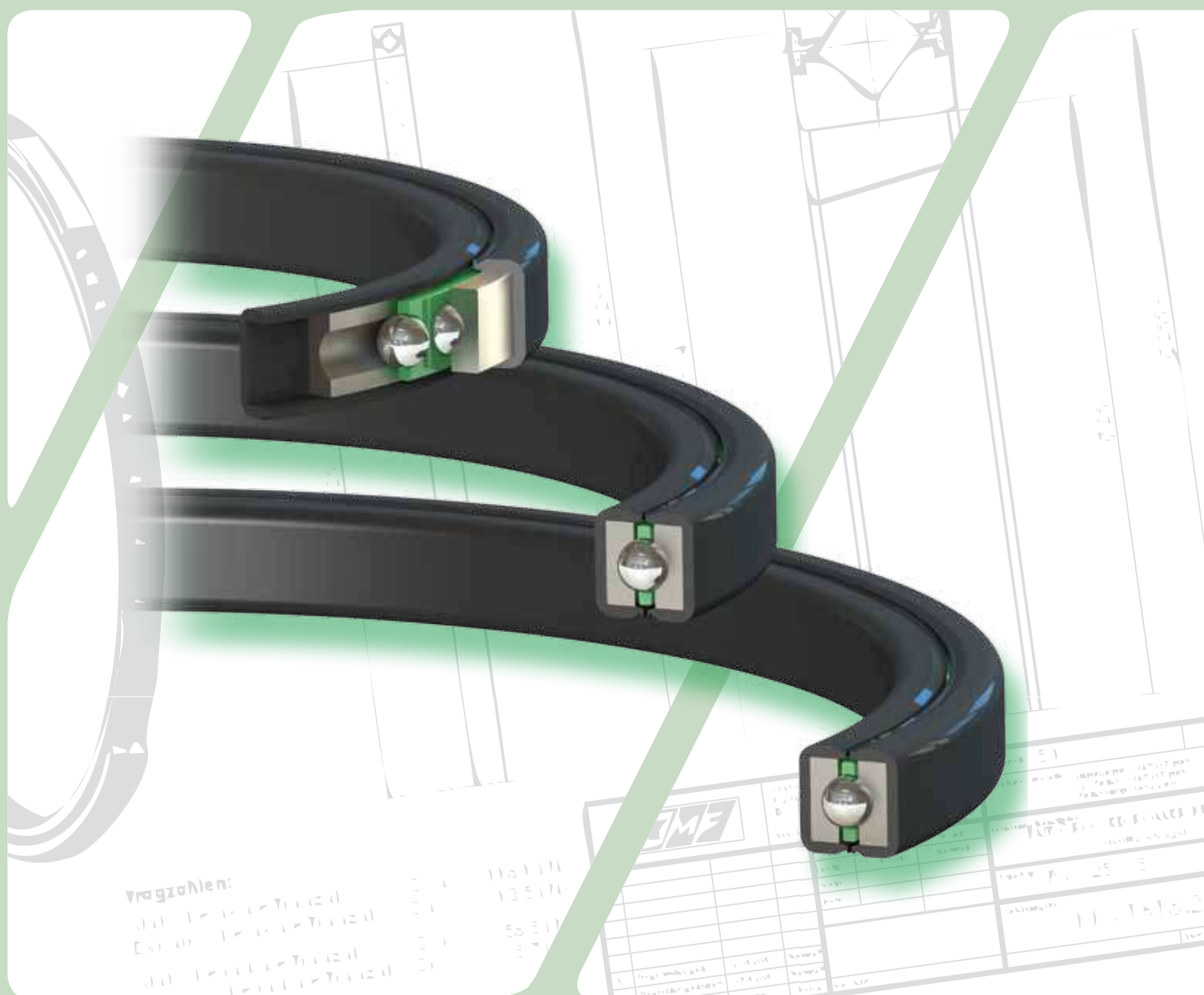


Whisper thin ring bearing
PFXD



Description of shape

The Whisper-Thin ring bearing consists of a thin ring bearing type series PBXD, which is covered on the outer and inner ring with an sheath with a hardness of 70 Shore.

Operating conditions

The temperature limits of the standard bearing in continuous operation are -40°C and +80°C. This Whisper-Thin ring bearing has more outstanding features.

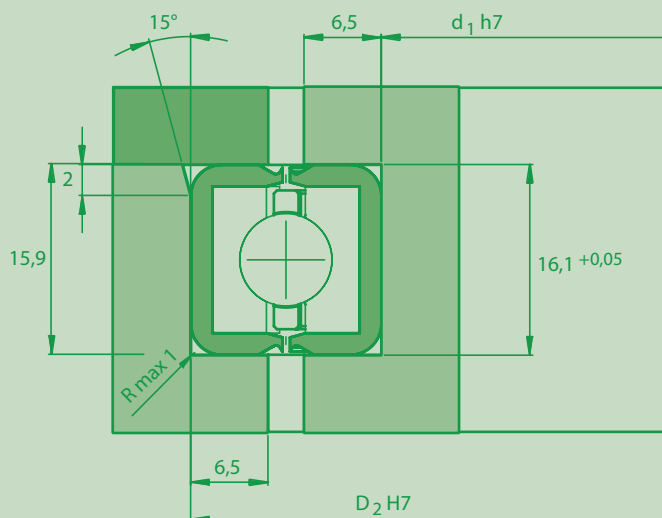
Features

- Low operating noise
- Low impact sound
- Insusceptible to shock
- Bearing clearance adjustable, due to the splitted bearing rings and elastomer sheath
- Large installation tolerances on the connecting parts
- The raceway system is protected from rough contamination due to reduction of the bearing gap

