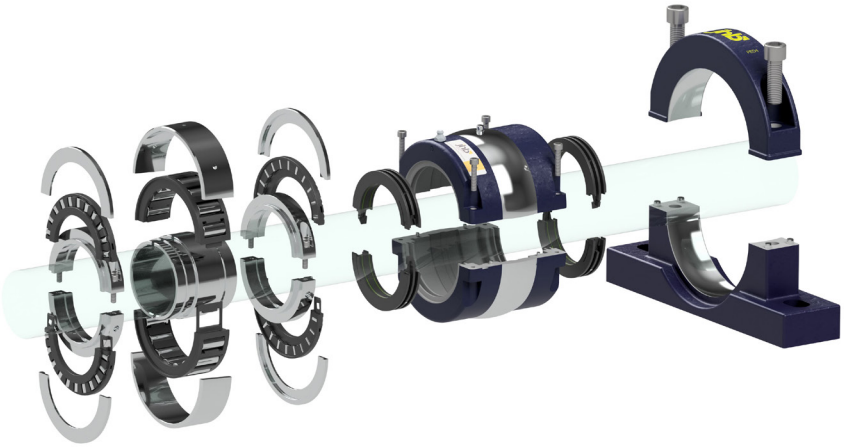
JHB Split Bearings

Advanced Split Roller Bearing Solutions



Product Information and Technical Data

Bearings to suit shaft diameter from 30mm to 160mm

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Contents

About John Handley Bearings

John Handley Bearings serves some of the UK's largest industrial companies and strategic industries with a range of specialised bearing products. With more than 50 years' experience the JHB name is synonymous with quality products, accurate specification, technical expertise, fast delivery and competitive pricing. A leading distributor to some of the world's largest bearing manufacturers, JHB is proud to serve a varied cross section of industries.

As well as our revolutionary split roller bearing we are proud to hold prestigious distributorships with NSK and Thomson for linear bearings and guides and Bowman International for plain bearings. We also supply our own range of branded rod ends. For more information on our extensive product range visit our website on www.johnhandleybearings.com.

The Bowman Group

The Bowman Group is a group of divisions dedicated to innovation, reliability and quality customer service within the engineering sector. The Bowman Group incorporates Bowman International, Bowman Additive Production, Bowman Advanced Engineering, John Handley Bearings and Bowman Deutsche. The JHB Split Bearing is the result of a collaboration between different parts of the Bowman Group, utilising design and manufacturing expertise across various divisions.

BOWMAN®

BOWMAN® ADVANCED ENGINEERING

BOWMAN® ADDITIVE PRODUCTION

jhb® JOHN HANDLEY BEARINGS

JHB Split Roller Bearings - Introduction

The split roller bearing was invented at the beginning of the 20th century and has been an industry stalwart ever since. Split roller bearings are renowned throughout industry for their ability to improve efficiency by reducing downtime, resulting in increased production. They are highly regarded for saving time during installation, inspection and maintenance for end-users, whilst also offering simplified machine and shaft design for equipment manufacturers. Essential for applications where bearing locations are trapped or access is limited, split roller bearings also eliminate the need to remove ancillary equipment from the shaft when installing or replacing the bearing.

The design of the split roller bearing has remained largely unchanged for over one hundred years.... until now!

As a company primarily founded around the split roller bearing JHB, along with the Bowman Group, have developed a split roller bearing with significantly increased load capacities with an innovative new design which incorporates separate radial and axial elements. We have updated the split roller bearing for the modern world by extending its operating envelope into high thrust load applications that cannot be covered by existing split roller bearings.

The JHB Split Roller Bearing is designed and manufactured in the UK and is offered with price and numerous performance advantages over existing split roller bearings as well as exceptional technical support through Bowman Advanced Engineering – the technical wing of the Bowman Group.

Mounting options

The most popular method of mounting is via standard pedestal housings, however JHB bearings can also be mounted in a variety of outer supports, including flanges, take-up, rod ends and hangers depending on the application.

Our range includes pedestals with critical dimensions to match industry-standard SN / SD / SAF bearing housings, however JHB has the capability to design and manufacture bespoke housings. Please contact our Technical Department with details of your requirements.

Design Ethos

The remit for the product was to design a bearing with:

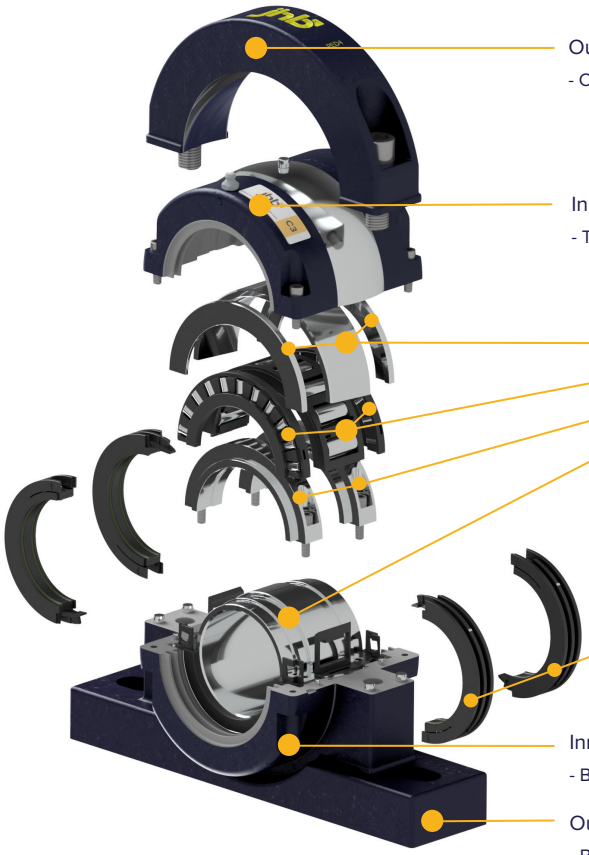
- The highest radial and axial capacities (static and dynamic) of any split-to-the-shaft bearing currently available in any format, cylindrical; spherical; taper or ball bearing – by completely re-engineering the split roller bearing and utilising the new technologies now available

  ▶ **Radial Capacity 70% Increase** ▶ **Axial Capacity 1000% Increase**
- High strength housings to cope with increased loads
- Uprated fixing hardware compared to currently available product
- Simplified installation and maintenance – run-safe bearing design / minimised bearing failure strategy by designing cage jointing method with no loose parts, housings with no grub screws/side rods to axially locate the fixed bearing outer races
- ROLLER TRAIN® 3D printed bearing cages allow complex geometries and flexible design to be utilised
- Separate rolling elements accommodate axial loads independently of radial loads enabling, for the first time, calculation of an axial L10 life
- Greater axial expansion of the non-locating bearing than leading competitors
- Extended working life by the ability to replace or re-use components
- Inner housing is interchangeable within existing manufacturers outer housings
- Inner housing incorporates patented SEAL TRAIN® composite multi-labyrinth seals
- Inner and outer housings manufactured from ductile (SG) cast iron for high strength and durability

Minimising Inventory

- Interchangeable bearing components within a group size
- Using one inner housing per bearing group size, by use of independent seals, enabling inner housing seal bore variation within the same inner housing
- Designing one series of bearing with the capacity to replace five series of existing manufacturers product range, whilst remaining interchangeable with existing products
- To maintain the highest stock levels to improve product availability and minimise customer spares holding requirements

Product Technical Data



Split Roller Bearings

Delivering the highest radial and axial capacity split roller bearing currently within the market and intended for both the 'free' and 'fixed' bearing positions, JHB split bearing units have the ability to adapt the 'free' bearing into a 'fixed' bearing via the addition of split thrust roller (axial) bearings within the bearing housing.

