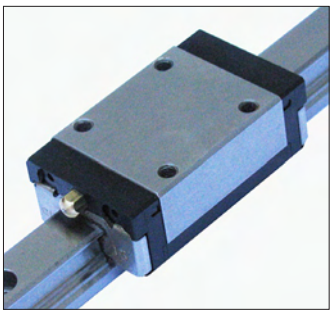
Accuracy of Running Parallelism



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



* Application Rail
* 4 rows of re-circulating balls
* Equal loading in all directions
* Dust proof design
* Alloy steel bearing, rail, and balls
* Self lube reservoir *optional*

AR 15 M N S V1 - 2 - 1260 - 30 - 30

Series Type
AR - Application profile rail

Profile Size
15 - 15 mm size

Rail Width
M - Standard Style

Block Length
N - Standard Style

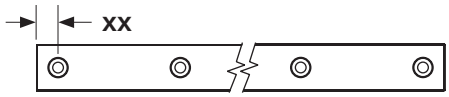
Block Type
S - Seals, both ends
SL - Seals with reinforcing plates, both ends with self lube

Block Clearance
V1 - Light Preload

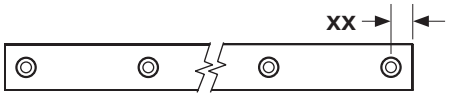
Number of Blocks
2 - Number of blocks on each rail

Rail Length
xxxx - Overall rail length (mm)

Start Hole
xx - Distance from end (mm)

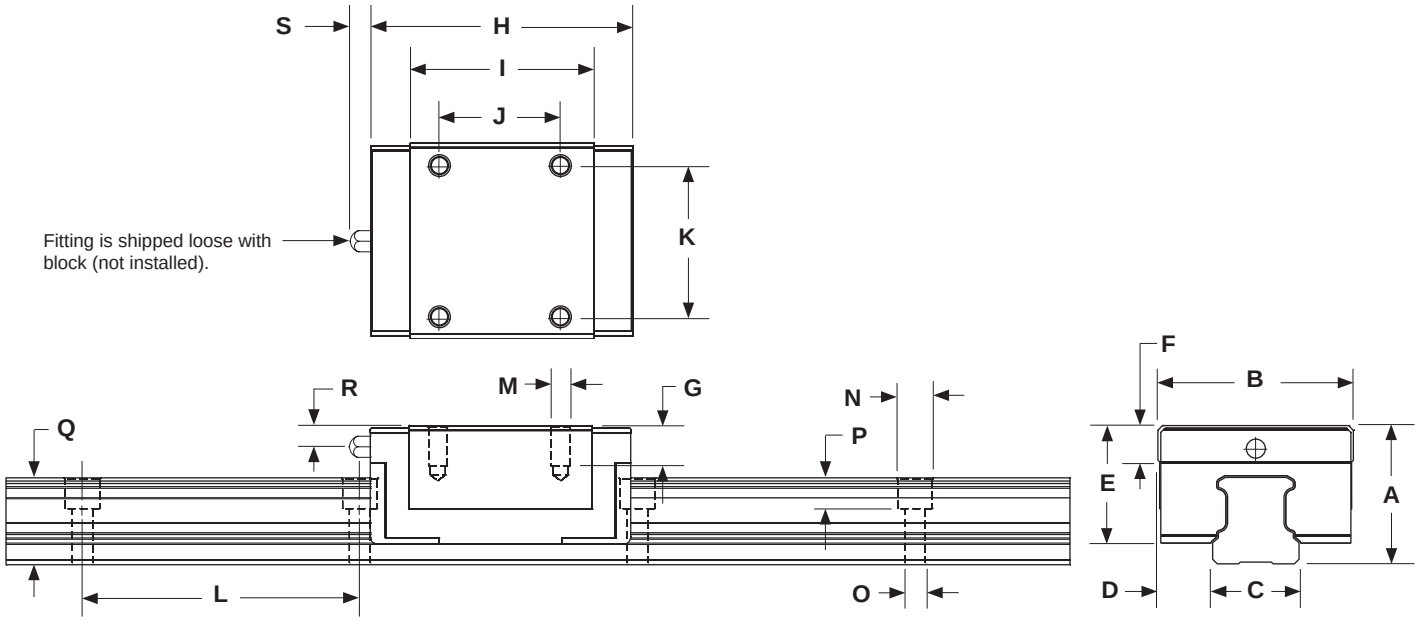


End Hole
xx - Distance from end (mm)



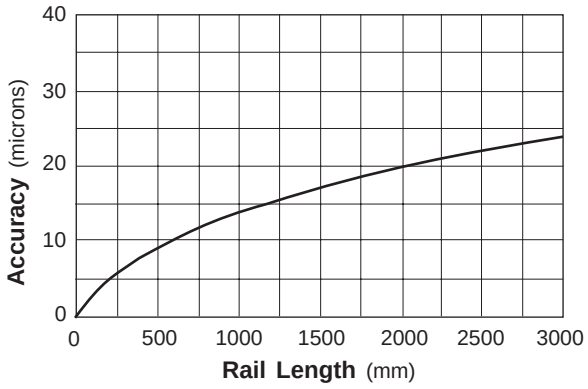
Dimensions & Specifications:

Model Number	Dimensions (mm)															Block Weight	Rail Weight
	A	B	C	D	E	F	M x G	H	I	J	K	L	Q	N x O x P	R	S	(kg)	(kg/m)
AR15	24	34	15	9.5	20.1	6	M4 x 7	56.1	39.5	26	26	60	15	7.5 x 4.5 x 5.3	4	10	0.140	1.290

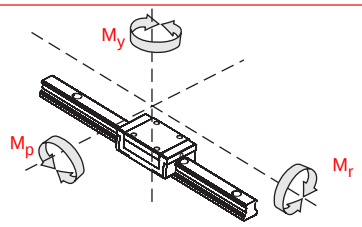


Other	For Block or Rail
Height Tolerance	+/- 40 microns
Width Tolerance	+/- 20 microns
Block Clearance	- 4 to - 10 microns
Block Style	Seals, both ends and bottom
Block and Rail Material	Alloy Steel
Max. Speed & Acceleration	3 m/s & 25 m/s^2, 5 m/s & 30 m/s^2 (SL option)
Friction Coefficient	< 0.003
Seal Drag	< 2.0 N
Operation Temperature	- 40 to + 80 degrees C
Maximum Rail Length	3000 mm (longer lengths available with butt joints)

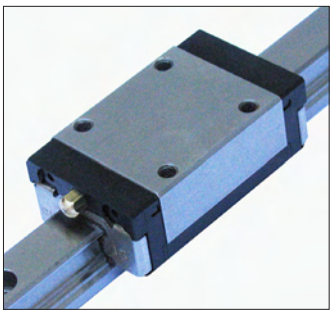
Accuracy of Running Parallelism



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)
AR15	11.34	17.50	140	100



Note: 1 kN = 102 kg or 225 lbs



* Heavy Load Rail
* 4 rows of re-circulating balls
* Equal loading in all directions
* Dust proof design
* Alloy steel bearing, rail, and balls
* Self lube reservoir *optional*

HR 25 M N S V1 - 2 - 1260 - 30 - 30

Series Type
HR - Heavy profile rail

Profile Size
25 - 25 mm size

Rail Width
M - Standard Style

Block Length
N - Standard Style

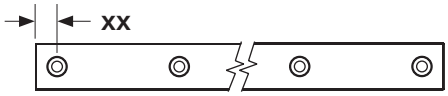
Block Type
S - Seals, both ends
SL - Seals with reinforcing plates, both ends with self lube

Block Clearance
V1 - Light Preload

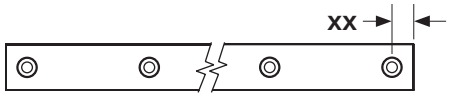
Number of Blocks
2 - Number of blocks on each rail

Rail Length
xxxx - Overall rail length (mm)

Start Hole
xx - Distance from end (mm)

