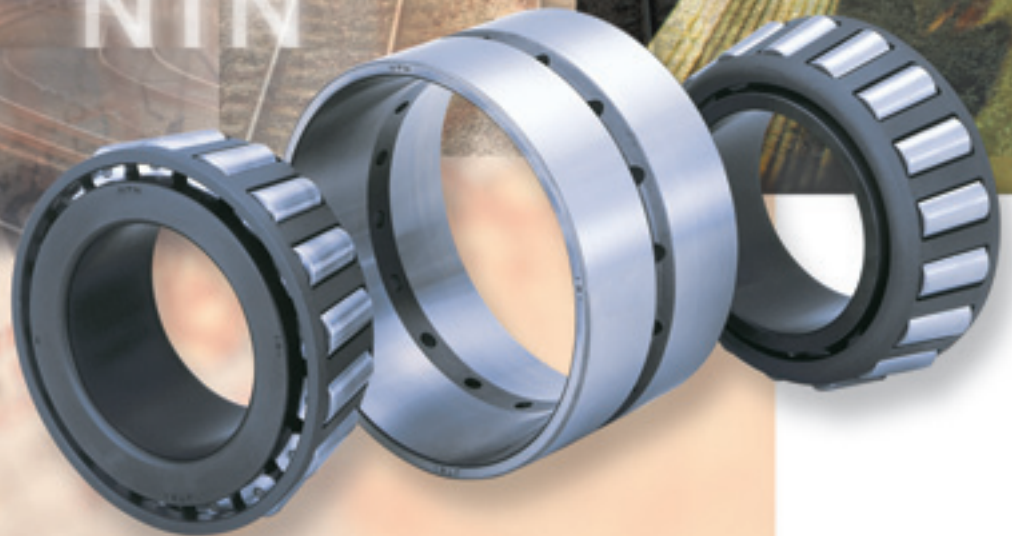


## RAILWAY BEARINGS

- 
- Double Row Cylindrical Roller Bearings*
  - Ball Bearings for Thrust Load Support*
  - Double Row Cylindrical Roller Bearings with Ribs*
  - Double Row Tapered Roller Bearings Indirect Mounting*
  - RCC Bearings*
  - RCT Bearings Approved by A.A.R.*
  - RCT Bearings*
  - Spherical Roller Bearings*
  - Cylindrical Roller Bearings Specified by UIC*
  - Double row Cylindrical Roller Bearings Standardized by UIC*
  - Bearings for Driving Gears*
  - Insulated Bearings-Resin Coated type for Traction Motor*
  - Insulated Bearings-Ceramic coated type for Traction Motor*
  - Double Row Cylindrical Roller Bearings*
  - Double Row Tapered Roller Bearings*
  - RCC Bearing*
  - RCT Bearings Approved by A.A.R.*
  - RCT Bearings*
  - Spherical Roller Bearings*
  - Cylindrical Roller Bearings*
  - Double row Cylindrical Roller Bearings for Driving Gears*
  - Insulated Bearings-Resin Coated type for Traction Motor*
  - Insulated Bearings-Ceramic coated type for Traction Motor*

NTN



# NTN

# RAILWAY BEARINGS

## CONTENTS

### Types of NTN Bearings and Axle Boxes

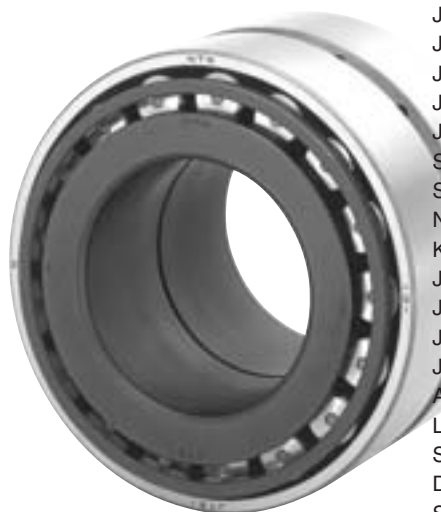
1. Journal Bearings .....	2
2. Bearings for Driving Gears .....	4
3. Bearings for Main Electric Motors .....	5

### Types of NTN Railway Bearings

Double Row Cylindrical Roller Bearings .....	6
Ball Bearings for Thrust Load Support .....	7
Double Row Cylindrical Roller Bearings with Ribs .....	8
Double Row Tapered Roller Bearings Indirect Mounting .....	9
RCC Bearings.....	10
RCT Bearings Approved by A.A.R. ....	12
RCT Bearings .....	14
Spherical Roller Bearings .....	16
Cylindrical Roller Bearings Standardized by UIC .....	18
Double row Cylindrical Roller Bearings Standardized by UIC .....	20
Bearings for Driving Gears .....	22
Insulated Bearings-Resin Coated type for Traction Motor .....	24
Insulated Bearings-Ceramic Coated type for Traction Motor .....	25