The resulting 'fixed' bearing is capable of handling high axial loads in either direction – with no decrease in radial performance (unlike spherical and taper roller bearings), due to the unit's independent thrust bearings. Each bearing performs one task only – compared to competitor's units which employ multirole rollers. 'Free' bearings have plain outer races to allow unrestricted axial movement of the rollers with thermal expansion and contraction.

JHB bearing inner race halves are retained on the shaft by hardened steel clamp rings with high-tensile (grade 12.9) socket head screws.

JHB split bearings utilise cylindrical rollers within the ROLLER TRAINS® 3D printed cage. The cage material has excellent mechanical properties, and resistance to chemicals, and the manufacturing processes utilised allow for flexible design.

Radial rollers are not located or axially loaded by the races, therefore reducing skewing within the cage pockets and reducing the minimum loading requirements.

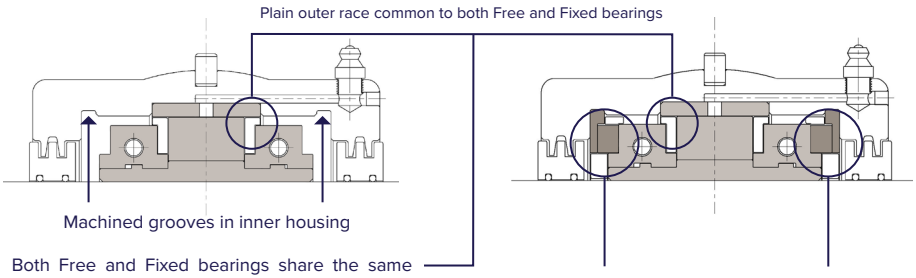
Plain outer races are used for both locating and non-locating bearings, thus negating the need for additional retaining or side location screws within the inner housing; only one housing type is required for 'free' or 'fixed' bearing types.

Axial split thrust roller bearings use 3D printed cages with ROLLER TRAINS® joining technology.

The two halves of the cage are joined using rollers, therefore no risk of damage can occur from loose metal cage joints or clips becoming loose within the bearing.

Free (Non-Locating) Bearing

Fixed (Locating) Bearing



Both Free and Fixed bearings share the same radial bearing components (inner races, clamp rings, radial cage and roller assemblies AND plain radial outer races). For the Free bearing this plain outer race accommodates axial expansion as the radial rollers are not axially constrained.

Free bearings can be converted into Fixed bearings by adding axial bearing components (axial cage and roller assemblies and axial outer races) between the clamp rings of the free bearing and machined grooves in the inner housing.

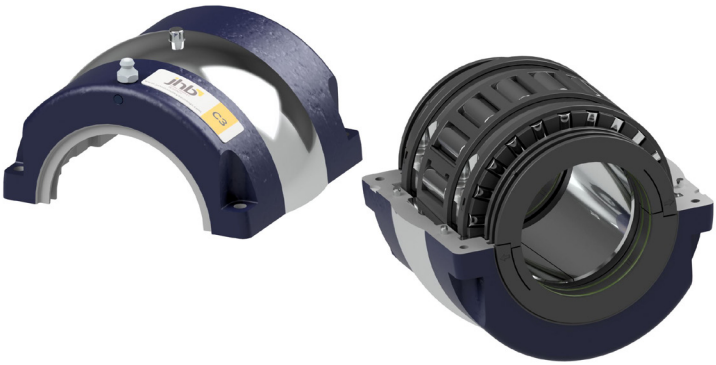
Inner Housings (Cartridges)

JHB split bearings are mounted within an inner housing which in turn is mounted (via a spherical ball joint) within an outer housing. The outer housing connects the JHB split bearing unit to the mounting structure. This spherical ball joint between the inner & outer housings allows misalignment between the shaft and the mounting structure and reduces edge-loading of the bearing.

Whilst providing location for the bearing the inner housing also contains the composite multi-labyrinth seals which, via the spherical ball jointing, remain concentric to the shaft even with shaft/mounting structure misalignment. Multi-labyrinth seals are fitted to the shaft and rotate within close tolerances to the inner housing, resulting in efficient non-contact sealing for a wide range of environmental conditions.

JHB inner housings are manufactured from high strength ductile cast iron and can be installed in outer housings (such as pedestals, flanges, take-up units etc) from other split roller bearing manufacturers.

There are two different JHB inner housings for each bearing group size - one to fit the Light/01/E Series outer housings of other manufacturers, and one to fit the Medium/02 Series. This is because of the high capacities of the JHB bearings which are in most cases suitable as a direct interchange for both other manufacturers bearing series.



Outer Housings (Pedestals)

JHB split bearing unit outer housings are designed to be interchangeable with existing split bearing manufacturers outer housings and hence share the spherical ball socket dimensions, heights to shaft centre, base foot print and fixing bolt dimensions. JHB outer housings are manufactured from high strength ductile cast iron. JHB can also provide these outer housings to order.

Bearing Ratings and Selection

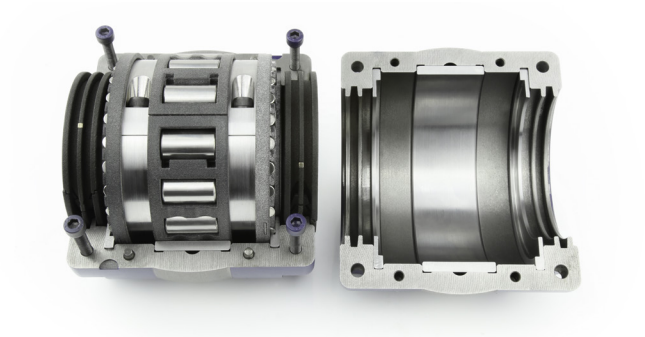
Bearing ratings for dynamic radial capacity (C_R), dynamic axial capacity (C_A), static radial capacity (C_{OR}) and static axial capacity (C_{OA}) shown in this catalogue are based on ISO 281-1990 (dynamic capacity) and ISO 76-1987 (static capacity) respectively.

Radial and axial loads can be considered independently and JHB split bearing units isolate one from the other.

Bearing Radial and Axial Ratings

Size Group	Bearing Bore Ø		Radial		Axial [1]		Max Speed
	(mm)	(inch)	Dynamic C_R (kN)	Static C_{OR} (kN)	Dynamic C_A (kN)	Static C_{OA} (kN)	
108	30, 35, 40	1.1875”- 1.5”	97	108	42	138	5400
200	45, 50	1.6875”- 2.0”	123	146	50	140	4630
208	55, 60, 65	2.1875” - 2.5”	152	192	70	246	3940
300	70, 75	2.6875” - 3.0”	203	268	79	313	3310
308	80, 85, 90	3.1875”- 3.5”	293	414	103	388	2790
400	100, 105	3.6875”- 4.0”	371	544	130	550	2340
408	110, 115	4.1875”- 4.5”	418	615	162	656	1970
500	120, 125, 130	4.6875”- 5.0”	561	874	178	770	1740
508	135, 140	5.1875”- 5.5”	593	937	210	895	1570
600	150, 155, 160	5.6875”- 6.0”	634	1040	233	1028	1450

1) Axial ratings apply only to fixed bearing where the radial inner race is located against shaft abutments. Shaft abutment should be shaft diameter +5mm for bearings up to and including 308 group, and +10mm for bearings from 400 to 600 group.



