



# ROTARY LINEAR BEARINGS



## SPECIAL BEARING DESIGN SERVICE

Since 1926, Brauer has been providing industry with the finest engineered products, expert technical support, on time deliveries and unparalleled customer service. Our brands are now recognised world-wide as products of the highest quality, and the breadth of our product portfolio provides our demanding customers with a tooling solution for a wide variety of problems.

Brauer has been designing and manufacturing rotary linear bearings since the 1950's and has gained a wealth of experience understanding the demands unique to combined rotary linear motion applications.

Our team of highly talented engineers is backed by the latest computer aided design facilities including three dimensional feature based parametric solid modelling. Manufacturing is carried out in our modern, well equipped factories accredited with ISO 9001 certification and situated in the U.K.

At Brauer, we continue to be motivated by working with our customers in providing innovative solutions for their particular requirements. These working partnerships, built by many years of unparalleled customer service, will ensure that Brauer branded tooling, automation and metrology products, will remain at the forefront of their markets.

To view the complete tooling portfolio manufactured by the Brauer companies, please consult our web site at [www.brauer.co.uk](http://www.brauer.co.uk).

### SPECIAL BEARINGS

Brauer can develop one off prototype bearings and/or manufacture medium and high volumes of product to suit customer needs.

If, after considering our standard range of product, you are unable to find a solution to suit your particular application, then please consult our design application engineers who will be only too pleased to consider the design and manufacture of a **bespoke** specially designed item to meet your particular requirements.

### MATERIALS

Bearings can be manufactured from standard bearing steel, stainless steel or with special coatings for high load and corrosive atmospheres. Bearings can be fitted with either ball cages, bronze liners, or speciality composite liners.

### BALL CAGES

Ball cages can be designed to fit existing shaft and housings and can be developed for higher load applications within the same design envelope.

### SHAFTS AND HOUSING

Special shafts and housings can be supplied specifically to match the demands of the application.

### WHEELS, AXLE BRACKETS AND AXLE ASSEMBLIES

In addition to the above bearing products, Brauer also manufactures a comprehensive range of heavy duty wheels, both steel and polyurethane tyred, axle brackets and bracket/axle assemblies. Technical details can be found in our specialist catalogue.

### CAD

Drawings are produced using 3D Mechanical Desktop and Autocad 2000 and our design team can accept CAD data in a wide range of formats.

*For further details contact*

# BRAUER<sup>®</sup>

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# Standard Rotolin MCR, MR, MS & ML Series Bearings

## Technical Information

### Construction

The outer sleeves are precision ground, high carbon chromium steel BS970: Part 1 1991 535 A99 or equivalent. Balls of the same material are accurate to .00025mm.

### Ball Retaining Cages

The cages are made of yellow brass and aluminium. Ball quantity depends on design load capacity within a given cross section.

### Oil Seal

Rotolin bearings are fitted with nitrile oil seals, where applicable, which are moulded from quality synthetic rubber. The seals effectively close both ends of the bearings, serving the dual purpose of retaining the lubricant and protecting the working surface against abrasive grit, moisture and other foreign matter.

### Preloading

Preloading is a condition in which the balls are slightly compressed, causing pressure to be exerted between the bearing sleeve and the shaft. This condition is, in effect a "press fit" although the balls can rotate about their own axes, according to the movement of the cage.

The relative longitudinal travel of the shaft is twice that of the ball cage because the balls travel an equal distance on the working surfaces of both the bearing sleeve and the shaft.

### Spindles and Shafts

Shafts are made from "50" Carbon steel (070 M55), Induction hardened to a minimum of 60 HRC with a 1.5mm (.060") to 2.5mm (.100") depth of case according to the diameter of the shaft and the magnitude of loading. The shaft should be precision ground, round and parallel, within the recommended limits to provide the correct preload, with a surface finish not exceeding .25µm (10 micro inches).

### Lubrication and Temperature Requirements

All bearings are supplied in rust preventative oil and should be cleaned and lubricated before use.

Good quality medium oils and light ball bearing greases have the advantage of greater surface cohesion. High grade light oil will allow a higher operating speed and greater sensitivity to movement.

Working temperatures under maximum load conditions should not exceed 120°C although the bearings can operate safely at slightly higher temperatures and under decreased load conditions, with special lubricants.

For continuous high temperature operation, suitable grades of lithium grease should be used.

### Bearing Life

The "basic capacity" shown is the load at which 90% of the bearings will complete or exceed one million revolutions, when tested under identical conditions, before the first perceptible sign of fatigue appears. It is generally accepted that the life expectancy is always a function of the load and this is inversely proportional to the cube of the basic capacity for bearings. Thus, the operation of a bearing at one half its rated basic capacity will increase to eight million revolutions, and at one quarter of its rated load, to sixty-four million revolutions.

### Static Capacity

This is defined as that static radial load which corresponds to the combined permanent deformation of ball and sleeve at the most heavily stressed contact of .0001 of the ball diameter.

**ROTOLIN**

# Type MCR Ball Retaining Cages

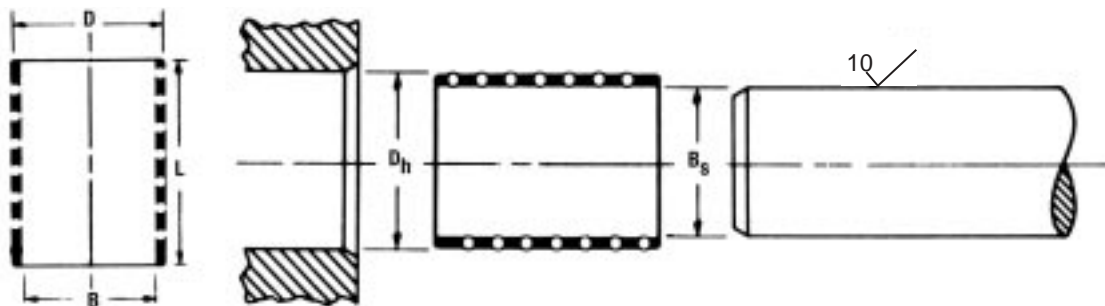


In applications where the design requires only a ball cage assembly, the MCR cages are recommended. Standard materials are brass and aluminium. Balls are manufactured from 535 A99 steel. Shaft and housing should be hardened to at least 60 HRC and ground to at least 0.25µm. It is therefore important that the dimensions for the shaft ( $B_s$ ) and for the housing ( $D_h$ ) be followed so the function of the entire bearing will be equal to that of the standard Rotolin Bearings.

### Special Retaining Cages

We are equipped to meet your requirements for special retainer cages in any size, any material, any configuration. Please call or write to us if you have a requirement which our standard cages do not fulfill.

If a shaft or housing is required please contact us to discuss your needs.



## DIMENSIONS AND SPECIFICATIONS *(Dimensions in inches)*

Bearing Ref	B		D		L	Shaft Dia. $B_s$	Housing $D_h$	Preload Interference Fit ‡		Static Capacity lbf	
	Min	Max	Min	Max				Min	Max		
△MCR 500-687	.500	<sup>+0.012</sup> <sub>-.015</sub>	.687	<sup>+0.010</sup> <sub>-.015</sub>	.468	.5000	.6875	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	230
△MCR 625-812	.625	<sup>+0.012</sup> <sub>-.015</sub>	.812	<sup>+0.010</sup> <sub>-.015</sub>	.656	.6250	.8125	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	352
MCR 750-937	.750	<sup>+0.012</sup> <sub>-.015</sub>	.937	<sup>+0.010</sup> <sub>-.015</sub>	.843	.7500	.9375	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	440
MCR 875-1125	.875	<sup>+0.022</sup> <sub>-.025</sub>	1.125	<sup>+0.020</sup> <sub>-.025</sub>	1.031	.8750	1.1250	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	562
MCR 1000-1250	1.000	<sup>+0.022</sup> <sub>-.025</sub>	1.250	<sup>+0.020</sup> <sub>-.025</sub>	1.281	1.0000	1.2500	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	688
MCR 1125-1375	1.125	<sup>+0.022</sup> <sub>-.025</sub>	1.375	<sup>+0.020</sup> <sub>-.025</sub>	1.531	1.1250	1.3750	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	814
MCR 1250-1500	1.250	<sup>+0.022</sup> <sub>-.025</sub>	1.500	<sup>+0.020</sup> <sub>-.025</sub>	1.781	1.2500	1.5000	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	967
MCR 1500-1750	1.500	<sup>+0.022</sup> <sub>-.025</sub>	1.750	<sup>+0.020</sup> <sub>-.025</sub>	2.000	1.5000	1.7500	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	1147
MCR 1750-2125	1.750	<sup>+0.032</sup> <sub>-.035</sub>	2.125	<sup>+0.030</sup> <sub>-.035</sub>	2.375	1.7500	2.1250	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	2185
MCR 2000-2375	2.000	<sup>+0.032</sup> <sub>-.035</sub>	2.375	<sup>+0.030</sup> <sub>-.035</sub>	2.687	2.0000	2.3750	<sup>+0.0003</sup> <sub>-.0005</sub>	.0001	.0005	2490

‡ Between Shaft, Balls and Outer Sleeve I.D.

△ Available in brass only.



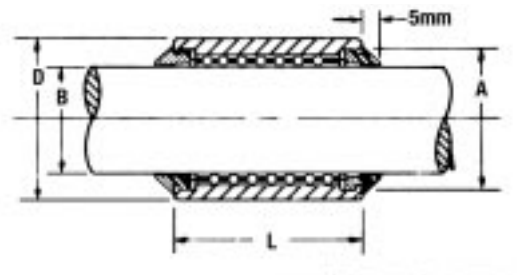


## Type MR

### PRELOADED GENERAL PURPOSE BEARINGS FOR ROTARY MOTION ONLY



Rotolin "MR" Series ball bearings are designed and manufactured for those applications where purely radial loads must be supported in a PRELOADED condition. They are ideally adapted to those applications where the necessary clearance in needle and roller bearings is not desirable. "MR" type bearings are fitted with nitrile rubber wiper seals. The retainer is held between two flat retaining rings which also back up the seals.



#### DIMENSIONS AND SPECIFICATIONS

##### METRIC RANGE (Dimensions in mm)

Bearing Ref Δ	B Shaft Dia	D Bearing O.D.	L <sup>+0.00</sup> <sub>-0.13</sub>
MR 16 - 28	16	28	29.00
MR 20 - 32	20	32	34.00
MR 25 - 39	25	39	38.00
MR 32 - 46	32	46	49.00
MR 40 - 55	40	55	57.00
MR 50 - 70	50	70	72.00

##### INCH RANGE (Dimensions in inches)

Bearing Ref Δ	B Shaft Dia	D Bearing O.D.	L <sup>+0.000</sup> <sub>-0.005</sub>
MR 500 - 875	.5000	.8750	.937
MR 625 - 1000	.6250	1.0000	1.125
MR 750 - 1250	.7500	1.2500	1.312
MR 875 - 1500	.8750	1.5000	1.500
MR 1000 - 1625	1.0000	1.6250	1.750
MR 1125 - 1750	1.1250	1.7500	2.000
MR 1250 - 1875	1.2500	1.8750	2.250
MR 1500 - 2125	1.5000	2.1250	2.500
MR 1750 - 2625	1.7500	2.6250	2.875
MR 2000 - 2875	2.0000	2.8750	3.187

Δ Bearing reference indicates bearing type, shaft diameter, outside diameter.

‡ Between Shaft, Balls and Outer Sleeve I.D.

Larger, heavy duty and special types are available. Call or write outlining your performance requirements using the form on page 21.

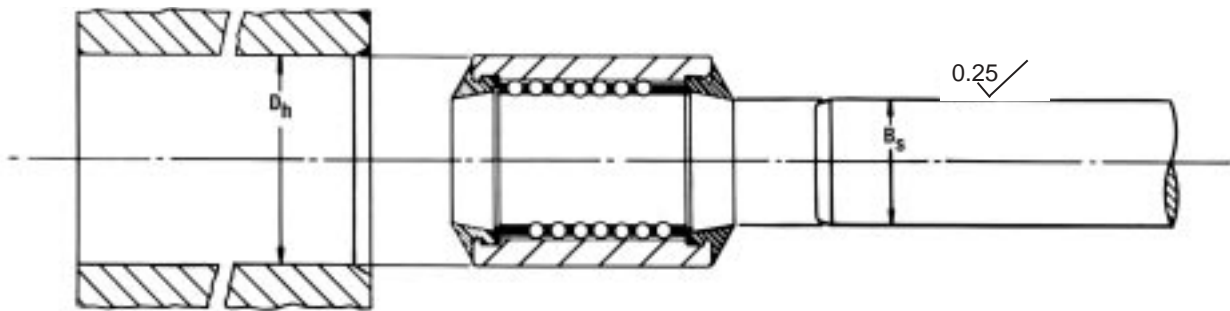
\*CAUTION: Excessive press fits may affect preload. If in doubt please contact us for alternative mounting methods

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## ENGINEERING DATA

## Type MR

Series "MR" bearings supporting pure radial loads must be used with an interference fit between the balls and the shaft. In such applications, the shaft must be made to the dimensions and tolerances given below. The outer races and balls are of 535 A99 steel. Shafts should be hardened to at least 60 HRC and ground to at least 0.25µm.



