MOTION & CONTROL™

NSK

BALL SCREW SUPPORT BEARINGS

NSKHPS – BSBD SERIES

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As one of the world's leading manufacturers of rolling bearings, linear technology components and steering systems, we can be found on almost every continent – with production facilities, sales offices and technology centres – because our customers appreciate short decision-making channels, prompt deliveries and local service.

The NSK company

NSK commenced operations as the first Japanese manufacturer of rolling bearings back in 1916. Ever since, we have been continuously expanding and improving not only our product portfolio but also our range of services for various industrial sectors. In this context, we develop technologies in the fields of rolling bearings, linear systems, components for the automotive industry and mechatronic systems. Our research and production facilities in Europe, Americas and Asia are linked together in a global technology network. Here we concentrate not only on the development of new technologies, but also on the continuous optimisation of quality – at every process stage.

Among other things, our research activities include product design, simulation applications using a variety of analytical systems and the development of different steels and lubricants for rolling bearings.

Partnership based on trust – and trust based on quality

Total Quality by NSK: The synergies of our global network of NSK Technology Centres. Just one example of how we meet our requirements for high quality.

NSK is one of the leading companies with a long tradition in patent applications for machine parts. In our worldwide research centres, we not only concentrate on the development of new technologies, but also on the continual improvement of quality based on the integrated technology platform of tribology, material technology, analysis and mechatronics. **More about NSK at www.nskeurope.com or call us on +44 (0) 1636 605 123**

Ball Screw Support Bearings

NSKHPS BSBD Series

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.

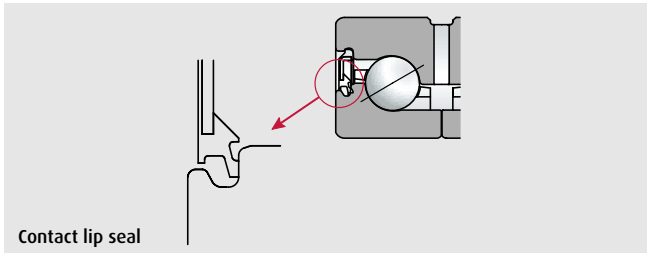
Long Life

High Accuracy

Wide Range Lineup

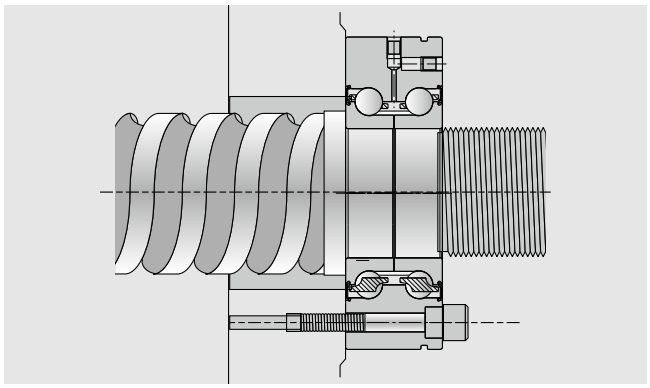
Types

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.

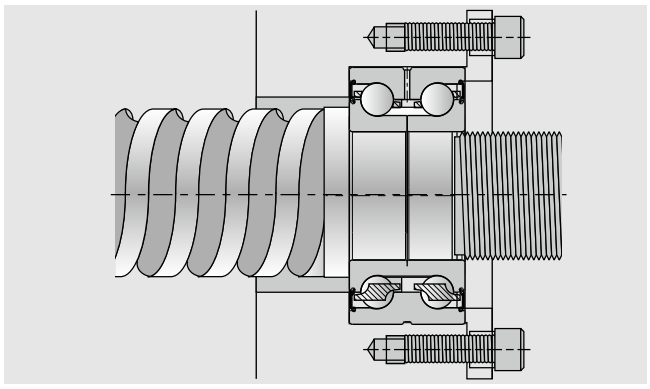


Contact lip seal

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 load capacities and stiffness.

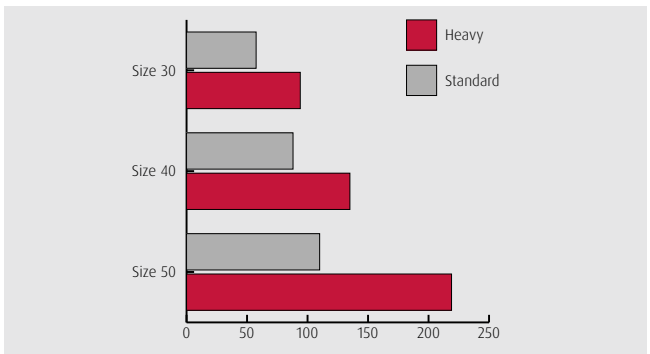
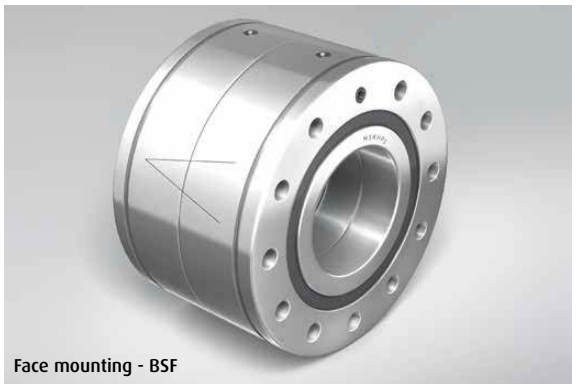


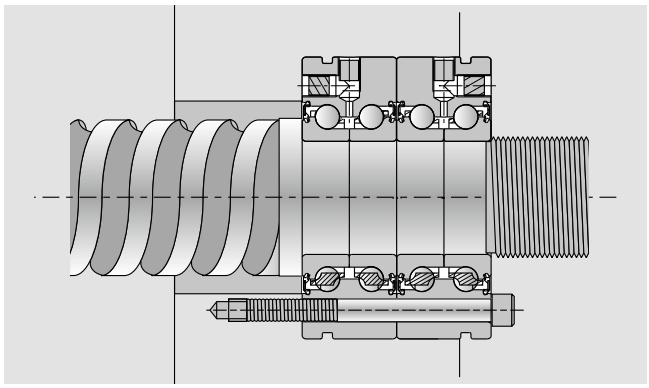
Fig 1. Comparison of dynamic load rating. Unit: N

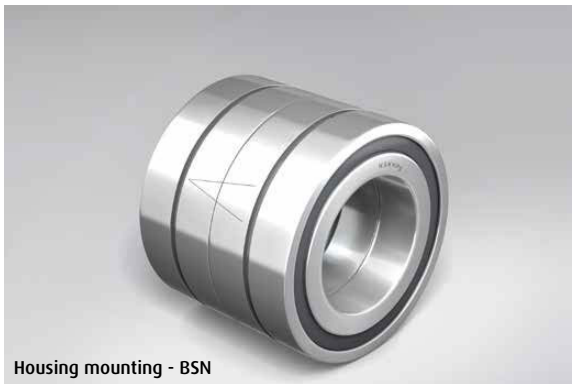
Matched Pairs

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.

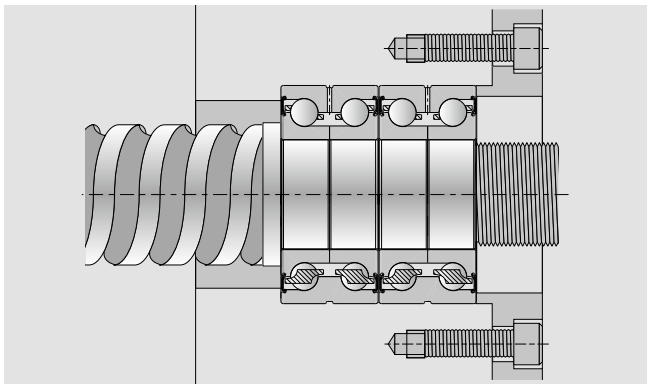


Face mounting - BSF





Housing mounting - BSN



In case of pairs of the BSF heavy series, the number and position of the through holes are different from the standard series, please refer to the tables on page 12-13 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.

Note: Fixing bolts are not included.

Nomenclature

Example:

BS F 30 80 DDU H P2B DT

Series (Ball Screw Support)

F: Face mounting
N: No face mounting (housing)

Bore

Outer diameter

Seal type

Preload

Class ISO 2

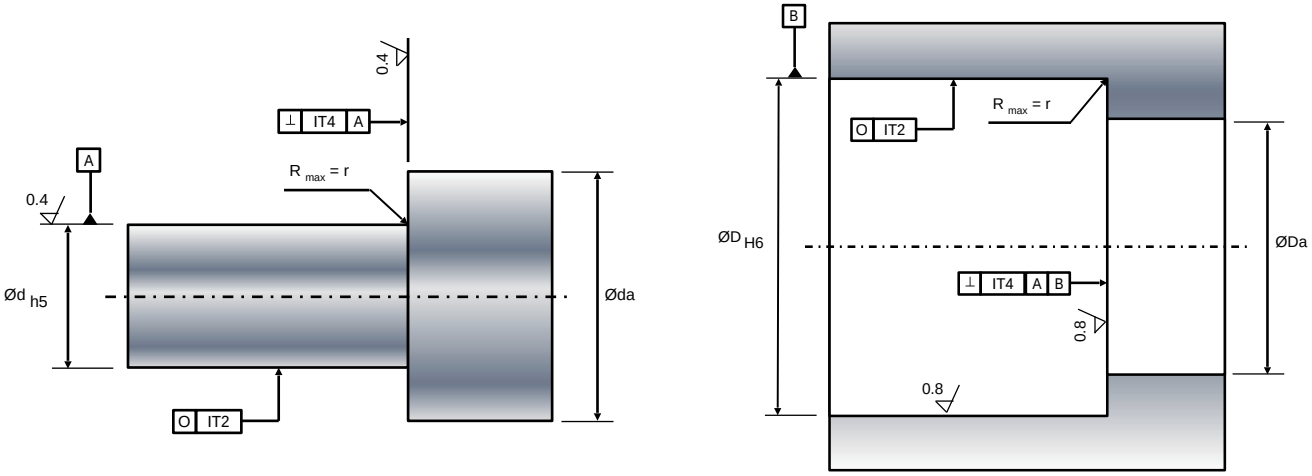
No symbol: single bearing
DT: paired bearing

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

CAD-Data: nsk.solidcomponents.com

Design of Shaft & 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. The mating parts should be as accurate as possible. Inaccurate mating of parts can cause the formation of peaks or ridges along the shaft of a precision lathe, which can affect the quality of finished work.



Designation (Unit: mm)				r (min)	Øda	ØDa
BSF	1255	BSF	1242	0.6	18	33
BSF	1560	BSF	1545	0.6	22	35
BSF	1762	BSN	1747	0.6	23	37
BSF	2068	BSN	2052	0.6	26	43
BSF	2575	BSN	2557	0.6	32	48
BSF	3080	BSN	3062	0.6	37	53
BSF	30100	BSN	3072	0.6	40	64
BSF	3590	BSN	3572	0.6	43	62
BSF	40100	BSN	4075	0.6	48	67
BSF	40115	BSN	4090	0.6	51	80
BSF	50115	BSN	5090	0.6	60	82
BSF	50140	BSN	50110	0.6	63	98
BSF	60145	BSN	60110	0.6	75	100

Static Load and Limiting Axial Load

Basic Static Load Ratings

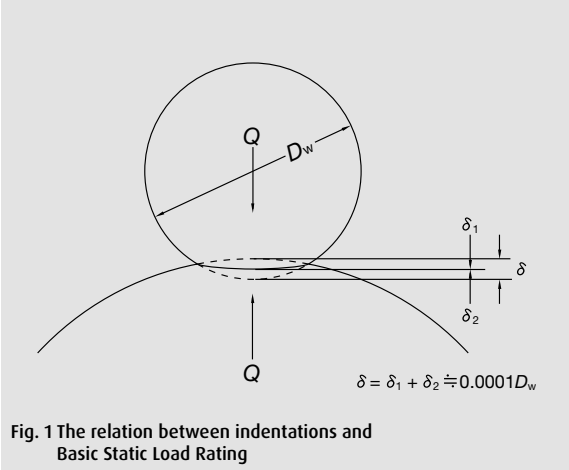


Fig. 1 The relation between indentations and Basic Static Load Rating

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 non-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 centre of the contact area between the rolling element subjected to the maximum stress and the raceway surface, being for ball bearings 4 200MPa. 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).

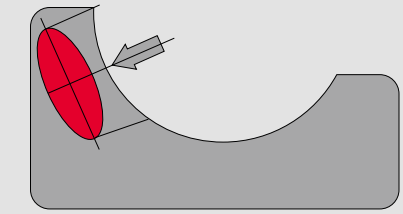


Fig. 2 Contact ellipse

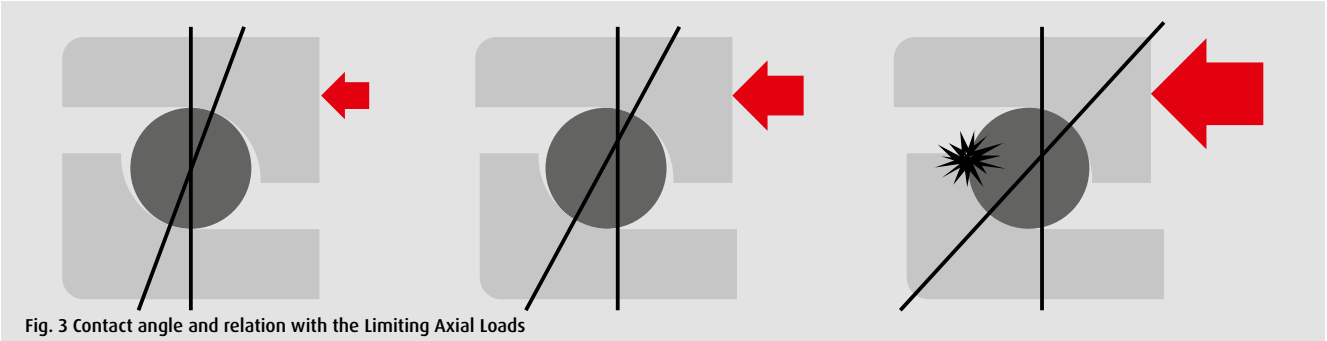
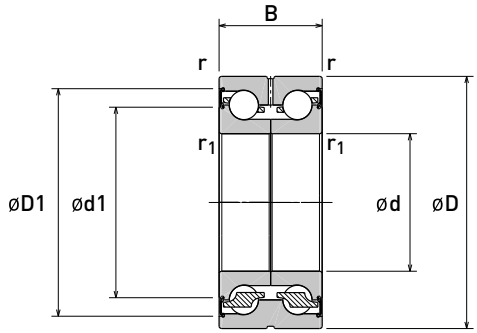


Fig. 3 Contact angle and relation with the Limiting Axial Loads

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



BSN Type

The BSN Type of ball screw support 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.

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 grove in the inner ring. This gives excellent sealing characteristics, while minimising torque and heat generation.

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

Bearing Numbers	Boundary Dimensions (mm)					Reference Dimensions (mm)		Basic Dynamic Load Rating (kN)	Basic Static Load Rating (kN)	Limiting Axial Load[3] (kN)	Inertia ($kg \cdot cm^2$)	Axial rigidity (N/μm)	Tilting rigidity (Nm/mrad)	Mass (kg)	Limiting Speed (min^{-1})	Starting torque[1] (Nm)	Clamping Force (N)
	d	D	B	r_1 (min)	r (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	8000	0,05	4030
BSN1545	15	45	25	0,3	0,6	26,7	35,7	19,4	26,9	19,4	0,101	400	60	0,220	7200	0,05	4050
BSN1747	17	47	25	0,6	0,6	28,1	37,7	20,3	29,7	21,2	0,130	450	80	0,230	6700	0,05	4400
BSN2052	20	52	28	0,6	0,6	32,6	43,0	26,4	41,0	29,3	0,258	650	140	0,310	5800	0,13	7600
BSN2557	25	57	28	0,6	0,6	37,6	48,0	28,3	48,0	34,0	0,413	750	210	0,360	5100	0,16	8100
BSN3062	30	62	28	0,6	0,6	42,6	53,0	30,0	55,5	38,5	0,624	850	290	0,398	4500	0,19	8600
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	3900	0,59	11100
BSN3572	35	72	34	0,6	0,6	53,1	62,2	42,0	77,5	52,0	1,410	900	400	0,660	3800	0,21	13500
BSN4075	40	75	34	0,6	0,6	55,1	67,2	44,5	88,0	58,5	1,950	1000	560	0,650	3500	0,24	14100
BSN4090[2]	40	90	46	0,6	0,6	63,1	80,1	78,5	135,0	91,0	5,200	1200	910	1,380	3100	1,02	18700
BSN5090	50	90	34	0,6	0,6	70,1	82,2	48,0	110,0	71,5	5,000	1250	1050	0,930	2800	0,33	15400
BSN50110[2]	50	110	54	0,6	0,6	78,1	97,5	116,0	219,0	149,0	14,600	1400	1600	2,460	2500	1,06	19100
BSN60110	60	110	45	0,6	0,6	83,1	99,3	86,5	187,0	126,0	12,900	1300	1600	1,820	2400	0,50	20900

Note 1. Starting torque indicates torque due to the preload of the bearing only. If you need further information please consult NSK
Note 2. Heavy series
Note 3. See definition on page 9

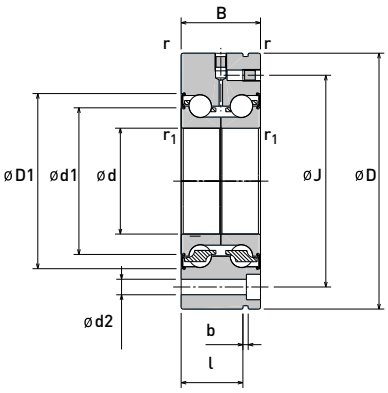
BSF Type

BSF Type

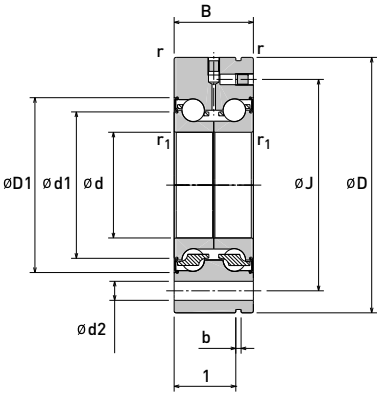
The BSF Type of bearings is equivalent to the BSN range of bearings, with an extended outer ring, with bolt holes for easy direct mounting.

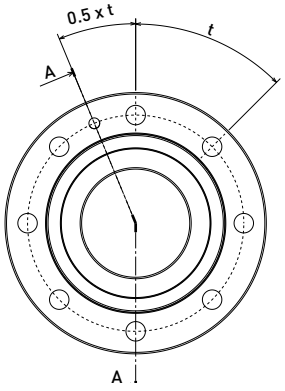
Relubrication holes in outside surface and face of the outer ring allow for relubrication during operation if required. The holes are closed off with set screws. An extraction groove on the outer surface of the outer ring aids removal of the bearing.

Design for d = 60 mm



Design for d ≤ 50 mm

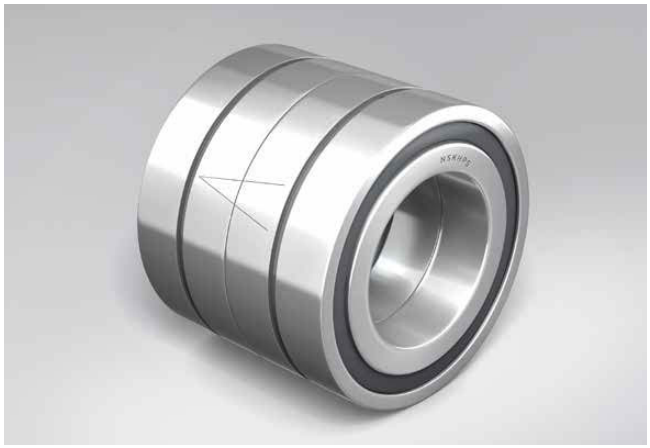




Bearing Numbers	Boundary Dimensions (mm)					Reference Dimensions (mm)							Fixing screws		Basic Dynamic Load Rating (kN)	Basic Static Load Rating (kN)	Limiting Axial Load[3] (kN)	Inertia (kg·cm²)	Axial Rigidity (N/μm)	Tilting rigidity (Nm/mrad)	Mass (kg)	Limiting Speed (min⁻¹)	Starting torque[1] (Nm)	Clamping Force (N)
	d	D	B	r_1 (min)	r (min)	d1	D1	J	d_2	l	b	t	Size	Quantity								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	8000	0,05	4030
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	7200	0,05	4050
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	6700	0,05	4400
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	5800	0,13	7600
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	5100	0,16	8100
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	4500	0,19	8600
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	3900	0,59	11100
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	3800	0,21	13500
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	3500	0,24	14100
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	3100	1,02	18700
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	1050	1,890	2800	0,33	15400
BSF50140[2]	50	140	54	0,6	0,6	78,1	97,5	113	11	45	3	12 x 30°	M10	12	116,0	219,0	149,0	14,600	1400	1600	4,460	2500	1,06	19100
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	1600	4,060	2400	0,50	20900

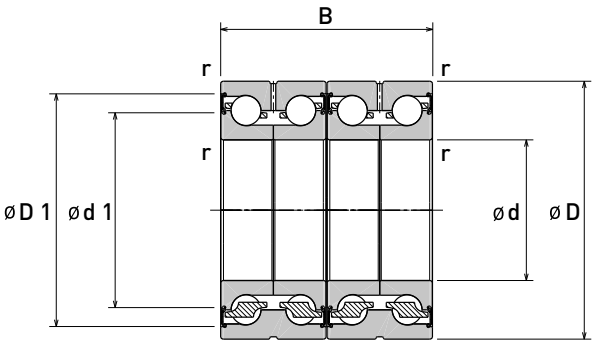
Note 1. Starting torque indicates torque due to the preload of the bearing only. If you need further information please consult NSK
Note 2. Heavy series
Note 3. See definition on page 9

BSN-DT Type



BSN-DT Type

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



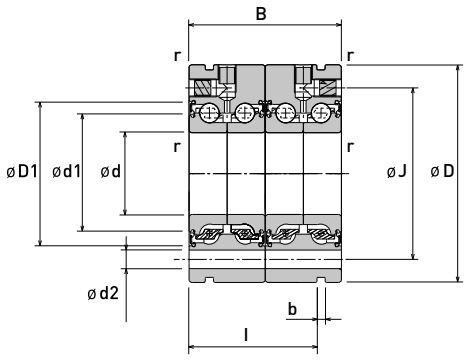
Bearing Numbers	Boundary Dimensions (mm)				Reference Dimensions (mm)		Basic Dynamic Load Rating (kN)	Basic Static Load Rating (kN)	Limiting Axial Load[3] (kN)	Inertia (kg·cm^2)	Axial rigidity (N/µm)	Tilting rigidity (Nm/mrad)	Mass (kg)	Limiting Speed (min^{-1})	Starting torque[1] (Nm)	Clamping Force (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	6700	0,10	4400
BSN2052-DT	20	52	56	0,6	32,6	43,0	43,0	82,0	58,5	0,516	1180	320	0,620	5800	0,26	7600
BSN2557-DT	25	57	56	0,6	37,6	48,0	46,0	96,0	68,0	0,826	1370	460	0,720	5100	0,32	8100
BSN3062-DT	30	62	56	0,6	42,6	53,0	49,0	111,0	77,0	1,248	1580	620	0,796	4500	0,37	8600
BSN3072-DT[2]	30	72	76	0,6	49,1	64,4	98,0	188,0	133,0	3,600	1800	990	1,480	3900	1,17	11100
BSN3572-DT	35	72	68	0,6	53,1	62,2	68,0	155,0	104,0	2,820	1630	900	1,320	3800	0,41	13500
BSN4075-DT	40	75	68	0,6	55,1	67,2	72,0	176,0	117,0	3,900	1850	1200	1,300	3500	0,49	14100
BSN4090-DT[2]	40	90	92	0,6	63,1	80,1	128,0	269,0	182,0	10,400	2300	2000	2,760	3100	2,03	1870
BSN5090-DT	50	90	68	0,6	70,1	82,2	78,0	220,0	143,0	10,000	2330	2220	1,860	2800	0,66	15400
BSN50110-DT[2]	50	110	108	0,6	78,1	97,5	188,0	440,0	299,0	29,000	2690	3560	4,920	2500	2,11	19100

Note 1. Starting torque indicates torque due to the preload of the bearing only. If you need further information please consult NSK
Note 2. Heavy series
Note 3. See definition on page 9