Maximum Axial Load When Inner Race Is Mounted On Plain Shaft

Size Group	Bearing Bore Ø		Max Axial Load F_A(kN)
	(mm)	(inch)	
108	30, 35, 40	1.1875”- 1.5”	18.3
200	45, 50	1.6875”- 2.0”	18.3
208	55, 60, 65	2.1875” - 2.5”	18.3
300	70, 75	2.6875” - 3.0”	26.13
308	80, 85, 90	3.1875”- 3.5”	26.13
400	100, 105	3.6875”- 4.0”	26.13
408	110, 115	4.1875”- 4.5”	46.24
500	120, 125, 130	4.6875”- 5.0”	46.24
508	135, 140	5.1875”- 5.5”	46.24
600	150, 155, 160	5.6875”- 6.0”	46.24

(Figures are based on coefficient of friction for steel on steel, with lubrication and the clamp force generated by the four clamp ring screws. These figures apply for shafts of the correct tolerance and no guarantee can be given where shafts are outside of specified tolerance for diameter and form).

Maximum Axial Load When Inner Race Is Mounted With Two Location Pins On Plain Shaft

Size Group	Bearing Bore Ø		Pin Ø (mm)	Max Axial Load F_A (kN)
	(mm)	(inch)		
108	30, 35, 40	1.1875”- 1.5”	Ø6	60
200	45, 50	1.6875”- 2.0”	Ø6	60
208	55, 60, 65	2.1875” - 2.5”	Ø6	60
300	70, 75	2.6875” - 3.0”	Ø8	106
308	80, 85, 90	3.1875”- 3.5”	Ø8	106
400	100, 105	3.6875”- 4.0”	Ø8	106
408	110, 115	4.1875”- 4.5”	Ø10	168
500	120, 125, 130	4.6875”- 5.0”	Ø10	168
508	135, 140	5.1875”- 5.5”	Ø12	240
600	150, 155, 160	5.6875”- 6.0”	Ø12	240

(Figures are based on the inner race being located by two ‘Spirol’ heavy duty coiled pins. The shaft must be drilled and further guidance for this can be provided on request).

Maximum Axial Load When Used With JHB Inner Housing (Cartridge) and Outer Housing (Pedestal) and Also When Used Within Other Manufacturer's Outer Housing (Pedestal)

Size Group	Bearing Bore Ø		Max Axial Load F_A (kN)		
	(mm)	(inch)	JHB Inner Housing (Bearing Maximum)	JHB Outer Housing (Pedestal)	Other Outer Housing (Pedestal)
108	30, 35, 40	1.1875”- 1.5”	138	22	13.8
200	45,50	1.6875”- 2.0”	140	18.5	11.7
208	55,60,65	2.1875” - 2.5”	246	30	20.7
300	70,75	2.6875” - 3.0”	313	56.7	30.7
308	80, 85, 90	3.1875”- 3.5”	388	102.8	66.2
400	100, 105	3.6875”- 4.0”	550	89.5	57.7
408	110, 115	4.1875”- 4.5”	656	146	100.9
500	120, 125, 130	4.6875”- 5.0”	770	150.8	104.2
508	135, 140	5.1875”- 5.5”	895	143.7	99.3
600	150, 155, 160	5.6875”- 6.0”	1028	146.8	101.4

Notes:

In all instances of high axial load, when considering suitability of the bearing for an applied axial load, the highest axial capacity is achieved when using JHB housings and a shaft recess or abutment to locate the radial inner race.

Other methods of locating the radial inner race can be used, such as coiled dowel pins, which provide an improvement over using only the clamp ring force. In the majority of normal applications the clamp force is sufficient to ensure the axial bearings perform under moderate force. Consideration should be given to using suitable location and retaining bolts to connect the outer housing (pedestal) to the machine structure.

Bearing Selection

Rolling element bearing life calculations given below are based on ISO standards, where statistical life expectancy for rolling contact fatigue provides a reasonable estimate of service life under conditions of adequate lubrication and protection against contamination and excessive misalignment. In practice the service life of a bearing may be determined by factors other than the normal fatigue life.

Calculating Bearing Radial Life

Expected radial bearing life is calculated by the following equation:

$$L10_R = [C_R / (P_R \times f_{Rd})]^{10/3}$$

Where:

- $L10_R$ = Expected radial life of 90% of similar bearings under similar operating conditions (in millions of revolutions)
- C_R = Radial Dynamic Rating (kN)
- P_R = Dynamic Radial Load (kN)
- f_{Rd} = Radial Dynamic (or Service) Factor

Radial Dynamic (or Service) Factors f_{Rd} are determined depending on application conditions, as below:

Steady Load / Small Fluctuations	1.0 to 1.3
Light to Medium Fluctuations	1.3 to 2.0
Heavy Shock, Reciprocation or Vibration	2.0 to 3.5

Calculating Bearing Axial Life

Expected axial bearing life is calculated by the following equation.

$$L10_A = [C_A / (P_A \times f_{Ad})]^{10/3}$$

Where:

- $L10_A$ = Expected axial life of 90% of similar bearings under similar operating conditions (in millions of revolutions)
- C_A = Axial Dynamic Rating (kN)
- P_A = Dynamic Axial Load (kN)
- f_{Ad} = Axial Dynamic (or Service) Factor

Axial Dynamic (or Service) Factors f_{Ad} are determined depending on application conditions, as below:

Steady Load / Small Fluctuations	1.0 to 1.3
Light to Medium Fluctuations	1.3 to 2.0
Heavy Shock, Reciprocation or Vibration	2.0 to 3.5

Static Ratings

The static rating is defined as that load which causes a permanent deformation of 0.0001 times the diameter of the roller and can be considered to correspond to a contact stress of 4,000 MPa at the centre of the most heavily loaded roller.

For slow rotation speeds (less than 5 rpm) consider static ratings for the bearing selection.

$$C_{OR} \geq f_{RS} \times P_{OR} \quad \text{(Radial)}$$

$$C_{OA} \geq f_{AS} \times P_{OA} \quad \text{(Axial)}$$

Where:

C_{OR} = Bearing Radial Static Rating (kN)

C_{OA} = Bearing Axial Static Rating (kN)

P_{OR} = Bearing Radial Static Load (kN)

P_{OA} = Bearing Axial Static Load (kN)

f_{RS} = Static Safety Factor (Radial)

f_{AS} = Static Safety Factor (Axial)

Guidelines for appropriate static safety factor are below:

Type of Operation	Requirement For Smooth Operation		
	Low	Normal	High
Smooth / Vibration Free	1	1.5	3
Normal	1	2	3.5
High Shock Loads	2.5	3	4

(Refer to our Technical Department for advice on service factors)

Bearing Minimum Radial Loading

To avoid excessive skidding of the radial rollers, sufficient radial load must be applied to the bearing. Generally, radial load with a magnitude of 1% of the dynamic radial capacity of the bearing would be required to drive the radial rollers.

Shaft Tolerance & Surface Texture

Split roller bearings rely on accurate shaft form and diameter to ensure the desired bearing diametric clearance is obtained. Journal diameter at bearing seating is generally required to be within h7 tolerance (based on BS4500 / BS-EN-ISO 286-2) for most applications. Where shaft speeds and loads permit, wider tolerances can be used. Generally:

h6 tolerance should be applied where speed is over 150,000dn mm

h7 tolerance can be applied for speeds between 50,000dn mm and 150,000dn mm

For speeds under 50,000dn mm, h9 tolerance can be applied

Note, 'dn' is an expression of shaft speed used by bearing manufacturers, where:-

'dn' = bearing bore (mm) x shaft speed (rpm)

Diameter	Over	-	50mm	80mm	120mm
	Up to and including	50mm	80mm	120mm	180mm
Tolerance Band (BS4500)	h6	+0 -0.016	+0 -0.019	+0 -0.022	+0 -0.025
	h7	+0 -0.025	+0 -0.030	+0 -0.035	+0 -0.040
	h9	+0 -0.062	+0 -0.074	+0 -0.087	+0 -0.100
	IT6	0.016	0.019	0.022	0.025

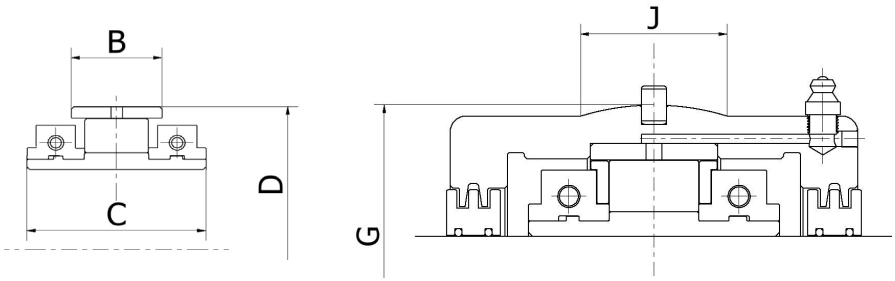
Tolerances in the table above are in µm.