### Applications for NTN Railway Bearings

JR (Japan Railway) Central Super Express Train, 300 Series .....	26
JR-West Super Express Train, 500 Series .....	28
JR-Central Super Express Train, 700 Series .....	30
JR-Central Limited Express, Diesel Train, Type KIHA 85 .....	32
JR-Central Limited Express, Electric Train, 383 Series.....	34
JR-Central Electric Train, 313 Series .....	36
JR-West Limited Express, Electric Train, 681 Series .....	38
JR-West Electric Train, 223 Series .....	40
JR Shikoku Limited Express, Diesel Train, KIHA 2000 .....	42
JR Kyushu Limited Express, Electric Train, 783 Series.....	44
JR Kyushu Electric Train, 813 Series .....	46
JR Kyushu Electric Train, 815 Series .....	48
Sagami Railways Electric Train, 8000 Series .....	50
Sagami Railways Electric Train, 9000 Series .....	52
NANKAI Electric Railways Electric Train, 11000 Series .....	54
Kinki Nippon Railways Limited Express, Electric Train, 23000 Series .....	56
JR Freight KOKI 106 Series .....	58
JR Freight KOKI 50000 Series .....	60
JR Freight KOKI 71 .....	62
JR Freight KOKI 72 .....	64
Argentinean Railway.....	66
London Underground 5066 Series .....	68
Singapore Subway .....	70
DB (Deutsche Bahn AG) .....	72
Seoul Subway .....	74
Indian National Railway.....	76



## 1. Journal Bearings

Train passenger's safety depends on the reliability and durability provided by rolling stock journal bearings.

Special care is given to design specification manufacture and testing. Journal bearings are generally characterized by larger width and smaller radius and can be cylindrical roller bearing type, tapered roller bearing type or self aligning roller bearing type.

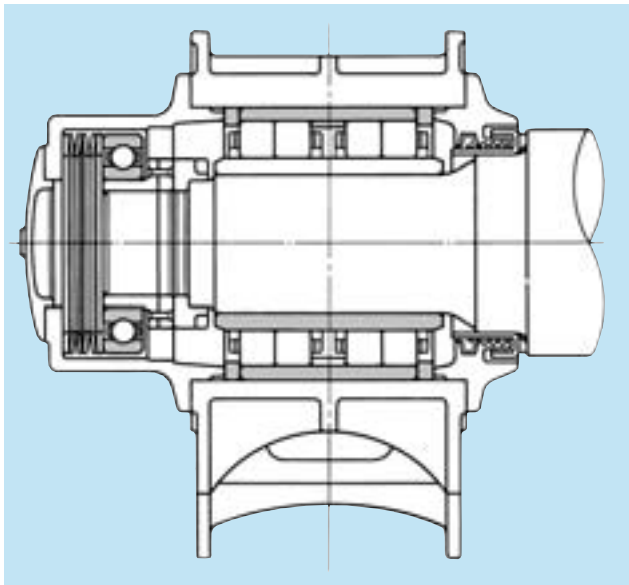
Ball bearings are used to support thrust loads.

Also, ball bearings could be used as journal bearings in lightly loaded applications.

### 1.1 Double or Four Row Cylindrical Roller Bearings

#### 1.1.1 Double or Four Row Cylindrical Roller Bearings (with ball bearing for thrust load support)

The inner ring of cylindrical roller bearing has no ribs. It is fitted with a ball bearing on the axle end for thrust load support. The axle end side of the ball bearing is sometimes fitted with coned disc spring or rubber buffers to absorb shock loads.

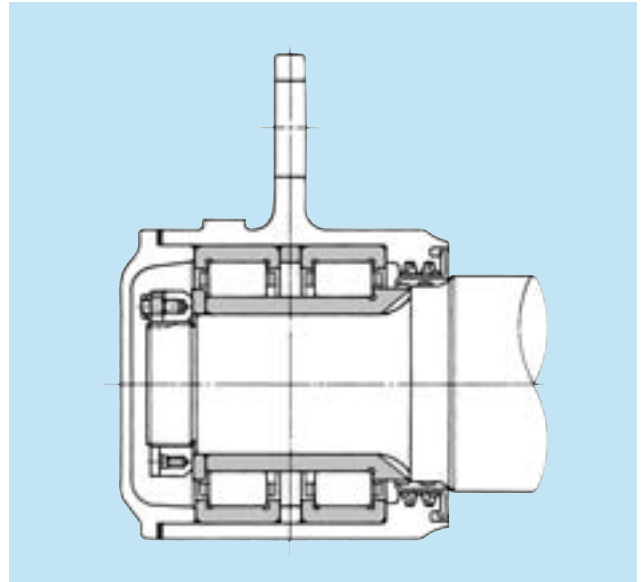


#### 1.1.2 Double Row Cylindrical Roller Bearings (with Ribs)

This bearing supports thrust loads with its inner and outer ring rib sidefaces.

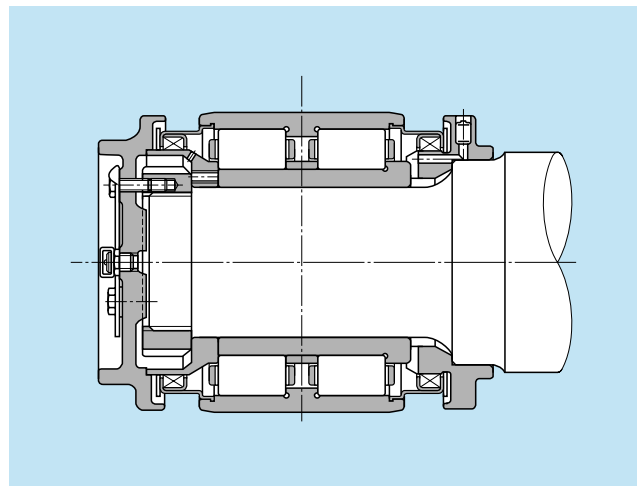
Since a ball bearing is not needed for thrust loading, this design is more reasonably priced.

It is popular for its high grease fill and durability.



#### 1.1.3 RCC Bearings

These are unitized cylindrical roller bearings with seal for axles of rolling stock and are pre-lubricated with grease. They are provided with a hermetic seal, which permits a simplified axle box structure. They are designed and built to provide ease of use and long life for the passenger coach application.

