

Single direction angular contact thrust ball bearings (“ball screw support bearings”)

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Single direction angular contact thrust ball bearings (“ball screw support bearings”)

SKF single direction angular contact thrust ball bearings have been developed especially for the support of ball and roller screws in machine tools, but are also used successfully for other applications where high axial rigidity and running accuracy is needed. They are of non-separable design and incorporate a large number of balls, have a particularly close conformity between balls and raceways, and a contact angle of 60°.

These bearings are characterised by
- high axial load ratings,
- superior axial stiffness,
- excellent running accuracy, especially in axial direction,
- speed and acceleration capability, and
- low frictional torque.



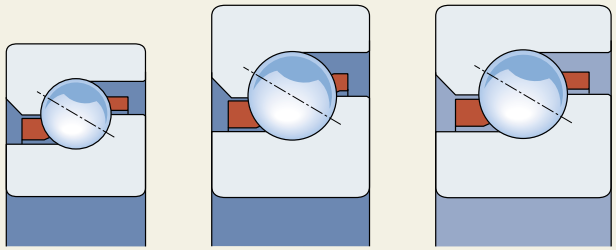
For best performance under extreme (shock-) loads, speeds, accelerations, and/or temperatures the bearings have a special blending of the raceway-shoulder transition, a light and robust cage design, and a special heat treatment for dimensional stabilisation. The special stabilisation for bore diameters larger than 20 mm ensures constant preload/stiffness over the whole application lifetime, and also at high temperature.

SKF single direction angular contact thrust ball bearings are available in three metric dimension series: the series BSA 2 and BSA 3 having boundary dimensions conform to ISO 15:1998 (although this standard applies to radial bearings) and the series BSD (→ **fig 1**).

When the load carrying capacity of a single bearing is inadequate and/or when the bearing arrangement is required to take up axial loads acting in both directions these bearings can be supplied as “bearings for universal matching” single, or in matched sets. To further simplify mounting, complete ready-to-mount pre-greased cartridge units incorporating matched bearing sets in a flanged housing are supplied on request.

Different designs of SKF high-precision single direction angular contact thrust ball bearings

Fig 1



Bearings for universal matching

Universally matchable single direction angular contact thrust ball bearings are adjusted during manufacturing to be mounted immediately adjacent to each other in a back-to-back, face-to-face, or tandem arrangement as desired. When arranged back-to-back or face-to-face, the predetermined value of the preload will be attained, requiring no subsequent adjustment. Bearings for universal matching can be supplied in two basic executions: single universal bearings for mounting in any combination, or duplex sets.

Single bearings of 'universal' design are identified by the designation suffix G, which is followed by the letter A or B indicating the preload level, e.g. BSD 2047 CGA. When ordering these bearings, the number of single bearings required must be stated, not the number of sets. Universally matchable bearings may be useful in reducing stock holding and improving availability.

Alternatively, duplex sets of bearings for universal matching can be chosen. They are identified by the suffix DGA or DGB, where A stands for light and B for heavy preload. The term 'matched' refers to matching of the bore and outside diameter which, in a set, at most differ by half the permissible diameter tolerance.