IT6 is roundness and parallelism (cylindricity) of the bearing seating.

Tolerance of h9 and surface texture of 3.2µm Ra are applicable to the seal seating area.

Shaft surface finish for the bearing seating is generally 3.2µm Ra, for shafts of h7 tolerance, and 1.6µm Ra, where h6 shaft tolerance is applied.

Product Range and Dimensions



Roller Bearings and Inner Housings (Cartridges)

Size Group	B (E7)	C	D Ø (H7)	Axial Float ref (i)	Inner Housing ref (ii)	G Ø (g6)	J	Inner Housing ref (iii)	G Ø (g6)	J
108	30	62.7	84.14	9	C1	100.00	25	-	-	-
200	32	63.7	98.42	10	C2	117.48	25	C2A	134.94	32
208	35	68.7	114.30	12	C3	134.94	32	C3A	157.16	38
300	40	78.7	133.35	12	C4	157.16	38	C4A	177.80	50
308	51	88.7	152.40	17	C5	177.80	50	C5A	203.20	50
400	59	94.7	174.62	17	C6	203.20	50	C6A	231.78	64
408	60	109.7	203.20	19	C7	231.78	64	C7A	266.70	76
500	71	116.7	222.25	20	C8	266.70	76	C8A	295.28	82
508	73	121.7	241.30	23	C9	279.40	76	C9A	323.85	90
600	73	121.7	254.00	23	C10	295.28	82	C10A	336.55	95

Ref (i) Total axial float. Maximum offset from centreline is half of this amount

Ref (ii) JHB Inner housings to match ‘Light’ or ‘01/E’ series from other manufacturers

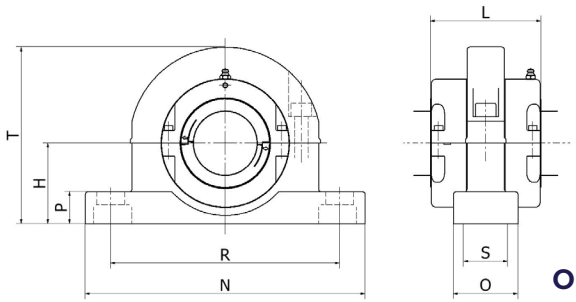
Ref (iii) JHB Inner housings to match ‘Medium’ or ‘02’ series from other manufacturers

Notes:

1) Spherical diameter of corresponding outer housing requires G7 tolerance
2) Recess / abutment for inner race would require D11 tolerance on race width C
3) Recommended abutment diameter and shaft fillet radii:

   For bearings up to and including 308 group: +5mm on shaft diameter and maximum 1.2mm fillet radii

   For bearings from 400 to 600 group: +10mm on shaft diameter and maximum 2.0mm fillet radii



Outer Housings (Pedestals)

Equivalent to “Light” (SRB/Timken) or “01/E” (SKF Cooper) series

Size Group	H	R		S	Fixing Bolts	N	O	P	T	L	JHB Ref
		Min	Max								
108	60	172	192	-	Ø12	228	60	22	138	105	PED1
200	70	203	227	-	Ø16	270	60	25	158	106	PED2
208	80	226	242	-	Ø16	280	70	32	180	120	PED3
300	95	260	280	-	Ø20	330	76	38	208	131	PED4
308	112	312	328	-	Ø24	380	90	44	252	148	PED5
400	125	342	366	-	Ø24	420	102	52	272	154	PED6
408	143	374	410	-	Ø24	466	120	60	314	179	PED7
500	162	438	462	120	Ø24	508	178	38	372	191	PED8
508	181	470	494	120	Ø24	558	178	41	405	198	PED9
600	181	484	508	120	Ø24	558	178	41	415	208	PED10

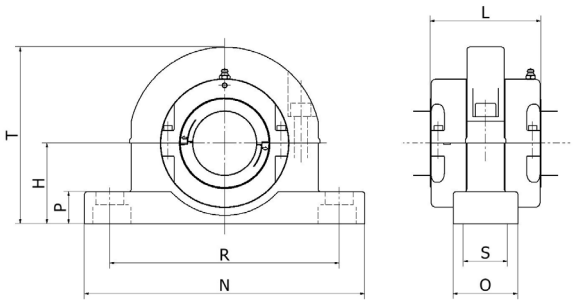
Notes:

1) Overall length (L) is taken over seals

2) Pedestal design shown for representation only

Component Weights (kg)

Size Group	Free Bearing	Fixed Bearing	Inner Housing	Pedestal
108	1.63	1.76	2.00	3.00
200	2.08	2.29	2.80	4.00
208	2.86	3.19	3.80	6.50
300	4.18	4.61	5.70	9.00
308	6.41	7.09	7.30	16.00
400	8.94	9.83	10.20	18.50
408	13.55	14.85	15.80	25.50
500	17.73	19.21	26.90	45.00
508	21.09	23.11	27.60	58.00
600	22.85	25.00	33.10	59.20



Equivalent to “Medium” (SRB/Timken) or “02” (SKF Cooper) series

Size Group	H	R		S	Fixing Bolts	N	O	P	T	L	JHB Ref
		Min	Max								
200	80	226	242	-	Ø16	280	70	32	180	106	PED3
208	95	260	280	-	Ø20	330	76	38	208	120	PED4
300	112	312	328	-	Ø24	380	90	44	252	131	PED5
308	125	342	366	-	Ø24	420	102	52	272	148	PED6
400	143	374	410	-	Ø24	466	120	60	314	154	PED7
408	162	438	462	120	Ø24	508	178	38	372	179	PED8
500	181	484	508	120	Ø24	558	178	41	415	191	PED10
508	203	534	558	120	Ø24	610	178	51	460	198	PED9A
600	210	546	570	128	Ø24	636	204	50	470	208	PED10A

Notes:

1) Overall length (L) is taken over seals

2) Pedestal design shown for representation only

Component Weights (kg)

Size Group	Free Bearing	Fixed Bearing	Inner Housing	Pedestal
200	2.08	2.29	5.2	6.50
208	2.86	3.19	7.9	9.00
300	4.18	4.61	10.1	16.00
308	6.41	7.09	15.2	18.50
400	8.94	9.83	29.8	25.50
408	13.55	14.85	31.9	45.00
500	17.73	19.21	43.4	59.20
508	21.09	23.11	55.8	84.00
600	22.85	25.00	61.8	97.60

Part Numbering and Ordering

The radial bearing and labyrinth seals are ***shaft size*** dependent and as such are given numbers which refer to the shaft size, either in mm for metric or inch for imperial. JHB offers imperial sizes in increments based on 16th inch, for example '215' would be 2 inches and 15/16, and '208' would be 2 inches and 8/16, equal to 2.5".

The radial bearing comprises the inner race, clamp rings, radial cage & roller assembly and radial outer race and is identified and ordered using a part numbering system with the shaft size referenced; For example, B050M for a metric shaft size of 50mm, and B200 for an imperial shaft size of 2 inches.