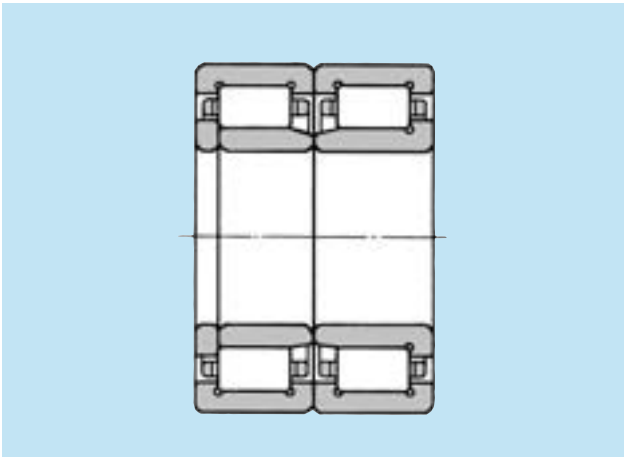


### 1.1.4 Double Row Cylindrical Roller Bearings (UIC Standard Type)

Railway cars traveling between various countries in Europe utilize journal bearings that have been standardized by International Union of Railways (UIC).

ISO bearings are sometimes used, but specially dimensioned bearings are the most common.

NTN manufactures specially dimensioned ISO bearings and standardized bearings by UIC for European use (see picture below).

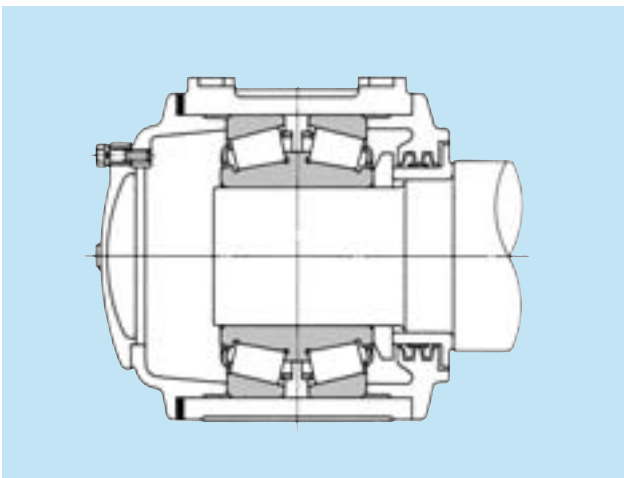


## 1.2 Double Row Tapered Roller Bearings

### 1.2.1 Double Row Tapered Roller Bearings

When mounted back to back, tapered roller bearings are commonly used for their ability to endure high moment loads. They are able to support high thrust loads despite their discreet profile and are relatively inexpensive.

Face to face mounted bearings are seldom used today because they have low rigidity when a moment load is applied.

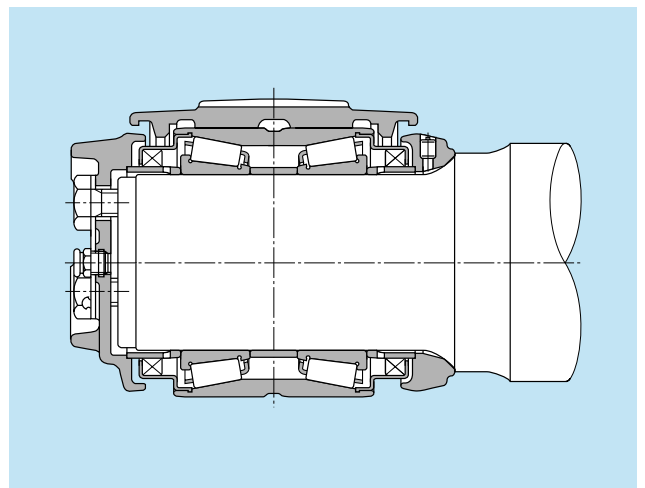


### 1.2.2 RCT Bearings

These are sealed tapered roller bearings used for axles of rolling stock. They are available as a unitized type, prelubricated with grease. They are provided with a hermetic seal, which permits a simplified axle box structure. They are designed and built to provide ease of use and long life.

The inch system classes of B, C, D, E, F and G, approved by the Association of American Railroads (A. A. R.), are standard for freight cars, locomotives and passenger cars.