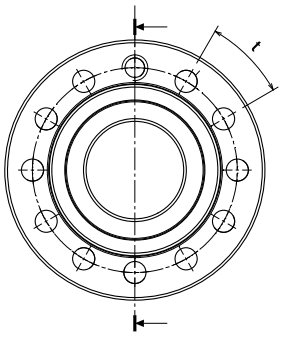
BSF-DT Type

BSF-DT Type

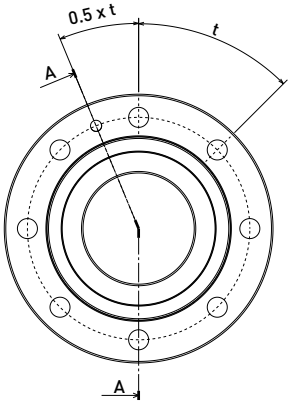
The matched DT pairs are essentially the same as the individual bearings. The two individual bearings have simply been matched together in the paired version. Some sizes also have additional fixing holes in the outer diameter. Both bearings have a V-shaped mark on the outer diameter to ensure that they are arranged correctly.



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)	Clamping Force (N)	Design
	d	D	B	r (min)	d_1	D_1	J	d_2	l	b	t	Size	Quantity								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	6700	0,10	4400	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	1180	320	1,170	5800	0,26	7600	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	1370	460	1,460	5100	0,32	8100	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	1580	620	1,580	4500	0,37	8600	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	1800	990	3,420	3900	1,17	11100	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	1630	900	2,300	3800	0,41	13500	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	1850	1200	2,880	3500	0,49	14100	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	2300	2000	5,120	3100	2,03	18700	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	2330	2220	3,620	2800	0,66	15400	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	2690	3560	8,920	2500	2,11	19100	II

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

Note 2. Heavy series

Note 3. See definition on page 9

Notes

MOTION & CONTROL™

NSK

NSK Sales Offices – Europe, Middle East and Africa

UK
NSK UK Ltd.
Northern Road, Newark
Nottinghamshire NG24 2JF
Tel. +44 (0) 1636 605123
Fax +44 (0) 1636 643276
info-uk@nsk.com

France & Benelux
NSK France S.A.S.
Quartier de l'Europe
2, rue Georges Guynemer
78283 Guyancourt Cedex
Tel. +33 (0) 1 30573939
Fax +33 (0) 1 30570001
info-fr@nsk.com

Middle East
NSK Bearings Gulf Trading Co.
JAFZA View 19, Floor 24 Office 2/3
Jebel Ali Downtown,
PO Box 262163
Dubai, UAE
Tel. +971 (0) 4 804 8205
Fax +971 (0) 4 884 7227
info-me@nsk.com

South Africa
NSK South Africa (Pty) Ltd.
25 Galaxy Avenue
Linbro Business Park
Sandton 2146
Tel. +27 (011) 458 3600
Fax +27 (011) 458 3608
nsk-sa@nsk.com

Germany, Austria, Switzerland, Nordic
NSK Deutschland GmbH
Harkortstraße 15
40880 Ratingen
Tel. +49 (0) 2102 4810
Fax +49 (0) 2102 4812290
info-de@nsk.com

Poland & CEE
NSK Polska Sp. z o.o.
Warsaw Branch
Ul. Migdałowa 4/73
02-796 Warszawa
Tel. +48 22 645 15 25
Fax +48 22 645 15 29
info-pl@nsk.com

Spain
NSK Spain, S.A.
C/ Tarragona, 161 Cuerpo Bajo
2ª Planta, 08014 Barcelona
Tel. +34 93 2892763
Fax +34 93 4335776
info-es@nsk.com

Italy
NSK Italia S.p.A.
Via Garibaldi, 215
20024 Garbagnate
Milanese (MI)
Tel. +39 02 995 191
Fax +39 02 990 25 778
info-it@nsk.com

Russia
NSK Polska Sp. z o.o.
Russian Branch
Office I 703, Bldg 29,
18th Line of Vasilievskiy Ostrov,
Saint-Petersburg, 199178
Tel. +7 812 3325071
Fax +7 812 3325072
info-ru@nsk.com

Turkey
NSK Rulmanları Orta Doğu Tic. Ltd. Şti
19 Mayıs Mah. Atatürk Cad.
Ulya Engin İş Merkezi No: 68/3 Kat. 6
P.K.: 34736 - Kozyatağı - İstanbul
Tel. +90 216 4777111
Fax +90 216 4777174
turkey@nsk.com

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