The remaining individual parts are group size dependent and are referenced as per the below table accordingly. For example, the 50mm bearing is from size group **200** and is referenced '**2**', hence other individual parts within that group will be referenced and marked '**2**' accordingly.

Size Ref No.	1	2	3	4	5	6	7	8	9	10
Size Group	108	200	208	300	308	400	408	500	508	600

Examples

"**C2**" **C**artridge ref **2** (also referred to as Inner Housing)

"**PED2**" **PED**estal ref **2** (also referred to as Outer Housing)

Labyrinth seals use the shaft size principle, where "**CTL**050**M**" is a **C**omposite **T**riple **L**abyrinth seal to suit a shaft of 50mm diameter. Likewise, "**CTL**215" is a seal to suit 2.15/16" shaft size. Note **M** denotes metric bore, to distinguish from imperial bores.

Typical Order References Are As Follows

Fixed bearing unit, pedestal mounted to suit 50mm shaft diameter:

Radial bearing:	**B050M**	quantity 1 required
Axial bearing:	**AB2**	quantity 2 required
Inner housing:	**C2**	quantity 1 required
Labyrinth seals:	**CTL050M**	quantity 2 required
Pedestal housing:	**PED2**	quantity 1 required

Free bearing unit, pedestal mounted to suit 2 15/16” shaft diameter:

Radial bearing:	**B215**	quantity 1 required
Axial bearing:	Not required	
Inner housing:	**C3**	quantity 1 required
Labyrinth seals:	**CTL215**	quantity 2 required
Pedestal housing:	**PED3**	quantity 1 required

Fixed bearing unit, pedestal mounted to suit 150mm shaft diameter
(Matching other manufacturer's Medium/02 series unit):

Radial bearing:	**B150M**	quantity 1 required
Axial bearing:	**AB10**	quantity 2 required
Inner housing:	**C10A**	quantity 1 required
Labyrinth seals:	**CTL150M**	quantity 2 required
Pedestal housing:	**PED10A**	quantity 1 required

Ordering Spare Components

When necessary replacement units can be ordered using the method stated above. However, a unique feature of the JHB split bearing is the ability to replace individual components within the radial and axial bearings as all bearing components are fully interchangeable. Components are marked with their unique reference number, simplifying the order process. After identifying those components needing to be replaced within the bearing use the following example based on the 2” size group (ref 2) bearings:

“**IR**050M” **I**nner **R**ace
“**CRA**2” **C**lamp **R**ing **A**ssembly
“**ROR**2” **R**adial **O**uter **R**ace
“**RCRA**2” **R**adial **C**age & **R**oller **A**ssembly
} (part of the radial bearing)

“**AR**2” **A**xial **R**ace
“**ACRA**2” **A**xial **C**age & **R**oller **A**ssembly
} (part of the axial bearing)

Please consult JHB for advice before ordering spare components.

Assembly and Installation Procedure

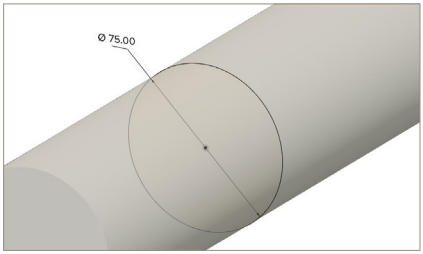
The following section shows a typical procedure for the assembly and installation of the JHB split roller bearing unit. Each bearing is supplied with detailed instructions in the box for use by the installer. The information given below is intended to guide engineers using this catalogue to understand the product and aid them in determining suitability for their machinery and plant. Further guidance on installation of specific bearings or applications can be provided by our Technical Department.

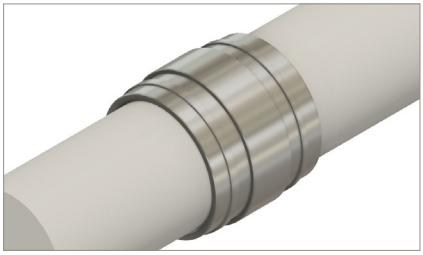
Preliminary Notes

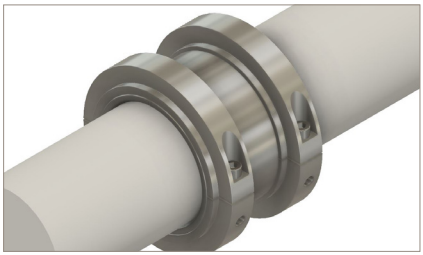
Determine the bearing positions and where possible install the fixed bearing first as this then locates the shaft axially. Wipe clean all bearing parts to remove preservative oil before fitting. All split components have marking numbers at the joint to identify matching halves. Lightly oil the shaft with thin oil. Other interfaces and threads should also be lubricated.

Stage 1:

Clean and inspect the shaft at the bearing seating. Determine the tolerance required from the table provided. When the two halves of the inner race are assembled around the shaft there should be a gap at each joint. This feature ensures the race is gripped to the shaft securely by the clamp ring halves. Maintain even joint gaps on the inner race and clamp rings. Soft packing can be used to equalise the inner race joint gaps. Fit the clamp rings with their joints approximately 90° to the inner race joints. Progressively tighten the clamp ring joint screws keeping all gaps equalised. With a soft faced hammer, tap the clamp ring halves to seat in their grooves. Finally, tighten the joint screws to the torque figure indicated in the provided table.



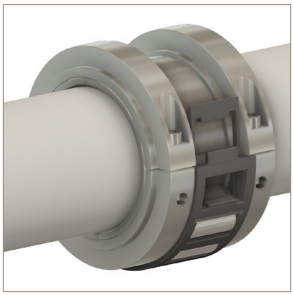
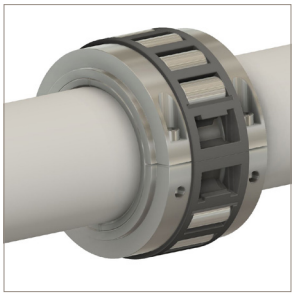
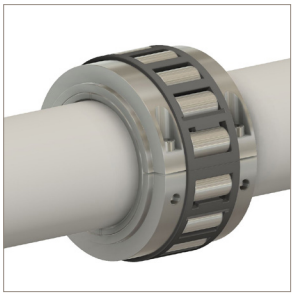




For expansion bearings, the inner race can be offset according to the amount of shaft thermal expansion, so that when operating temperature is reached, the rollers will run central to the outer race. When fitted, re-check the inner race and clamp ring joint gaps are equal and the race is correctly positioned axially.

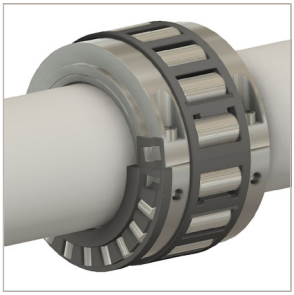
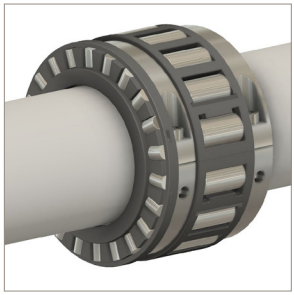
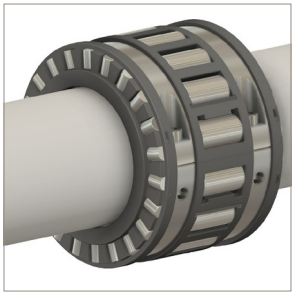
Stage 2:

The radial cage is supplied with some loose rollers which join the cage halves once assembled on the inner race. Apply a film of grease to the roller path and bore of the cage before placing the cage around the race. Insert the **joint coupler** with its bevel edge toward the shaft. The cage halves do not have matching numbers, instead each half has a male / female tenon. With the two halves around the inner race, fit the loose rollers with firm pressure until they lock in the pockets and retain the halves of the cage. Couplers can be fitted to one half of the cage before the cage is fitted. Rotate the cage to assemble the second joint.