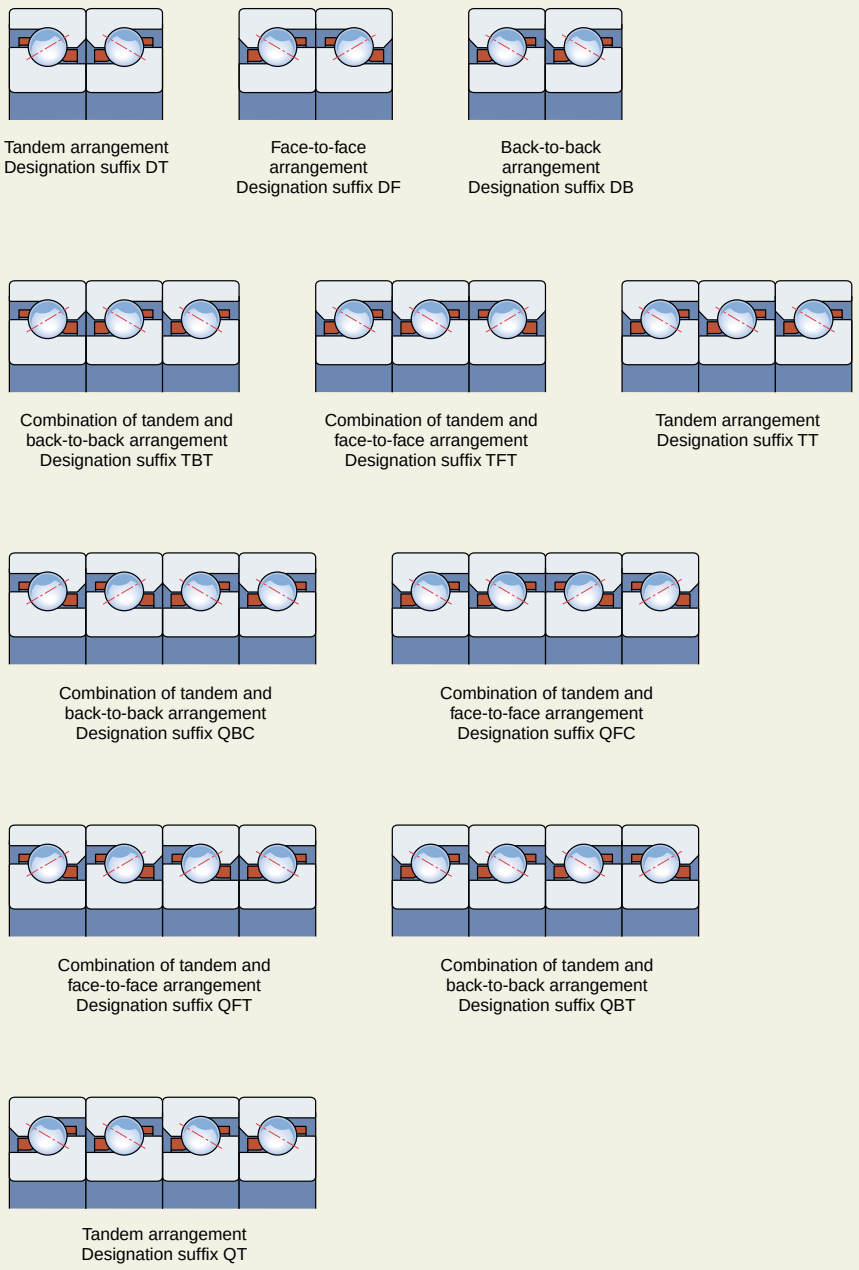
Matched bearing sets

SKF single direction angular contact thrust ball bearings can be supplied in matched sets of two, three or four bearings. The bearing sets are matched during production so that when mounted immediately adjacent to each other, the predetermined preload value and/or an even load distribution among the rows will be attained. Bore and outside diameters of the bearings in a set at most differ by half the permissible diameter tolerance. When bearings are arranged back-to-back, the load lines diverge towards the bearing axis. Axial loads acting in both directions can be accommodated, but supported by one bearing or bearing pair only. This arrangement has a relatively high tilting stiffness and tilting moments can be taken up.

In face-to-face arrangements the load lines converge towards the bearing axis. Again axial loads acting in both directions can be supported but only by one bearing or bearing pair at a time. This arrangement is less rigid than a back-to-back one with respect to tilting, but allows accommodating higher misalignments.

In tandem arrangements the load lines of the bearings are parallel to each other. The bearing set can accommodate thrust load in one direction only, and is generally adjusted against another bearing or bearing pair. Arrangements of three or four bearings, of which two or three are in tandem, are usually adopted when higher load capacity or higher stiffness are required in the application. The most common arrangements are shown in **fig 2** **page 237**.

Fig 2



Marking of single bearings

The bearing rings carry several markings for identification purposes. Each bearing is marked with the complete bearing designation. An asterisk (*) on the side face of inner and outer rings marks the position of the greatest out-of-round, i.e. where the greatest wall thickness between the base of the raceway groove and the bore or the outside diameter surface has been found (→ **fig** 3). To facilitate the selection of the actual bore and outside diameter in order to obtain the desired fits after mounting, the actual deviation of the inner bore diameter and outside diameter from nominal are marked on the inner ring/outer ring respectively (just beside the asterisk).

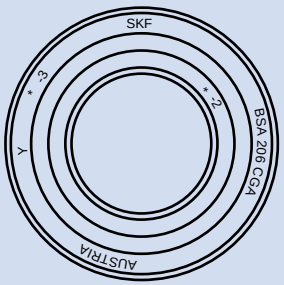
Marking of bearing sets

In addition to the markings of single bearings, bearings sets carry a “V”-shaped marking on the outside diameter of the bearings in order to facilitate proper mounting (→ **fig** 4). If the bearing set is to perform correctly, the bearings must be mounted in the order indicated by the V-marking. The V-marking is always applied in relation with the position of the greatest out-of-round of outer ring and it also gives the direction in which the axial load should act on the inner ring(s). For bearing sets that can accommodate axial loads in both directions, the ‘V’-point gives the direction of the greater axial load.

For each bearing of a matched set the same serial number is shown on the face of the outer ring.

Bearings for universal matching: example of marking of a single bearing

Fig 3



Cartridge units

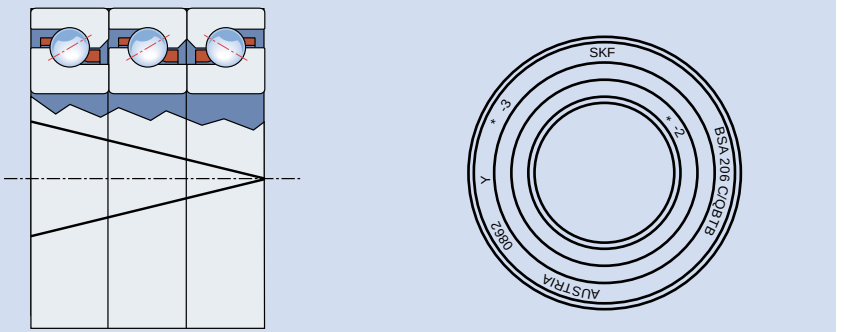
To simplify and speed-up mounting, complete cartridge units incorporating matched sets of four single direction angular contact thrust ball bearings in a flanged housing are supplied on request. These units are characterised by the following features:

- ready to mount
- with a flange so that the units can be simply bolted to the machine frame
- sealed
- pre-lubricated with a special grease for long grease life and good anti-brinelling properties
- extremely stiff design of carbon steel housing.

Cartridge units are marked on the side face with their complete designation and SKF trademark.

Example of marking of a bearing set

Fig 4



General bearing data

Dimensions

The boundary dimensions of series BSA 2 and BSA 3 conform to ISO 15:1998, Dimension Series 02 and 03 respectively, although this standard only applies to radial ball bearings. The boundary dimensions of the metric series BSD, and the cartridge units do not conform to any national or international standard, but have been widely accepted on the market for many years.

Tolerances

SKF single direction angular contact thrust ball bearings are manufactured as standard according the tolerances shown in **Table 1**. These values correspond to the ISO 492:2002-tolerance class 2 specifications, although the standards only apply to radial bearings. The inner and outer ring axial runout conform to ISO 492:2002-tolerance class 2. The values quoted refer to single bearings.

For matched sets that are correctly mounted on accurately machined seating, the axial runout generally does not exceed 2,5 microns.