SLIM-SPLIT-BEARING

four point contact bearing

Fitted dimensions



Bearing dimensions

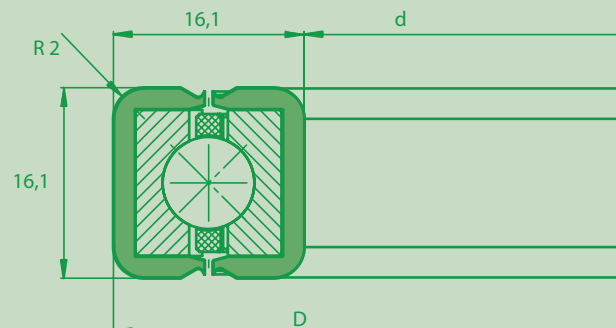


Table of dimensions (Type series PFXD)

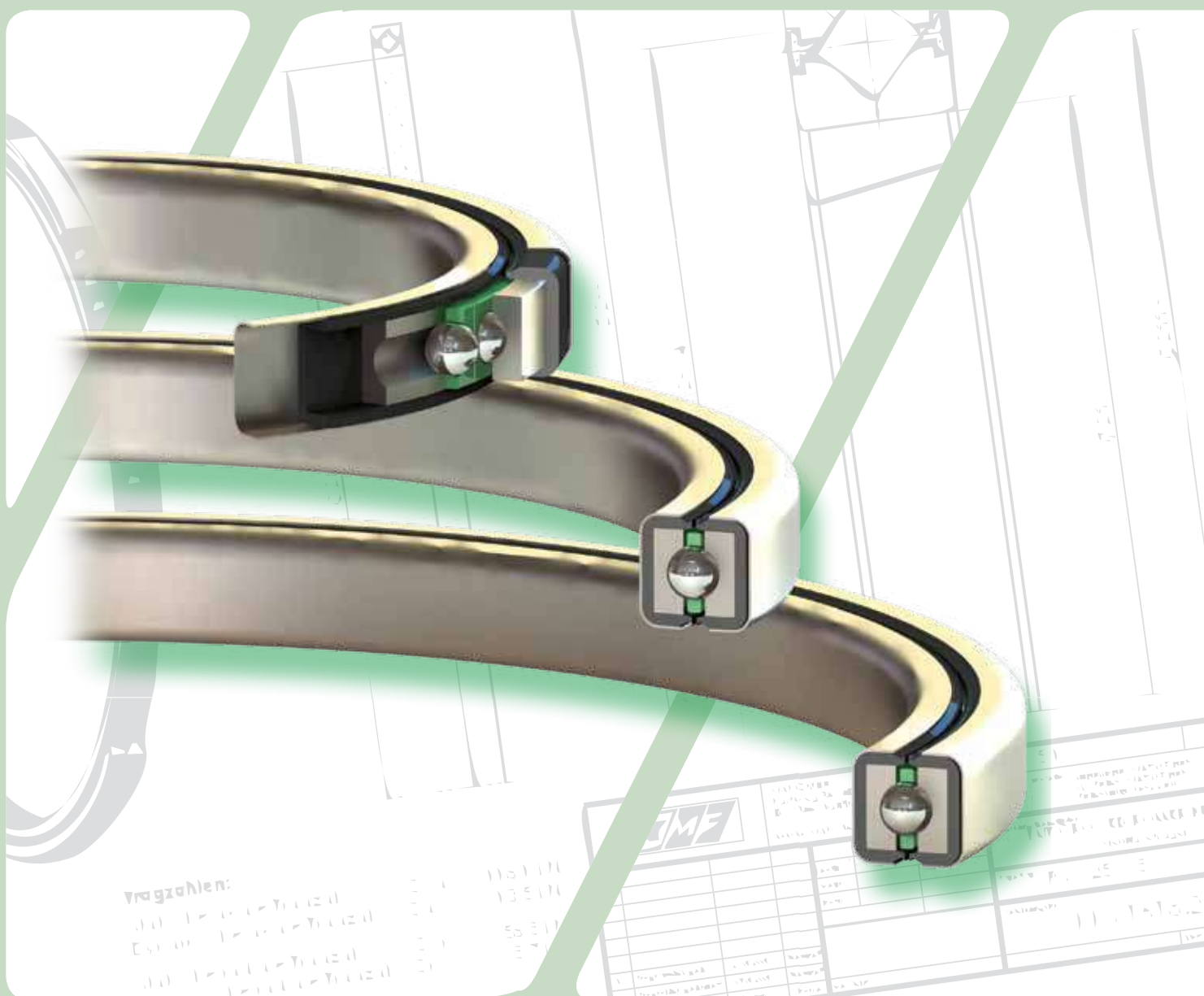
KMF-type ¹⁾	Bearing- dimension		Fitted dimensions		Basic load ratings				Mass	Limiting speeds
					Axial		Radial			
	d	D	d ₁	D ₂	Dyn.	Stat.	Dyn.	Stat.		
					C _a	C _{oa}	C _r	C _{or}	n _{G grease}	
mm	mm	mm	mm	kN	kN	kN	kN	kg	min ⁻¹	
PFXD 070	174,40	206,60	174,4	205,8	20,4	93,6	18,5	37,4	0,623	860
PFXD 075	187,10	219,30	187,1	218,5	21,0	100,8	19,1	40,5	0,668	800
PFXD 080	199,80	232,00	199,8	231,2	21,4	107,1	19,4	42,8	0,714	750
PFXD 085	212,50	244,70	212,5	243,9	21,8	113,4	19,8	45,0	0,759	710
PFXD 090	225,20	257,40	225,2	256,6	22,4	121,5	20,3	48,6	0,804	670
PFXD 095	237,90	270,10	237,9	269,3	23,0	126,9	20,6	51,3	0,850	630
PFXD 100	250,60	282,80	250,6	282,0	23,0	133,2	21,0	53,1	0,895	600
PFXD 105	263,30	295,50	263,3	294,7	23,9	141,3	21,5	56,7	0,940	570
PFXD 110	276,00	308,20	276,0	307,4	23,9	146,7	21,8	58,5	0,985	550
PFXD 115	288,70	320,90	288,7	320,1	24,3	153,0	22,1	61,2	1,030	520