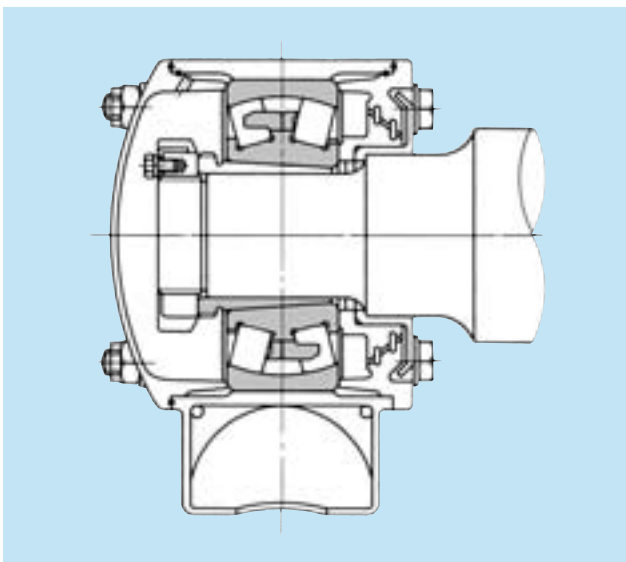
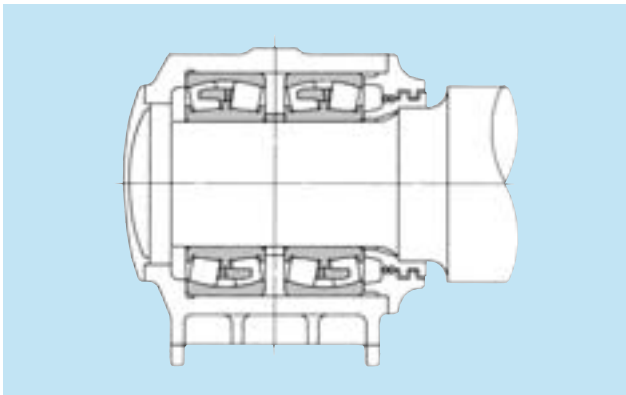
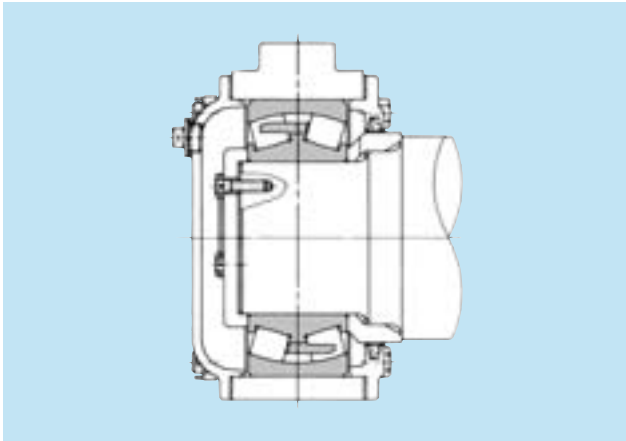
In the metric system, standard bearings JT9, JT10, and JT11 are used for freight cars while JT12, JT13, JT14 and JT15 are used for passenger coaches.



### 1.3 Spherical Roller Bearings

These bearings are suitable for radial loads, thrust loads or a combination of both. They are well equipped to handle vibration or impact loads and can be used in either one or two bearings axle designs.

Mounting is either accomplished directly on the shaft or sometimes with the use of a sleeve.



## 2. Bearings for Driving Gears

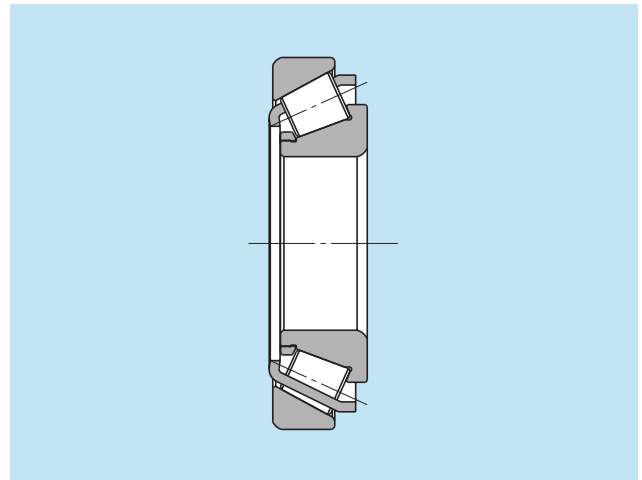
These bearings can support axial and radial loads as well as vibration produced by small and large gears.

Presently, parallel cardin drive system are used for driving gears in Japan.

NTN, there fore, has developed single row tapered roller bearings, back-to-back mounted and double row tapered roller bearings for small and large gears.

In order to extend bearing life, NTN developed new long life material for rolling elements and raceways, original analysis method with FEA for cage strength and developed improved features to prevent rib seizure.

Responding to inquiries from customers.



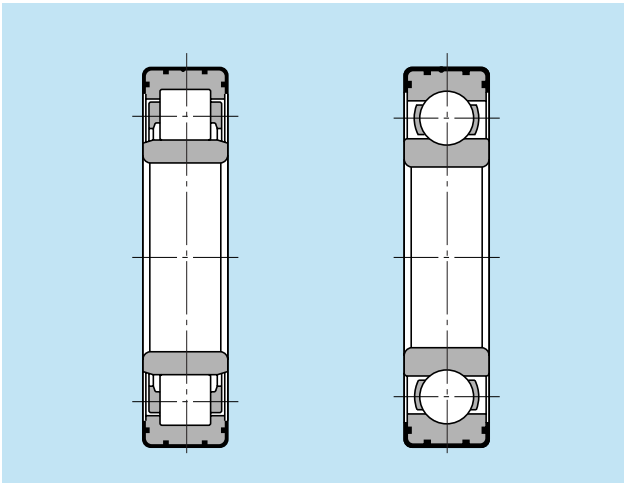
### 3. Bearings for Main Electric Motors

#### 3.1 Insulated Bearings, Resin Coated Type

Electrical pitting is produced when current passes through a bearing, causing damage to the raceway and rolling elements surfaces. Insulated bearings are treated with a special PPS resin insulating film on the outer diameter using the injection molding process.

These insulated bearings (7MP2- ) have high insulation resistance of at least  $2000M\Omega$  under normal temperature.

They have dimensions which meet the ISO standard, and are interchangeable with standard bearings. Although superior economically to ceramic insulated bearings, resin insulated bearings are mechanically inferior and must be handled with care so as not to damage the protective layer. They can, however, be washed like standard bearings.