### SHAFT AND HOUSING TOLERANCES AND RESULTING FITS

Seal O.D. A	Housing Dh*	Shaft Bs	Preload Interference Fit ±		Eccentricity O.D. to Bore	Maximum R.P.M.	Basic Capacity KN	Static Capacity KN
			Min	Max				
25.40	28.00 +0.007 -0.005	16.00 +0.000 -0.005	.002	.012	.007	13,000	1.50	1.34
29.36	32.00 +0.010 -0.005	20.00 +0.000 -0.005	.002	.012	.010	12,000	1.94	1.91
36.50	39.00 +0.013 -0.005	25.00 +0.000 -0.005	.002	.012	.010	10,000	2.45	2.24
42.85	46.00 +0.013 -0.005	32.00 +0.000 -0.005	.002	.012	.010	8,000	3.63	4.18
51.81	55.00 +0.013 -0.005	40.00 +0.000 -0.005	.002	.012	.010	7,000	4.41	5.37
63.50	70.00 +0.013 -0.005	50.00 +0.000 -0.005	.002	.012	.010	5,000	6.91	9.34

Seal O.D. A	Housing Dh*	Shaft Bs	Preload Interference Fit ±		Eccentricity O.D. to Bore	Maximum R.P.M.	Basic Capacity lbf	Static Capacity lbf
			Min	Max				
.875	.8750 +0.0003 -0.0002	.5000 +0.0000 -0.0002	.0001	.0005	.0003	14,000	230	158
1.000	1.0000 +0.0003 -0.0002	.6250 +0.0000 -0.0002	.0001	.0005	.0003	13,000	352	302
1.125	1.2500 +0.0004 -0.0002	.7500 +0.0000 -0.0002	.0001	.0005	.0004	12,000	440	430
1.312	1.5000 +0.0004 -0.0002	.8750 +0.0000 -0.0002	.0001	.0005	.0004	11,000	562	503
1.437	1.6250 +0.0004 -0.0002	1.0000 +0.0000 -0.0002	.0001	.0005	.0004	10,000	688	692
1.562	1.7500 +0.0004 -0.0002	1.1250 +0.0000 -0.0002	.0001	.0005	.0004	9,000	814	907
1.687	1.8750 +0.0005 -0.0002	1.2500 +0.0000 -0.0002	.0001	.0005	.0004	8,000	967	1195
1.937	2.1250 +0.0005 -0.0002	1.5000 +0.0000 -0.0002	.0001	.0005	.0004	7,000	1147	1612
2.312	2.6250 +0.0005 -0.0002	1.7500 +0.0000 -0.0002	.0001	.0005	.0004	6,000	2185	2978
2.562	2.8750 +0.0005 -0.0002	2.0000 +0.0000 -0.0002	.0001	.0005	.0004	5,000	2490	3733

### Lubrication and Temperature Requirements

All bearings are supplied in rust preventative oil and should be cleaned and lubricated before use. Good quality medium oils and light ball bearing greases have the advantage of greater surface cohesion. High grade light oil will allow a higher operating speed and greater sensitivity to movement. Working temperatures under maximum load conditions should not exceed 120°C although the bearings can operate safely at slightly higher temperatures and under decreased load conditions, with special lubricants. For continuous high temperature operation, suitable grades of silicone grease should be used.

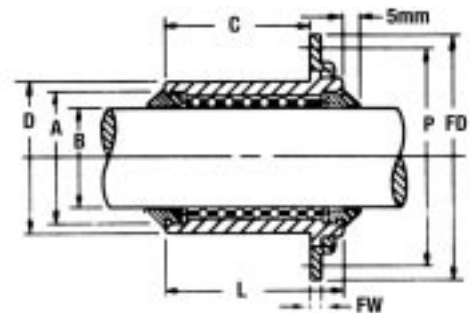
**NOTE:** Use Nomogram on page 31 for all load life calculations.



## Type MRF FLANGED PRELOADED GENERAL PURPOSE BEARINGS FOR ROTARY MOTION ONLY



Rotolin "MRF" Series ball bearings are designed and manufactured for those applications where purely radial loads must be supported in a PRELOADED condition. They are ideally adapted to those applications where the necessary clearance in needle and roller bearings is not acceptable. "MRF" type bearings are fitted with nitrile rubber wiper seals. The retainer is held between two flat retaining rings which also back up the seals.



### DIMENSIONS AND SPECIFICATIONS

#### METRIC RANGE (Dimensions in mm)

Bearing Ref Δ	B Shaft Dia	D Bearing O.D.	L <sup>+0.00</sup> <sub>-.13</sub>	C	Seal O.D. A	FW
MRF 16 - 28	16	28	29.00	21	25.4	1.63
MRF 20 - 32	20	32	34.00	24	29.36	1.63
MRF 25 - 39	25	39	38.00	26	36.50	1.63
MRF 32 - 46	32	46	49.00	37	42.85	2.03
MRF 40 - 55	40	55	57.00	43	51.01	2.03
MRF 50 - 70	50	70	72.00	58	63.50	2.03

#### INCH RANGE (Dimensions in inches)

Bearing Ref Δ	B Shaft Dia	D Bearing O.D.	L <sup>+0.000</sup> <sub>-.005</sub>	C	Seal O.D. A	FW
MRF 500 - 875	.5000	.8750	.937	.718	.875	.048
MRF 625 - 1000	.6250	1.0000	1.125	.812	1.000	.064
MRF 750 - 1250	.7500	1.2500	1.312	.937	1.125	.064
MRF 875 - 1500	.8750	1.5000	1.500	1.062	1.312	.064
MRF 1000 - 1625	1.0000	1.6250	1.750	1.312	1.437	.064
MRF 1125 - 1750	1.1250	1.7500	2.000	1.562	1.562	.064
MRF 1250 - 1875	1.2500	1.8750	2.250	1.812	1.687	.064
MRF 1500 - 2125	1.5000	2.1250	2.500	1.937	1.937	.080
MRF 1750 - 2625	1.7500	2.6250	2.875	2.312	2.312	.080
MRF 2000 - 2875	2.0000	2.8750	3.187	2.625	2.562	.080

Δ Bearing reference indicates bearing type, shaft diameter, outside diameter.

‡ Between Shaft, Balls and Outer Sleeve I.D.

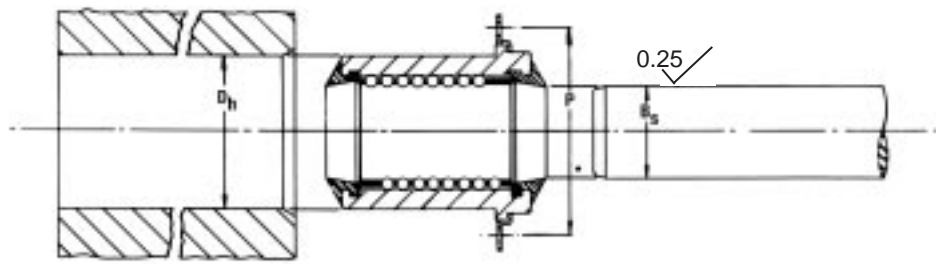
Larger, heavy duty and special types are available. Call or write outlining your performance requirements using the form on page 21.



## ENGINEERING DATA

## Type MRF

Series "MRF" bearings supporting pure radial loads must be used with an interference fit between the balls and the shaft. In such applications, the shaft must be made to the dimensions and tolerances given below. The outer races and balls are of 535 A99 steel. Shafts should be hardened to at least 60 HRC and ground to at least 0.25µm.



### SHAFT AND HOUSING TOLERANCES AND RESULTING FITS

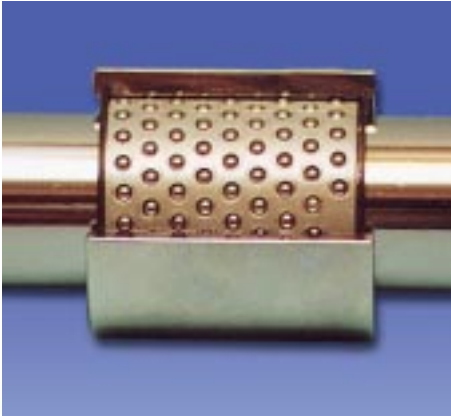
FD	Housing		Shaft		Preload Interference Fit ‡		P	Size Cap Screw	Eccentricity O.D. to Bore	Maximum R.P.M.	Basic Capacity KN	Static Capacity KN
	Dh*		Bs		Min	Max						
55.56	28.00	+0.007 -0.005	16.00	+0.000 -0.005	.002	.012	46	5mm 3-OFF	.007	13,000	1.57	1.34
60.32	32.00	+0.010 -0.005	20.00	+0.000 -0.005	.002	.012	51	5mm 3-OFF	.010	12,000	1.94	1.91
64.30	39.00	+0.013 -0.005	25.00	+0.000 -0.005	.002	.012	55	5mm 3-OFF	.010	10,000	2.45	2.24
73.02	46.00	+0.013 -0.005	32.00	+0.000 -0.005	.002	.012	64	5mm 3-OFF	.010	8,000	3.63	4.18
87.31	55.00	+0.013 -0.005	40.00	+0.000 -0.005	.002	.012	75	5mm 3-OFF	.010	7,000	4.41	5.37
104.00	70.00	+0.013 -0.005	50.00	+0.000 -0.005	.002	.012	95	5mm 4-OFF	.010	5,000	6.91	9.34

FD	Housing		Shaft		Preload Interference Fit ‡		P	Size Cap Screw	Eccentricity O.D. to Bore	Maximum R.P.M.	Basic Capacity lbf	Static Capacity lbf
	Dh*		Bs		Min	Max						
1.812	.875	+0.0003 -0.0002	.5000	+0.0000 -0.0002	.0001	.0005	1.500	3 BA 3-OFF	.0003	14,000	230	158
2.187	1.0000	+0.0003 -0.0002	.6250	+0.0000 -0.0002	.0001	.0005	1.812	2 BA 3-OFF	.0003	13,000	352	302
2.375	1.2500	+0.0004 -0.0002	.7500	+0.0000 -0.0002	.0001	.0005	2.000	2 BA 3-OFF	.0004	12,000	440	430
2.531	1.5000	+0.0004 -0.0002	.8750	+0.0000 -0.0002	.0001	.0005	2.187	2 BA 3-OFF	.0004	11,000	562	503
2.687	1.6250	+0.0004 -0.0002	1.0000	+0.0000 -0.0002	.0001	.0005	2.312	2 BA 3-OFF	.0004	10,000	688	692
2.875	1.7500	+0.0004 -0.0002	1.1250	+0.0000 -0.0002	.0001	.0005	2.531	2 BA 3-OFF	.0004	9,000	814	907
3.000	1.8750	+0.0005 -0.0002	1.2500	+0.0000 -0.0002	.0001	.0005	2.656	2 BA 3-OFF	.0004	8,000	967	1195
3.437	2.1250	+0.0005 -0.0002	1.5000	+0.0000 -0.0002	.0001	.0005	2.968	2 BA 3-OFF	.0004	7,000	1147	1612
3.937	2.6250	+0.0005 -0.0002	1.7500	+0.0000 -0.0002	.0001	.0005	3.468	2 BA 4-OFF	.0004	6,000	2185	2978
4.093	2.8750	+0.0005 -0.0002	2.0000	+0.0000 -0.0002	.0001	.0005	3.178	2 BA 4-OFF	.0004	5,000	2490	3733

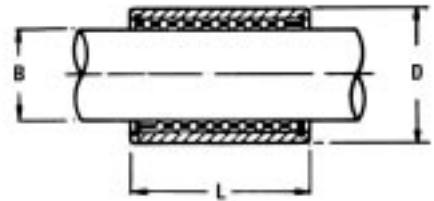


## Type MS

## SLIDING AND ROTARY MOTION BALL BUSHES



Rotolin sliding ball bushes are designed to allow unrestricted length of linear travel and consequently, are not suitable for preloading. They are capable of both sliding and rotary motions and provide a sensitive fit, superior to any plain bushings. Sliding ball bushes are eminently satisfactory for a wide variety of purposes not requiring preloading, and particularly suitable for light loading and vertical applications. Being virtually friction-free in operation, they permit high speed performance with freedom from lubrication troubles or risk of seizure.



### DIMENSIONS AND SPECIFICATIONS

#### METRIC RANGE (Dimensions in mm)

Bearing Ref Δ	B Shaft Dia	D Bearing O.D.	L <sup>+0.00</sup> <sub>-0.13</sub>
MS 16 - 28	16	28	22.00
MS 20 - 32	20	32	26.00
MS 25 - 39	25	39	32.00
MS 32 - 46	32	46	42.00
MS 40 - 55	40	55	50.00
MS 50 - 70	50	70	64.00

#### INCH RANGE (Dimensions in inches)

Bearing Ref Δ	B Shaft Dia	D Bearing O.D.	L <sup>+0.000</sup> <sub>-0.005</sub>
MS 500 - 875	0.5000	0.8750	0.625
MS 625 - 1000	0.6250	1.0000	0.812
MS 750 - 1250	0.7500	1.2500	1.000
MS 875 - 1500	0.8750	1.5000	1.250
MS 1000 - 1625	1.0000	1.6250	1.500
MS 1125 - 1750	1.1250	1.7500	1.750
MS 1250 - 1875	1.2500	1.8750	2.000
MS 1500 - 2125	1.5000	2.1250	2.250
MS 1750 - 2625	1.7500	2.6250	2.625
MS 2000 - 2875	2.0000	2.8750	3.000

Δ Bearing reference indicates bearing type, shaft diameter, outside diameter.

‡ Between Shaft, Balls and Outer Sleeve I.D.

Larger, heavy duty and special types are available. Call or write outlining your performance requirements using the form on page 21.

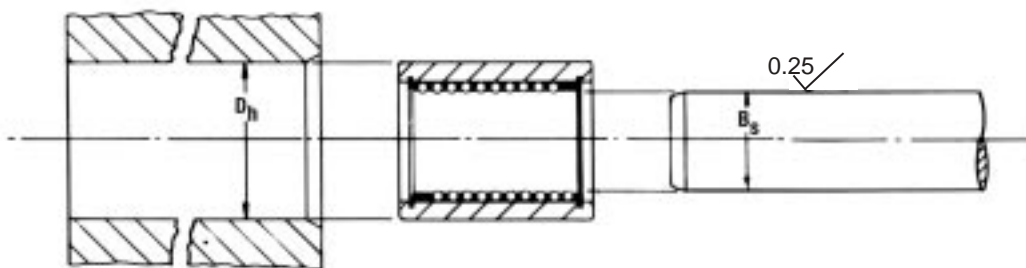
\*CAUTION: Excessive press fits may affect preload. If in doubt please contact us for alternative mounting methods

**ROTOLIN**

## ENGINEERING DATA

## Type MS

Series "MS" bearings must be used with a clearance fit between the balls and the shaft. The housing and shaft tolerances stated must therefore be strictly adhered to in order to prevent excessive closing in of the bearing sleeve on assembly. The outer race and balls are of 535 A99 steel. Shafts should be hardened to at least 60 HRC and ground to at least 0.25µm.



### SHAFT AND HOUSING TOLERANCES AND RESULTING FITS

Housing Dh*	Shaft Bs	Clearance Fit ±		Static Capacity KN
		Min	Max	
28.00	16.00	.002	.012	1.34
32.00	20.00	.005	.015	1.91
39.00	25.00	.005	.015	2.24
46.00	32.00	.008	.018	4.18
55.00	40.00	.008	.018	5.37
70.00	50.00	.008	.018	9.34

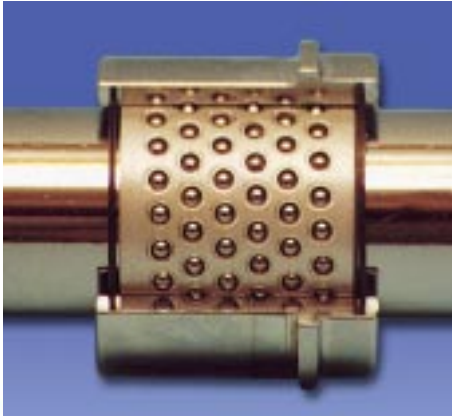
Housing Dh*	Shaft Bs	Clearance Fit ±		Static Capacity lbf
		Min	Max	
0.8750	0.5000	.0001	.0005	158
1.0000	0.6250	.0001	.0005	302
1.2500	0.7500	.0002	.0006	430
1.5000	0.8750	.0002	.0006	503
1.6250	1.0000	.0002	.0006	692
1.7500	1.1250	.0002	.0006	907
1.8750	1.2500	.0003	.0007	1195
2.1250	1.5000	.0003	.0007	1612
2.6250	1.7500	.0003	.0007	2978
2.8750	2.0000	.0003	.0007	3733



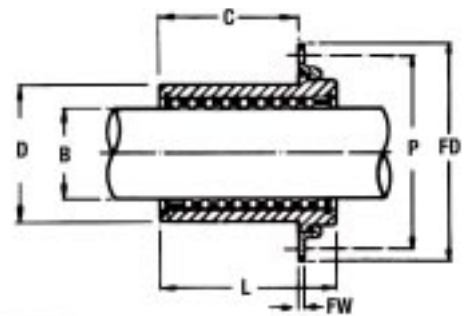


## Type MSF

## SLIDING AND ROTARY MOTION BALL BUSHES



Flanged types of Rotolin sliding ball bushes are made a "push fit" into bored holes of correct diameter. This avoids any possible closing-in of the outer sleeve which could result in preloading and impair the ultra-smooth working action, it also serves to facilitate installation in their operating stations. These ball bushes are capable of providing first class, sliding fit on precision shafts without restriction on the length of travel, they are extensively employed for their adaptability, reliability and general efficiency in service.



### DIMENSIONS AND SPECIFICATIONS

#### METRIC RANGE (Dimensions in mm)

Bearing Ref $\Delta$	B Shaft Dia	D Bearing O.D.	L <sup>+0.000</sup> <sub>-0.13</sub>	C	FW	FD
MSF 16 - 28	16	28	22.00	14	1.63	56
MSF 20 - 32	20	32	26.00	16	1.63	60
MSF 25 - 39	25	39	32.00	20	1.63	64
MSF 32 - 46	32	46	42.00	30	2.03	73
MSF 40 - 55	40	55	50.00	36	2.03	87
MSF 50 - 70	50	70	64.00	50	2.03	104

#### INCH RANGE (Dimensions in inches)

Bearing Ref $\Delta$	B Shaft Dia	D Bearing O.D.	L <sup>+0.000</sup> <sub>-0.005</sub>	C	FW	FD
MSF 500 - 875	0.5000	0.8750	0.625	0.406	.048	1.812
MSF 625 - 1000	0.6250	1.0000	0.812	0.500	.064	2.187
MSF 750 - 1250	0.7500	1.2500	1.000	0.625	.064	2.375
MSF 875 - 1500	0.8750	1.5000	1.250	0.812	.064	2.531
MSF 1000 - 1625	1.0000	1.6250	1.500	1.062	.064	2.687
MSF 1125 - 1750	1.1250	1.7500	1.750	1.312	.064	2.875
MSF 1250 - 1875	1.2500	1.8750	2.000	1.562	.080	3.000
MSF 1500 - 2125	1.5000	2.1250	2.250	1.687	.080	3.437
MSF 1750 - 2625	1.7500	2.6250	2.625	2.062	.080	3.937
MSF 2000 - 2875	2.0000	2.8750	3.000	2.437	.080	4.093

$\Delta$  Bearing reference indicates bearing type, shaft diameter, outside diameter.

‡ Between Shaft, Balls and Outer Sleeve I.D.

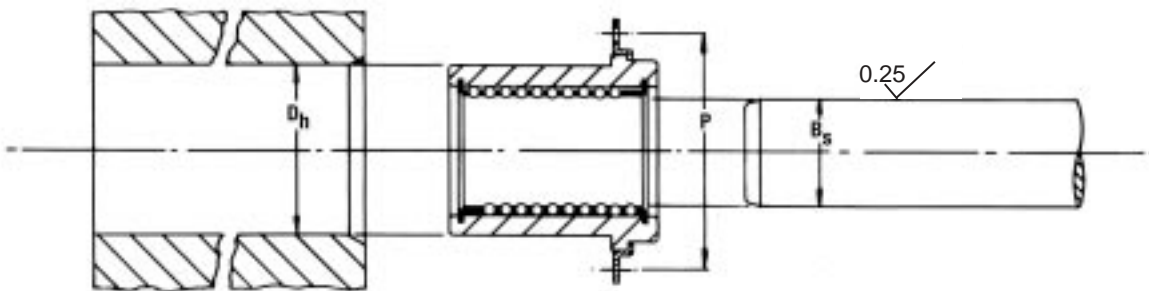
Larger, heavy duty and special types are available. Call or write outlining your performance requirements using the form on page 21.

**ROTOLIN**

## ENGINEERING DATA

## Type MSF

Series "MSF" bearings must be used with a clearance fit between the balls and the shaft. The housing and shaft tolerances stated must therefore be strictly adhered to in order to prevent excessive closing in of the bearing sleeve on assembly. The outer race and balls are of 535 A99 steel. Shafts should be hardened to at least 60 HRC and ground to at least 0.25µm.



### SHAFT AND HOUSING TOLERANCES AND RESULTING FITS

Housing Dh*	Shaft Bs	Clearance Fit ±		P	Size Cap Screw	Static Capacity KN
		Min	Max			
28.00 <sup>+0.007</sup> / <sub>-0.005</sub>	16.00 <sup>+0.000</sup> / <sub>-0.005</sub>	.002	.012	46	5mm 3-OFF	1.34
32.00 <sup>+0.010</sup> / <sub>-0.005</sub>	20.00 <sup>+0.000</sup> / <sub>-0.005</sub>	.002	.012	51	5mm 3-OFF	1.91
39.00 <sup>+0.013</sup> / <sub>-0.005</sub>	25.00 <sup>+0.000</sup> / <sub>-0.005</sub>	.002	.012	55	5mm 3-OFF	2.24
46.00 <sup>+0.013</sup> / <sub>-0.005</sub>	32.00 <sup>+0.000</sup> / <sub>-0.005</sub>	.002	.012	64	5mm 3-OFF	4.18
55.00 <sup>+0.013</sup> / <sub>-0.005</sub>	40.00 <sup>+0.000</sup> / <sub>-0.005</sub>	.002	.012	75	5mm 3-OFF	5.38
70.00 <sup>+0.013</sup> / <sub>-0.005</sub>	50.00 <sup>+0.000</sup> / <sub>-0.005</sub>	.002	.012	95	5mm 4-OFF	9.34

Housing Dh*	Shaft Bs	Clearance Fit ±		P	Size Cap Screw	Static Capacity lbf
		Min	Max			
0.8750 <sup>+0.0003</sup> / <sub>-0.0002</sub>	0.5000 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	1.500	3BA 3-OFF	158
1.0000 <sup>+0.0003</sup> / <sub>-0.0002</sub>	0.6250 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	1.812	2BA 3-OFF	302
1.2500 <sup>+0.0004</sup> / <sub>-0.0002</sub>	0.7500 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	2.000	2BA 3-OFF	430
1.5000 <sup>+0.0004</sup> / <sub>-0.0002</sub>	0.8750 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	2.187	2BA 3-OFF	503
1.6250 <sup>+0.0004</sup> / <sub>-0.0002</sub>	1.0000 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	2.312	2BA 3-OFF	692
1.7500 <sup>+0.0004</sup> / <sub>-0.0002</sub>	1.1250 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	2.531	2BA 3-OFF	907
1.8750 <sup>+0.0005</sup> / <sub>-0.0002</sub>	1.2500 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	2.656	2BA 3-OFF	1195
2.1250 <sup>+0.0005</sup> / <sub>-0.0002</sub>	1.5000 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	2.968	2BA 3-OFF	1612
2.6250 <sup>+0.0005</sup> / <sub>-0.0002</sub>	1.7500 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	3.468	2BA 4-OFF	2978
2.8750 <sup>+0.0005</sup> / <sub>-0.0002</sub>	2.0000 <sup>+0.0000</sup> / <sub>-0.0002</sub>	.0001	.0005	3.718	2BA 4-OFF	3733

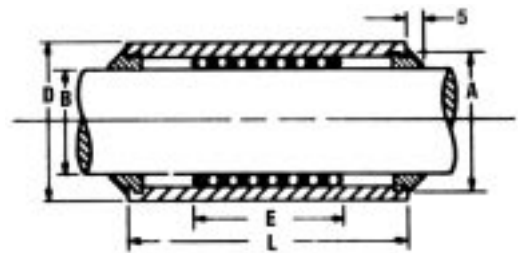


## Type ML

### PRELOADED GENERAL PURPOSE BEARINGS SUPPORTING COMBINATION LINEAR AND ROTARY MOTION



Rotolin "ML" Series ball bearings support rotary and linear relative shaft motions simultaneously and separately. Shaft rigidity and anti-friction freedom is maintained at all times because all the balls are under an intentional preload. All "ML" Series bearings have low-friction moulded nitrile rubber wiper seals.



#### DIMENSIONS AND SPECIFICATIONS

METRIC RANGE (*Dimensions in mm*)

Bearing Ref $\Delta$	B Shaft Dia	D Bearing O.D.	E	L $\begin{smallmatrix} +.00 \\ -.13 \end{smallmatrix}$	Total Linear Travel
ML 16 - 28 - 25	16	28	16	45.00	25
ML 16 - 28 - 50				55.00	50
ML 20 - 32 - 25	20	32	21	50.00	25
ML 20 - 32 - 50				60.00	50
ML 25 - 39 - 25	25	39	25	55.00	25
ML 25 - 39 - 50				65.00	50
ML 25 - 39 - 75				80.00	75
ML 25 - 39 - 100				95.00	100
ML 32 - 46 - 25	32	46	36	65.00	25
ML 32 - 46 - 50				75.00	50
ML 32 - 46 - 75				90.00	75
ML 32 - 46 - 100				105.00	100
ML 32 - 46 - 150				125.00	150
ML 40 - 55 - 25	40	55	43	70.00	25
ML 40 - 55 - 50				85.00	50
ML 40 - 55 - 75				95.00	75
ML 40 - 55 - 100				110.00	100
ML 40 - 55 - 150				135.00	150
ML 50 - 70 - 25	50	70	58.5	85.00	25
ML 50 - 70 - 50				100.00	50
ML 50 - 70 - 75				110.00	75
ML 50 - 70 - 100				125.00	100
ML 50 - 70 - 150				150.00	150

$\Delta$  Bearing reference indicates bearing type, shaft diameter, outside diameter.

$\ddagger$  Between Shaft, Balls and Outer Sleeve I.D.

Larger, heavy duty and special types are available. Call or write outlining your performance requirements using the form on page 21.

\*CAUTION: Excessive press fits may affect preload. In if doubt please contact us for alternative mounting methods

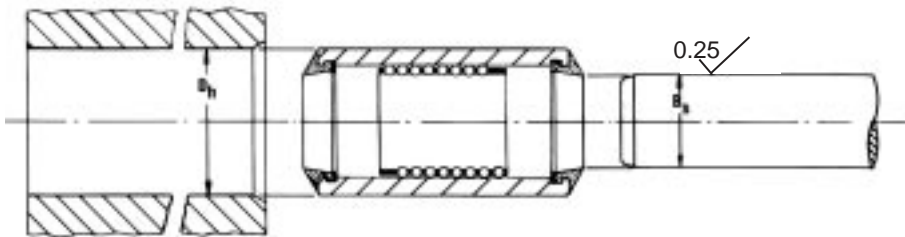
**ROTOLIN**



## ENGINEERING DATA

## Type ML

All Rotolin Series "ML" bearings must be mounted and used with a shaft that produces an interference between the balls and the shaft. This PRELOADS the balls. Shafts should be hardened to at least 60 HRC and be ground to a finish of at least 0.25 $\mu$ m. Assembly of the shaft will require some sliding of the ball cage to locate it in its proper operating position. Balls and outer race are made from carbon chrome bearing steel of 535 A99. Housing and shaft tolerances listed on these two pages will produce the required fit of the housing and interference of the shaft.



### SHAFT AND HOUSING TOLERANCES AND RESULTING FITS

Seal O.D. A	Housing Dh*	Shaft Bs	Preload Min	Interference Max	Fit $\pm$	Eccentricity O.D. to Bore	Maximum R.P.M.	Basic Capacity KN	Static Capacity KN
25.5	28.00 +0.007 -0.005	16.00 +0.000 -0.005	.002	.012	.007	13,000	1.57	1.34	
29.5	32.00 +0.010 -0.005	20.00 +0.000 -0.005	.002	.012	.010	12,000	1.94	1.91	
36.5	39.00 +0.013 -0.005	25.00 +0.000 -0.005	.002	.012	.010	10,000	2.45	2.24	
43	46.00 +0.013 -0.005	32.00 +0.000 -0.005	.002	.012	.010	8,000	3.63	4.18	
52	55.00 +0.013 -0.005	40.00 +0.000 -0.005	.002	.012	.010	7,000	4.41	5.37	
63.5	70.00 +0.013 -0.005	50.00 +0.000 -0.005	.002	.012	.010	5,000	6.91	9.34	

#### Lubrication and Temperature Requirements

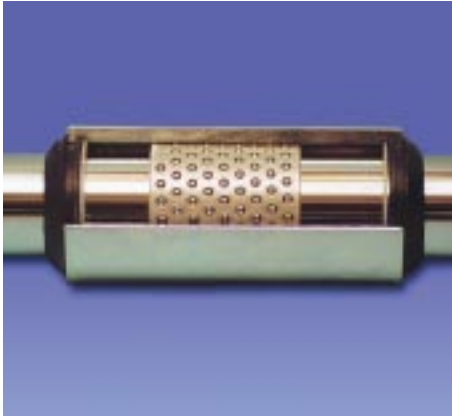
All bearings are supplied in rust preventative oil and should be cleaned and lubricated before use. Good quality medium oils and light ball bearing greases have the advantage of greater surface cohesion. High grade light oil will allow a higher operating speed and greater sensitivity to movement. Working temperatures under maximum load conditions should not exceed 120°C although the bearings can operate safely at slightly higher temperatures and under decreased load conditions, with special lubricants. For continuous high temperature operation, suitable grades of silicone grease should be used.

**NOTE:** Use Nomogram on page 31 for all load life calculations.

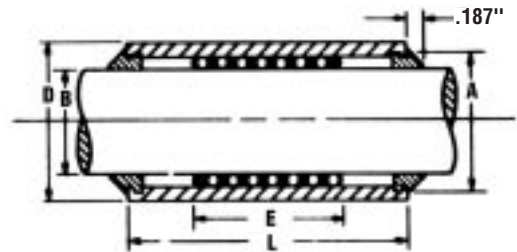


## Type ML

### PRELOADED GENERAL PURPOSE BEARINGS SUPPORTING COMBINATION LINEAR AND ROTARY MOTION



Rotolin "ML" Series ball bearings support rotary and linear relative shaft motions simultaneously and separately. Shaft rigidity and anti-friction freedom is maintained at all times because all the balls are under an intentional preload. All "ML" Series bearings have low-friction moulded nitrile rubber wiper seals.



#### DIMENSIONS AND SPECIFICATIONS

INCH RANGE (Dimensions in inches)

Bearing Ref Δ	B Shaft Dia	D Bearing O.D.	E	L <sup>+0.000</sup> <sub>-0.005</sub>	Total Linear Travel
ML 500 - 875 - 1	.5000	.8750	.500	1.625	1.000
ML 500 - 875 - 2				2.125	2.000
ML 625 - 1000 - 1	.6250	1.0000	.656	1.875	1.000
ML 625 - 1000 - 2				2.375	2.000
ML 750 - 1250 - 1	.7500	1.2500	.843	2.000	1.000
ML 750 - 1250 - 2				2.500	2.000
ML 875 - 1500 - 1	.8750	1.5000	1.031	2.250	1.000
ML 875 - 1500 - 2				2.750	2.000
ML 1000 - 1625 - 1	1.0000	1.6250	1.281	2.500	1.000
ML 1000 - 1625 - 2				3.000	2.000
ML 1000 - 1625 - 3				3.500	3.000
ML 1000 - 1625 - 4				4.000	4.000
ML 1125 - 1750 - 1	1.1250	1.7500	1.531	2.750	1.000
ML 1125 - 1750 - 2				3.250	2.000
ML 1125 - 1750 - 3				3.750	3.000
ML 1125 - 1750 - 4				4.250	4.000
ML 1250 - 1875 - 1	1.2500	1.8750	1.781	3.000	1.000
ML 1250 - 1875 - 2				3.500	2.000
ML 1250 - 1875 - 3				4.000	3.000
ML 1250 - 1875 - 4				4.500	4.000
ML 1250 - 1875 - 6				5.500	6.000
ML 1500 - 2125 - 1				1.5000	2.1250
ML 1500 - 2125 - 2	3.750	2.000			
ML 1500 - 2125 - 3	4.250	3.000			
ML 1500 - 2125 - 4	4.750	4.000			
ML 1500 - 2125 - 6	5.750	6.000			
ML 1750 - 2625 - 1	1.7500	2.6250	2.375		
ML 1750 - 2625 - 2				4.125	2.000
ML 1750 - 2625 - 3				4.625	3.000
ML 1750 - 2625 - 4				5.125	4.000
ML 1750 - 2625 - 6				6.125	6.000
ML 2000 - 2875 - 1				2.0000	2.8750
ML 2000 - 2875 - 2	4.500	2.000			
ML 2000 - 2875 - 3	5.000	3.000			
ML 2000 - 2875 - 4	5.500	4.000			
ML 2000 - 2875 - 6	6.500	6.000			



**ROTOLIN**

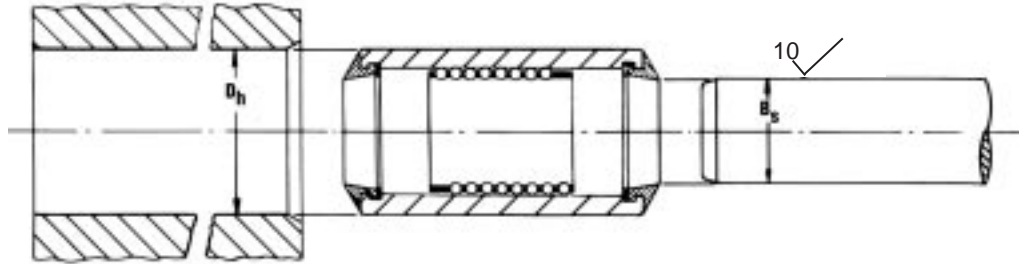
Δ Bearing reference indicates bearing type, shaft diameter, outside diameter.

Larger, heavy duty and special types are available.  
Call or write outlining your performance requirements using the form on page 21.

## ENGINEERING DATA

## Type ML

All Rotolin Series "ML" bearings must be mounted and used with a shaft that produces an interference between the balls and the shaft. This PRELOADS the balls. Shafts should be hardened to at least 60 HRC and be ground to a finish of at least 10 micro inches. Assembly of the shaft will require some sliding of the ball cage to locate it in its proper operating position. Balls and outer race are made from carbon chrome bearing steel of 535 A99. Housing and shaft tolerances listed on these two pages will produce the required fit of the housing and interference of the shaft.



### SHAFT AND HOUSING TOLERANCES AND RESULTING FITS

Seal O.D. A	Housing Dh*	Shaft Bs	Preload Interference Fit ‡	Eccentricity O.D. to Bore	Maximum R.P.M.	Basic Capacity lbf	Static Capacity lbf
			Min	Max			
.875	.8750 $\begin{smallmatrix} +.0003 \\ -.0002 \end{smallmatrix}$	.5000 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0003	14,000	230
1.000	1.0000 $\begin{smallmatrix} +.0003 \\ -.0002 \end{smallmatrix}$	.6250 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0003	13,000	302
1.125	1.2500 $\begin{smallmatrix} +.0004 \\ -.0002 \end{smallmatrix}$	.7500 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0004	12,000	430
1.312	1.5000 $\begin{smallmatrix} +.0004 \\ -.0002 \end{smallmatrix}$	.8750 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0004	11,000	562
1.437	1.6250 $\begin{smallmatrix} +.0004 \\ -.0002 \end{smallmatrix}$	1.0000 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0004	10,000	688
1.562	1.7500 $\begin{smallmatrix} +.0004 \\ -.0002 \end{smallmatrix}$	1.1250 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0004	9,000	814
1.687	1.8750 $\begin{smallmatrix} +.0005 \\ -.0002 \end{smallmatrix}$	1.2500 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0004	8,000	967
1.937	2.1250 $\begin{smallmatrix} +.0005 \\ -.0002 \end{smallmatrix}$	1.5000 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0004	7,000	1147
2.312	2.6250 $\begin{smallmatrix} +.0005 \\ -.0002 \end{smallmatrix}$	1.7500 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0004	6,000	2185
2.562	2.8750 $\begin{smallmatrix} +.0005 \\ -.0002 \end{smallmatrix}$	2.0000 $\begin{smallmatrix} +.0000 \\ -.0002 \end{smallmatrix}$	.0001	.0005	.0004	5,000	2490

‡ Between Shaft, Balls and Outer Sleeve I.D.

\*CAUTION: Excessive press fits may affect preload. If in doubt please contact us for alternative mounting methods

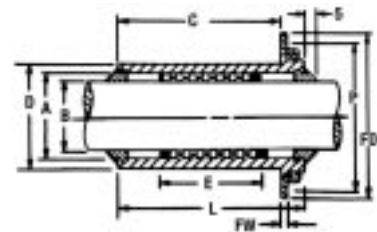




## Type MLF FLANGED PRELOADED GENERAL PURPOSE BEARINGS SUPPORTING COMBINATION LINEAR AND ROTARY MOTION



Rotolin "MLF" Series ball bearings support rotary and linear relative shaft motions simultaneously and separately. Shaft rigidity and anti-friction freedom is maintained at all times because all the balls are under an intentional preload. All "MLF" Series bearings have low-friction moulded nitrile rubber wiper seals. Type "MLF" bearings are furnished with a flange on the O.D. and a locking ring. On **Special** order the flange can be located at any point along the O.D.



### DIMENSIONS AND SPECIFICATIONS

METRIC RANGE (*Dimensions in mm*)

Bearing Ref Δ	B Shaft Dia	D Bearing O.D.	E	L <sup>+0.00</sup> <sub>-0.13</sub>	Total Linear Travel	FD	C	FW
MLF 16 - 28 - 25	16	28	16	45.00	25	55.56	37	1.63
MLF 16 - 28 - 50				55.00	50			
MLF 20 - 32 - 25	20	32	21	50.00	25	60.32	40	1.63
MLF 20 - 32 - 50				60.00	50			
MLF 25 - 39 - 25	25	39	25	55.00	25	64.30	43	1.63
MLF 25 - 39 - 50				65.00	50		53	
MLF 25 - 39 - 75				80.00	75		68	
MLF 25 - 39 - 100				95.00	100		83	
MLF 32 - 46 - 25	32	46	36	65.00	25	73.02	53	2.03
MLF 32 - 46 - 50				75.00	50		63	
MLF 32 - 46 - 75				90.00	75		78	
MLF 32 - 46 - 100				105.00	100		93	
MLF 32 - 46 - 150				125.00	150		113	
MLF 40 - 55 - 25	40	55	43	70.00	25	87.31	55	2.03
MLF 40 - 55 - 50				85.00	50		70	
MLF 40 - 55 - 75				95.00	75		80	
MLF 40 - 55 - 100				110.00	100		95	
MLF 40 - 55 - 150				135.00	150		120	
MLF 50 - 70 - 25	50	70	58.5	85.00	25	104.00	70	2.03
MLF 50 - 70 - 50				100.00	50		85	
MLF 50 - 70 - 75				110.00	75		95	
MLF 50 - 70 - 100				125.00	100		110	
MLF 50 - 70 - 150				150.00	150		135	

Δ Bearing reference indicates bearing type, shaft diameter, outside diameter.

‡ Between Shaft, Balls and Outer Sleeve I.D.

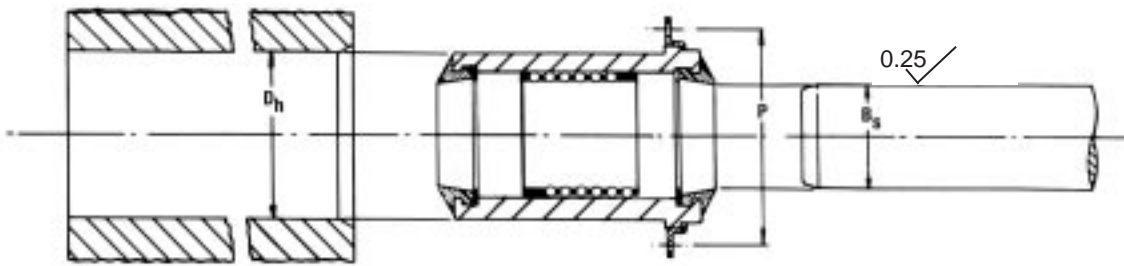
Larger, heavy duty and special types are available. Call or write outlining your performance requirements using the form on page 21.

ROTOLIN

## ENGINEERING DATA

## Type MLF

All Rotolin Series "MLF" bearings must be mounted and used with a shaft that produces an interference between the balls and the shaft. This PRELOADS the balls. Shafts should be hardened to at least 60 HRC and be ground to a finish of at least 0.25 $\mu$ m. Assembly of the shaft will require some sliding of the ball cage to locate it in its proper operating position. Balls and outer race are made from carbon chrome bearing steel of 535 A99. Housing and shaft tolerances listed on these two pages will produce the required fit of the housing and interference of the shaft. These flanged bearings are designed to be a "push fit" into housing ratings of the correct nominal diameter, secured by a locking ring.



### SHAFT AND HOUSING TOLERANCES AND RESULTING FITS

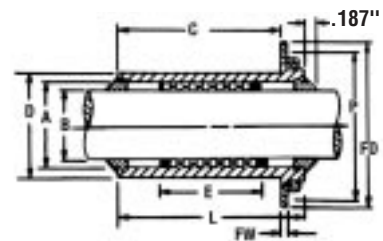
Seal O.D. A	Housing Dh*	Shaft Bs	Preload Interference Fit ‡		P	Size Cap Screw	Eccentricity O.D. to Bore	Maximum R.P.M.	Basic Capacity KN	Static Capacity KN
			Min	Max						
25.4	28.00 $\begin{smallmatrix} +.007 \\ -.005 \end{smallmatrix}$	16.00 $\begin{smallmatrix} +.000 \\ -.005 \end{smallmatrix}$	.002	.012	46	5mm 3-OFF	.007	13,000	1.57	1.34
29.36	32.00 $\begin{smallmatrix} +.010 \\ -.005 \end{smallmatrix}$	20.00 $\begin{smallmatrix} +.000 \\ -.005 \end{smallmatrix}$	.002	.012	51	5mm 3-OFF	.010	12,000	1.94	1.91
36.50	39.00 $\begin{smallmatrix} +.013 \\ -.005 \end{smallmatrix}$	25.00 $\begin{smallmatrix} +.000 \\ -.005 \end{smallmatrix}$	.002	.012	55	5mm 3-OFF	.010	10,000	2.45	2.24
42.85	46.00 $\begin{smallmatrix} +.013 \\ -.005 \end{smallmatrix}$	32.00 $\begin{smallmatrix} +.000 \\ -.005 \end{smallmatrix}$	.002	.012	64	5mm 3-OFF	.010	8,000	3.63	4.18
51.81	55.00 $\begin{smallmatrix} +.013 \\ -.005 \end{smallmatrix}$	40.00 $\begin{smallmatrix} +.000 \\ -.005 \end{smallmatrix}$	.002	.012	75	5mm 3-OFF	.010	7,000	4.41	5.37
63.50	70.00 $\begin{smallmatrix} +.013 \\ -.005 \end{smallmatrix}$	50.00 $\begin{smallmatrix} +.000 \\ -.005 \end{smallmatrix}$	.002	.012	95	5mm 4-OFF	.010	5,000	6.91	9.34

**NOTE:** Use Nomogram on page 31 for all load life calculations.

## Type MLF FLANGED PRELOADED GENERAL PURPOSE BEARINGS SUPPORTING COMBINATION LINEAR AND ROTARY MOTION



Rotolin "MLF" Series ball bearings support rotary and linear relative shaft motions simultaneously and separately. Shaft rigidity and anti-friction freedom is maintained at all times because all the balls are under an intentional preload. All "MLF" Series bearings have low-friction moulded nitrile rubber wiper seals. Type "MLF" bearings are furnished with a flange on the O.D. and a locking ring. On **Special** order the flange can be located at any point along the O.D.



### DIMENSIONS AND SPECIFICATIONS

INCH RANGE (Dimensions in inches)

Bearing Ref Δ	B Shaft Dia	D Bearing O.D.	E	L <sup>+0.000</sup> <sub>-0.005</sub>	Total Linear Travel	FD	C	FW
MLF 500 - 875 - 1	.5000	.8750	.500	1.625	1.000	1.812	1.406	.048
MLF 500 - 875 - 2				2.125	2.000		1.906	
MLF 625 - 1000 - 1	.6250	1.0000	.656	1.875	1.000	2.187	1.562	.064
MLF 625 - 1000 - 2				2.375	2.000		2.062	
MLF 750 - 1250 - 1	.7500	1.2500	.843	2.000	1.000	2.375	1.625	.064
MLF 750 - 1250 - 2				2.500	2.000		2.125	
MLF 875 - 1500 - 1	.8750	1.5000	1.031	2.250	1.000	2.531	1.812	.064
MLF 875 - 1500 - 2				2.750	2.000		2.312	
MLF 1000 - 1625 - 1	1.0000	1.6250	1.281	2.500	1.000	2.687	2.062	.064
MLF 1000 - 1625 - 2				3.000	2.000		2.562	
MLF 1000 - 1625 - 3				3.500	3.000		3.062	
MLF 1000 - 1625 - 4				4.000	4.000		3.562	
MLF 1125 - 1750 - 1	1.1250	1.7500	1.531	2.750	1.000	2.875	2.312	.064
MLF 1125 - 1750 - 2				3.250	2.000		2.812	
MLF 1125 - 1750 - 3				3.750	3.000		3.312	
MLF 1125 - 1750 - 4				4.250	4.000		3.812	
MLF 1250 - 1875 - 1	1.2500	1.8750	1.781	3.000	1.000	3.000	2.562	.064
MLF 1250 - 1875 - 2				3.500	2.000		3.062	
MLF 1250 - 1875 - 3				4.000	3.000		3.562	
MLF 1250 - 1875 - 4				4.500	4.000		4.062	
MLF 1250 - 1875 - 6				5.500	6.000		5.062	
MLF 1500 - 2125 - 1	1.5000	2.1250	2.000	3.250	1.000	3.437	2.687	.080
MLF 1500 - 2125 - 2				3.750	2.000		3.187	
MLF 1500 - 2125 - 3				4.250	3.000		3.687	
MLF 1500 - 2125 - 4				4.750	4.000		4.187	
MLF 1500 - 2125 - 6				5.750	6.000		5.187	
MLF 1750 - 2625 - 1	1.7500	2.6250	2.375	3.625	1.000	3.937	3.062	.080
MLF 1750 - 2625 - 2				4.125	2.000		3.562	
MLF 1750 - 2625 - 3				4.625	3.000		4.062	
MLF 1750 - 2625 - 4				5.125	4.000		4.562	
MLF 1750 - 2625 - 6				6.125	6.000		5.562	
MLF 2000 - 2875 - 1	2.0000	2.8750	2.687	4.000	1.000	4.093	3.437	.080
MLF 2000 - 2875 - 2				4.500	2.000		3.937	
MLF 2000 - 2875 - 3				5.000	3.000		4.437	
MLF 2000 - 2875 - 4				5.500	4.000		4.937	
MLF 2000 - 2875 - 6				6.500	6.000		5.937	

Δ Bearing reference indicates bearing type, shaft diameter, outside diameter.

Larger, heavy duty and special types are available.

Call or write outlining your performance requirements using the form on page 21.

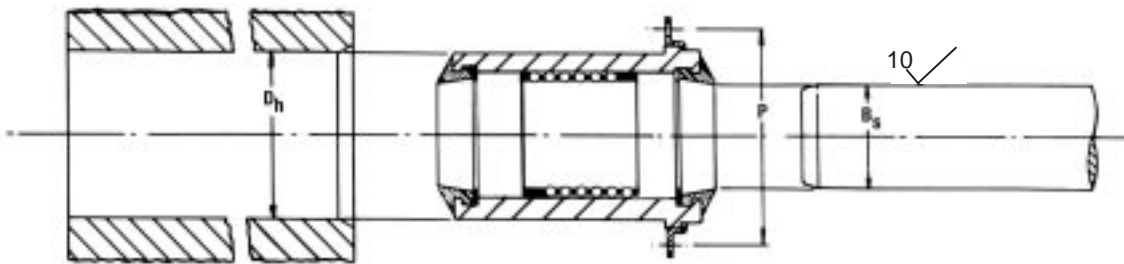
**ROTOLIN**



## ENGINEERING DATA

## Type MLF

All Rotolin Series "MLF" bearings must be mounted and used with a shaft that produces an interference between the balls and the shaft. This PRELOADS the balls. Shafts should be hardened to at least 60 HRC and be ground to a finish of at least 10 micro inches. Assembly of the shaft will require some sliding of the ball cage to locate it in its proper operating position. Balls and outer race are made from carbon chrome bearing steel of 535 A99. Housing and shaft tolerances listed on these two pages will produce the required fit of the housing and interference of the shaft. These flanged bearings are designed to be a "push fit" into housing ratings of the correct nominal diameter, secured by a locking ring.



SHAFT AND HOUSING TOLERANCES AND RESULTING FITS

Seal O.D. A	Housing Dh*	Shaft Bs	Preload Interference Fit ‡		P	Size Cap Screw	Eccentricity O.D. to Bore	Maximum R.P.M.	Basic Capacity lbf	Static Capacity lbf
			Min	Max						
.875	.8750 +.0003 -.0002	.5000 +.0000 -.0002	.0001	.0005	1.500	3 BA 3-OFF	.0003	14,000	230	158
1.000	1.0000 +.0003 -.0002	.6250 +.0000 -.0002	.0001	.0005	1.812	2 BA 3-OFF	.0003	13,000	352	302
1.125	1.2500 +.0004 -.0002	.7500 +.0000 -.0002	.0001	.0005	2.000	2 BA 3-OFF	.0004	12,000	440	430
1.312	1.5000 +.0004 -.0002	.8750 +.0000 -.0002	.0001	.0005	2.187	2 BA 3-OFF	.0004	11,000	562	503
1.437	1.6250 +.0004 -.0002	1.0000 +.0000 -.0002	.0001	.0005	2.312	2 BA 3-OFF	.0004	10,000	688	692
1.562	1.7500 +.0004 -.0002	1.1250 +.0000 -.0002	.0001	.0005	2.531	2 BA 3-OFF	.0004	9,000	814	907
1.687	1.8750 +.0005 -.0002	1.2500 +.0000 -.0002	.0001	.0005	2.656	2 BA 3-OFF	.0004	8,000	967	1195
1.937	2.1250 +.0005 -.0002	1.5000 +.0000 -.0002	.0001	.0005	2.968	2 BA 3-OFF	.0004	7,000	1147	1612
2.312	2.6250 +.0005 -.0002	1.7500 +.0000 -.0002	.0001	.0005	3.468	2 BA 4-OFF	.0004	6,000	2185	2978
2.562	2.8750 +.0005 -.0002	2.0000 +.0000 -.0002	.0001	.0005	3.7182	2 BA 4-OFF	.0004	5,000	2490	3733

‡ Between Shaft, Balls and Outer Sleeve I.D.

NOTE: Use Nomogram on page 31 for all load life calculations.





## Precision Guide Shafts



The metric range of Rotolin precision guide shafts have been introduced in response to popular demand. Basically, they represent the sizes of various shafts which were formerly most frequently produced to customers' requirements as "specials". Guide shafts have the advantage of lower costs by virtue of economical large scale specialised production methods and most sizes are normally available for immediate delivery from stock.

It is not always obvious that shafts are an integral part of linear bearing assemblies and for maximum performance, their excellence should match the quality and precision of the bearings. The balls impose searching conditions of service, particularly for preloaded bearings, and any minor variations in shaft diameter, case depth or surface hardness and finish has a critical influence on working efficiency which can result in tracking or indentations under severe operating conditions. Rotolin guide shafts are made from high grade carbon steel and induction hardened to produce a hard uniform deep case, minimum 60 HRC, free from surface defects or minute cracks. They are ground to precision tolerances, straight within 0.025/300mm and parallel with a fine micro finish to ensure a smooth working action and provide the correct preload for the corresponding diameter bearings.

### Non-Standard Shafts

It is part of our service to undertake the manufacture of spindles and shafts up to 1828mm long to customers' special requirements. Non-standard sizes and special variations of guide shafts are made to order with prompt delivery.

### Cutting Service

Standard guide shafts can be cut to customers' individual requirements subject to a service charge.

### METRIC RANGE

Reference	Diameter +.000mm -.005mm	Length ± 2mm	Min. Depth of case mm
SS 12-250	12	250	1.5
SS 12-500		500	
SS 16-300	16	300	1.5
SS 16-600		400	
SS 20-400	20	600	1.5
SS 20-750		750	
SS 25-500	25	500	2.0
SS 25-1000		1000	
SS 32-650	32	650	2.0
SS 32-1250		1250	
SS 40-750	40	750	2.0
SS 40-1500		1500	
SS 50-750	50	750	2.5
SS 50-1500		1500	

### INCH RANGE

Reference	Diameter +.0000" -.0002"	Length ± .060"	Min. Depth of case ins
SS 500-10	.5000	10	.060
SS 500-20		20	
SS 625-12	.6250	12	.060
SS 625-25		25	
SS 750-15	.7500	15	.060
SS 750-30		30	
SS 875-15	0.8750	15	.060
SS 875-30		30	
SS 1000-20	1.0000	20	.080
SS 1000-40		40	
SS 1125-25	1.1250	25	.080
SS 1125-50		50	
SS 1250-25	1.2500	25	.080
SS 1250-50		50	
SS 1500-30	1.5000	30	.080
SS 1500-60		60	
SS 1750-30	1.7500	30	.100
SS 1750-60		60	
SS 2000-30	2.0000	30	.100
SS 2000-60		60	

# Special Application Bearings

including Doctor Blade Bearings for the paper industry



ROTARY LINEAR BEARINGS

**ROTOLIN**

# Design Questionnaire for Rotary/Linear Bearings

(for Paper Mill Bearings, also complete questionnaire on page 32)

## APPLICATION DATA

COMPANY: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CONTACT: \_\_\_\_\_ PHONE: \_\_\_\_\_

FAX: \_\_\_\_\_ EMAIL: \_\_\_\_\_

INDUSTRY \_\_\_\_\_

Linear Motion: \_\_\_\_\_ m/sec: \_\_\_\_\_

Rotary Motion: \_\_\_\_\_ RPM: \_\_\_\_\_

Loading: \_\_\_\_\_ Radial N: \_\_\_\_\_ Moment: Nm: \_\_\_\_\_

## ENVIRONMENTAL FACTORS

Temperature (Degrees C or F): \_\_\_\_\_ Contaminant: \_\_\_\_\_

Aggressive Media: \_\_\_\_\_ Other: \_\_\_\_\_

Sealing required: \_\_\_\_\_ Special requirements: \_\_\_\_\_

## DIMENSIONS:

Shaft Diameter: \_\_\_\_\_ Housing bore: \_\_\_\_\_

Self alignment required? \_\_\_\_\_ Drawing Available? \_\_\_\_\_

Quantity required per annum: \_\_\_\_\_ Target Price: \_\_\_\_\_

Other information: \_\_\_\_\_

Completed by: \_\_\_\_\_

Company: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

email: \_\_\_\_\_ Date: \_\_\_\_\_

Date information required by: \_\_\_\_\_

**ROTOLIN****Fax to: +44 121 711 1084****BRAUER COLEY LTD  
RADWAY ROAD  
SOLIHULL, B90 4PA  
ENGLAND****Telephone: +44 121 705 6431**

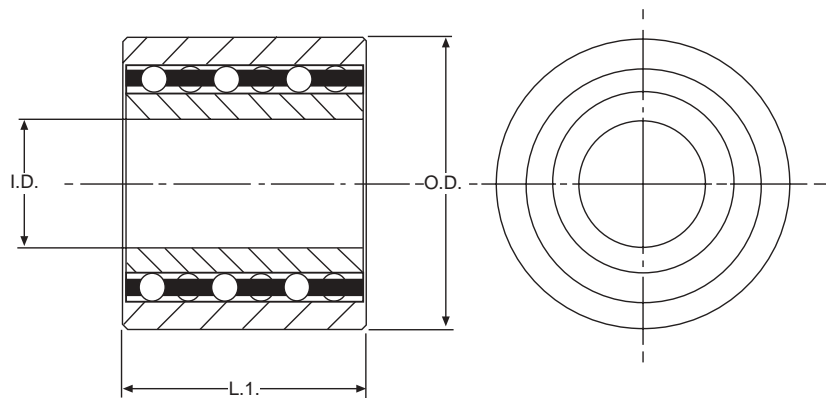
# Standard

## ROTARY MOTION BEARINGS



For use primarily in the paper industry this rugged standard rotary motion bearing is ideal for use in hostile environments where heavy load bearing is required in conjunction with rotary motion.

These bearings are available in other materials, with bronze liners for extra heavy duty applications.



### INCH SERIES (Dimensions in inches)

Reference	I.D.	O.D.	L1	Basic Capacity lbf	Static Capacity lbf
<b>SBB 980*</b>	1.6875 1.6870	2.6875 2.6865	3.770	1476	2553
<b>SBB 980/1*</b>	1.6875 1.6870	2.8125 2.8115	3.770	1476	2553
<b>SBB 1571</b>	0.750	1.875	1.500	750	765
<b>SBB 1622</b>	0.875	2.000	1.500	1260	1284
<b>SBB 1623</b>	1.000	2.125	1.500	1300	1360
<b>SBB 1624</b>	1.125	2.250	1.750	1520	1723
<b>SBB 1582</b>	1.250	2.750	1.500	2000	2015
<b>SBB 1625</b>	1.375	2.625	2.000	2600	2687
<b>SBB 1626</b>	1.375	3.000	1.625	2100	2141
<b>SBB 1627</b>	1.500	3.250	1.625	2300	2393
<b>SBB 1628</b>	1.625	3.125	2.250	3520	3989
<b>SBB 1629</b>	1.875	3.750	2.500	3800	4111
<b>SBB 1630</b>	2.000	3.875	2.500	4000	4353
<b>SBB 1631</b>	2.250	4.625	2.875	5760	6995
<b>SBB 1632</b>	2.500	5.000	3.250	6400	7818
<b>SBB 1633</b>	3.000	6.000	4.250	10000	15050
<b>SBB 1634</b>	3.500	7.000	4.250	11400	15117
<b>SBB 1635</b>	4.00	7.750	4.500	11800	16628

\*Fitted with bronze end caps





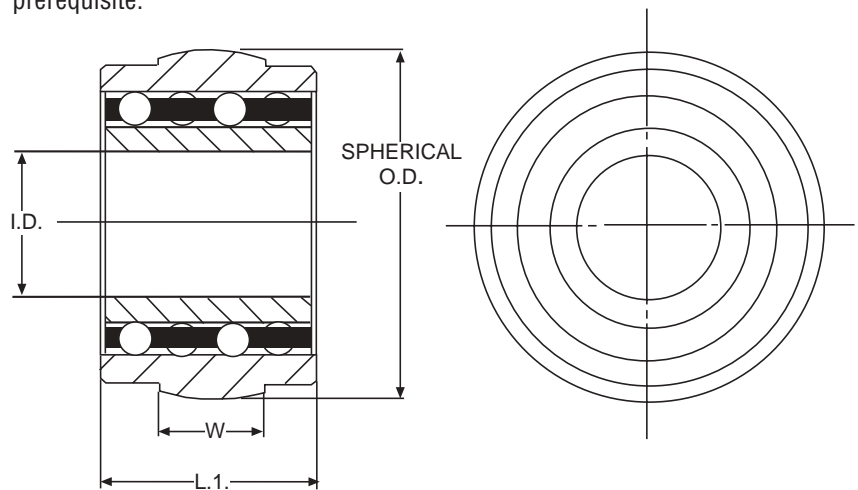
## Standard Self-Aligning

## ROTARY MOTION BEARINGS



For use primarily in the paper industry this rugged standard self-aligning rotary motion bearing is ideal for use in hostile environments where heavy load bearing is required alongside rotary motion.

These bearings are available in other materials and with bronze liners for extra heavy duty applications, where the requirement for self alignment up to 2° is a prerequisite.



### INCH SERIES (Dimensions in inches)

REFERENCE	I.D.	Spherical O.D.	Outer Length L1	Spherical Seat Width W	Basic Capacity lbf	Static Capacity lbf
SBB 1612	1.500	3.875	2.500	0.875	4200	5291
SBB 1613	1.750	3.875	2.500	0.875	4400	5542
SBB 1614	2.000	3.875	2.500	0.875	4500	5794
SBB 1615	2.000	5.125	3.625	1.250	6500	9312
SBB 1616	2.250	5.125	3.625	1.250	6550	9312
SBB 1617	2.500	5.125	3.625	1.250	6700	9375
SBB 1618	2.750	5.125	3.625	1.250	6800	10158
SBB 1619	3.000	5.125	3.625	1.250	6850	10158
SBB 1620	3.250	6.000	3.625	1.250	7000	11358
SBB 1576	3.500	6.000	3.625	1.250	7050	11358
SBB 1621	3.500	7.000	5.000	1.750	10500	18518

### METRIC SERIES (Dimensions in mm)

REFERENCE	I.D.	Spherical O.D.	Outer Length L1	Spherical Seat Width W	Basic Capacity KN	Static Capacity KN
SBB 1430	55	113	79	17	59.80	63.25
SBB 1548	45	98.4	63.5	22.2	40.21	38.74
SBB 1561	55	140	79	40	73.55	89.60
SBB 1779	55	113	79	17	49.39	70.29

**ROTOLIN**

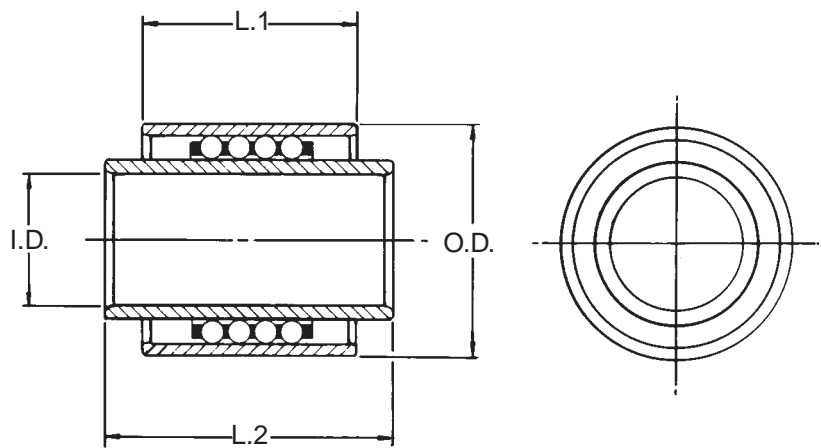
# Combination

## LINEAR AND ROTARY MOTION BEARINGS



For use primarily in the paper industry this rugged combination rotary motion bearing is ideal for use in hostile environments where heavy load bearing is required alongside rotary motion.

These bearings are available in other materials such as stainless steel with bronze liners for extra heavy duty applications.



### INCH SERIES (Dimensions in inches)

Reference	I.D.	O.D.	Length L.1	Length L.2	Basic Capacity lbf	Static Capacity lbf	Linear Travel
SBB 596	1.8735	3.624	3.000	3.250	3518	3628	1.000
	1.8725	3.623					
SBB 762	3.498	6.249	5.875	7.875	10000	13605	3.000
	3.497	6.248					
SBB 910	3.248	5.999	4.000	4.500	9000	12900	1.000
	3.247	5.998					
SBB 933	1.751	3.126	2.750	3.000	3400	4703	1.000
	1.750	3.125					
SBB 986	1.751	3.126	2.000	2.250	2400	2820	0.750
	1.750	3.125					
SBB 1008	3.998	6.749	5.000	5.500	8000	14996	1.000
	3.997	6.748					
SBB 1452	1.4985	2.874	2.750	3.000	3400	3779	1.000
	1.4980	2.873					

### METRIC SERIES (Dimensions in mm)

Reference	I.D.	O.D.	Length L.1	Length L.2	Basic Capacity KN	Static Capacity KN	Linear Travel
SBB 1553	80.025	125.025	80.00	85.00	26.17	35.59	20.00
	80.000	125.000					
SBB 1660	55.000	95.000	65.00	90.00	12.92	18.65	30.00
	54.095	94.985					
SBB 1452	40.000	75.000	60.00	80.00	9.90 KN	11.72	20.00
	39.988	74.987					



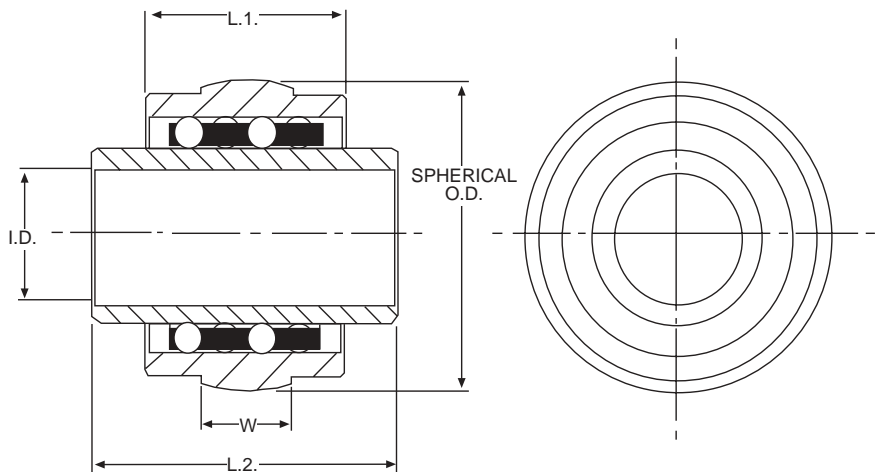
## Combination Self-Aligning

## LINEAR AND ROTARY MOTION BEARINGS



For use primarily in the paper industry this rugged combination self-aligning rotary motion bearing is ideal for use in hostile environments where heavy load bearing is required alongside rotary motion.

These bearings are available in other material and with bronze liners for extra heavy duty applications.



### INCH SERIES (Dimensions in inches)

Reference	I.D.	Spherical O.D.	Linear Travel Inches	Outer Length L1	Inner Length L2	Spherical Seat Width W	Basic Capacity lbf	Static Capacity lbf
SBB 1600	1.500	3.875	0.875	2.500	3.375	0.875	4200	5291
SBB 1601	1.750	3.875	0.875	2.500	3.375	0.875	4400	5542
SBB 1602	2.000	3.875	0.875	2.500	3.375	0.875	4500	5794
SBB 1603	2.250	3.875	1.125	2.500	3.875	0.875	2600	3359
SBB 1604	2.250	3.875	1.125	2.500	6.000	0.875	2600	3359
SBB 1575	2.500	4.687	1.125	3.625	6.250	1.250	5000	5761
SBB 1605	2.750	5.125	1.125	3.625	4.750	1.250	6000	8707
SBB 1606	3.000	5.125	1.250	3.625	5.000	1.250	5500	7256
SBB 1607	3.250	6.000	1.250	3.625	5.250	1.250	7000	9465
SBB 1608	3.500	6.000	1.125	3.625	6.000	1.250	7050	9465
SBB 1609	4.000	7.000	2.000	5.000	6.000	1.750	9000	15555
SBB 1610	4.500	7.500	2.000	5.000	6.000	1.750	9500	16707
SBB 1611	5.000	8.000	1.750	5.000	8.000	1.750	11900	21070

### METRIC SERIES (Dimensions in mm)

Reference	I.D.	Spherical O.D.	Linear Travel Inches	Outer Length L1	Inner Length L2	Spherical Seat Width W	Basic Capacity KN	Static Capacity KN
SBB 1546	45	98.4	16	63.5	85.72	22.2	40.21	38.74

**ROTOLIN**

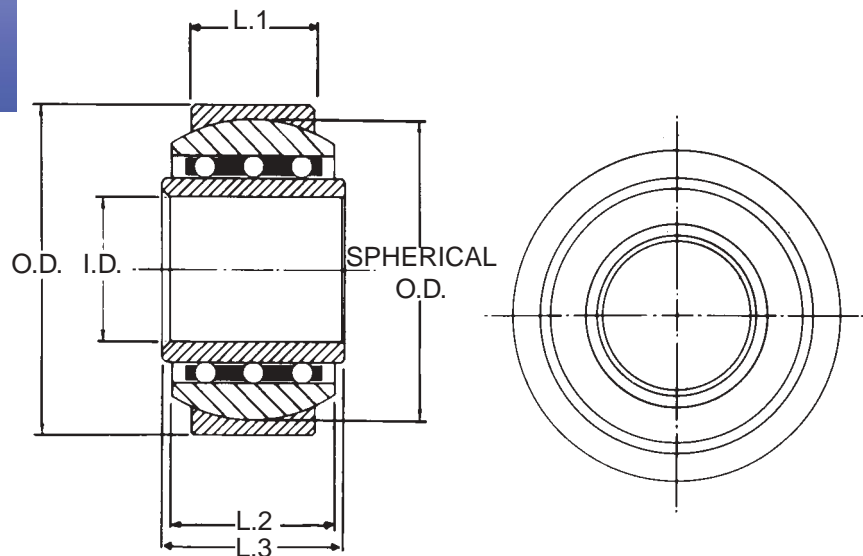
# Medium Duty Self-Aligning

## LINEAR AND ROTARY MOTION BEARINGS



For use primarily in the paper industry this rugged medium duty self-aligning rotary motion bearing is ideal for use in hostile environments where heavy load bearing is required alongside rotary motion.

These bearings are available in other material and with bronze liners for extra heavy duty applications.



### INCH SERIES (Dimensions in inches)

Reference	I.D.	O.D.	Spherical O.D.	Length L.1	Length L.2	Length L.3	Basic Capacity lbf	Static Capacity lbf	Linear Travel
<b>SBB 930</b>	1.751	4.000	3.625	1.500	2.000	2.250	2400	2820	0.500
	1.750	3.999							
<b>SBB 1044</b>	2.251	5.251	4.750	2.500	3.250	4.000	3400	5160	1.000
	2.250	5.250							
<b>SBB 1076</b>	1.751	4.501	4.125	2.000	2.750	3.000	2600	3117	0.875
	1.750	4.500							
<b>SBB 1161</b>	3.501	7.001	6.475	3.500	4.250	5.000	4600	8900	1.000
	3.500	7.000							
<b>SBB 1262</b>	1.626	4.000	3.625	1.500	2.000	4.500	2400	2820	0.750
	1.625	3.999							

### METRIC SERIES (Dimensions in mm)

Reference	I.D.	O.D.	Spherical O.D.	Length L.1	Length L.2	Length L.3	Basic Capacity KN	Static Capacity KN	Linear Travel
<b>SBB 1710</b>	80.03	160.00	150.00	55.00	80.00	110.00	28.43	48.53	20.00
	80.00	159.98							





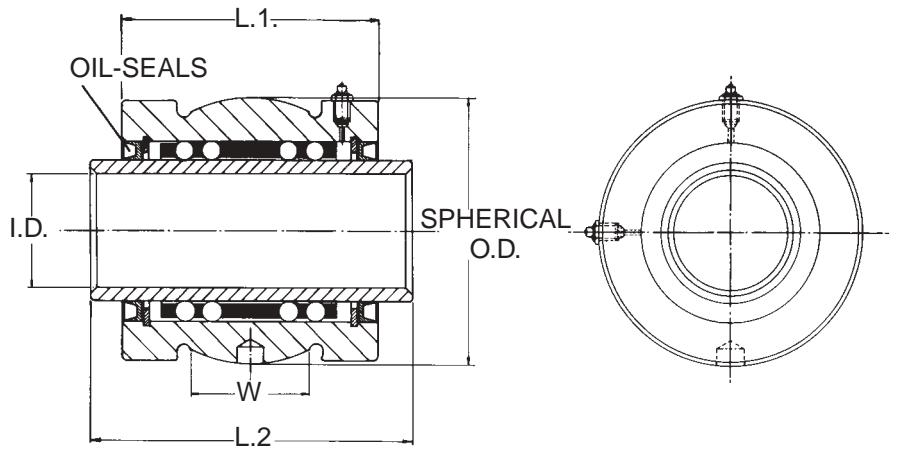
## Heavy Duty Self-Aligning

## LINEAR AND ROTARY MOTION BEARINGS



For use primarily in the paper industry this rugged heavy duty self-aligning rotary motion bearing is ideal for use in hostile environments where heavy load bearing is required alongside rotary motion.

These bearings are available in other material and with bronze liners for extra heavy duty applications.



### INCH SERIES (Dimensions in inches)

Reference	I.D.	Spherical O.D.	Spherical Length W	Length L.1	Length L.2	Basic Capacity lbf	Static Capacity lbf	Linear Travel
SBB 940	2.125	5.000	2.250	4.875	6.125	5750	8042	1.000
	2.124	4.998						
SBB 985	2.625	6.000	2.875	6.187	7.125	7000	10642	0.875
	2.624	5.998						
SBB 1204	2.625	6.000	2.875	6.187	7.125	9000	12040	0.875
	2.624	5.998						
SBB 1051	3.875	8.500	4.000	8.000	9.500	12000	20640	1.375
	3.874	8.499						
SBB 1156	3.501	6.875	2.250	4.937	6.000	5500	7860	1.000
	3.500	6.870						
SBB 1181	3.501	6.875	2.250	4.937	6.000	7000	9876	1.000
	3.500	6.870						
SBB 1330	4.500	9.3125	4.552	10.400	11.875	19000	38000	1.500
	4.499	9.3115						
SBB 1389	3.502	7.750	2.500	6.875	7.875	13800	20000	1.000
	3.501	7.748						

### METRIC SERIES (Dimensions in mm)

Reference	I.D.	Spherical O.D.	Spherical Length W	Length L.1	Length L.2	Basic Capacity KN	Static Capacity KN	Linear Travel
SBB 1550	87.312	163.499	56.00	125.40	152.40	30.13	44.48	20.00
	87.287	163.449						

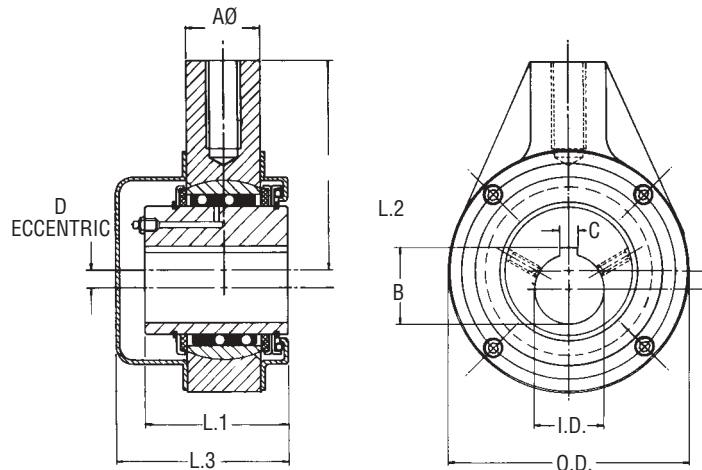
**ROTOLIN**

# Detachable Self-Aligning Eccentric Bearings

FOR GENERATING  
ECCENTRIC MOTION



Eccentric bearing primarily used to produce oscillating motion for doctor blade applications in paper mills.



**INCH SERIES** (Dimensions in inches)

Reference	I.D.	O.D.	AØ	L.1	L.2	L.3	B	C	D Eccentric	Basic Capacity lbf	Static Capacity lbf
<b>SBB 1002</b>	1.496 1.495	5.25	1.625	3.125	4.50	3.625	1.630	0.392 0.394	0.375	2500	2530
<b>SBB 1436</b>	1.496 1.495	5.25	1.625	3.125	4.50	3.625	1.630	0.392 0.394	0.187	2500	2530
<b>SBB 1482</b>	1.496 1.495	5.25	1.625	3.125	4.50	3.625	1.630	0.392 0.394	0.250	2500	2530
<b>SBB 1486</b>	1.378 1.379	5.25	1.625	3.125	4.50	3.625	1.508	0.392 0.394	0.375	2500	2530
<b>SBB 1514</b>	1.548 1.501	5.25	1.625	3.125	4.50	3.625	1.630	0.392 0.394	0.375	2500	2530
<b>SBB 1569</b>	1.378 1.379	5.25	1.625	3.125	4.50	3.625	1.508	0.392 0.394	0.197	2500	2530
<b>SBB 1669</b>	1.770 1.771	5.25	1.625	3.125	4.50	3.625	1.929	0.548 0.550	0.250	2500	2530
<b>SBB 1675</b>	1.770 1.771	5.25	1.625	3.125	4.50	3.625	1.929	0.548 0.550	0.197	2500	2530
<b>SBB 1685</b>	1.770 1.771	5.25	1.625	3.125	4.50	3.625	1.929	0.548 0.550	0.197	2500	2530
<b>SBB 1704</b>	1.496 1.495	5.25	1.625	3.125	4.50	3.625	1.630	0.392 0.394	0.197	2500	2530
<b>SBB 1711</b>	1.770 1.771	5.25	1.625	3.125	3.70	3.625	1.929	0.548 0.550	0.197	2500	2530
<b>SBB 1791</b>	1.770 1.771	5.25	1.625	3.125	4.50	3.625	1.929	0.548 0.550	0.197	2500	2530

ROTARY LINEAR BEARINGS

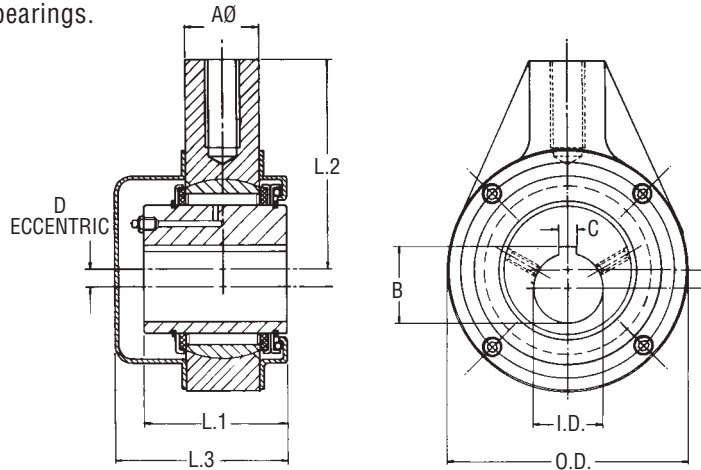


## Heavy Duty Detachable Eccentric Self-Aligning Bearing

FOR GENERATING ECCENTRIC MOTION



For additional load capacity rollers, are used in place of the standard ball bearings.



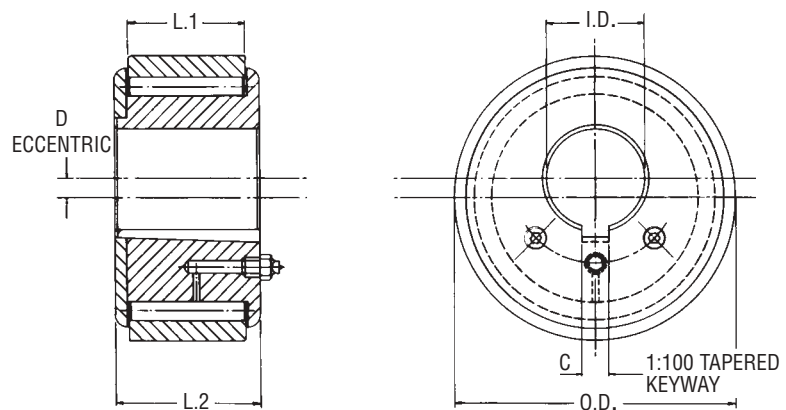
(Dimensions in inches)

Reference	I.D.	O.D.	AØ	L.1	L.2	L.3	B	C	D Eccentric	Basic Capacity lbf	Static Capacity lbf
SBB 1709	1.770"	5.25"	1.625"	3.125"	4.50"	3.625"	1.929"	0.548"	0.197"	22355	40000
	1.771"							0.550"			
SBB 1820	2.126"	5.25"	1.625"	3.125"	4.50"	3.625"	2.349"	0.500"	0.187"	22355	40000
	2.125"						2.355"	0.501"			

## Heavy Duty Eccentric Roller Bearings



Heavy duty roller eccentric motion bearings primarily used to produce oscillating motion for doctor blade applications in paper mills where high load carrying capability is required.

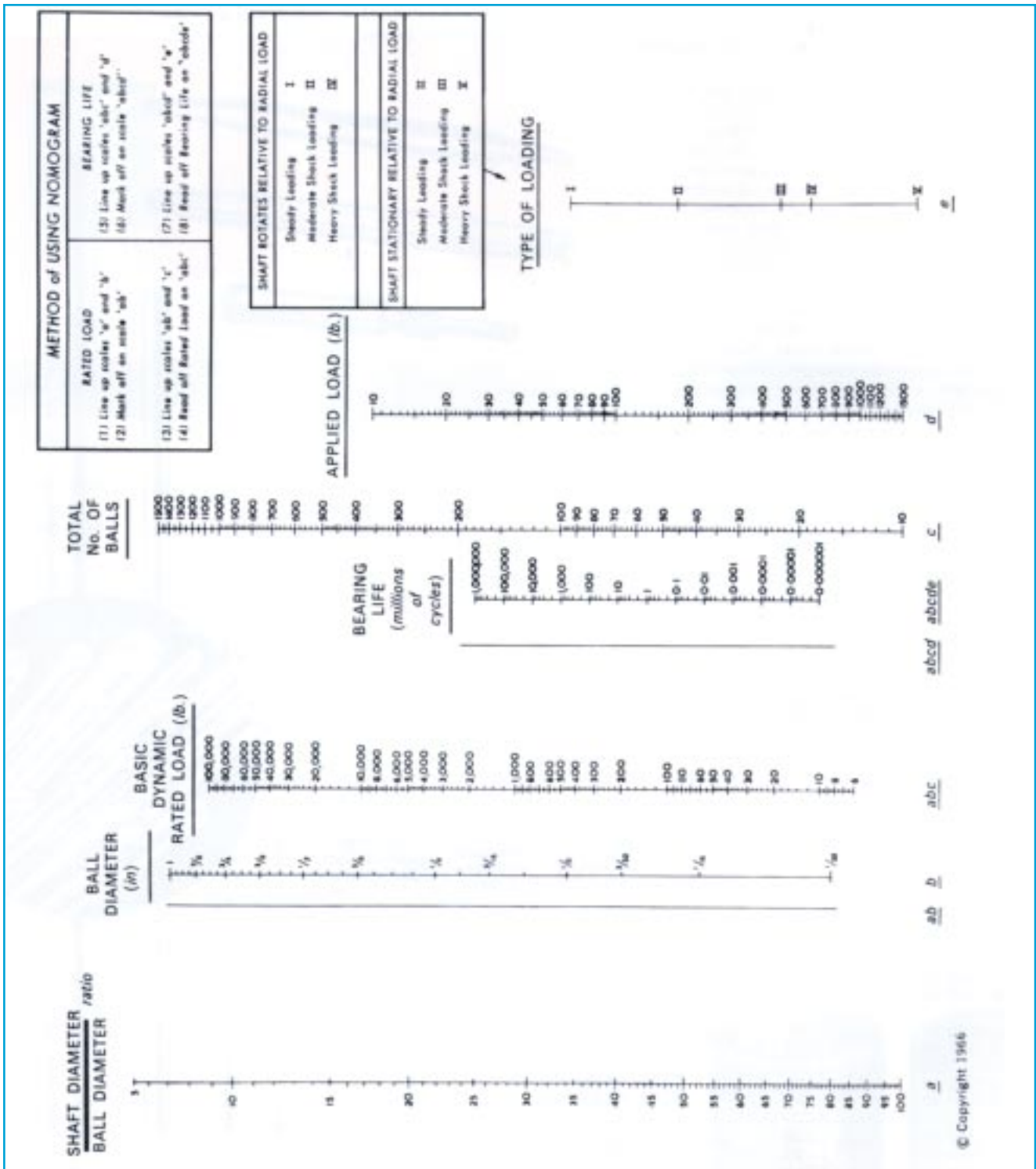


(Dimensions in inches)

### HEAVY DUTY ROLLER ECCENTRIC

Reference	I.D.	O.D.	L.1	L.2	C	D Eccentric	Basic Capacity lbf	Static Capacity lbf
SBB 644	1.938	5.375	2.000	2.562	0.500	0.187	45000	79500
	1.937	5.371						

# Nomogram for rated load and bearing life calculations





# Design Questionnaire for Rotolin Paper Mill Bearings

DATE \_\_\_\_\_

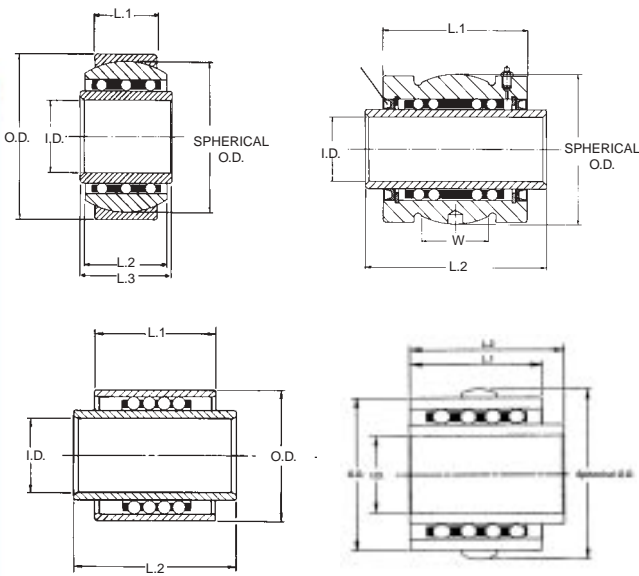
(please also complete questionnaire on page 22)

## APPLICATION DATA

FROM: \_\_\_\_\_  
 COMPANY: \_\_\_\_\_  
 TELEPHONE NO: \_\_\_\_\_  
 FAX NO: \_\_\_\_\_  
 EMAIL: \_\_\_\_\_

CUSTOMER: \_\_\_\_\_  
 CONTACT: \_\_\_\_\_  
 TELEPHONE NO: \_\_\_\_\_  
 FAX NO: \_\_\_\_\_  
 EMAIL: \_\_\_\_\_

BRAUER USE
DATE REC
ANSWER ON



### MUST HAVE INFORMATION

I.D. shaft dia.	
O.D. hosing bore	
L1 outer sleeve	
L2 inner sleeve	
Spherical O.D.	
Ball cage or brass bush	

**TIPS:**  
 Bearing reference number may be on the end of outer sleeve  
 What materials are used in construction? (Any brass?)  
 More information = easier to identify = faster response = easier sale

If configuration is different from the types detailed above, please provide a sketch below or on a separate sheet

### ADDITIONAL INFORMATION (if known)

Paper Mill original equipment manufacturer  
 Valmet/Metso  Voith  Beloit  Black Clawson  Other

Doctor Blade original equipment manufacturer  
 Lamort  Thermo  Lantia  Bonetti  Other

FAX TO: TECHNICAL SERVICES, BRAUER COLEY LIMITED



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