KMF-type ¹⁾	Bearing- dimension		Fitted dimensions		Basic load ratings				Mass	Limiting speeds
					Axial		Radial			
	d	D	d ₁	D ₂	Dyn.	Stat.	Dyn.	Stat.		
					C _a	C _{oa}	C _r	C _{or}		n _{G grease}
mm	mm	mm	mm	kN	kN	kN	kN	kg	min ⁻¹	
PFXD 120	301,40	333,60	301,40	332,80	24,8	161,1	22,5	64,8	1,075	500
PFXD 130	326,80	359,00	326,80	358,20	25,7	172,8	22,7	69,3	1,164	460
PFXD 140	352,20	384,40	352,20	383,60	26,1	187,2	23,9	74,7	1,253	430
PFXD 150	377,60	409,80	377,60	409,00	27,0	200,7	24,3	80,1	1,343	400
PFXD 160	403,00	435,20	403,00	434,40	27,5	213,3	24,3	85,5	1,433	380
PFXD 170	428,40	460,60	428,40	459,80	28,4	225,0	25,7	90,9	1,522	350
PFXD 180	453,80	486,00	453,80	485,20	28,8	243,0	26,1	96,3	1,612	330
PFXD 190	479,20	511,40	479,20	510,60	29,3	252,0	26,6	100,8	1,702	320
PFXD 200	504,60	536,80	504,60	536,00	29,7	265,5	27,0	107,1	1,791	300
PFXD 210	530,00	562,20	530,00	561,40	30,2	279,0	27,5	111,6	1,881	290
PFXD 220	555,40	587,60	555,40	586,80	31,1	292,5	27,9	117,0	1,970	270
PFXD 230	580,80	613,00	580,80	612,20	31,1	306,0	28,4	122,4	2,060	260
PFXD 240	606,20	638,40	606,20	637,60	32,0	319,5	28,8	127,8	2,150	250
PFXD 250	631,60	663,80	631,60	663,00	32,4	333,0	29,3	133,2	2,239	240
PFXD 260	657,00	689,20	657,00	688,40	32,9	346,5	29,7	138,6	2,329	230
PFXD 270	682,40	714,60	682,40	713,80	33,3	360,0	30,2	143,1	2,418	220
PFXD 280	707,80	740,00	707,80	739,20	33,8	373,5	30,6	149,4	2,508	210
PFXD 290	733,20	765,40	733,20	764,60	34,2	387,0	31,1	154,8	2,597	210
PFXD 300	758,60	790,80	758,60	790,00	34,7	400,5	31,1	159,3	2,687	200
PFXD 310	784,00	816,20	784,00	815,40	35,1	414,0	31,5	164,7	2,776	190
PFXD 320	809,40	841,60	809,40	840,80	35,6	427,5	32,0	171,0	2,866	190
PFXD 330	834,80	867,00	834,80	866,20	35,6	436,5	32,4	175,5	2,956	180
PFXD 340	860,20	892,40	860,20	891,60	36,0	450,0	32,9	180,9	3,045	180
PFXD 400	1012,60	1044,80	1012,60	1044,00	39,0	529,5	35,7	213,4	3,596	155
PFXD 405	1025,30	1057,50	1025,30	1056,70	39,3	536,0	35,9	216,0	3,641	150
PFXD 417	1057,05	1089,25	1057,05	1088,45	39,9	552,5	36,5	222,7	3,754	145
PFXD 420	1063,40	1095,60	1063,40	1094,80	40,0	556,0	36,6	224,0	3,776	140

1) Other dimensions on request

Sleeve whisper
thin ring bearing HFXD



Description of shape

A thorough going further development of the KMF-Slim bearing PBXC led, via the whisper bearing PFXC, to the Sleeve-Whisper bearing HFXD. The well-known "C" cross-section of 9,525 x 9,525 mm was enlarged by an elastomer housing and a sleeve to a bearing cross-section of 12,925 x 12,925 mm.

The thin-walled sleeve is made of steel, the hardness of the elastomer housing is 70 Shore.

Operating conditions

Operating temperature from -40°C to $+80^{\circ}\text{C}$.

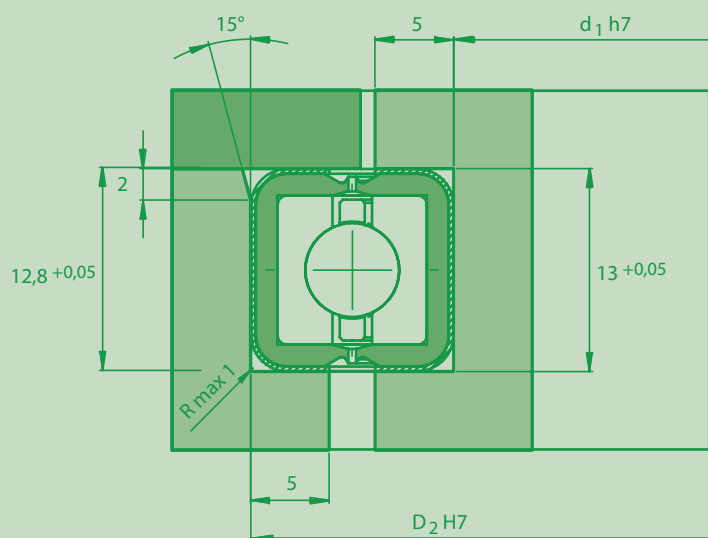
Features

- Low operating noise
- Low impact sound
- Insusceptible to shock
- Bearing clearance adjustable, due to the splitted bearing rings, sleeves and elastic sheath
- Large installation tolerances on the connecting parts
- The splitted bearing rings eliminates functional difficulties resulting through different material expansions, e. g. different material combinations as light metal steel and cast iron
- Corrosion resistant
- Low maintenance
- High static and dynamic load capacities
- High durability
- Low Mass
- The raceway system is protected from rough contamination due to reduction of the bearing gap