Class 4 tolerances for single direction angular contact thrust ball bearings

Table 1

Inner ring						
d		Δ_{ds}		Δ_{Ts}		S_{ia}
over	incl.	high	low	high	low	max
mm	mm	µm	µm	µm	µm	µm
10	**18**	0	–4	0	–80	1,5
18	**30**	0	–5	0	–120	2,5
30	**50**	0	–6	0	–120	2,5
50	**80**	0	–7	0	–150	2,5
Outer ring						
D		Δ_{Ds}		S_{ea}		
over	incl.	high	low	max		
mm	mm	µm	µm	µm		
18	**30**	0	–5	2,5		
30	**50**	0	–6	2,5		
50	**80**	0	–7	4		
80	**120**	0	–8	5		

Preload

SKF single direction angular contact thrust ball bearings are produced with two preload classes as standard: light (class A) and heavy (class B). Preload values apply both to single bearings and cartridge units. Axial preload values for sets of two bearings paired either back-to-back or face-to-face (DB or DF) are shown in **Table 2**.

Matched sets incorporating more than two bearings (i.e. sets of three and four bearings) have higher preloads. Preload values for such sets can be obtained by multiplying the values in the preload table (→ **Table 2**) by the factors stated in **Table 3** **page 242**.

Preload in unmounted condition, friction torque and axial stiffness for single direction angular contact thrust ball bearings, series BSA and BSD

Table 2

Bearing designation	**Axial preload** Class		**Axial stiffness** Preload		**Friction torque**	
	A	B	A	B	A	B
	N		N/µm		Nm	
BSA 201 C	650	1 300	350	455	0,016	0,029
BSA 202 C	775	1 550	415	535	0,023	0,040
BSA 203 C	1 040	2 080	535	700	0,045	0,080
BSA 204 C	1 480	2 960	660	860	0,056	0,101
BSA 205 C	1 580	3 160	730	935	0,077	0,132
BSA 206 C	2 250	4 500	925	1 180	0,132	0,224
BSA 207 C	2 950	5 900	1 090	1 390	0,202	0,345
BSA 305 C	2 400	4 800	905	1 155	0,120	0,214
BSA 306 C	3 300	6 600	1 025	1 310	0,194	0,346
BSA 307 C	4 500	9 000	1 200	1 530	0,289	0,523
BSA 308 C	5 000	10 000	1 350	1 720	0,387	0,679
BSD 2047 C	1 480	2 960	660	860	0,056	0,101
BSD 2562 C	2 400	4 800	905	1 155	0,120	0,214
BSD 3062 C	2 250	4 500	925	1 180	0,132	0,224
BSD 3572 C	2 950	5 900	1 090	1 390	0,202	0,345
BSD 4072 C	2 950	5 900	1 090	1 390	0,202	0,345
BSD 4090 C	5 000	10 000	1 350	1 720	0,387	0,679
BSD 4575 C	2 900	5 800	1 185	1 515	0,256	0,414
BSD 45100 C	6 500	13 000	1 535	1 965	0,548	0,971
BSD 50100 C	6 500	13 000	1 535	1 965	0,548	0,971
BSD 55100 C	6 500	13 000	1 535	1 965	0,548	0,971
BSD 55120 C	7 900	15 800	1 770	2 260	0,800	1,400
BSD 60120 C	7 900	15 800	1 770	2 260	0,800	1,400

Preload values refer to unmounted bearings, i.e. when the bearing rings are free to expand. Actual preloads will be higher when bearings are mounted with tight shaft/housing fits. Bearings with a special preload can be supplied as well.

Preload factor for single direction angular contact thrust ball bearings

Table 3

Bearing arrangement in a set	Preload factor
TBT or TFT	1,36
QBT or QFT	1,57
QBC or QFC	2,00

Axial stiffness

Single direction angular contact thrust ball bearings have been designed for superior axial rigidity. Stiffness values are given in **Table** 2 **page 241** and refer to sets of two bearings matched either DB or DF, before mounting. Stiffness values for other bearing arrangements can be obtained by multiplying the values quoted in **Table** 2 by the factors in **Table** 4.

Higher stiffness may be obtained by using sets with still higher preloads, although this is not advisable as too high a preload will generate a temperature rise. Please consult the SKF application engineering service for more details.

Stiffness and friction factor for single direction angular contact thrust ball bearings

Table 4

Bearing arrangement in a set	Stiffness factor for low axial bearing load	Stiffness factor for high axial bearing load[1)]	Friction factor
TBT or TFT	1,45	1,64	1,35
QBT or QFT	1,79	2,24	1,55
QBC or QFC	2,00	2,00	2,00

[1)] Guideline values under the assumption of a high external axial load acting in the direction of the highest load capacity of the bearing set (in accordance with DIN 628-6).

Friction torque

The bearings of series BSD and BSA have been designed for low friction torque. Friction torque is directly influenced by the amount of preload actually acting on the bearing sets, the higher the preload value, the higher the friction torque.

Guideline values for friction torque are given in **Table** 2 **page 241**, based on operating conditions with light and heavy preload, and at low speed. The starting torque will be approximately twice as high as the operating running torque. The torque values in the table apply to sets of two bearings matched back-to-back or face-to-face. Torque values for other bearing arrangements can be obtained by multiplying the values shown in **Table** 2 by the factors given in **Table** 4.

Cages

SKF single direction angular contact thrust ball bearings are built to withstand rapid speed changes and high rotational accelerations. Under such conditions the cage has to withstand high inertia forces. Therefore, a special ball-centred cage of injection moulded, glass fibre reinforced polyamide 6,6 is applied. Generally these cages may be used at temperatures up to +120°C although short periods at higher temperature will not have a detrimental effect - provided they are followed by long periods at lower temperatures.

