



# COMBINED NEEDLE ROLLER BEARINGS



## Combined needle roller bearings (NKX..(Z), NKXI..(Z))

### Type and Part Code

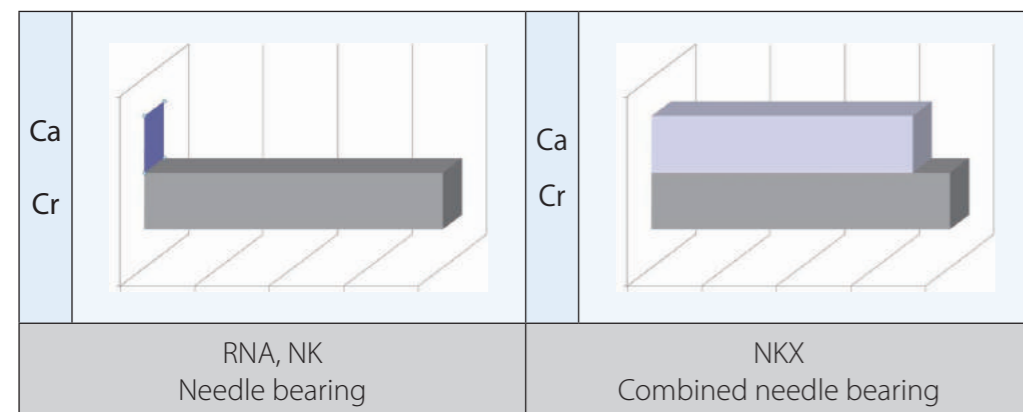
Type	Applicable axis diameter	Feature	Part Code
 NKX..(Z)	φ 10 ~ φ 70	Machined type combined bearing Radial bearing: needle bearing Thrust bearing: ball bearing With collar outer ring Without inner ring	<b>Type NKX</b> ↓ Type of bearing  <b>Dimensions 30</b> ↓ Inscribed circle diameter  <b>Z</b> ↓ Z: With dust cover No symbol: Without dust cover
 NKXI..(Z)	φ 7 ~ φ 60	Machined type combined bearing Radial bearing: needle bearing Thrust bearing: ball bearing With collar outer ring With inner ring	<b>Type NKXI</b> ↓ Type of bearing  <b>Dimensions 25</b> ↓ Bore diameter  <b>Z</b> ↓ Z: With dust cover No symbol: Without dust cover  <b>Suffix code C3</b> ↓ Clearance symbol (C3 clearance) (Standard: No symbol, CN clearance)