SLIM-SPLIT-BEARING

four point contact bearing

Fitted dimensions



Bearing dimensions

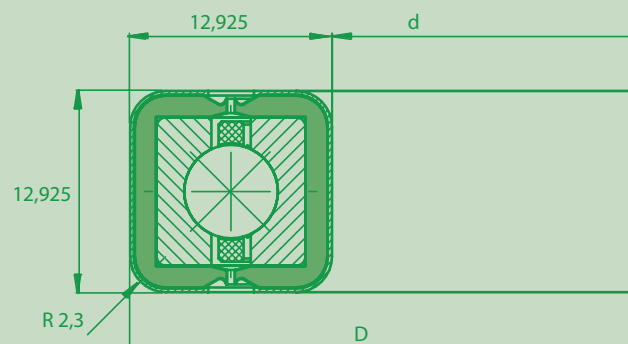


Table of dimensions (Type series HFXD)

KMF-type ¹⁾	Bearing- dimension		Fitted dimensions		Basic load ratings				Mass	Limiting speeds
					Axial		Radial			
	d	D	d ₁	D ₂	Dyn.	Stat.	Dyn.	Stat.		
					C _a	C _{oa}	C _r	C _{or}	n _{G grease}	
mm	mm	mm	mm	kN	kN	kN	kN	kg	min ⁻¹	
HFXD 070	174,4	200,25	174,4	200,1	10,9	60,8	9,9	24,2	0,35	880
HFXD 075	187,1	212,95	187,1	212,8	11,1	64,6	10,1	26,1	0,38	820
HFXD 080	199,8	225,65	199,8	225,5	11,4	69,4	10,4	27,6	0,40	760
HFXD 085	212,5	238,35	212,5	238,2	11,6	73,2	10,6	29,5	0,43	720
HFXD 090	225,2	251,05	225,2	249,9	11,9	77,9	10,7	30,9	0,45	680
HFXD 095	237,9	263,75	237,9	263,6	12,2	82,7	11,0	33,3	0,48	640
HFXD 100	250,6	276,45	250,6	276,3	12,4	86,5	11,2	34,7	0,50	610
HFXD 105	263,3	289,15	263,3	289,0	12,6	91,2	11,4	36,6	0,53	580
HFXD 110	276,0	301,85	276,0	301,7	12,8	95,0	11,6	38,0	0,55	550
HFXD 115	288,7	314,55	288,7	314,4	13,0	99,8	11,8	39,9	0,58	530
HFXD 120	301,4	327,25	301,4	327,1	13,2	103,6	12,0	41,3	0,60	510
HFXD 130	326,8	352,65	326,8	352,5	13,6	112,1	12,3	44,7	0,65	470
HFXD 140	352,2	378,05	352,2	377,9	14,0	120,7	12,6	48,5	0,70	430