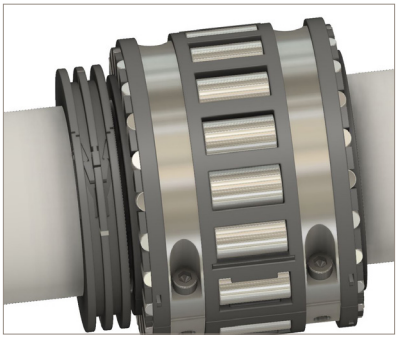
Stage 3 (applicable only for a locating bearing):

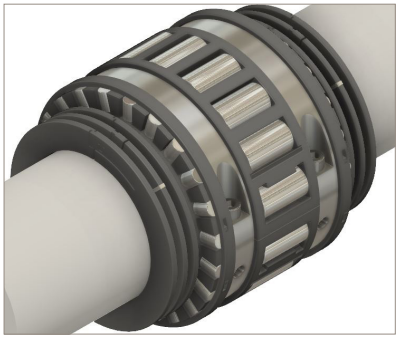
The axial cage halves are joined in a similar way to the radial cages. Apply a film of grease to the side face of the clamp ring and axial rollers.

Stage 4:

Individual instructions are supplied with each seal. Separate the seal halves using the release tool provided. Lubricate the bore of the seal and the shaft with a thin film of grease. Place the two halves of seal around the shaft ensuring the male / female joints correspond and compress the 'O' rings to clip the halves together. Once fitted, the seals can be moved axially to position them relative to the housing grooves (when the housing is fitted)

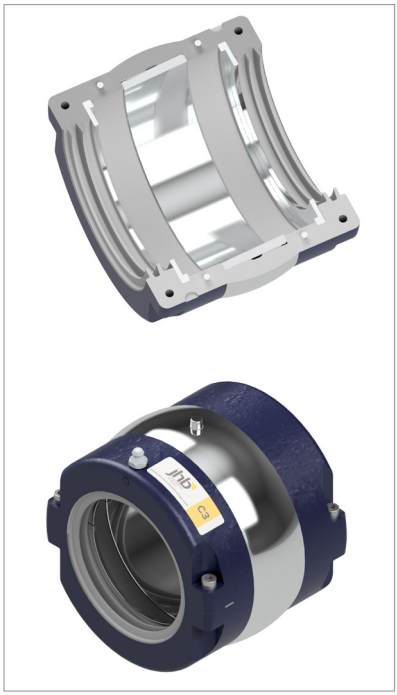




Stage 5:

Prime the small radial groove of the inner housing with grease. Take the radial outer race halves. The upper half is identifiable by the radial lubrication holes and must be fitted in the housing top half which has the lubrication nipple. Push the race halves into the seating grooves ensuring matching numbers coincide. The race joints will protrude slightly beyond the housing joints. Protect these faces when handling the halves.

For fixed bearings, place the axial races in their recesses as shown. When pushed fully into their seating the joints of the axial races will be slightly below the face of the housing.

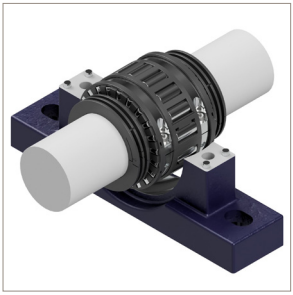


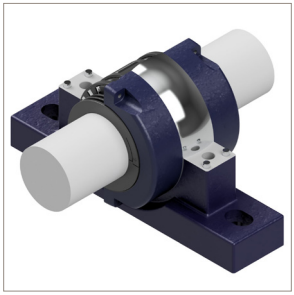
Stage 6:

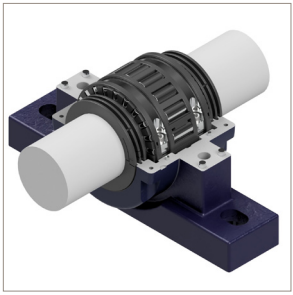
Apply lubricant to the inside surface of the housing, covering the fitted races. Coat the assembled cages & rollers on the inner race and add some grease to the labyrinths of the seals. The quantity of grease to be used in the bearing can be determined from the grease weights table.

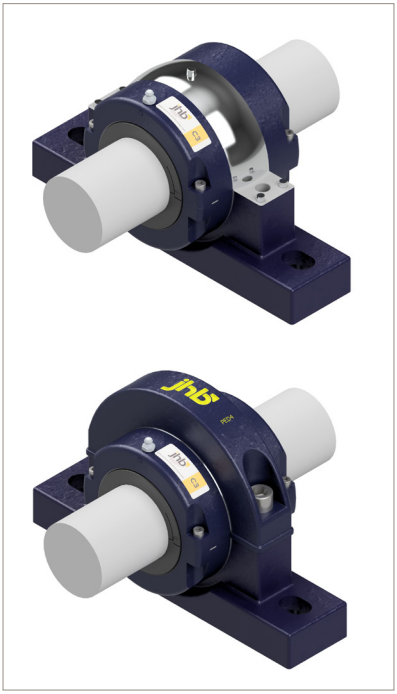
Stage 7:

With the pedestal base located in position, place the lower half of the inner housing on top of the shaft. Lubricate the spherical surfaces of pedestal and inner housing. Align the two spherical surfaces, ensure the labyrinth seals mate with their corresponding grooves and rotate the housing around the shaft into the pedestal base until both joint faces are aligned. It may be necessary to manually guide the axial rollers between the clamp rings and axial outer races whilst rotating the housing into position.









Stage 8:

Place the upper half of the inner housing on top of the shaft in position, ensuring the axial rollers & races align. Lower gently into position, then fit and progressively tighten the housing joint screws.

Shaft supports or jacks can now be removed.

Apply a thin film of grease to the spherical surfaces of the pedestal cap and the upper half of the inner housing. The pedestal cap can now be fitted, ensuring the matching numbers are together. Fit the joint screws, tighten then release approximately half a turn. Rotate the shaft by hand or under power for a few revolutions before finally tightening the cap screws. This allows the housings to align the bearing with the shaft.

Assembly Check List

- Clean bearing parts and shaft before installation
- Measure shaft to ensure it is within tolerance
- Keep matched component halves together
- Equalise joint gaps on both sides of inner race and clamp rings
- Inner race must be fully tightened
- Lubricate bearing during assembly NOT after
- Lubricate seal bores, labyrinths and housing spherical surfaces
- Tighten screws according to torque figures provided

Screw Sizes and Tightening Torques

(All screws are metric coarse thread, socket-head cap screws grade 12.9)

Size Group	Bearing Bore Ø (mm)	Bearing Bore Ø (inch)	Clamp Ring Joint Screw	Torque (Nm)	Cartridge Joint Screw	Torque (Nm)
108	30, 35, 40	1.1875" - 1.5"	M5	8.5	M5	6.5
200	45, 50	1.6875" - 2.0"	M5	8.5	M5	6.5
208	55, 60, 65	2.1875" - 2.5"	M5	8.5	M5	6.5
300	70, 75	2.6875" - 3.0"	M6	15	M6	11
308	80, 85, 90	3.1875"- 3.5"	M6	15	M6	11
400	100, 105	3.6875" - 4.0"	M6	15	M6	11
408	110, 115	4.1875" - 4.5"	M8	35	M8	26
500	120, 125, 130	4.6875" - 5.0"	M8	35	M8	26
508	135, 140	5.1875" - 5.5"	M8	35	M8	26
600	150, 155, 160	5.6875" - 6.0"	M8	35	M8	26