### Structure and Features

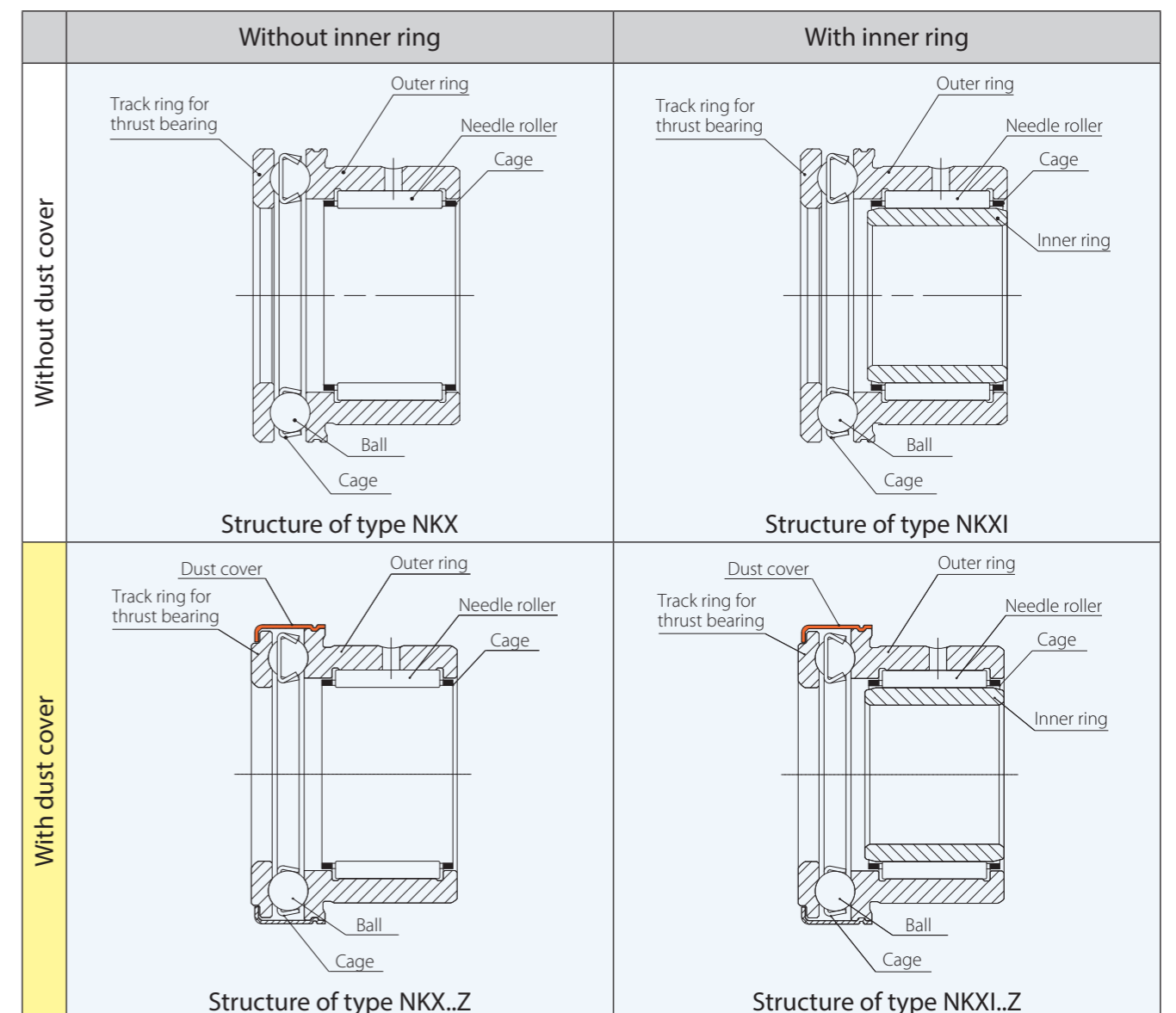
Combined needle roller bearings are made from a combination of radial needle bearings which support radial load and thrust ball bearings which support axial load.

Combined needle roller bearings are compact and simultaneously supports both radial and axial load. As such, it is possible to design more compact equipment as the space occupied by bearings can be kept small.

Moreover, on the type featuring a dust cover, the thrust bearing does not separate, therefore it is easy to handle and when greasing, splattering caused by centrifugal force within the thrust bearing can be prevented.



Ca : Axial load  
Cr : Radial load



## Accuracy standard

Please refer to page 22 regarding accuracies for the radial section of combined needle bearings. Table-1 indicates thrust section accuracies.