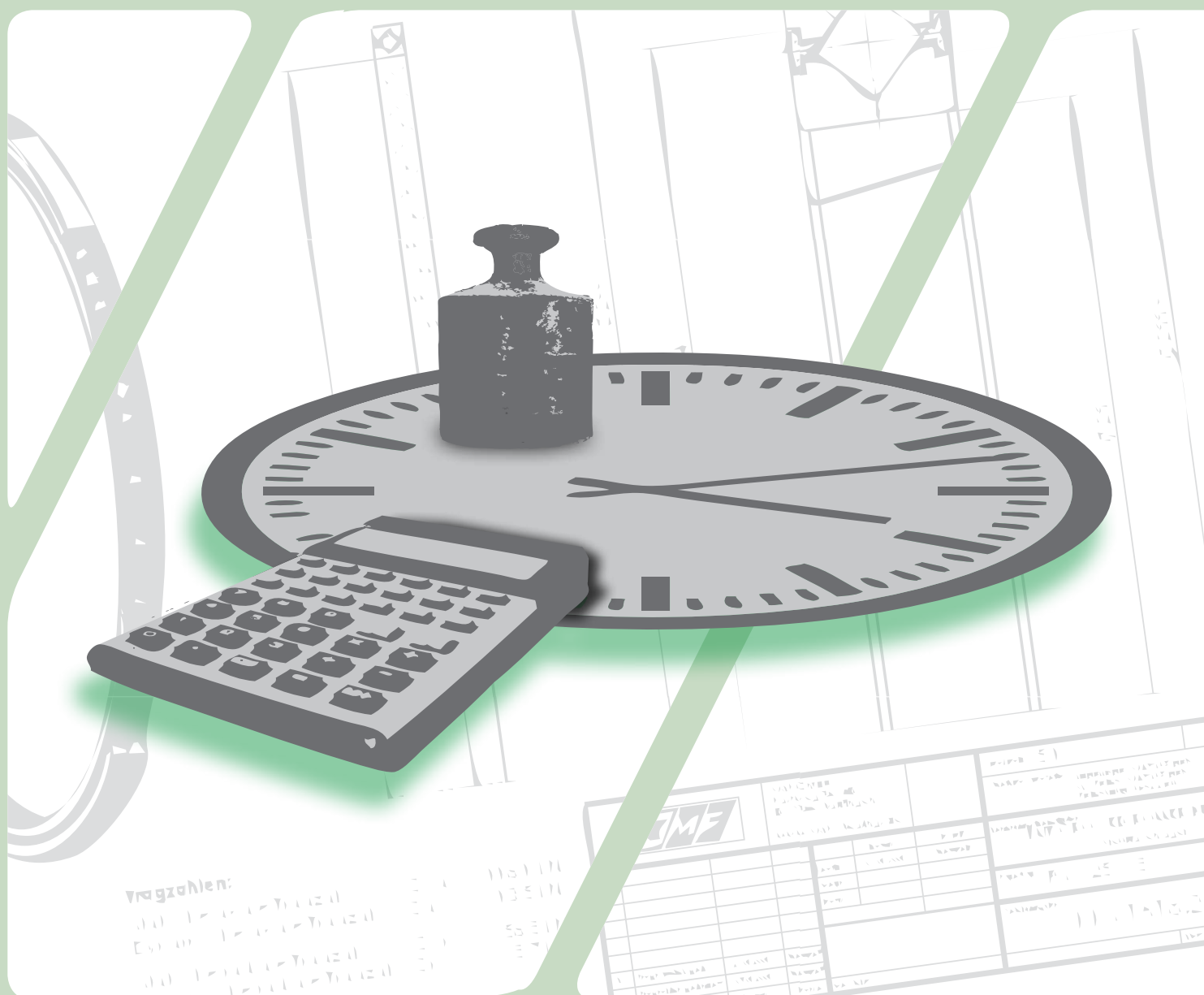


KMF-type ¹⁾	Bearing- dimension		Fitted dimensions		Basic load ratings				Mass	Limiting speeds
					Axial		Radial			
	d	D	d ₁	D ₂	Dyn.	Stat.	Dyn.	Stat.		
					C _a	C _{oa}	C _r	C _{or}		n _{G grease}
	mm	mm	mm	mm	kN	kN	kN	kN	kg	min ⁻¹
HFXD 150	377,6	403,45	377,6	403,3	14,3	129,2	12,9	51,3	0,75	400
HFXD 160	403,0	428,85	403,0	428,7	14,6	137,8	13,2	55,1	0,80	380
HFXD 170	428,4	454,25	428,4	454,1	14,9	146,3	13,5	58,9	0,85	360
HFXD 180	453,8	479,65	453,8	479,5	15,3	154,9	13,8	61,8	0,90	340
HFXD 190	479,2	505,05	479,2	504,9	15,6	163,4	14,1	65,6	0,95	320
HFXD 200	504,6	530,45	504,6	530,3	15,9	172,0	14,3	68,4	1,00	300
HFXD 210	530,0	555,85	530,0	555,7	16,2	180,5	14,6	72,2	1,05	290
HFXD 220	555,4	581,25	555,4	581,1	16,4	189,1	14,8	75,1	1,10	270
HFXD 230	580,8	606,65	580,8	606,5	16,7	197,6	15,1	78,9	1,15	260
HFXD 240	606,2	632,05	606,2	631,9	17,0	206,2	15,3	82,7	1,20	250
HFXD 250	631,6	657,45	631,6	657,3	17,2	214,7	14,6	85,5	1,25	240
HFXD 260	657,0	682,85	657,0	682,7	17,5	223,3	15,8	89,3	1,30	230
HFXD 300	758,6	784,45	758,6	784,3	18,3	256,5	16,6	102,6	1,50	200

1) Other dimensions on request

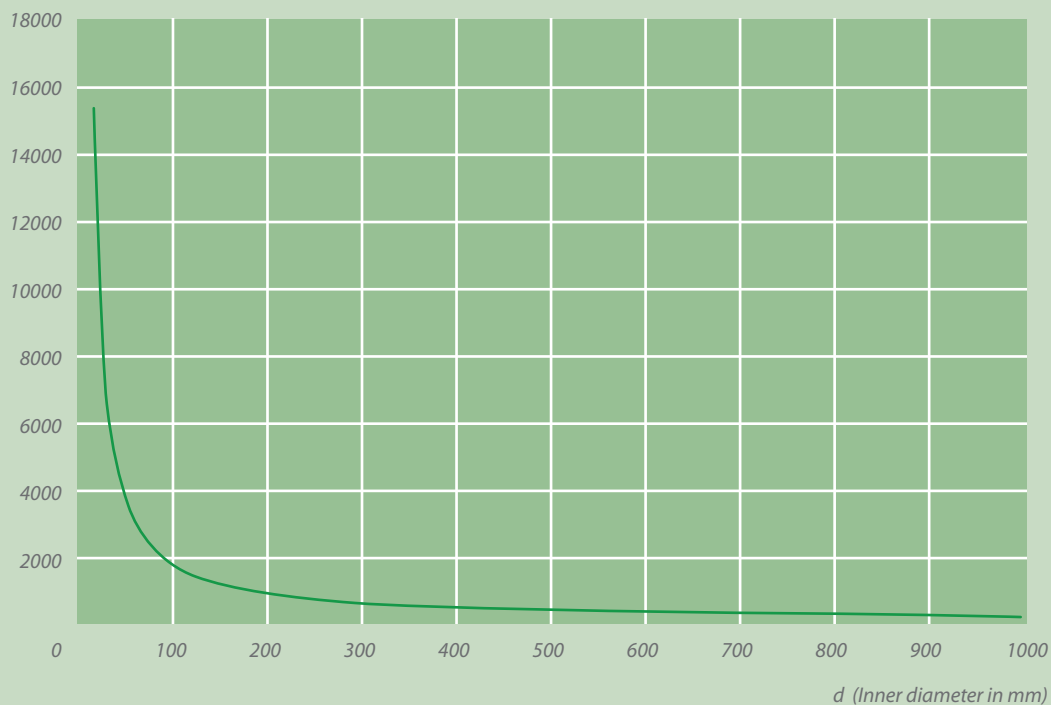
Example of calculations for combined static strength and nominal service life

$$S_0 = \frac{14,6}{42} = 2,7$$



Characteristics of the limiting speeds

n (revolutions per minute in min^{-1})



SLIM-SPLIT-BEARING

Calculation of Static Strength

Given:

PBXC 115

Static Basic load ratings $C_{0a} = 114,6 \text{ kN}$

Bearing Loads:

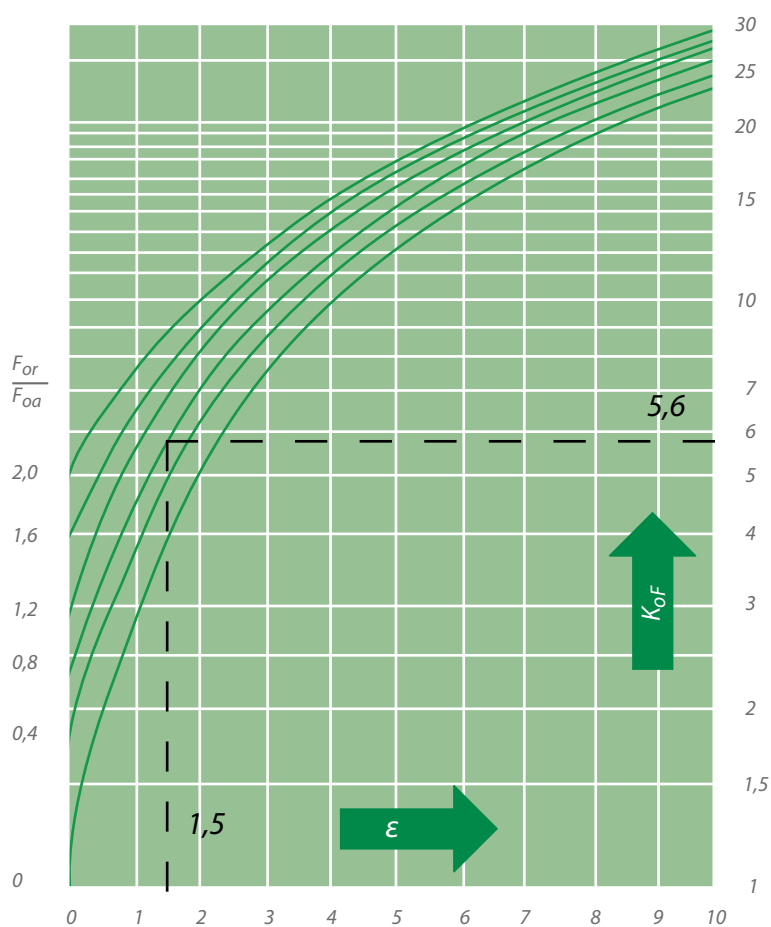
Axial Load $F_{0a} = 7,5 \text{ kN}$

Radial Load $F_{0r} = 6,0 \text{ kN}$

Tilting Torque $M_{0k} = 1,7 \text{ kNm}$

Wanted:

Static Safety Factor



Static Load Factor K_{0F} for four point thin ring bearing

ϵ = Load eccentricity value

D_L = Pitch circle diameter $\varnothing$ in mm = $\frac{d + D}{2}$

$$\epsilon = \frac{2 \cdot M_{0k}}{F_{0a} \cdot D_L} \cdot 10^3$$

$$\epsilon = \frac{2 \cdot 1,7}{7,5 \cdot 301,6} \cdot 10^3 = 1,5$$

$$\frac{F_{0r}}{F_{0a}} = \frac{6}{7,5} = 0,8 \quad K_{0F} = 5,6$$

$$P_0 = F_{0a} \cdot K_{0F} = 7,5 \cdot 5,6 = 42 \text{ kN}$$

$$\text{Static Safety Factor } S_0 = \frac{C_{0a}}{P_0}$$

$$S_0 = \frac{114,6}{42} = 2,73$$

Calculation of Service Life

Given:

PBXC 115

Dynamic Basic load ratings $C_a = 20 \text{ kN}$

Bearing Loads:

Axial Load $F_a = 2,50 \text{ kN}$

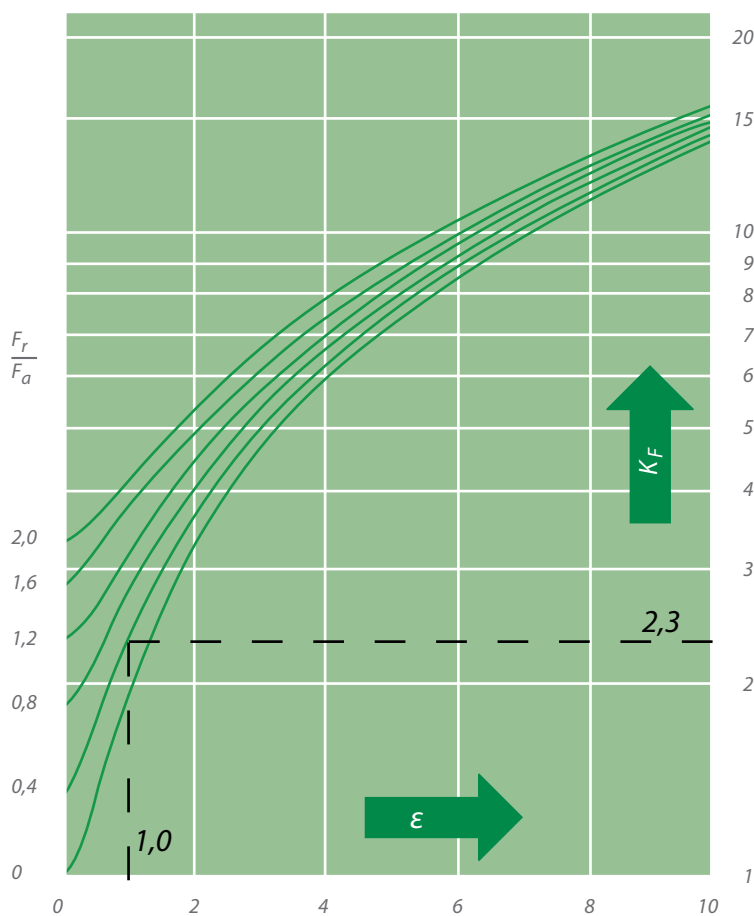
Radial Load $F_r = 1,00 \text{ kN}$

Tilting Torque $M_k = 0,38 \text{ kNm}$

Speed $n = 20 \text{ min}^{-1}$

Wanted:

Nominal Service Life



Dynamic Load Factor K_F for four point thin ring bearing

ϵ = Load eccentricity value

$$D_L = \text{Pitch circle diameter } \varnothing \text{ in mm} = \frac{d + D}{2}$$

$$\epsilon = \frac{2 \cdot M_k}{F_a \cdot D_L} \cdot 10^3$$

$$\epsilon = \frac{2 \cdot 0,38}{2,5 \cdot 301,6} \cdot 10^3 = 1,0$$

$$\frac{F_r}{F_a} = \frac{1,0}{2,5} = 0,4 \quad K_F = 2,3$$

$$P = F_a \cdot K_F = 2,5 \cdot 2,3 = 5,75 \text{ kN}$$

$$\text{Service Life } L_h = \frac{16666}{n} \cdot \left(\frac{C_a}{P} \right)^3$$