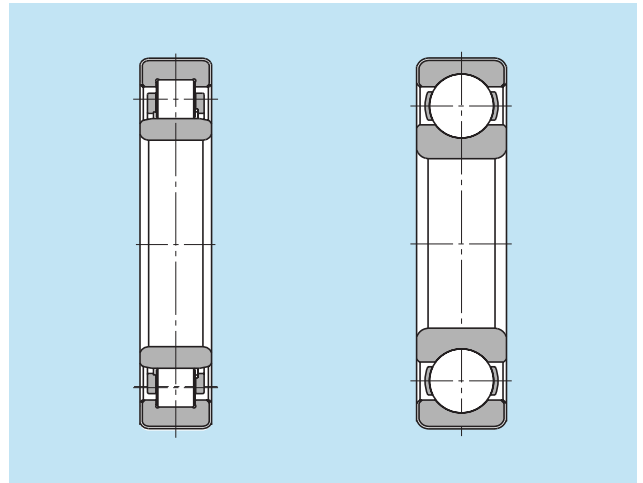


#### 3.2 Insulated Bearings, Ceramic Coated Type

These bearings (7MC- ) are treated with two layers of metal and one layer of ceramic material using the plasma spray process.

These insulated bearings have high insulation resistance of at least  $2000M\Omega$  under normal temperature.

They have dimensions which meet the ISO standard, and are interchangeable with standard bearings. Although inferior economically to resin insulated bearings, ceramic insulated bearings are mechanically superior but must be handled with care so as not to damage the ceramic layer. They can, however, be washed like standard bearings.



### Double Row Cylindrical Roller Bearings

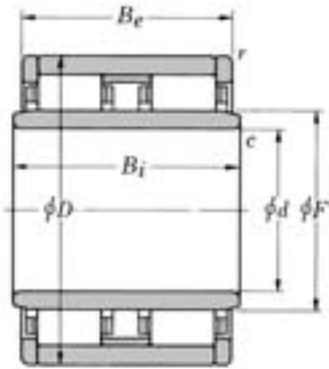


Fig.1

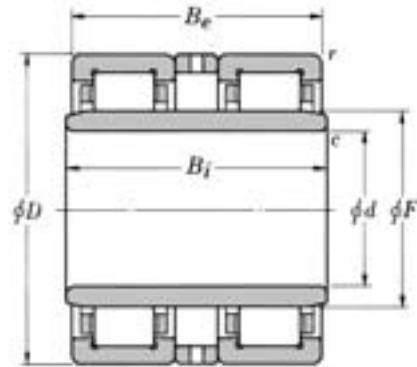


Fig.2

Bearing number	Fig. No.	Boundary dimensions							Basic load ratings		Mass kg
		mm							dynamic	static	
		$d$	$D$	$B_i$	$B_e$	$F$	$c$	$r$	N $C_r$	N $C_{or}$	
JC1	1	110	225	150	140	138	1	2	945 000	1 450 000	29
JC2	1	110	235	180	160	141	1	2	1 030 000	1 550 000	37
JC11	1	120	240	180	160	150	2	2	1 020 000	1 580 000	36.3
JC5	1	130	260	180	160	163	1	2	1 080 000	1 710 000	42.8
JC9	2	130	280	215	210	167	5	5	1 440 000	2 250 000	61.4
JC29	2	130	270	215	210	164	5	5	1 280 000	2 000 000	55

Note: Please refer to NTN for the bearing internal clearance and specification of cage.

## Ball Bearings for Thrust Load Support

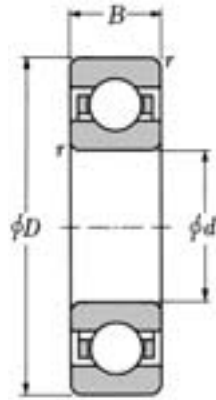


Fig.1

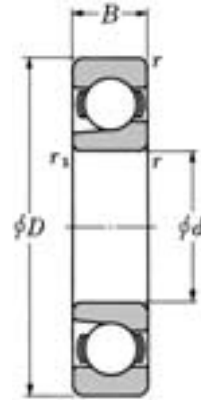


Fig.2

Bearing number	Fig. No.	Boundary dimensions					Basic load ratings		Mass kg
		mm					dynamic	static	
		$d$	$D$	$B$	$r$	$r_1$	N $C_a$	N $C_{oa}$	
<b>JB8A</b>	1	70	150	35	3.5	—	95 500	156 000	3.01
<b>JB1D</b>	2	85	180	41	4	2	121 000	222 000	4.30
<b>JB2</b>	2	100	215	47	4	2	165 000	325 000	6.76
<b>JB3</b>	2	110	215	47	4	2	213 000	425 000	6.7
<b>JB4</b>	1	125	260	55	4	—	225 000	475 000	14.5
<b>JB9</b>	1	125	250	55	4(inner ring) 2(outer ring)	—	210 000	420 000	13.1

Note: Please refer to NTN for the bearing internal clearance and specification of cage.