Table-1 Thrust section accuracies

Unit:  $\mu\text{m}$

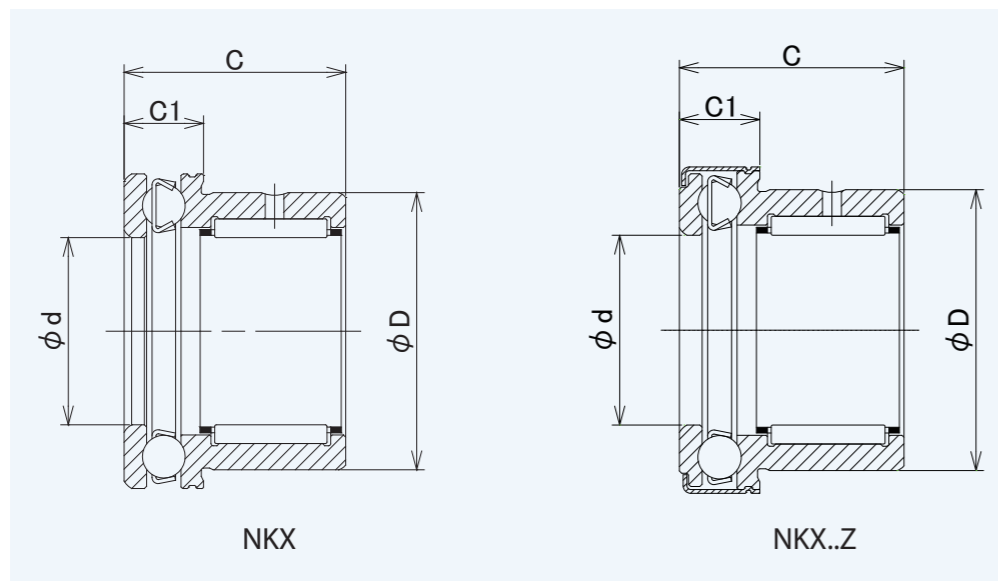
Part code	Inner ring		Outer ring			Inner ring/Outer ring			
	$\Delta_{\text{dmp}}$ Deviation of mean bore diameter in a single plane	$V_{\text{dsp}}$ Variation of bore diameter in a single plane	$\Delta_{\text{Dmp}}$ Deviation of mean outer diameter in a single plane	$V_{\text{Dsp}}$ Variation of outer diameter in a single plane	$S_i/S_e$ Variation of track thickness				
					Class 0	Class 6	Class 5		
	high	low	max.	high	low	max.	max.		
NKX10 to 15(Z) NKXI7 to 12(Z)	0	-8	6	0	-11	8	10	5	3
NKX17 to 30(Z) NKXI14 to 25(Z)	0	-10	8	0	-13	10	10	5	3
NKX35 to 50(Z) NKXI30 to 45(Z)	0	-12	9	0	-16	12	10	6	3
NKX60 to 70(Z) NKXI50 to 60(Z)	0	-15	11	0	-19	14	10	7	4

Table-2 indicates the accuracies of the assembled bearings.

Table-2 Assembled bearing accuracy

Unit: mm

d	D	C	C1
E8 (Fitting accuracy)	H5 (Fitting accuracy)	MAX. 0 MIN. -0.25	MAX. 0 MIN. -0.2



## Radial internal clearance

Table-3 indicates the radial internal clearances of combined needle bearings with inner rings (NKXI).

Table-3 Radial internal clearances Unit:  $\mu\text{m}$

Part code	Radial internal clearance	
	min.	max.
NKXI 7 to 25	20	45
NKXI 30 to 40	25	50
NKXI 45 to 50	30	60
NKXI 60	40	70
NKXI 70	40	75

## Fits

Table-4 indicates the recommended fits between the combined needle bearing and shaft and housing.

Table-4 Recommended fits Unit:  $\mu\text{m}$

Shaft tolerance		Housing tolerance
Without Inner ring	With Inner ring	
H5 K5	K5	K6, M6

## Lubrication

Please refer to page 43 - 7 Lubrication regarding lubrication for the radial and thrust sections of combined needle bearings. For both the time with a dust cover and without, grease is pre-packed into the thrust section before factory dispatch.

## Rating life

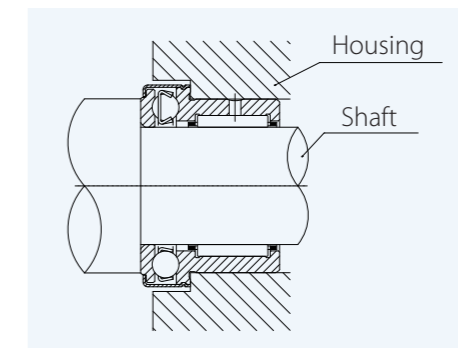
Please calculate rating life for radial needle bearings and thrust ball bearings respectively using the formula provided on page 12 - 1 Bearing Life and Load Rating. Assume that the radial needle bearing supports the radial element of load while the thrust ball bearing supports the thrust element. The overall rating life is then calculated using the respective calculation results in the below formula.

$$L = \left[ \left( \frac{1}{L_a} \right)^{3/2} + \left( \frac{1}{L_r} \right)^{3/2} \right]^{-2/3} \dots \dots \dots (0.0)$$

- $L$  : Basic rating life of combined needle bearings is  $10^6$  rotation  $10^6$  REV.
- $L_r$  : Basic rating life of radial needle bearings is  $10^6$  rotation  $10^6$  REV.
- $L_a$  : Basic rating life of thrust ball bearings is  $10^6$  rotation  $10^6$  REV.

## Mounting

The below is an example of combined needle bearing mounting. The thrust section housing and its clearance must be made 0.5 mm or greater than the outer diameter of the outer ring collar (NKX(I)) and the outer diameter of the dust cover (NKX(I)..Z).