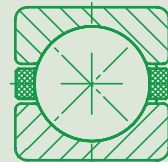
$$L_h = \frac{16666}{20} \cdot \left(\frac{20}{5,75} \right)^3 = 35000 \text{ h}$$

AXIAL-SLIM-SPLIT-BEARING

Axial-Ball thrust bearing
PBAU 4,5 x 4,5



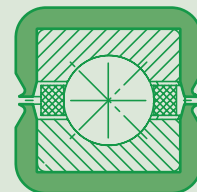
Axial-Ball thrust bearing
PBAD 12,7 x 12,7



Axial-Ball thrust bearing
PBAA 6,35 x 6,35



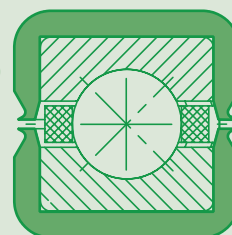
Axial-Whisper-ball thrust bearing PFAC
12,325 x 12,325



Axial-Ball thrust bearing
PBAC 9,525 x 9,525



Axial-Whisper-ball thrust bearing PFAD
16,1 x 16,1



Ball thrust bearing

Whisper ball thrust bearing

PBAU
PBAA
PBAC
PBAD
PFAC



Technical Description

Description of shape

The KMF-Ball thrust bearing – AXIAL-SLIM-SPLIT-BEARING uses a four point geometry. Due to these four contact points (pressure angle 90°) this axial thrust ball bearing has an extremely high axial Basic load ratings in relation to the small bearing cross-cut. Axial thrust ball bearings are mostly so called vertical bearings (turning axes vertical) and can not transmit any radial loads.

These bearings are no self holding units. The assembly of the bearing parts (bearing rings, balls and cage) can be done separately and is for bigger diameters more easy.

Materials

The ball thrust bearings of the type series PBAU, PBAA, PBAC and PBAD are corrosion resistant. Axial bearing rings are made of stainless steel X46Cr13 (material code 1.4034). The cage is made of plastic.

Operating conditions

The temperature limits of the standard bearing in continuous operation are -40°C and +100°C, temporary up to +120°C.

Bearing Cross-Cuts

The KMF-AXIAL-SLIM-SPLIT-BEARING can be offered in the following cross-cuts:

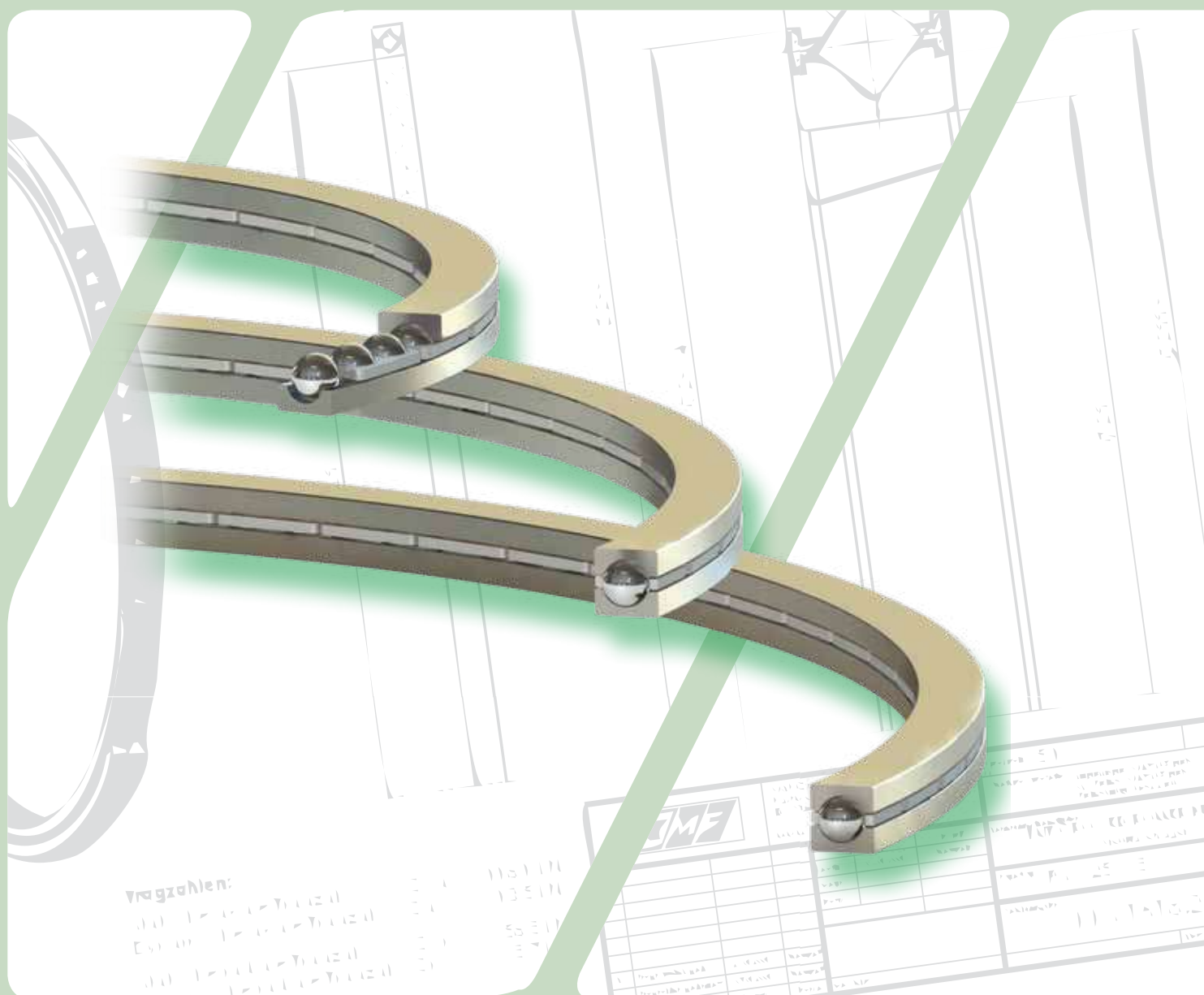
Diameter		KMF-type
Abburation	Dimensions	
U	4,5 x 4,5 mm	PBAU
A	6,35 x 6,35 mm	PBAA
C	9,525 x 9,525 mm	PBAC
D	12,7 x 12,7 mm	PBAD

KMF can supply all bearing types of the complete diameter range of each type series within short terms. Also all other dimensions beneath the preferred series can be supplied within short terms as well.