### Double Row Cylindrical Roller Bearings with Ribs

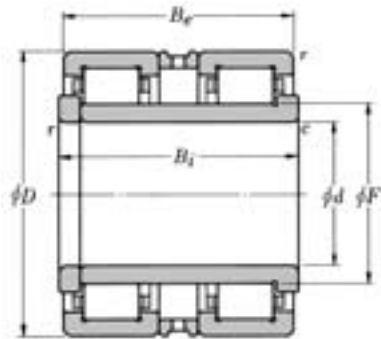


Fig.1

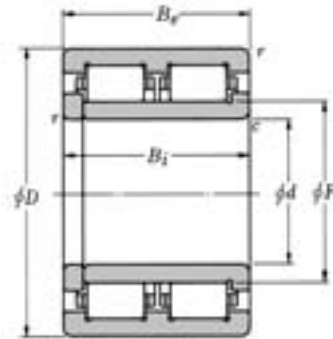


Fig.2

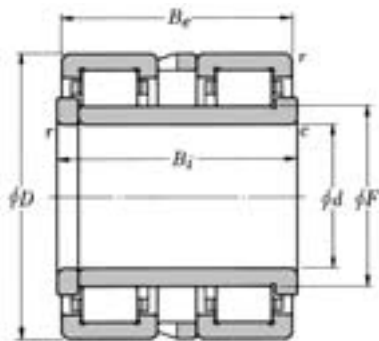


Fig.3

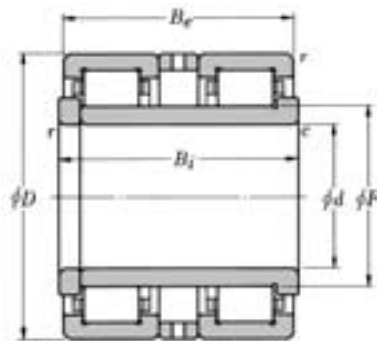


Fig.4

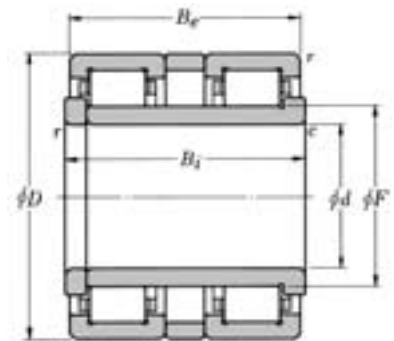


Fig.5

Bearing number	Fig. No.	Boundary dimensions							Basic load ratings		Mass kg
		mm							dynamic	static	
		<i>d</i>	<i>D</i>	<i>B<sub>i</sub></i>	<i>B<sub>e</sub></i>	<i>F</i>	<i>c</i>	<i>r</i>	N <i>C<sub>r</sub></i>	N <i>C<sub>or</sub></i>	
JC6	1	110	220	180	180	138	1	3.5	790 000	1 190 000	29.8
2RNUP2459	1	120	240	185	180	150	4	4	945 000	1 470 000	
JC12	3	120	240	180	176	150	1	4	1 020 000	1 580 000	40
JC34	4	120	230	170	165	145	1	4	945 000	1 460 000	30.8
JC35	4	120	225	170	165	145	1	4	875 000	1 380 000	30
JC38	4	125	235	170	165	150	1	4	945 000	1 470 000	32.1
JC14	2	130	260	160	160	163	4	4	1 080 000	1 710 000	40.2
JC16	1	130	280	210	210	167	1	5	1 440 000	2 250 000	62.3
JC21	5	130	260	205.5	180	163	—	4	1 030 000	1 610 000	45.3
JC37	4	130	265	166	166	161.5	1	4	1 140 000	1 700 000	43.4

Note: Please refer to NTN for the bearing internal clearance and specification of cage.

### Double Row Tapered Roller Bearings Indirect Mounting

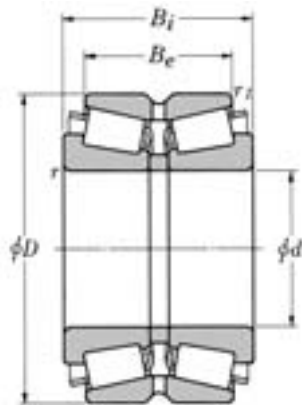


Fig.1

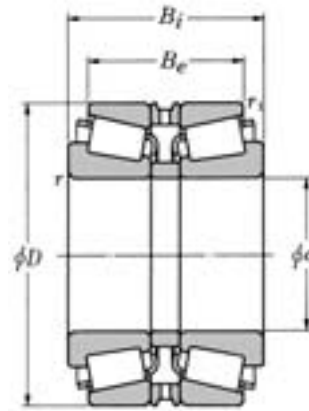


Fig.2

**Dynamic equivalent load**

$$P_r = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	$Y_1$	0.67	$Y_2$

For values of  $e$ ,  $Y_1$  and  $Y_2$  see the table below.

Bearing number	Fig. No.	Boundary dimensions						Basic load ratings		Factor	Axial load factor		Mass
		mm						dynamic	static				
		$d$	$D$	$B_i$	$B_e$	$r$	$r_1$	N $C_r$	N $C_{or}$		$e$	$Y_1$	
<b>JT21</b>	1	120	220	155	130	3	1	850 000	1 460 000	0.26	2.55	3.8	24.5
<b>JT8</b>	2	140	280	210	170	5	2	1 030 000	1 180 000	0.33	2.03	3.02	47

Note: Please refer to NTN for the bearing internal clearance and specification of cage.