# COMBINED NEEDLE ROLLER BEARINGS

WITH AXIAL BALL BEARINGS WITHOUT INNER RINGS



NKX

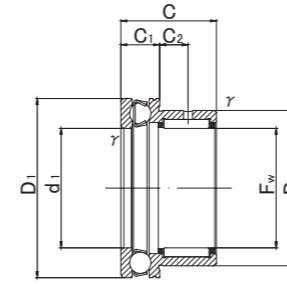
NKX.Z



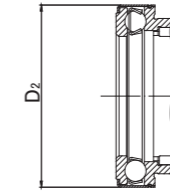
NKX



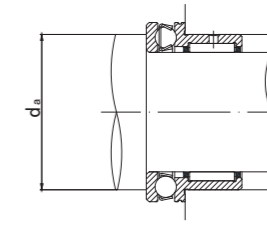
NKX.Z



NKX



NKX.Z



## NKX, NKX.Z TYPE

Shaft diameter (mm)	Designation		Dimensions (mm)									Standard mounting dimensions (mm)	Basic dynamic load rating		Basic static load rating		Limiting speed (Grease)*	Mass (g approx.)	Usable bearing designation		
	Open type	With dust cover	Fw	D	D1	D2	C	C1	C2	r <sub>s min</sub>	d1		da MIN	Radial	Axial	Radial			Axial	INNER RING	WITH INNER RING
														Cr N		Cor N					
10	NKX10	—	10 +0.022	19	24	—	23	9	6.5	0.3	10	18	8 200	10 000	9 200	14 000	9 500	36	IR71016	NKXI 7	
	—	NKX10Z	10 +0.013	19	—	25	23	9	6.5	0.3	10	18	8 200	10 000	9 200	14 000	9 500	37.5	IR71016	NKXI 7Z	
12	NKX12	—	12 +0.027	21	26	—	23	9	6.5	0.3	12	20	9 200	10 300	11 200	15 400	9 200	40.5	IR91216	NKXI 9	
	—	NKX12Z	12 +0.016	21	—	27	23	9	6.5	0.3	12	20	9 200	10 300	11 200	15 400	9 200	42	IR91216	NKXI 9Z	
15	NKX15	—	15 +0.027	24	28	—	23	9	6.5	0.3	15	23	12 400	10 500	14 900	16 800	8 800	44	IR121516	NKXI 12	
	—	NKX15Z	15 +0.016	24	—	29	23	9	6.5	0.3	15	23	12 400	10 500	14 900	16 800	8 800	45.5	IR121516	NKXI 12Z	
17	NKX17	—	17 +0.027	26	30	—	25	9	8	0.3	17	25	12 800	10 800	16 300	18 200	8 500	52	IR141717	NKXI 14	
	—	NKX17Z	17 +0.016	26	—	31	25	9	8	0.3	17	25	12 800	10 800	16 300	18 200	8 500	53.5	IR141717	NKXI 14Z	
20	NKX20	—	20 +0.033	30	35	—	30	10	10.5	0.3	20	29	17 600	14 200	25 400	24 700	7 500	83	IR172020	NKXI 17	
	—	NKX20Z	20 +0.020	30	—	36	30	10	10.5	0.3	20	29	17 600	14 200	25 400	24 700	7 500	85.5	IR172020	NKXI 17Z	
25	NKX25	—	25 +0.033	37	42	—	30	11	9.5	0.6	25	35	20 000	19 600	32 200	37 300	6 500	124.5	IR202520	NKXI 20	
	—	NKX25Z	25 +0.020	37	—	43	30	11	9.5	0.6	25	35	20 000	19 600	32 200	37 300	6 500	127.5	IR202520	NKXI 20Z	
30	NKX30	—	30 +0.033	42	47	—	30	11	9.5	0.6	30	40	25 100	20 400	40 100	42 200	6 200	141.5	IR253020	NKXI 25	
	—	NKX30Z	30 +0.020	42	—	48	30	11	9.5	0.6	30	40	25 100	20 400	40 100	42 200	6 200	145	IR253020	NKXI 25Z	
35	NKX35	—	35 +0.041	47	52	—	30	12	9	0.6	35	45	27 000	20 400	46 200	44 700	5 600	163	IR303520	NKXI 30	
	—	NKX35Z	35 +0.025	47	—	53	30	12	9	0.6	35	45	27 000	20 400	46 200	44 700	5 600	167.5	IR303520	NKXI 30Z	
40	NKX40	—	40 +0.041	52	60	—	32	13	10	0.6	40	52	29 400	26 900	54 100	62 900	5 000	214	IR354020	NKXI 35	
	—	NKX40Z	40 +0.025	52	—	61	32	13	10	0.6	40	52	29 400	26 900	54 100	62 900	5 000	220	IR354020	NKXI 35Z	
45	NKX45	—	45 +0.041	58	65	—	32	14	9	0.6	45	57	31 100	27 900	60 100	69 200	4 600	251	IR404520	NKXI 40	
	—	NKX45Z	45 +0.025	58	—	66.5	32	14	9	0.6	45	57	31 100	27 900	60 100	69 200	4 600	264.5	IR404520	NKXI 40Z	
50	NKX50	—	50 +0.041	62	70	—	35	14	10	0.6	50	62	43 000	28 700	85 200	75 400	4 500	277	IR455025	NKXI 45	
	—	NKX50Z	50 +0.025	62	—	71.5	35	14	10	0.6	50	62	43 000	28 700	85 200	75 400	4 500	291.5	IR455025	NKXI 45Z	
60	NKX60	—	60 +0.049	72	85	—	40	17	12	1	60	75	47 500	41 400	103 000	113 000	3 700	443	IR506025	NKXI 50	
	—	NKX60Z	60 +0.030	72	—	86.5	40	17	12	1	60	75	47 500	41 400	103 000	113 000	3 700	465.5	IR506025	NKXI 50Z	
70	NKX70	—	70 +0.049	85	95	—	40	18	11	1	70	85	55 500	43 100	120 600	127 000	3 400	577	IR607025	NKXI 60	
	—	NKX70Z	70 +0.030	85	—	96.5	40	18	11	1	70	85	55 500	43 100	120 600	127 000	3 400	601	IR607025	NKXI 60Z	