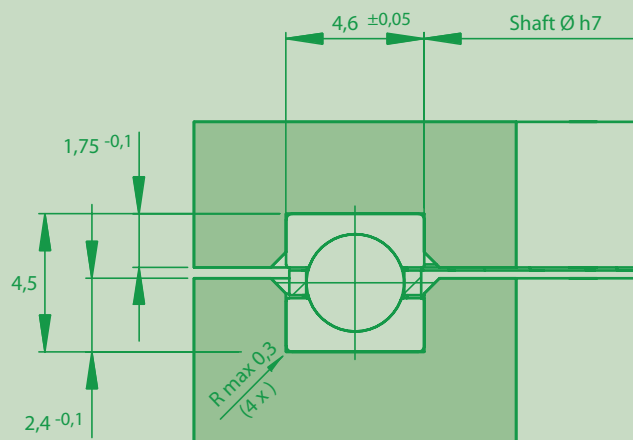
Features

- Free choice of material of the connecting parts, e. g. aluminium
- The splitted bearing rings eliminate functional difficulties resulting through different material expansions, e. g. different material combinations as light metal steel and cast iron
- Corrosion resistant and low maintenance
- High static and dynamic Basic load ratings
- High durability
- High rigidity
- Low Mass
- Easy to install and economical mounting and dismounting, as special fixtures are not necessary
- Dimensions beneath preferred series can be supplied within short terms

Axial-Ball thrust bearing PBAU



Fitted dimensions



Bearing dimensions

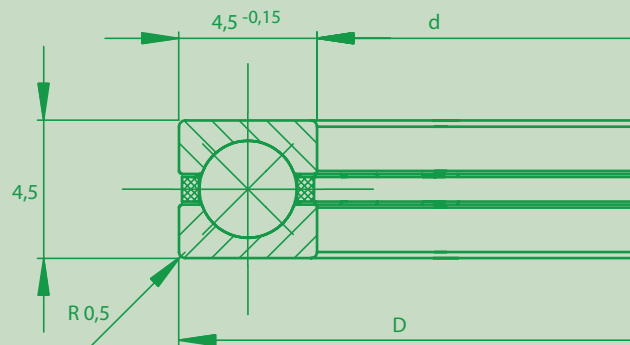


Table of dimensions (Type series PBAU)

KMF-type ¹⁾	Bearing dimension		Basic load ratings		Mass	Limiting speeds
			Axial			
	d	D	Dyn.	Stat.		
			C _a	C _{oa}		n _{G grease}
	mm	mm	kN	kN	kg	min ⁻¹
PBAU 0090	90	99	5,80	33,4	0,035	1700
PBAU 0095	95	104	5,85	35,4	0,037	1610
PBAU 0100	100	109	6,00	37,4	0,039	1530
PBAU 0110	110	119	6,20	40,8	0,043	1390
PBAU 0120	120	129	6,30	44,8	0,047	1270
PBAU 0130	130	139	6,50	48,2	0,051	1170
PBAU 0140	140	149	6,70	52,0	0,055	1090
PBAU 0150	150	159	6,90	56,0	0,059	1020
PBAU 0160	160	169	7,10	60,0	0,062	950
PBAU 0170	170	179	7,20	63,0	0,066	900
PBAU 0180	180	189	7,40	67,0	0,070	850
PBAU 0190	190	199	7,60	70,0	0,074	800
PBAU 0200	200	209	7,60	74,0	0,078	760
PBAU 0210	210	219	7,80	78,0	0,082	730
PBAU 0220	220	229	7,90	81,0	0,086	690
PBAU 0230	230	239	8,00	85,0	0,090	660
PBAU 0240	240	249	8,10	89,0	0,094	640
PBAU 0250	250	259	8,30	93,0	0,098	610



KMF-type ¹⁾	Bearing dimension		Basic load ratings		Mass	Limiting speeds
			Axial			
	d	D	Dyn.	Stat.		
			C _a	C _{oa}		n _{G grease}
	mm	mm	kN	kN	kg	min ⁻¹
PBAU 0260	260	269	8,45	96,0	0,102	590
PBAU 0270	270	279	8,60	100,0	0,106	570
PBAU 0280	280	289	8,60	104,0	0,110	550
PBAU 0290	290	299	8,80	108,0	0,113	530
PBAU 0300	300	309	9,00	110,0	0,117	510
PBAU 0310	310	319	9,00	114,0	0,121	490
PBAU 0320	320	329	9,10	118,0	0,125	480
PBAU 0330	330	339	9,30	122,0	0,129	460
PBAU 0340	340	349	9,30	126,0	0,133	450
PBAU 0350	350	359	9,40	130,0	0,137	440
PBAU 0360	360	369	9,40	134,0	0,141	420
PBAU 0370	370	379	9,60	136,0	0,145	410
PBAU 0380	380	389	9,75	140,0	0,149	400
PBAU 0390	390	399	9,75	144,0	0,153	390
PBAU 0400	400	409	9,90	148,0	0,157	380
PBAU 0410	410	419	9,90	152,0	0,161	370
PBAU 0420	420	429	10,10	156,0	0,165	360
PBAU 0430	430	439	10,10	160,0	0,169	360
PBAU 0440	440	449	10,20	162,0	0,173	350
PBAU 0450	450	459	10,20	166,0	0,177	340