The lubricants employed with rolling bearings generally do not have any detrimental effect on cage characteristics, with the exception of some synthetic oils, greases based on such oils and some lubricants containing large proportions of EP additives, especially at high temperatures.

Speed reduction factor for sets of single direction angular contact thrust ball bearings

Table 5

Bearing arrangement	Bearing design BSA 2, BSA 3 and BSD Preload A	Preload B
Set of 2 bearings paired in tandem	0,8	0,4
Set of 2 bearings paired back-to-back or face-to-face	0,8	0,4
Set of 3 bearings	0,65	0,3
Set of 4 bearings	0,5	0,25

Speed ratings

The speed rating values quoted in the product tables are guideline values for single bearings with light preloads under light loads. For bearing sets the values should be reduced according to the number of bearings in the set and their preload, see **Table** 5 **page 243**.

For grease lubrication the speed rating values in the product tables can be used directly. For other lubrication methods certain factors have to be taken into account, see **Table** 6. The speed ratings quoted for cartridge units already take into account the number of bearings with which the cartridge is filled.

Lubrication

Single direction angular contact thrust ball bearings can be lubricated with either grease or oil. Generally, grease lubrication is preferred as bearing design can be simple, sealing arrangements uncomplicated and maintenance requirements minimised. Good quality, high grade greases with EP-additives and good anti-brinelling properties with an operating temperature range of –30 to +120°C are recommended. As a rule, a normal filling grade (25 % to 35 % of the free space in the bearings) is recommended for a long-lasting lubrication. If the bearings are running at very high speeds, lower filling rates (e.g. 15 %) will give lower temperatures and better performance. The actual quantities are given in the **Table** 2 **page 65** in the Chapter: Principles of bearing selection and application, section Lubrication and Maintenance.

Speed reduction factor for different lubrication methods

Table 6

Lubrication method	Reduction factor
Oil bath	0,3 – 0,4
Oil mist	0,95
Oil jet	Generally > 1 but depends very much on oil type, oil supply rate, oil inlet temperature, oil drainage efficiency, etc. Please consult the SKF application engineering service for details.

Design of associated components

The single direction angular contact thrust ball bearings are manufactured to a high degree of accuracy and are primarily intended for the support of precision ball screws in numerically controlled machine tools, and in robots. The high demands in respect of running accuracy placed on these bearing arrangements can only be achieved, however, if the accuracy of the associated components corresponds to bearing accuracy. Deviations in dimensions and geometrical form must therefore be as small as possible. Recommended tolerances for the bearing seatings on the spindle, and in the housing bore for bearings and cartridges will be found in the **Tables** 7 and **fig** 5**, Tables** 8**,** 9 **and fig** 6 **and** 7 **page 246**.

Accuracy of shaft seatings

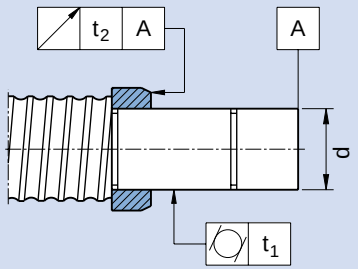
Table 7

Nominal bore diameter d		Tolerance h4		Tolerance grades Cylindricity	Runout
				IT2	IT2
over	incl.	high	low	t_1 [1)]	t_2 [1)]
mm		µm		µm	µm
10	**18**	0	–5	2	2
18	**30**	0	–6	2,5	2,5
30	**50**	0	–7	2,5	2,5
50	**80**	0	–8	3	3

[1)] See fig 5

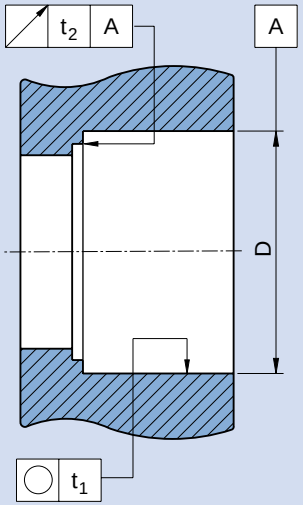
Accuracy of form for shafts

Fig 5



Accuracy of form for housings ➤

Fig 6



Accuracy of housing bore seatings for bearings

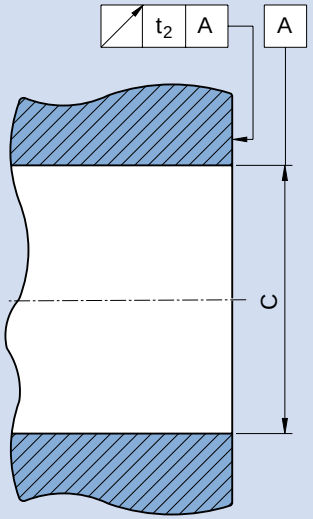
Table 8

Nominal bore diameter d over	incl.	Tolerance H5 high	low	Tolerance grades Cylindricity IT3 t_1[1)]	Runout IT3 t_2[1)]
mm		µm		µm	µm
–	**50**	0	+11	2	4
50	**80**	0	+13	3	5
80	**120**	0	+15	4	6

[1)] See fig 6

Accuracy of form for housings for cartridge units ➤

Fig 7



Accuracy of housing bore seatings for cartridge units

Table 9

Nominal bore diameter d over	incl.	Tolerance H6 high	low	Tolerance grades Runout IT3 t1[1)]
mm		µm		µm
50	**80**	0	+19	5
80	**120**	0	+22	6
120	**150**	0	+25	8

[1)] See fig 7

Load carrying capacity of bearing sets

The values given in the bearing tables for the basic dynamic and static load ratings apply to single bearings. For sets of bearings it must be remembered that each bearing can only support axial load acting in one direction. It is therefore necessary to calculate bearing life etc. using only the number of bearings actually supporting the thrust load in a given direction, i.e. for a pair of bearings arranged back-to-back, only one bearing will carry the load in a given direction. Appropriate guidance for calculating the basic load ratings of bearings in matched sets is given in **Table** 10.

Dynamic and static load ratings for ball screw support bearing sets

Table 10

Bearings in a set	Set	Load direction	Arrangement	Dynamic	Static	X	Y
2	**DB**	⇐	⟨ ⟩	C	C_0	1,9	0,55
	DF	⇐	⟩ ⟨	C	C_0	1,9	0,55
	DT	⇒	⟨ ⟨	1,63 C	2 C_0	–	–
3	**TBT**	⇐	⟨ ⟩⟩	1,63 C	2 C_0	2,32	0,35
	TBT	⇒	⟨⟨ ⟩	C	C_0	1,43	0,76
	TFT	⇒	⟩ ⟨⟨	1,63 C	2 C_0	2,32	0,35
	TFT	⇐	⟩⟩ ⟨	C	C_0	1,43	0,76
	TT	⇒	⟨⟨⟨	2,16 C	3 C_0	–	–
4	**QBT**	⇒	⟨⟨⟨ ⟩	2,16 C	3 C_0	2,52	0,26
	QBT	⇐	⟨⟨⟨ ⟩	C	C_0	1,17	0,88
	QFT	⇒	⟩ ⟨⟨⟨	2,16 C	3 C_0	2,52	0,26
	QFT	⇐	⟩ ⟨⟨⟨	C	C_0	1,17	0,88
	QBC	⇒ or ⇐	⟨⟨ ⟩⟩	1,63 C	2 C_0	1,9	0,55
	QFC	⇒ or ⇐	⟩⟩ ⟨⟨	1,63 C	2 C_0	1,9	0,55
	QT	⇒	⟨⟨⟨⟨	2,64 C	4 C_0	–	–

Equivalent dynamic bearing load

The equivalent dynamic bearing load for single bearings and any configuration of bearings in a set can be calculated – separately for the two directions of axial load – from

$P = XF_r + YF_a$ for $F_a/F_r \leqslant 2{,}17$
$P = 0{,}92\ F_r + F_a$ for $F_a/F_r > 2{,}17$

where
P = equivalent dynamic load acting on bearing or bearing set, N
F_r = radial component of actual load acting on bearing or bearing set, N
F_a = axial component of actual load acting on bearing or bearing set, N
X = radial load factor, see **Table** 10 **page 247**
Y = axial load factor, see **Table** 10

Note that when calculating the axial load component Fa the (non-linear) influence of internal bearing preload acting within the bearing set must be taken into account.

Equivalent static bearing load

For bearing sets with bearings arranged back-to-back or face-to-face, the equivalent static load can be determined – separately for each direction of axial load – from

$P_0 = 4F_r + F_a$

where
P_0 = equivalent static load acting on bearing or bearing set, N
F_r = radial component of maximum static load acting on bearing or bearing set, N
F_a = axial component of maximum static load acting on bearing or bearing set, N

The equation for the equivalent static load is also valid for single bearings and bearings arranged in tandem, provided the ratio F_a/F_r does not exceed 0,25. Satisfactory but less accurate values are obtained when F_a/F_r is between 0,25 and 0,4.

Designation system

For series BSA 2 and BSA 3 conform to ISO 15:1998 and metric series BSD the complete designation of a single bearing identifies the series itself and the bore diameter. The designation of the series BSD bearings includes both bore and outside diameter. For bearing sets, additional suffixes specify the number of bearings in a set, their arrangement in the set and preload class. Details of the designation system are given in **Table** 11 **page 250**.

The designation of cartridge units identifies bore diameter, number of bearings and their arrangement in a set, as well as the preload class.

In cases where the application requires special preload, SKF supplies single bearings, bearing sets or cartridge units with appropriate preload values. An additional suffix G followed by the actual preload value expressed in daN is then shown in the designation (e.g. BSA 206 C/DBG360, matched set of two bearings arranged back-to-back with an 3600 N special preload).

Product tables

Designations of single direction angular contact thrust ball bearings for precision ball screws

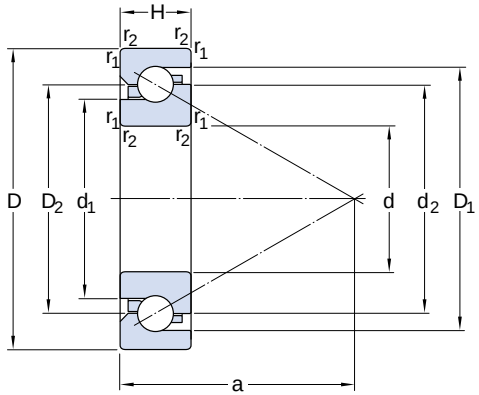
Table 11

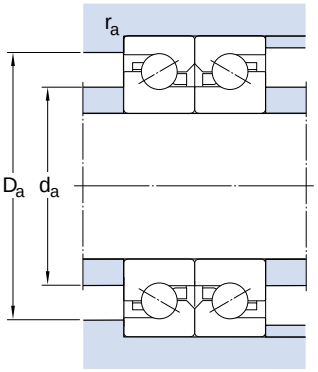
Basic designation

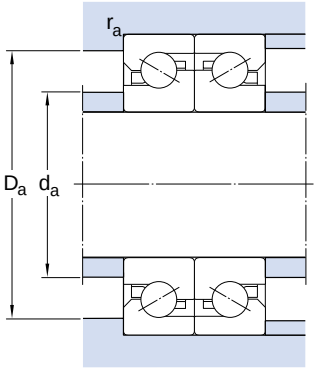
BS **B**all **S**crew support bearings

A	**ISO 15 series**	**Metric series**	**D**
Dimension series		**Dimension series**	
2	ISO 15 Diameter Series 2	Not standardised	**–**
3	ISO 15 Diameter Series 3		
Bore diameter		**Bore diameter**	
01	12 mm bore diameter	Bore diameter, mm	**20**
02	15 mm bore diameter	Outside diameter, mm	**47**
03	17 mm bore diameter		
04 (×5)	20 mm bore diameter		
|			
15 (×5)	75 mm bore diameter		

Contact angle	
–	60 degrees
Internal design	
C	Special internal design
Number of bearings in set	
D	Two bearings
T	Three bearings
Q	Four bearings
Bearing arrangement in matched set	
B	Back-to-back
F	Face-to-face
T	Tandem
BT	Back-to-back/tandem
FT	Face-to-face/tandem
BC	Back-to-back of pairs in tandem
FC	Face-to-face of pairs in tandem
G	For universal matching
Preload	
A	Light preload
B	Heavy preload
G..	Special preload (value in daN e.g. G240)
EXAMPLES	**BSA 204 C/DBA** **BSD 2047 C/QBCA**

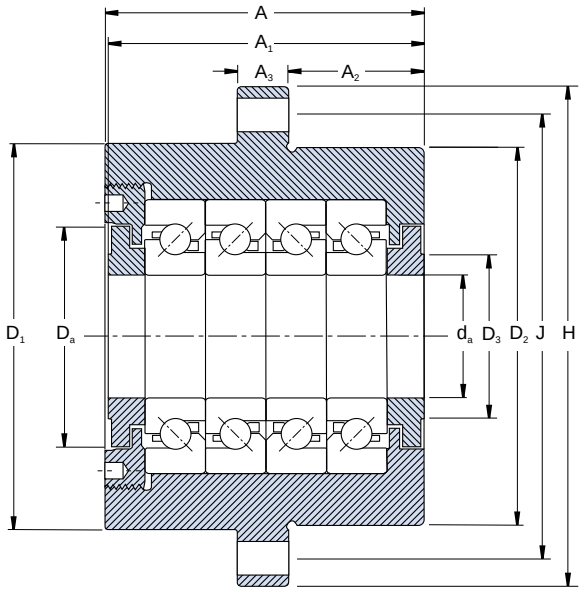


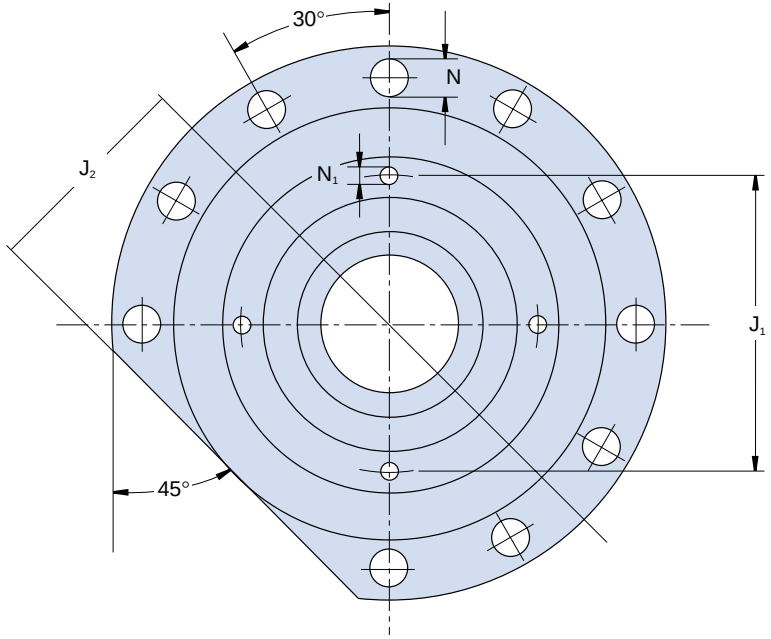




Principal dimensions			Basic load ratings dynamic	static	Fatigue load limit	Maximum axial load	Speed ratings Lubrication grease	oil spot	Mass	Designation
d	D	H	C	C_0	P_u					
mm			N		N	N	r/min		kg	–
12	32	10	11 400	18 000	670	7 250	12 000	16 000	0,024	**BSA 201 C**
15	35	11	12 200	20 400	765	8 500	11 000	15 000	0,054	**BSA 202 C**
17	40	12	18 300	37 500	1 370	13 000	9 700	13 000	0,078	**BSA 203 C**
20	47	14	24 000	52 000	1 930	19 500	8 200	11 000	0,13	**BSA 204 C**
	47	15	24 000	52 000	1 930	19 500	8 200	11 000	0,13	**BSD 2047 C**
25	52	15	24 500	56 000	2 080	20 800	7 500	10 000	0,15	**BSA 205 C**
	62	17	36 500	86 500	3 200	36 000	6 700	9 000	0,27	**BSA 305 C**
	62	15	36 500	86 500	3 200	36 000	7 200	9 600	0,25	**BSD 2562 C**
30	62	16	32 000	80 000	3 000	31 500	6 900	9 300	0,24	**BSA 206 C**
	62	15	32 000	80 000	3 000	31 500	7 200	9 600	0,22	**BSD 3062 C**
	72	19	49 000	114 000	4 250	52 800	5 900	7 900	0,41	**BSA 306 C**
35	72	15	39 000	104 000	3 900	42 750	6 600	8 900	0,3	**BSD 3572 C**
	72	17	39 000	104 000	3 900	42 750	6 300	8 400	0,34	**BSA 207 C**
40	72	15	39 000	104 000	3 900	42 750	6 600	8 900	0,27	**BSD 4072 C**
	90	23	69 500	183 000	6 800	78 200	4 800	6 400	0,77	**BSA 308 C**
	90	20	69 500	183 000	6 800	78 200	5 100	6 900	0,68	**BSD 4090 C**
45	75	15	35 500	104 000	3 900	40 200	6 500	8 700	0,27	**BSD 4575 C**
	100	20	88 000	240 000	8 800	107 400	4 800	6 500	0,83	**BSD 45100 C**
50	100	20	88 000	240 000	8 800	107 400	4 800	6 500	0,77	**BSD 50100 C**
55	100	20	88 000	240 000	8 800	107 400	4 800	6 500	0,74	**BSD 55100 C**
	120	20	112 000	320 000	11 800	130 000	4 300	5 800	1,15	**BSD 55120 C**
60	120	20	112 000	320 000	11 800	130 000	4 300	5 800	1,09	**BSD 60120 C**
	110	22	78 000	245 000	9 000	90 000	4 200	5 600	0,95	**BSA 212 C**
75	130	25	81 500	280 000	10 400	100 000	3 600	4 700	1,6	**BSA 215 C**