\* Suitable for oil lubrication. In case of grease lubrication, down to 70% of this value.

# COMBINED NEEDLE ROLLER BEARINGS

WITH AXIAL BALL BEARINGS WITH INNER RINGS



NKXI

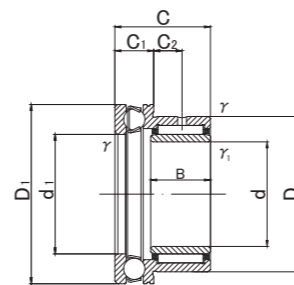
NKXI.Z



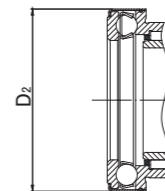
NKXI



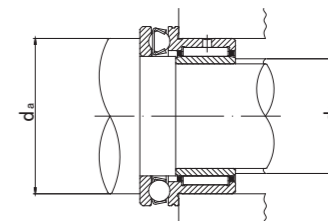
NKXI..Z



NKXI



NKXI.Z



## NKXI, NKXI..Z TYPE

Shaft diameter (mm)	Designation		Dimensions (mm)										Standard mounting dimensions (mm)		Basic dynamic load rating		Basic static load rating		Limiting speed (Grease)*	Mass (approx.)	Usable bearing designation		
	Open type	With dust cover													Radial		Radial				OUTER RING	INNER RING	
	Grease pre-packed in thrust section		d	D	D1	D2	B	C	C1	C2	r <sub>s</sub> min	r <sub>s1</sub> min	d1	da MIN	db	Cr N	Cor N	rpm			g		
7	NKXI 7	—	7 <sub>0</sub>	19	24	25	16	23	9	6.5	0.3	0.3	10	18	9	8 200	10 000	9 200	14 000	9 500	41	NKX10	IR71016
	—	NKXI 7Z	7 <sub>-0.008</sub>	19	24	25	16	23	9	6.5	0.3	0.3	10	18	9	8 200	10 000	9 200	14 000	9 500	42.5	NKX10Z	IR71016
9	NKXI 9	—	9 <sub>0</sub>	21	26	27	16	23	9	6.5	0.3	0.3	12	20	11	9 200	10 300	11 200	15 400	9 200	46.5	NKX12	IR91216
	—	NKXI 9Z	9 <sub>-0.008</sub>	21	26	27	16	23	9	6.5	0.3	0.3	12	20	11	9 200	10 300	11 200	15 400	9 200	48	NKX12Z	IR91216
12	NKXI 12	—	12 <sub>0</sub>	24	28	29	16	23	9	6.5	0.3	0.3	15	23	14	12 400	10 500	14 900	16 800	8 800	51.8	NKX15	IR121516
	—	NKXI 12Z	12 <sub>-0.008</sub>	24	28	29	16	23	9	6.5	0.3	0.3	15	23	14	12 400	10 500	14 900	16 800	8 800	53.3	NKX15Z	IR121516
14	NKXI 14	—	14 <sub>0</sub>	26	30	31	17	25	9	8	0.3	0.3	17	25	16	12 800	10 800	16 300	18 200	8 500	61.5	NKX17	IR141717
	—	NKXI 14Z	14 <sub>-0.008</sub>	26	30	31	17	25	9	8	0.3	0.3	17	25	16	12 800	10 800	16 300	18 200	8 500	63	NKX17Z	IR141717
17	NKXI 17	—	17 <sub>0</sub>	30	35	36	20	30	10	10.5	0.3	0.3	20	29	19	17 600	14 200	25 400	24 700	7 500	97	NKX20	IR172020
	—	NKXI 17Z	17 <sub>-0.008</sub>	30	35	36	20	30	10	10.5	0.3	0.3	20	29	19	17 600	14 200	25 400	24 700	7 500	99.5	NKX20Z	IR172020
20	NKXI 20	—	20 <sub>0</sub>	37	42	43	20	30	11	9.5	0.6	0.3	25	35	24	20 000	19 600	32 200	37 300	6 500	151.5	NKX25	IR202520
	—	NKXI 20Z	20 <sub>-0.010</sub>	37	42	43	20	30	11	9.5	0.6	0.3	25	35	24	20 000	19 600	32 200	37 300	6 500	154.5	NKX25Z	IR202520
25	NKXI 25	—	25 <sub>0</sub>	42	47	48	20	30	11	9.5	0.6	0.3	30	40	29	25 100	20 400	40 100	42 200	6 200	174.5	NKX30	IR253020
	—	NKXI 25Z	25 <sub>-0.010</sub>	42	47	48	20	30	11	9.5	0.6	0.3	30	40	29	25 100	20 400	40 100	42 200	6 200	178	NKX30Z	IR253020
30	NKXI 30	—	30 <sub>0</sub>	47	52	53	20	30	12	9	0.6	0.3	35	45	34	27 000	20 400	46 200	44 700	5 600	201.5	NKX35	IR303520
	—	NKXI 30Z	30 <sub>-0.010</sub>	47	52	53	20	30	12	9	0.6	0.3	35	45	34	27 000	20 400	46 200	44 700	5 600	206	NKX35Z	IR303520
35	NKXI 35	—	35 <sub>0</sub>	52	60	61	20	32	13	10	0.6	0.3	40	52	39	29 400	26 900	54 100	62 900	5 000	260	NKX40	IR354020
	—	NKXI 35Z	35 <sub>-0.012</sub>	52	60	61	20	32	13	10	0.6	0.3	40	52	39	29 400	26 900	54 100	62 900	5 000	266	NKX40Z	IR354020
40	NKXI 40	—	40 <sub>0</sub>	58	65	66.5	20	32	14	9	0.6	0.3	45	57	44	31 100	27 900	60 100	69 200	4 600	302	NKX45	IR404520
	—	NKXI 40Z	40 <sub>-0.012</sub>	58	65	66.5	20	32	14	9	0.6	0.3	45	57	44	31 100	27 900	60 100	69 200	4 600	315.5	NKX45Z	IR404520
45	NKXI 45	—	45 <sub>0</sub>	62	70	71.5	25	35	14	10	0.6	0.6	50	62	49	43 000	28 700	85 200	75 400	4 500	348	NKX50	IR455025
	—	NKXI 45Z	45 <sub>-0.012</sub>	62	70	71.5	25	35	14	10	0.6	0.6	50	62	49	43 000	28 700	85 200	75 400	4 500	362.5	NKX50Z	IR455025
50	NKXI 50	—	50 <sub>0</sub>	72	85	86.5	25	40	17	12	1	1	60	75	59	47 500	41 400	103 000	113 000	3 700	606	NKX60	IR506025
	—	NKXI 50Z	50 <sub>-0.012</sub>	72	85	86.5	25	40	17	12	1	1	60	75	59	47 500	41 400	103 000	113 000	3 700	628.5	NKX60Z	IR506025
60	NKXI 60	—	60 <sub>0</sub>	85	95	96.5	25	40	18	11	1	1	70	85	68	55 500	43 100	120 600	127 000	3 400	772	NKX70	IR607025
	—	NKXI 60Z	60 <sub>-0.015</sub>	85	95	96.5	25	40	18	11	1	1	70	85	68	55 500	43 100	120 600	127 000	3 400	796	NKX70Z	IR607025

\* Suitable for oil lubrication. In case of grease lubrication, down to 70% of this value.