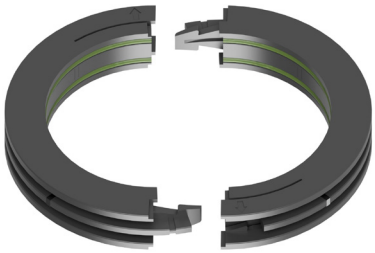
Pedestal	Joint Screw	Torque (Nm)
PED1	M10	52.5
PED2	M10	52.5
PED3	M12	90
PED4	M16	225
PED5	M20	420
PED6	M20	420
PED7	M24	712
PED8	M24	712
PED9	M24	712
PED10	M24	712
PED9A	M24	712
PED10A	M24	712

Hexagon Key Sizes

Screw Size	Key Size (A/F)
M5	4mm
M6	5mm
M8	6mm
M10	8mm
M12	10mm
M16	14mm
M20	17mm
M24	19mm

SEALTRAIN® Triple Labyrinth Seals

Peak performance and long life of the roller bearing depends on keeping contaminants out of the bearing and protecting the lubricant within the housing. The lubricant not only enhances the running of the bearing but also protects the bearing surfaces from corrosion. Effective sealing and maintaining the integrity of the housing is therefore of prime importance.



JHB bearing units incorporate an inner/outer housing with a spherical ball socket which maintains the Sealtrain® multi labyrinth seals concentric with the shaft even under shaft/mounting structure misalignment. This allows the use of tight running clearances between seal and inner housing seal bore surfaces.

Sealtrain® seals are directly interchangeable with other manufacturer triple labyrinth seals and can replace both nitrile rubber and aluminium seals. They can be ordered separately to the inner housing, specific to the shaft size required.

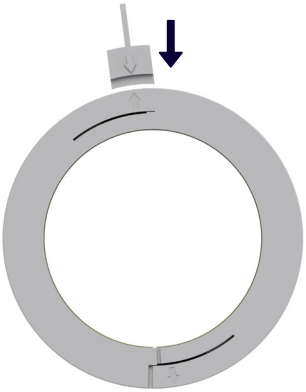
Sealtrain® seals can be fitted and released in seconds using the handy release tool which comes as standard with each seal.

- Compatible with all major split roller bearing manufacturer's housings
- Can replace nitrile rubber and aluminium types
- Intrinsically safe – can be used where aluminium is prohibited
- Gripped on the shaft with Viton 'O' rings as standard
- Suitable for temperatures from -20° to 150°C
- Ease of installation. No tools required
- Simple to remove using the removal tool supplied with each seal
- Lighter than other types of triple labyrinth seals
- Operates up to bearing maximum speeds
- Special shaft sizes easily accommodated with bespoke seals
- Can be manufactured to suit worn shafts

Seal Installation / Disassembly

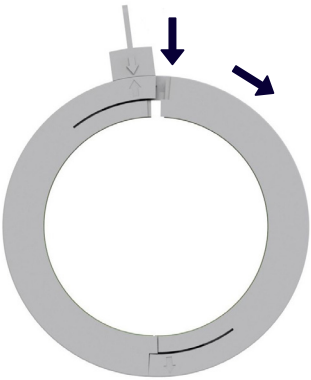
Each seal is supplied assembled in the box. Remove the seal and release tool from the box. Separate each seal into its two halves using the release tool as follows:

1



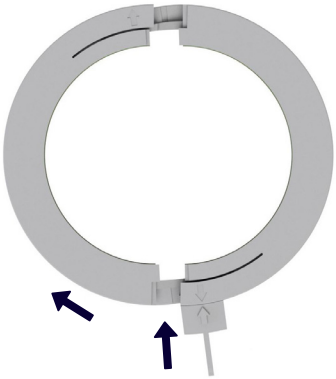
Insert tool, aligning arrows on seal and tool

2



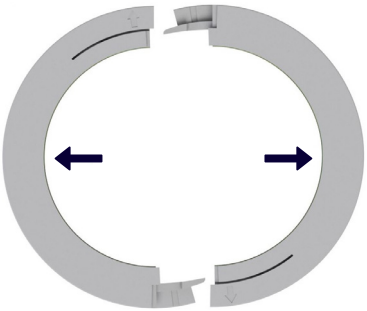
Press and hold tool whilst applying light pressure to the bore of the seal until the joint separates

3

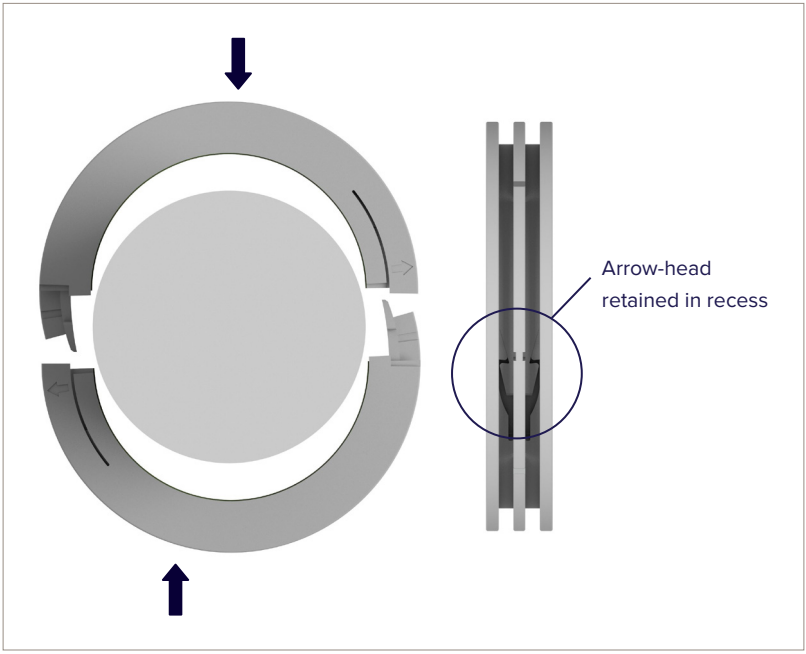


Repeat action on opposite joint

4



Pull both seal halves apart



Seal Installation

1) The seals can be installed before or after the radial & axial bearings are assembled. If fitted before the bearing, slide the seals axially away to each side of the bearing position allowing space to assemble the bearing.
2) Lightly lubricate the bore of each seal half, ensuring the 'O' rings remain in place.
3) Place both halves around the shaft ensuring male and female joints are aligned.
4) Clip the two halves together so that the 'arrow-head' is retained in the corresponding recess. Use jubilee clip if tight
5) Move the assembled seals into their correct position by sliding along the shaft.
6) Greasing the labyrinths before closing the cartridge serves to lubricate the seals and adds an additional grease barrier against contamination.
7) Seals rotate with the shaft and axially align themselves with their corresponding cartridge grooves during operation.

Blanking Plates are available to seal the end bore where the shaft terminates within the inner housing. Blanking plates are ordered specific to the inner housing.

Bearing Lubrication

JHB split bearing units are designed for grease lubrication. Grease is easier to retain in the housing than oil, offering reduced lubricant loss and improved sealing. It also offers better protection against corrosion to the rolling surfaces. Lubricant is directly injected into the path of the rollers for optimum distribution throughout the radial and axial bearings.

Inner housing lubrication points are tapped 1/8" NPT and fitted with nipples for grease lubrication. Grease nipples can be replaced with other fittings or pipes, however pipework must be flexible to allow the inner/outer housing spherical ball joint to operate correctly. BSP fittings may be used, but care must be taken to avoid blocking off the lubrication cross drilling in the inner housing as BSP fittings generally screw in further than NPT fittings.