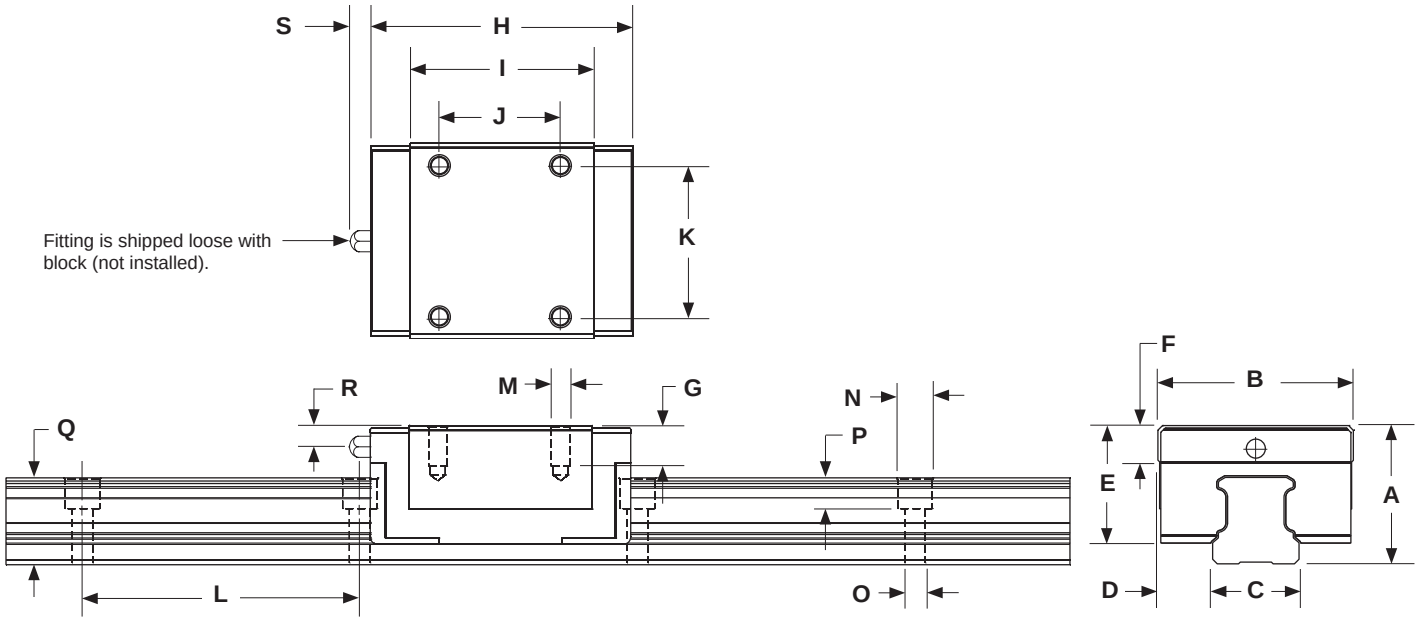


End Hole
xx - Distance from end (mm)



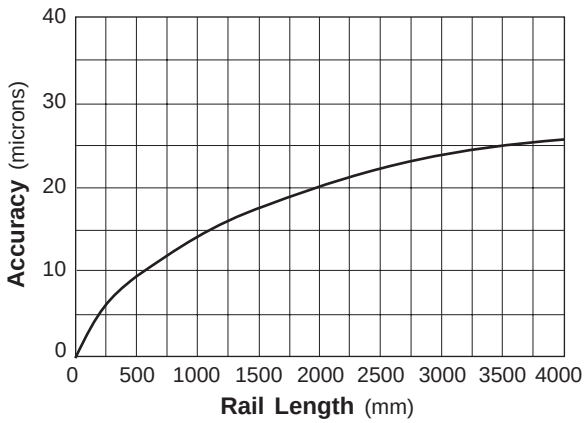
Dimensions & Specifications:

Model Number	Dimensions (mm)																Block Weight	Rail Weight
	A	B	C	D	E	F	M x G	H	I	J	K	L	Q	N x O x P	R	S	(kg)	(kg/m)
HR25	40	48	23	12.5	33.6	8	M6 x 9	80.2	60.0	35	35	60	24	11 x 7 x 9	12	12	0.530	3.020

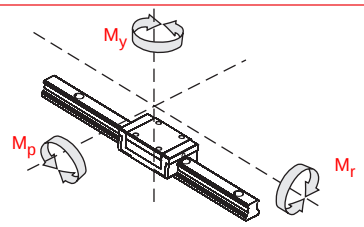


Other	For Block or Rail
Height Tolerance	+/- 40 microns
Width Tolerance	+/- 20 microns
Block Clearance	- 4 to - 10 microns
Block Style	Seals, both ends and bottom
Block and Rail Material	Alloy Steel
Max. Speed & Acceleration	3 m/s & 25 m/s^2, 5 m/s & 30 m/s^2 (SL option)
Friction Coefficient	< 0.003
Seal Drag	< 2.0 N
Operation Temperature	- 40 to + 80 degrees C
Maximum Rail Length	4000 mm (longer lengths available with butt joints)

Accuracy of Running Parallelism



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)
HR25	23.68	36.40	410	300



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

Reference : *Handbook of Tables for Applied Engineering Science*

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 LINTECH 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:

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

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 LINTECH 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. LINTECH shall not be held liable under any circumstance. All products are shipped F.O.B. Monrovia, CA. LINTECH packages all standard and custom products carefully. However, LINTECH 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. LINTECH 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 LINTECH 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

LINTECH requires a minimum of $30 List Price U.S. currency on all orders.

Warranty

All LINTECH 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 LINTECH. LINTECH 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 LINTECH (motors, gearheads, encoders, amplifiers, etc....), are subject to the manufacturers standard warranty terms and conditions.

Returns

Any product requiring a return to LINTECH (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. LINTECH will not accept return shipments sent freight collect. Product damage incurred during return shipment, from poor packaging, will not be warranted by LINTECH. Keeping original packing materials is recommended until initial inspection and testing is completed.

Dimensions and Product Changes

Published dimensions shown in LINTECH catalogs are known to be accurate at time of printing. LINTECH shall not be held liable, under any circumstances, for any wrongly documented dimension or specification. Changes in design are made whenever LINTECH 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, LINTECH may dispose of materials used in the manufacture of cancelled order as it sees fit.

Mechanical Motion Solutions

For over 39 years, LINTECH® has designed and manufactured numerous standard and custom mechanical motion control products that are used in a wide range of applications and markets. This document highlights cut to length round rail precision shafting, round rail linear bearings (with or without pillow blocks), steel & aluminum shaft supports, shaft assemblies (single & TWINRAIL®), TWINRAIL® carriage assemblies, profile rail linear bearings, rolled & ground ball screw assemblies, acme & ball screw driven actuators, belt driven slides, worm gear driven rotary tables, and a wide range of custom positioning assemblies.

LINTECH®

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

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

YOUR LOCAL AUTOMATION SPECIALIST: