BALL SCREW SUPPORT BEARINGS

NSKHPS – BSBD SERIES

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Modern machine tools require ball screws that can accurately position a work piece or machine component, quickly and efficiently. The BSN / BSF range of bearings are support bearings designed to specifically meet these demanding requirements.

The double row configuration, with a 60° contact angle, enables the bearings to support large axial forces in both directions, while providing the accuracy and stiffness required by modern high precision machinery. The bearings are supplied sealed, greased for life and ready for installation.

The bearings can be supplied as pairs (DT) for higher loads. In this case, the individual bearings are matched together. Continually developing products with greater strength and higher accuracy, NSK's new NSKHPS series fully incorporates the advantages of NSK's world class design, materials, and manufacturing technology, setting a new standard for bearings.

Long Life

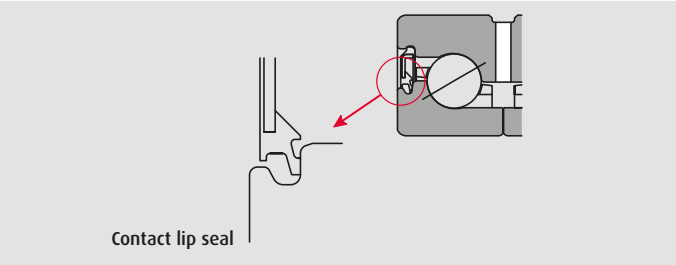
High Accuracy

High Performance Seal

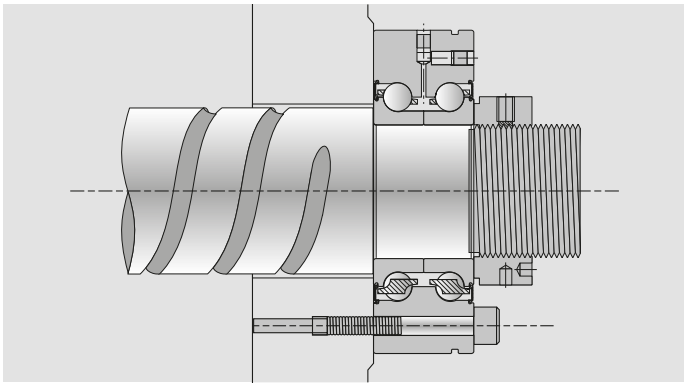
Wide Range Lineup

TYPES

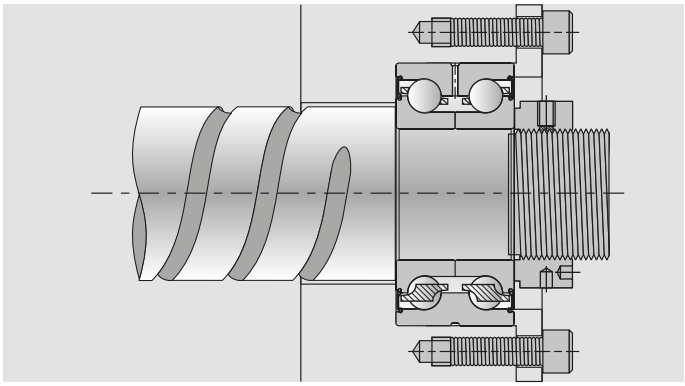
NSKHPS BSBD series is available for both housing mounting (BSN type) and face mounting (BSF type) with through holes for easy mounting. All types are greased for life and equipped with low friction contact lip seals with triple lip structure, achieving high grease retention and dust-proof performance while allowing high speeds.




Face mounting - BSF




Housing mounting - BSN



HEAVY SERIES

A heavy series type is available on some sizes. This type has the same inner ring dimensions, but a larger ball size and outer ring diameter, allowing higher axial loads and stiffness.

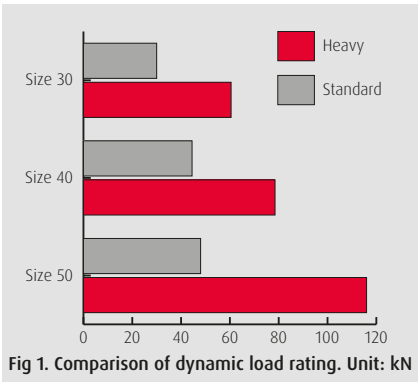


Fig 1. Comparison of dynamic load rating. Unit: kN

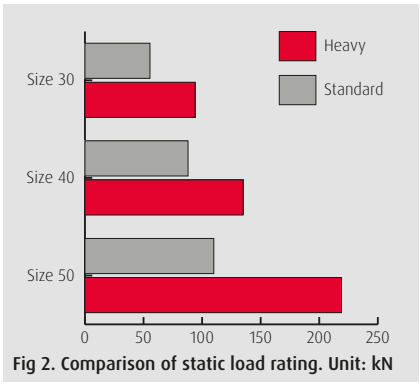
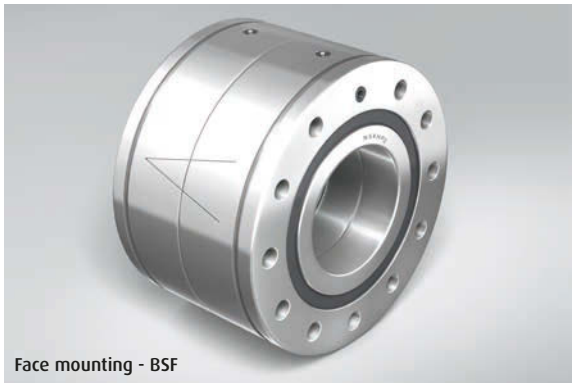


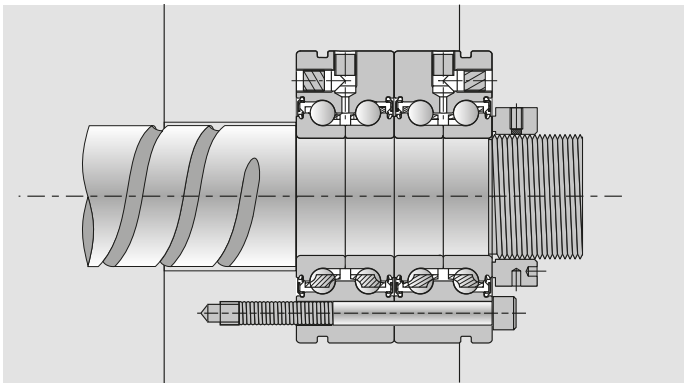
Fig 2. Comparison of static load rating. Unit: kN

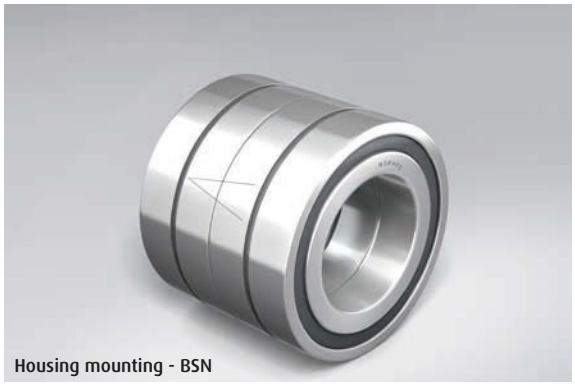
MATCHED PAIRS

If higher load capacities and/or stiffness are requested, a matched pair (DT) version can be ordered. A "V" is marked on the outer diameter surfaces of the bearings for proper matching and alignment. Matching surfaces are adjusted in order to control preload of each individual bearing.

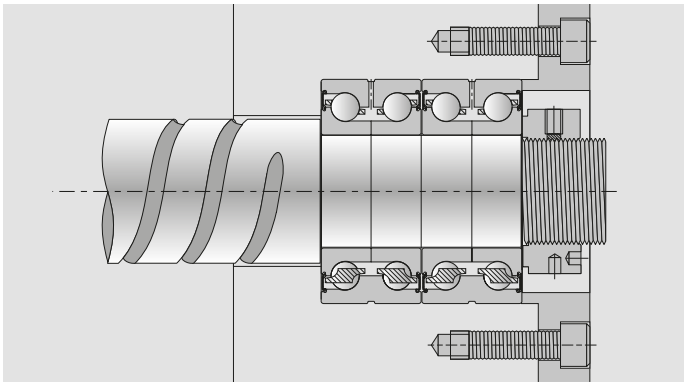


Face mounting - BSF





Housing mounting - BSN



In case of pairs of the BSF series, the number and position of the through holes are different, please refer to the tables on page 10-11 for details.

FIXING BOLTS *

In order to cope with the high loads applied to the ball screw support bearings, especially in those cases with belt driven ball screws where permanent radial force arises, NSK recommends to use bolts to class 10.9.

*Fixing bolts are not included.

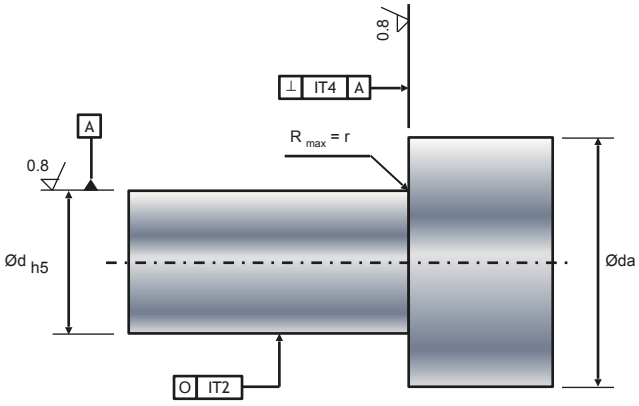
NOMENCLATURE

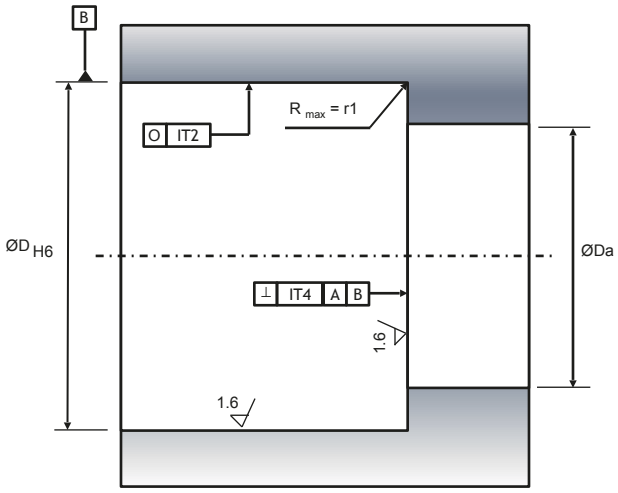
BS	F	30	80	DDU	H	P2B	DT
BEARING SERIES **BS:** Double row angular contact thrust ball bearing	**BEARING TYPE** **F:** Flange type **N:** No flange	**BORE DIAMETER** From 12 to 60mm (matched pairs 17 to 50mm)	**OUTER DIAMETER** From 55 to 145mm (matched pairs 62 to 140mm)	**SEALS** **DDU:** Contact triple lip seal	**PRELOAD** **H:** Heavy preload, standard in HPS series	**ACCURACY** **P2B:** Running accuracy is ISO Class 2, otherwise NSK-specific	**ARRANGEMENT** **Blank:** Single bearing **DT:** Matched pair

Feature	Benefit
60° contact angle	Enables bearings to support large axial forces
Double row	Supports axial load in two directions
Contact lip seal (seal runs in inner ring groove)	Provides excellent sealing characteristics, with low friction and heat generation
Greased	Greased for life (under normal operating conditions)
Relubrication facilities	Enables relubrication of bearing during operation if required
Mounting holes (BSF only)	Easy mounting of bearing, directly onto machinery
Extraction groove (BSF only)	To help with removal of bearing from machine
Set screws (BSF only)	Plugs relubrication holes to prevent contamination

DESIGN OF SHAFT AND HOUSING

It is of utmost importance that shafts and housings are accurately and precisely mated in order to take full advantage of the precision bearings' capabilities, which include rotational accuracy and low heat generation. When the inner ring or outer ring is mounted onto a shaft or into a housing with some interference, the shape of shaft or housing (out of roundness) is transferred to the bearing raceway surfaces and affects running accuracy.





BSBD Type	Bore	r1 (min)	r (min)	min. Øda	max. ØDa
BSN/BSF	12	0.6	0.3	15	33
BSN/BSF	15	0.6	0.3	19.5	35
BSN/BSF	17	0.6	0.6	23	37
BSN/BSF	20	0.6	0.6	25	43
BSN/BSF	25	0.6	0.6	32	48
BSN/BSF	30	0.6	0.6	36	53
BSN/BSF*	30	0.6	0.6	36	64
BSN/BSF	35	0.6	0.6	45	62
BSN/BSF	40	0.6	0.6	50	67
BSN/BSF*	40	0.6	0.6	50	80
BSN/BSF	50	0.6	0.6	63	82
BSN/BSF*	50	0.6	0.6	63	98
BSN/BSF	60	0.6	0.6	80	100

* Heavy series

BASIC STATIC LOAD RATINGS

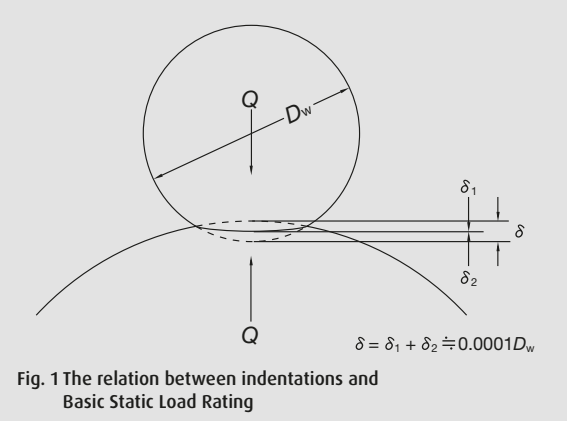


Fig. 1 The relation between indentations and Basic Static Load Rating

When subjected to an excessive load or a strong shock load, rolling bearings may incur a local permanent deformation of the rolling elements and raceway surface if the elastic limit is exceeded. The elastic deformation increases in area and depth as the load increases, and when the load exceeds a certain limit, the smooth running of the bearing is impeded.

In ISO the basic static load rating is defined as that static load which produces the following calculated contact stress at the center of the contact area between the rolling element subjected to the maximum stress and the raceway surface, being for ball bearings 4,200 MPa. In this most heavily contacted area, the sum of the permanent deformation of the rolling element and that of the raceway is nearly 0.0001 times the rolling element's diameter.

LIMITING AXIAL LOAD FOR BALL SCREW SUPPORT BEARINGS

Limiting axial load is defined as the maximum load whose large contact ellipse between the ball and raceway does not cause overriding of the shoulder of the raceway groove (Fig. 2). In the case of Ball Screw Support Bearings BSBD Series, the basic static axial load rating C_{0a} exceeds the limiting axial load by ball override, because the shoulder height of raceway groove is not considered in the ISO calculation. In that case, limiting axial load is more important than C_{0a} (Fig.3).

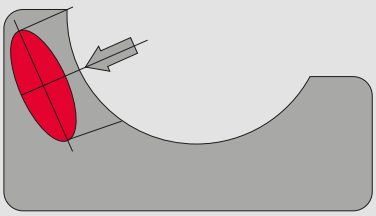


Fig. 2 Contact ellipse

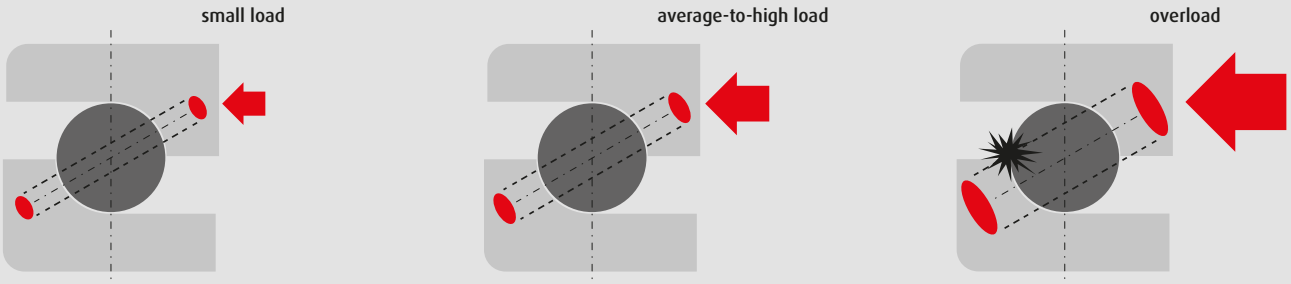
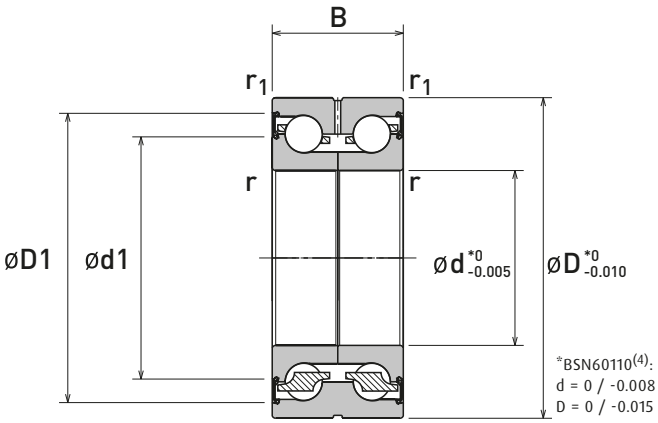


Fig. 3 Contact angle and relation with the Limiting Axial Loads

LUBRICATION

Ball screw support bearings BSBD series are greased with sufficient grease volume for the operating life of the bearing. Depending on the operating and environmental conditions of the application, relubrication may be necessary. In this case, use grease compatible with mineral oil base grease. BSF and BSN are equipped with lubrication holes in the outer ring. The BSF series has axial and radial threaded holes fitted with grub screws for easy selection of the relubrication position.

BSN TYPE



The BSN Type bearings are double row, angular contact thrust ball bearings, with a 60° contact angle. They are equivalent to two single row bearings in a back-to-back arrangement, with a single outer ring. Bearings are supplied ready to be mounted. They come greased with long life lithium soap grease, with synthetic hydrocarbon base oil as well as mineral oil.

Under normal operating conditions, the bearings are greased for life. A relubrication groove located on the outside surface of the outer ring allows the bearings to be relubricated during operation if required. The bearings are sealed on both sides. The low friction contact lip seal runs in a groove in the inner ring. This gives excellent sealing characteristics, while minimizing torque and heat generation.

Preload is set during manufacture so that the correct loading is achieved when the lock nut is tightened to provide the recommended clamping force.

Bearing Numbers	Boundary Dimensions (mm)					Reference Dimensions (mm)		Basic Dynamic Load Rating (kN)	Basic Static Load Rating (kN)	Limiting Axial Load[3] (kN)	Inertia (kg·cm^2)	Axial rigidity (N/µm)	Tilting rigidity (Nm/mrad)	Mass (kg)	Limiting Speed (min^{-1})	Starting torque[1] (Nm)	Recommended Clamping Force (N)
	d	D	B	r (min)	r_1 (min)	d1	D1								Grease		
BSN1242	12	42	25	0.3	0.6	23.7	32.7	18.5	24.0	17.6	0.068	375	50	0.200	8,000	0.05	4,030
BSN1545	15	45	25	0.3	0.6	26.7	35.7	19.4	26.9	19.4	0.101	400	60	0.220	7,200	0.05	4,050
BSN1747	17	47	25	0.6	0.6	28.1	37.7	20.3	29.7	21.2	0.130	450	80	0.230	6,700	0.05	4,400
BSN2052	20	52	28	0.6	0.6	32.6	43.0	26.4	41.0	29.3	0.258	650	140	0.310	5,800	0.13	7,600
BSN2557	25	57	28	0.6	0.6	37.6	48.0	28.3	48.0	34.0	0.413	750	210	0.360	5,100	0.16	8,100
BSN3062	30	62	28	0.6	0.6	42.6	53.0	30.0	55.5	38.5	0.624	850	290	0.398	4,500	0.19	8,600
BSN3072[2]	30	72	38	0.6	0.6	49.1	64.4	60.5	94.0	66.5	1.800	950	440	0.740	3,900	0.59	11,100
BSN3572	35	72	34	0.6	0.6	53.1	62.2	42.0	77.5	52.0	1.410	900	400	0.660	3,800	0.21	13,500
BSN4075	40	75	34	0.6	0.6	55.1	67.2	44.5	88.0	58.5	1.950	1,000	560	0.650	3,500	0.24	14,100
BSN4090[2]	40	90	46	0.6	0.6	63.1	80.1	78.5	135.0	91.0	5.200	1,200	910	1.380	3,100	1.02	18,700
BSN5090	50	90	34	0.6	0.6	70.1	82.2	48.0	110.0	71.5	5.000	1,250	1,050	0.930	2,800	0.33	15,400
BSN50110[2]	50	110	54	0.6	0.6	78.1	97.5	116.0	219.0	149.0	14.600	1,400	1,600	2.460	2,500	1.06	19,100
BSN60110	60	110	45	0.6	0.6	83.1	99.3	86.5	187.0	126.0	12.900	1,300	1,600	1.820	2,400	0.50	20,900

[1] Starting torque indicates torque due to the preload of the bearing only. If you need further information please consult NSK

[2] Heavy series

[3] See definition on page 7

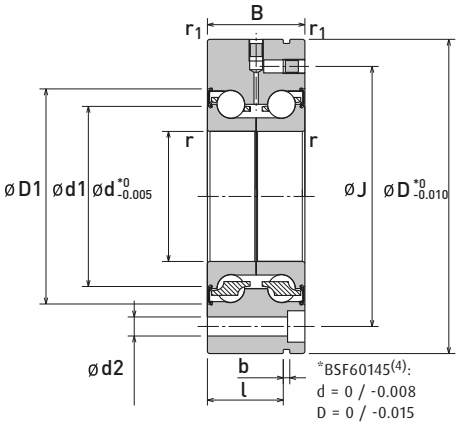
[4] Tolerances are valid for all sizes except for sizes mentioned in the sketch

BSF TYPE

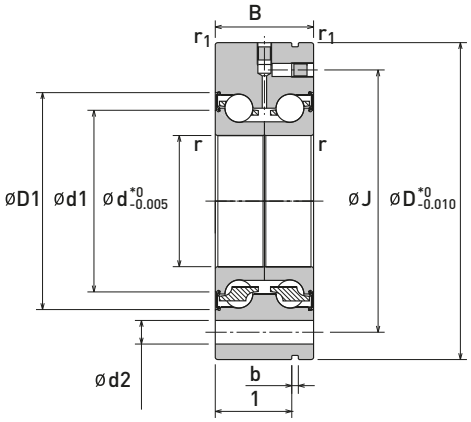
The BSF Type of bearings is equivalent to the BSN range of bearings, with an extended outer ring, with bolt holes for easy direct mounting.

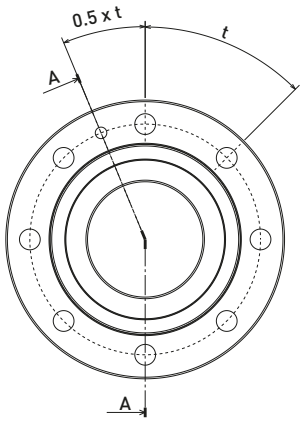
Relubrication holes in outside surface and face of the outer ring allow for relubrication during operation if required. The holes are closed off with set screws. An extraction groove on the outer surface of the outer ring aids removal of the bearing.

Design for d = 60 mm



Design for d ≤ 50 mm





Bearing Numbers	Boundary Dimensions (mm)					Reference Dimensions (mm)							Fixing screws		Basic Dynamic Load Rating (kN)	Basic Static Load Rating (kN)	Limiting Axial Load[3] (kN)	Inertia (kg·cm²)	Axial Rigidity (N/µm)	Tilting rigidity (Nm/mrad)	Mass (kg)	Limiting Speed (min⁻¹)	Starting torque[1] (Nm)	Recommended Clamping Force (N)
	d	D	B	r (min)	r1 (min)	d1	D1	J	d2	l	b	t	Size	Qty								Grease		
BSF1255	12	55	25	0.3	0.6	23.7	32.7	42	6.8	17	3	3 x 120°	M6	3	18.5	24.0	17.6	0.068	375	50	0.370	8,000	0.05	4,030
BSF1560	15	60	25	0.3	0.6	26.7	35.7	46	6.8	17	3	3 x 120°	M6	3	19.4	26.9	19.4	0.101	400	60	0.440	7,200	0.05	4,050
BSF1762	17	62	25	0.6	0.6	28.1	37.7	48	6.8	17	3	3 x 120°	M6	3	20.3	29.7	21.2	0.130	450	80	0.460	6,700	0.05	4,400
BSF2068	20	68	28	0.6	0.6	32.6	43.0	53	6.8	19	3	4 x 90°	M6	4	26.4	41.0	29.3	0.258	650	140	0.610	5,800	0.13	7,600
BSF2575	25	75	28	0.6	0.6	37.6	48.0	58	6.8	19	3	4 x 90°	M6	4	28.3	48.0	34.0	0.413	750	210	0.730	5,100	0.16	8,100
BSF3080	30	80	28	0.6	0.6	42.6	53.0	63	6.8	19	3	6 x 60°	M6	6	30.0	55.5	38.5	0.624	850	290	0.783	4,500	0.19	8,600
BSF30100[2]	30	100	38	0.6	0.6	49.1	64.4	80	8.8	30	3	8 x 45°	M8	8	60.5	94.0	66.5	1.800	950	440	1.710	3,900	0.59	11,100
BSF3590	35	90	34	0.6	0.6	53.1	62.2	75	8.8	25	3	4 x 90°	M8	4	42.0	77.5	52.0	1.410	900	400	1.200	3,800	0.21	13,500
BSF40100	40	100	34	0.6	0.6	55.1	67.2	80	8.8	25	3	4 x 90°	M8	4	44.5	88.0	58.5	1.950	1000	560	1.490	3,500	0.24	14,100
BSF40115[2]	40	115	46	0.6	0.6	63.1	80.1	94	8.8	36	3	12 x 30°	M8	12	78.5	135.0	91.0	5.200	1200	910	2.560	3,100	1.02	18,700
BSF50115	50	115	34	0.6	0.6	70.1	82.2	94	8.8	25	3	6 x 60°	M8	6	48.0	110.0	71.5	5.000	1250	1,050	1.890	2,800	0.33	15,400
BSF50140[2]	50	140	54	0.6	0.6	78.1	97.5	113	11.0	45	3	12 x 30°	M10	12	116.0	219.0	149.0	14.600	1400	1,600	4.460	2,500	1.06	19,100
BSF60145	60	145	45	0.6	0.6	83.1	99.3	120	8.8	35	3	8 x 45°	M8	8	86.5	187.0	126.0	12.900	1300	1,600	4.060	2,400	0.50	20,900

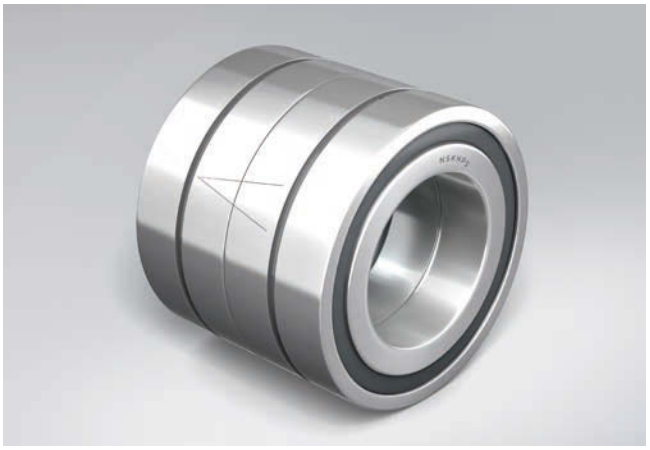
[1] Starting torque indicates torque due to the preload of the bearing only. If you need further information please consult NSK

[2] Heavy series

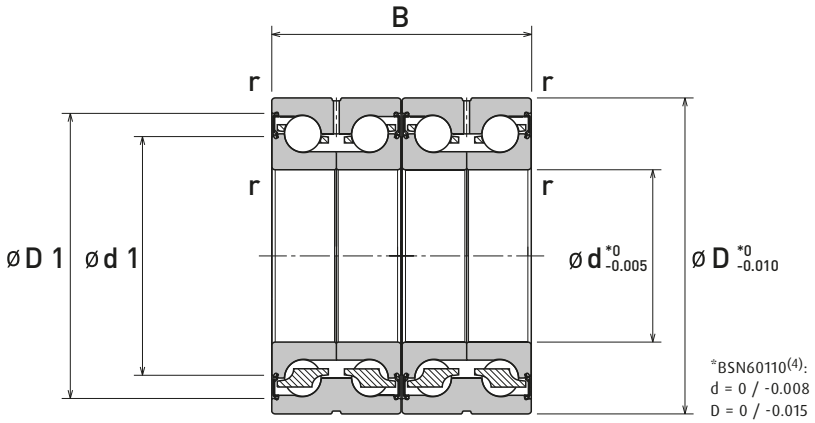
[3] See definition on page 7

[4] Tolerances are valid for all sizes except for sizes mentioned in the sketch

BSN-DT SERIES



The matched DT pairs are essentially the same as the individual bearings. The two bearings have been manufactured to match together in a paired version. Both bearings have a V-shaped mark on the outer diameter to ensure that they are arranged correctly.



Bearing Numbers	Boundary Dimensions (mm)				Reference Dimensions (mm)		Basic Dynamic Load Rating (kN)	Basic Static Load Rating (kN)	Limiting Axial Load(3) (kN)	Inertia (kg·cm²)	Axial rigidity (N/µm)	Tilting rigidity (Nm/mrad)	Mass (kg)	Limiting Speed (min⁻¹)	Starting torque(1) (Nm)	Recommended Clamping Force (N)
	d	D	B	r (min)	d_1	D_1								Grease		
BSN1747-DT	17	47	50	0.6	28.1	37.7	33.0	59.5	42.5	0.260	790	175	0.46	6,700	0.10	4,400
BSN2052-DT	20	52	56	0.6	32.6	43.0	43.0	82.0	58.5	0.516	1,180	320	0.620	5,800	0.26	7,600
BSN2557-DT	25	57	56	0.6	37.6	48.0	46.0	96.0	68.0	0.826	1,370	460	0.720	5,100	0.32	8,100
BSN3062-DT	30	62	56	0.6	42.6	53.0	49.0	111.0	77.0	1.248	1,580	620	0.796	4,500	0.37	8,600
BSN3072-DT(2)	30	72	76	0.6	49.1	64.4	98.0	188.0	133.0	3.600	1,800	990	1.480	3,900	1.17	11,100
BSN3572-DT	35	72	68	0.6	53.1	62.2	68.0	155.0	104.0	2.820	1,630	900	1.320	3,800	0.41	13,500
BSN4075-DT	40	75	68	0.6	55.1	67.2	72.0	176.0	117.0	3.900	1,850	1,200	1.300	3,500	0.49	14,100
BSN4090-DT(2)	40	90	92	0.6	63.1	80.1	128.0	269.0	182.0	10.400	2,300	2,000	2.760	3,100	2.03	1,870
BSN5090-DT	50	90	68	0.6	70.1	82.2	78.0	220.0	143.0	10.000	2,330	2,220	1.860	2,800	0.66	15,400
BSN50110-DT(2)	50	110	108	0.6	78.1	97.5	188	440.0	299.0	25.800	2,690	3,500	4.920	2,500	2.11	19,100
BSN60110-DT	60	110	90	0.6	83.1	99.3	140.0	375.0	251.0	25.800	2,500	3,500	3.640	2,400	0.50	20,900

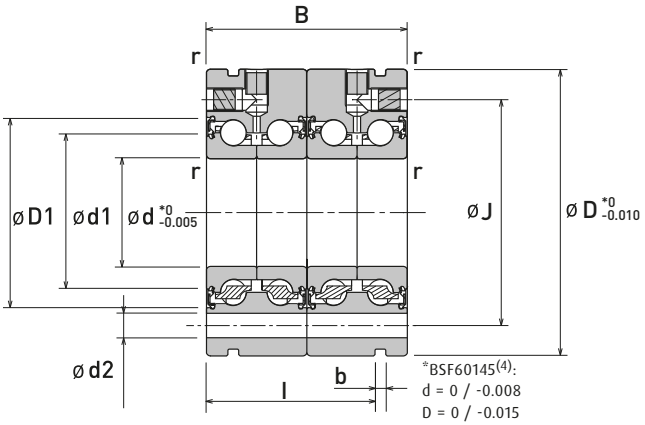
(1) Starting torque indicates torque due to the preload of the bearing only. If you need further information please consult NSK