Lubricant Type

Greases of NLGI No.2 designation are recommended for most applications. For centrally pumped systems a No.1 grease may be used for increased pumpability.

Greases with extreme pressure (EP) additives are recommended. However, JHB split bearing units do not rely upon EP greases being used to achieve the axial capacities listed, unlike existing manufacturers units.

Grease with a lithium complex thickener is usually used for normal applications operating at temperatures between 0° and 80°C. When water resistance is required a grease with an aluminium complex thickener can be used. Some greases are immiscible with each other so if changing lubricants, the bearing unit must be solvent-cleaned of the old lubricant before using the new lubricant.

Please contact our Technical Department if lubrication advice is required.

Grease Quantity For Initial Lubrication

The quantity of grease required for initial lubrication is dependent upon operating speed. For slow applications the bearing and housing can be packed full of grease, however at higher speeds excessive grease will cause the bearing to overheat.

The following table shows the fully packed quantity of grease for each housing size. The actual amount should be estimated using the percentage of this quantity factored according to the shaft speed.

Fully Packed Grease Quantity

Group Size	Inner Housing Ref	Grease Quantity (g)	Inner Housing Ref	Grease Quantity (g)
108	C1	35	-	-
200	C2	55	C2A	55
208	C3	75	C3A	75
300	C4	90	C4A	90
308	C5	140	C5A	140
400	C6	190	C6A	190
408	C7	260	C7A	260
500	C8	300	C8A	300
508	C9	350	C9A	350
600	C10	400	C10A	400

Estimation of the quantity required depending on the speed can be made using the table below.

Speed Range			Percentage
0	→	50,000dn	100%
50,000dn	→	100,000dn	75%
150,000dn	→	200,000dn	50%
Above 200,000dn			25%

The routine greasing interval is dependent upon operating speed, temperature and environment. As a guide, the re-lubrication quantity should be around 2 – 3 grams given at the following interval:

- Radial bearing with axial bearing (fixed or thrust arrangement) re-grease every 100 hours
- Radial bearing only (expansion arrangement) re-grease every 400 hours

Temperature Characteristics

The normal operating temperature range for the bearing is from 0° to 100°C. Operating temperatures outside of this range will require consideration for lubrication, seals and materials of construction. Please consult our Technical Department for further advice.

Condition Monitoring Frequency Data

Condition monitoring of machinery is used to identify significant changes which in turn indicates developing faults and is a major component of the predictive maintenance process. By using the bearing frequency data listed below, machine operators can input the correct information into condition monitoring equipment, enabling them to identify and monitor potential faults and schedule maintenance procedures accordingly. Successful use of this system reduces downtime by enabling repairs to be planned, avoiding the possibility of catastrophic failure and breakdowns.

Bearing component frequencies are given per shaft revolution and can be explained as follows:

Cage (Radial): The frequency at which a point on the radial cage rotates relative to the inner housing.
(Axial): The frequency at which a point on the axial cage rotates relative to the inner housing.

Roller (Radial): The frequency at which a point on a given radial roller contacts the inner race or radial outer race or the radial cage roller pocket.
(Axial): The frequency at which a point on a given axial roller contacts the clamp ring or axial outer race or the axial cage roller pocket.

Outer (Radial): The frequency at which a point on the radial outer race contacts the radial rollers.
(Axial): The frequency at which a point on the axial outer race contacts the axial rollers.

Inner (Radial): The frequency at which a point on the inner race contacts the radial rollers.
(Axial): The frequency at which a point on the clamp ring contacts the axial rollers.

Roller details, such as PCD, number of rollers and their diameter are often required in monitoring and are included on the following page.

Radial Data

Size Group	Bearing Bore Ø		Cage	Roller	Outer	Inner	Radial PCD (mm)	No. of Rollers	Roller Ø (mm)
	(mm)	(inch)							
108	30, 35, 40	1.1875" - 1.5"	0.404	2.516	4.851	7.149	62.687	12	12
200	45, 50	1.6875" - 2.0"	0.415	2.845	5.806	8.194	76.20	14	13
208	55, 60, 65	2.1875" - 2.5"	0.423	3.152	6.761	9.239	90.424	16	14
300	70, 75	2.6875" - 3.0"	0.425	3.251	6.797	9.203	106.426	16	16
308	80, 85, 90	3.1875" - 3.5"	0.427	3.366	7.691	10.309	123.80	18	18
400	100, 105	3.6875" - 4.0"	0.429	3.463	7.727	10.273	141.351	18	20
408	110, 115	4.1875" - 4.5"	0.431	3.539	7.753	10.247	158.75	18	22
500	120, 125, 130	4.6875" - 5.0"	0.431	3.569	8.626	11.374	174.625	20	24
508	135, 140	5.1875" - 5.5"	0.434	3.744	8.688	11.312	190.50	20	25
600	150, 155, 160	5.6875" - 6.0"	0.438	4.002	9.647	12.353	203.20	22	25

Axial Data

Size Group	Bearing Bore Ø		Cage	Roller	Outer	Inner	Axial PCD (mm)	No. of Rollers	Roll-er Ø (mm)
	(mm)	(inch)							
108	30, 35, 40	1.1875" - 1.5"	0.500	5.724	12.000	12.000	62.687	24	6
200	45, 50	1.6875" - 2.0"	0.500	6.850	12.000	12.000	76.20	24	6
208	55, 60, 65	2.1875" - 2.5"	0.500	6.152	12.000	12.000	90.424	24	8
300	70, 75	2.6875" - 3.0"	0.500	7.152	12.000	12.000	106.426	24	8
308	80, 85, 90	3.1875" - 3.5"	0.500	6.690	12.000	12.000	123.80	24	10
400	100, 105	3.6875" - 4.0"	0.500	7.568	14.000	14.000	141.351	28	10
408	110, 115	4.1875" - 4.5"	0.500	7.115	14.000	14.000	158.75	28	12
500	120, 125, 130	4.6875" - 5.0"	0.500	7.776	14.000	14.000	174.625	28	12
508	135, 140	5.1875" - 5.5"	0.500	7.304	14.000	14.000	190.50	28	14
600	150, 155, 160	5.6875" - 6.0"	0.500	7.757	14.000	14.000	203.20	28	14

Typically, velocity of a new bearing could be 4mm/s (RMS) and alarm levels should be set to 15mm/s (RMS), however experience and monitoring trends will assist with establishing alarm and shut-down levels.

Other Products & Services from the Bowman Group

Linear Bearings & Guides

John Handley bearings is proud to hold distributorships with NSK Linear and Thomson Linear and holds considerable stock of both manufacturers products. JHB also offer a same day cutting service.

Plain Bearings

Bowman International is one of the leading suppliers and manufacturers of plain bearings in the UK and holds one of the largest stock profiles of plain bearings in the world.

Sintered Parts

Bowman can offer shaped sintered components in a variety of iron or bronze materials and have the ability to produce complex shaped parts to close tolerances in volume at much lower cost than conventional methods of forming.

Volume 3D Printing

Bowman Additive Production is the 3D printing division of the group. Using the latest HP Multi Jet Fusion technology, Bowman AP offers a full production 3D printing service from design to manufacture.

Rod Ends & Spherical Bearings

John Handley Bearings stock a large range of metric and imperial rod ends and spherical bearings from a wide range of manufacturers.

Inspection & Testing

Bowman International's inhouse bearing test facility is able to determine bearing capabilities and provide fault analysis for plain and rolling element bearings. Our inspection facility guarantees the quality of each bearing that leaves our premises.

For more information about the Bowman Group or any of our products or services visit www.bowman.co.uk.
You can also email us on info@bowman.co.uk or call +44 (0) 1235 462500.

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