RCC Bearings

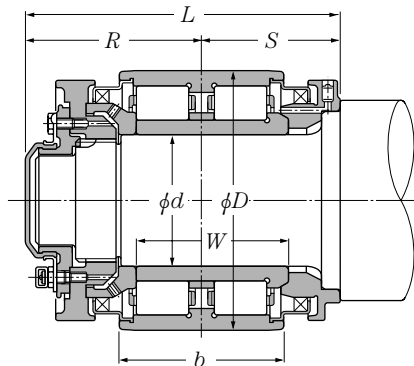


Fig.1

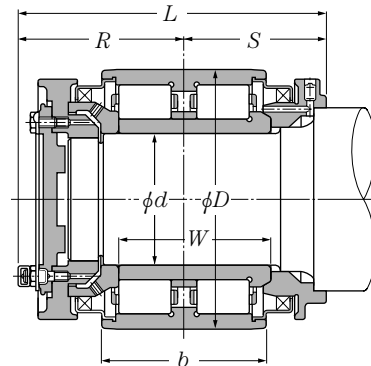


Fig.2

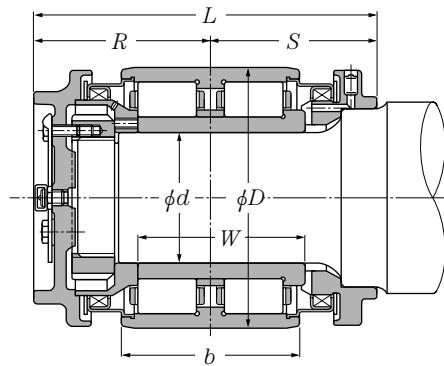


Fig.3

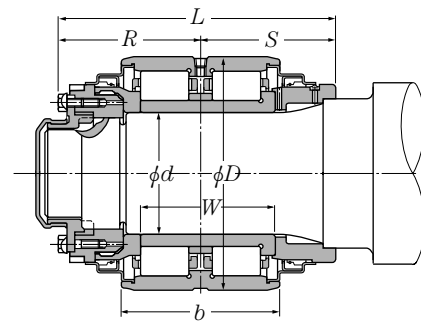


Fig.4

Bearing number	Fig. No.	Boundary dimensions							Basic load ratings				Mass
		mm							dynamic	static	dynamic	static	
		$d$	$D$	$W$	$b$	$R$	$S$	$L$	kN $C_r$	kN $C_{or}$	kgf $C_r$	kgf $C_{or}$	
JC33-1	5	110	220	128	145	134.4	127	261.4	790	1 190	80 500	122 000	34.7
JC36-1	7	120	220	128.5	145	134.4	134	268.4	700	1 120	71 500	114 000	36.3
JC32-1	4	120	230	126	150	134.2	130	264.2	830	1 290	84 500	132 000	39
JC32A-1	6	120	230	126	150	134.2	134	268.2	830	1 290	84 500	132 000	41
JC26-1	1	120	240	145	160	169	130	299	935	1 420	95 500	145 000	50
JC26A-1	2	120	240	145	160	156	142	298	935	1 420	95 500	145 000	51.5
JC17-1	3	120	240	158	170	158	149	307	1 020	1 580	104 000	161 000	54
JC17A-1	3	120	240	158	170	164	161	325	1 020	1 580	104 000	161 000	56.8

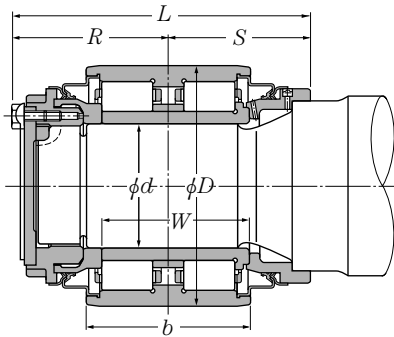


Fig.5

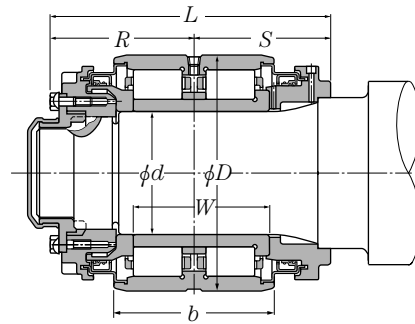


Fig.6

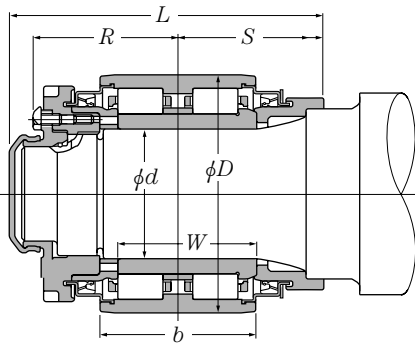
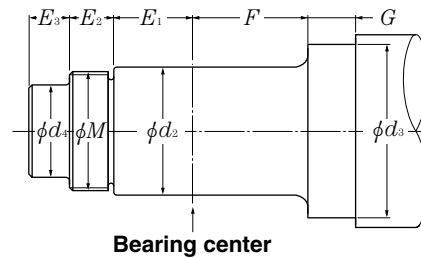


Fig.7



Boundary dimensions mm										Thread
$d_2$		$d_3$		$d_4$	$E_1$	$E_2$	$E_3$	$F$	$G$	$M$
max	min	max	min							
110.045	110.023	155.068	155.043	—	70	42	—	110	50	M100×2
120.045	120.023	155.068	155.043	85	70	42	33	117	50	M110×2
120.045	120.023	155.068	155.043	85	70	42	33	113	42 (72)	M110×2
120.045	120.023	155.068	155.043	85	70	42	33	117	42 (72)	M110×2
120.045	120.023	168.068	168.043	85	80	40	38	113	42 (72)	M110×2
120.045	120.023	168.068	168.043	—	80	40	—	125	42	M110×2
120.045	120.023	168.068	168.043	—	87	33	—	113	37 (72)	M110×2
120.045	120.023	168.068	168.043	—	87	43	—	125	45	M110×2

RCT Bearings  
Approved by A.A.R.