(2) Heavy series

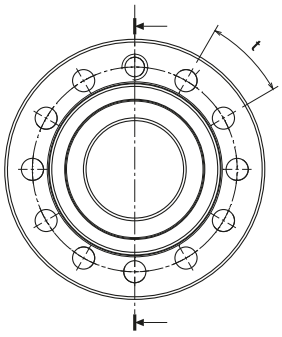
(3) See definition on page 7

(4) Tolerances are valid for all sizes except for sizes mentioned in the sketch

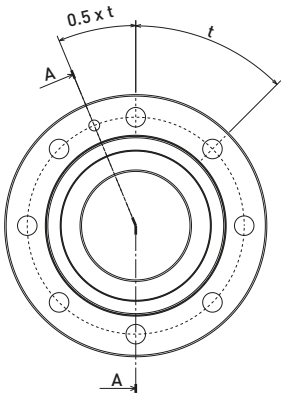
The matched DT pairs are essentially the same as the individual bearings. The two bearings have been manufactured to match together in the paired version. All sizes except one have different fixing holes in the outer ring. Both bearings have a V-shaped mark on the outer diameter to ensure that they are arranged correctly during the mounting process.



Design I



Design II



Bearing Numbers	Boundary Dimensions (mm)				Reference Dimensions (mm)							Fixing screws		Basic Dynamic Load Rating (kN)	Basic Static Load Rating (kN)	Limiting Axial Load(3) (kN)	Inertia (kg·cm2)	Axial Rigidity (N/µm)	Tilting rigidity (Nm/ mrad)	Mass (kg)	Limiting Speed (min-1)	Starting torque(1) (Nm)	Recommended Clamping Force (N)	Design
	d	D	B	r (min)	d_1	D_1	J	d_2	l	b	t	Size	Qty								Grease			
BSF1762-DT	17	62	50	0.6	28.1	37.7	48	6.8	42	3	6 x 60°	M6	5	33.0	59.5	42.5	0.260	790	175	0.890	6,700	0.10	4,400	I
BSF2068-DT	20	68	56	0.6	32.6	43.0	53	6.8	47	3	8 x 45°	M6	7	43.0	82.0	58.5	0.516	1,180	320	1.170	5,800	0.26	7,600	I
BSF2575-DT	25	75	56	0.6	37.6	48.0	58	6.8	47	3	8 x 45°	M6	7	46.0	96.0	68.0	0.826	1,370	460	1.460	5,100	0.32	8,100	I
BSF3080-DT	30	80	56	0.6	42.6	53.0	63	6.8	47	3	12 x 30°	M6	11	49.0	111.0	77.0	1.248	1,580	620	1.580	4,500	0.37	8,600	I
BSF30100-DT(2)	30	100	76	0.6	49.1	64.4	80	8.8	68	3	8 x 45°	M8	8	98.0	188.0	133.0	3.600	1,800	990	3.420	3,900	1.17	11,100	II
BSF3590-DT	35	90	68	0.6	53.1	62.2	75	8.8	59	3	8 x 45°	M8	7	68.0	155.0	104.0	2.820	1,630	900	2.300	3,800	0.41	13,500	I
BSF40100-DT	40	100	68	0.6	55.1	67.2	80	8.8	59	3	8 x 45°	M8	7	72.0	176.0	117.0	3.900	1,850	1,200	2.880	3,500	0.49	14,100	I
BSF40115-DT(2)	40	115	92	0.6	63.1	80.1	94	8.8	82	3	12 x 30°	M8	12	128.0	269.0	182.0	10.400	2,300	2,000	5.120	3,100	2.03	18,700	II
BSF50115-DT	50	115	68	0.6	70.1	82.2	94	8.8	59	3	12 x 30°	M8	11	78.0	220.0	143.0	10.000	2,330	2,220	3.620	2,800	0.66	15,400	I
BSF50140-DT(2)	50	140	108	0.6	78.1	97.5	113	11	99	3	12 x 30°	M10	12	188.0	440.0	299.0	29.000	2,690	3,560	8.920	2,500	2.11	19,100	II

(1) Starting torque indicates torque due to the preload of the bearing only. If you need further information please consult NSK

(2) Heavy series

(3) See definition on page 7

(4) Tolerances are valid for all sizes except for sizes mentioned in the sketch

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