Dimensions							Abutment and fillet dimensions		
d	d_1 ≈	d_2 ≈	D_1 ≈	D_2 ≈	$r_{1,2}$ min	a	d_a min	D_a max	r_a max
mm							mm		
12	18,0	22,3	21,7	27,0	0,6	24	18	29	0,6
15	21,0	25,3	24,8	30,0	0,6	27	21	31,9	0,6
17	24,4	29,3	28,6	34,8	0,6	31	21,7	36,5	0,6
20	29,2	34,8	34,2	41,1	1	36	26,4	42,1	1
	29,2	34,8	34,2	41,1	1	37	26,4	42,1	1
25	33,2	38,8	38,2	45,1	1	40	31	47,2	1
	39,4	46,3	45,6	54,2	1,1	48	33,9	55,3	1
	39,4	46,3	45,6	54,2	1,1	47	33,9	55,3	1
30	41,0	47,3	46,6	54,4	1	48	36,8	56,7	1
	41,0	47,3	46,6	54,4	1	48	36,8	56,7	1
	43,3	51,8	51,1	61,2	1,1	54	40,1	64,6	1
35	48,4	55,3	54,6	63,1	1,1	55	43,4	65,3	1
	48,4	55,3	54,6	63,1	1,1	56	43,4	65,3	1
40	48,4	55,3	54,6	63,1	1,1	55	47,4	65,3	1
	56,9	66,8	66,1	77,8	1,5	69	51,5	81,4	1,5
	56,9	66,8	66,1	77,8	1,5	69	51,5	81,4	1,5
45	67,3	59,6	60,4	54,0	1,1	59	52,4	68,6	1
	65,5	76,8	76,1	89,4	1,5	76	58,1	90,5	1,5
50	65,5	76,8	76,1	89,4	1,5	76	62,4	90,5	1,5
55	65,5	76,8	76,1	89,4	1,5	76	65,5	90,5	1,5
	78,7	91,4	90,6	105,6	1	89	86,5	111,5	1
60	78,7	91,4	90,6	105,6	1	89	72,5	111,5	1
	77,4	87,4	86,6	98,3	1,5	86	70,9	101,8	1,5
75	89,4	99,4	98,6	110,3	1,5	98	85,3	122,3	1,5

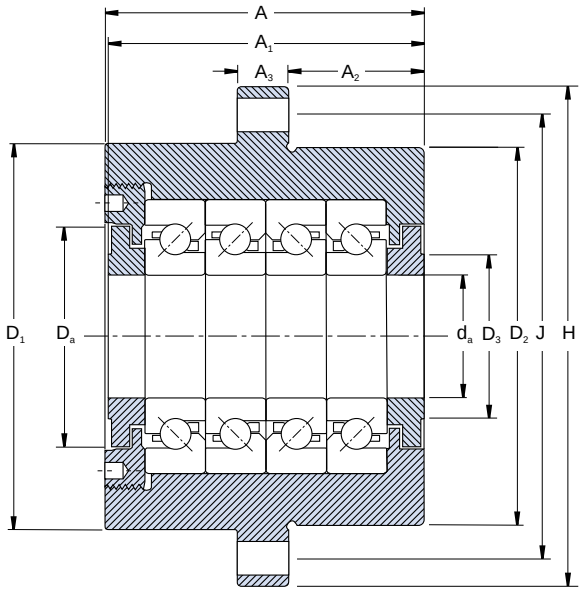


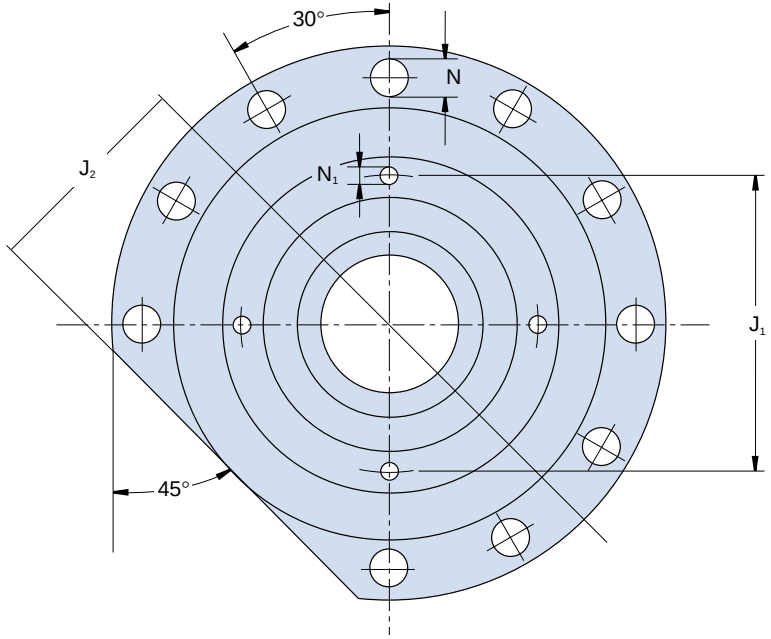


Dimensions															Mass	Designation[1)]
d_a	A	A_1	A_2	A_3	D_1	D_2	D_3	D_a	H	J	J_1	J_2	N	N_1		
mm															kg	–
20	77	74,26	32	13	64	60	26	37	90	76	43,8	32	6,6	2,7	1,75	**FBSA 204/QBCA**
	77	72,74	32	13	64	60	26	37	90	76	43,8	32	6,6	2,7	1,75	**FBSA 204/QFCA**
25	82	80,26	32	15	88	80	38	52	120	102	60	44	9,2	4,3	3,5	**FBSD 25/QBCA**
	82	78,74	32	15	88	80	38	52	120	102	60	44	9,2	4,3	3,5	**FBSD 25/QFCA**
30	82	80,26	32	15	88	80	38	52	120	102	60	44	9,2	4,3	3,4	**FBSD 30/QBCA**
	82	78,74	32	15	88	80	38	52	120	102	60	44	9,2	4,3	3,4	**FBSD 30/QFCA**
35	82	80,26	32	15	98	90	45	59	130	113	65	49	9,2	4,3	4,25	**FBSD 35/QBCA**
	82	78,74	32	15	98	90	45	59	130	113	65	49	9,2	4,3	4,25	**FBSD 35/QFCA**
40	106	104,26	43,5	17	128	124	55	75	165	146	88	64	11,4	5,2	9,6	**FBSD 40/QBCA**
	106	102,74	43,5	17	128	124	55	75	165	146	88	64	11,4	5,2	9,6	**FBSD 40/QFCA**
45	106	104,26	43,5	17	128	124	70	82	165	146	97	64	11,4	6,2	9,35	**FBSD 45/QBCA**
	106	102,74	43,5	17	128	124	70	82	165	146	97	64	11,4	6,2	9,35	**FBSD 45/QFCA**
50	106	104,26	43,5	17	128	124	70	82	165	146	97	64	11,4	6,2	9,05	**FBSD 50/QBCA**
	106	102,74	43,5	17	128	124	70	82	165	146	97	64	11,4	6,2	9,05	**FBSD 50/QFCA**

Designation	Basic load ratings dynamic C	Basic load ratings static C_0	Maximum axial load	Axial rigidity Preload class A	Axial rigidity Preload class B	Friction torque Preload class A	Friction torque Preload class B	Speed rating Preload class A	Speed rating Preload class B
	N		N	N/µm		Nm		r/min	
FBSA 204/QBCA	39 000	104 000	39 000	1 320	1 720	0,112	0,202	4 100	1 800
	39 000	104 000	39 000	1 320	1 720	0,112	0,202	4 100	1 800
FBSD 25/QBCA	60 000	173 000	72 000	1 810	2 310	0,24	0,428	3 600	1 600
	60 000	173 000	72 000	1 810	2 310	0,24	0,428	3 600	1 600
FBSD 30/QBCA	52 000	160 000	63 000	1 850	2 360	0,26	0,448	3 600	1 600
	52 000	160 000	63 000	1 850	2 360	0,26	0,448	3 600	1 600
FBSD 35/QBCA	64 000	208 000	85 500	2 180	2 780	0,404	0,69	3 300	1 400
	64 000	208 000	85 500	2 180	2 780	0,404	0,69	3 300	1 400
FBSD 40/QBCA	114 000	366 000	156 400	2 700	3 440	0,774	1,358	2 600	1 100
	114 000	366 000	156 400	2 700	3 440	0,774	1,358	2 600	1 100
FBSD 45/QBCA	143 000	480 000	214 800	3 070	3 930	1,096	1,942	2 400	1 000
	143 000	480 000	214 800	3 070	3 930	1,096	1,942	2 400	1 000
FBSD 50/QBCA	143 000	480 000	214 800	3 070	3 930	1,096	1,942	2 400	1 000
	143 000	480 000	214 800	3 070	3 930	1,096	1,942	2 400	1 000

Cartridge units with flanged housing
d **55 – 60** mm





Dimensions															Mass	Designation[1]
d_a	A	A_1	A_2	A_3	D_1	D_2	D_3	D_a	H	J	J_1	J_2	N	N_1		
mm															kg	–
55	106	104,26	43,5	17	148	144	86	103	185	166	112,5	74	11,4	6,2	11,7	**FBSD 55/QBCA**
	106	104,26	43,5	17	148	144	86	103	185	166	112,5	74	11,4	6,2	11,7	**FBSD 55/QFCA**
60	106	104,26	43,5	17	148	144	86	103	185	166	112,5	74	11,4	6,2	11,4	**FBSD 60/QBCA**
	106	104,26	43,5	17	148	144	86	103	185	166	112,5	74	11,4	6,2	11,4	**FBSD 60/QFCA**

Designation	Basic load ratings dynamic C	Basic load ratings static C_0	Maximum axial load	Axial rigidity Preload class A	Axial rigidity Preload class B	Friction torque Preload class A	Friction torque Preload class B	Speed rating Preload class A	Speed rating Preload class B
	N		N	N/µm		Nm		r/min	
FBSD 55/QBCA	183 000	640 000	260 000	3 540	4 520	1,6	2,8	2 150	900
	183 000	640 000	260 000	3 540	4 520	1,6	2,8	2 150	900
FBSD 60/QBCA	183 000	640 000	260 000	3 540	4 520	1,6	2,8	2 150	900
	183 000	640 000	260 000	3 540	4 520	1,6	2,8	2 150	900

[1] The designations are given for units with lightly preloaded bearing sets (suffix A). To specificy a heavy preload the suffix should be changed to B. e.g. FBSD 204/QBCB

Please contact SKF as to availability.