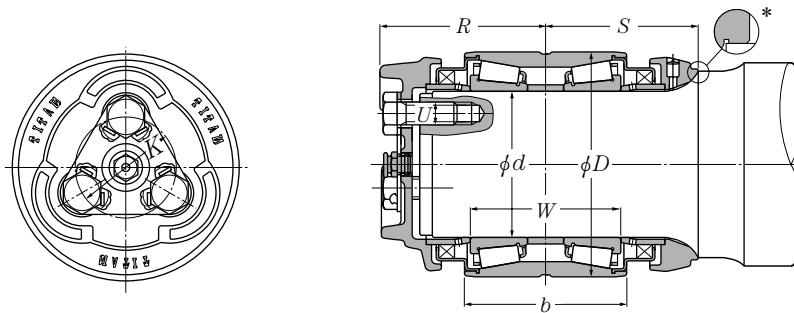


Fig.1

\* Fitted type

Bearing number Class	Boundary dimensions											
	mm inch.											
	<i>d</i>		<i>D</i>		<i>W</i>		<i>b</i>		<i>R</i> (REF.)		<i>S</i>	
<b>JT-B19-1111</b> <b>B</b>	101.6	4.0000	165.1	6 1/2	106.362	4 3/16	114.3	4 1/2	130.2	5 1/8	117.5	4 5/8
<b>JT-C19-1111</b> <b>C</b>	119.062	4.6875	195.262	7 1/16	136.525	5 3/8	142.875	5 5/8	147.6	5 13/16	134.9	5 5/16
<b>JT-D19-1111</b> <b>D</b>	131.75	5.1870	207.962	8 3/16	146.05	5 3/4	152.4	6	149.2	5 7/8	139.7	5 1/2
<b>JT-E19-1131</b> <b>E</b>	144.45	5.687	220.662	8 11/16	155.575	6 1/8	163.512	6 7/16	165.1	6 1/2	150.8	5 15/16
<b>JT-F19-1131</b> <b>F</b>	157.15	6.1870	252.412	9 15/16	177.8	7	184.15	7 1/4	179.4	7 1/16	160.3	6 5/16*
<b>JT-G19-1111</b> <b>G</b>	177.787	6.9995	276.225	10 7/8	180.975	7 1/8	185.738	7 5/16	177.8	7	173.0	6 13/16*
											165.1	6 1/2*

Note: Please refer to NTN for the bearing internal clearance and specification of cage.

Bearing number Class	Boundary dimensions									
	mm inch.									
	<i>d</i> <sub>2</sub>		<i>d</i> <sub>3</sub>		<i>E</i>		<i>F</i>		<i>G</i>	
<b>JT-B19-1111</b> <b>B</b>	101.702	4.004	127	5	101.6	4	117.5	4 5/8	41.3	1 5/8
	101.676	4.003								
<b>JT-C19-1111</b> <b>C</b>	119.164	4.6915	149.225	5 7/8	112.7	4 7/16	134.9	5 5/16	36.5	1 7/16
	119.139	4.6905								
<b>JT-D19-1111</b> <b>D</b>	131.864	5.1915	161.925	6 3/8	115.9	4 9/16	139.7	5 1/2	44.4	1 3/4
	131.839	5.1905								
<b>JT-E19-1131</b> <b>E</b>	144.564	5.6915	178.613	7.032*	127	5	150.8	5 15/16	46	1 13/16
	144.539	5.6905								
<b>JT-F19-1131</b> <b>F</b>	157.264	6.1915	191.313	7.532*	134.9	5 5/16	163.5	6 7/16	46	1 13/16
	157.239	6.1905								
<b>JT-G19-1111</b> <b>G</b>	177.902	7.004	203.251	8.002*	130.2	5 1/8	150.8	5 15/16	58.7	2 5/16
	177.876	7.003								

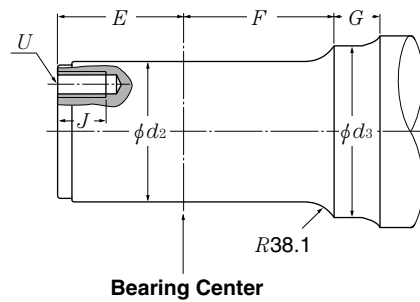
1) NTN RCT bearings have been approved by A.A.R. as AAR-19.

**Dynamic equivalent load**

$$P_r = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	$Y_1$	0.67	$Y_2$

For values of  $e$ ,  $Y_1$  and  $Y_2$  see the table below.



U	Boundary dimensions		Basic load ratings		Factor	Axial load factor		Mass
	mm	inch.	dynamic	static		$Y_1$	$Y_2$	
K			N	N	e			kg
			$C_r$	$C_{or}$				
$\frac{3}{4}$ -10UNC-2A	61.9	$2 \frac{7}{16}$	375 000	700 000	0.26	2.55	3.8	19.7
$\frac{7}{8}$ -9UNC-2A	76.2	3	575 000	1 080 000	0.26	2.56	3.81	25
$\frac{7}{8}$ -9UNC-2A	88.9	$3 \frac{1}{2}$	640 000	1 270 000	0.26	2.56	3.81	29.9
1-8UNC-2A	98.4	$3 \frac{7}{8}$	665 000	1 350 000	0.26	2.56	3.81	33
$1 \frac{1}{8}$ -7UNC-2A	108	$4 \frac{1}{4}$	900 000	1 820 000	0.26	2.56	3.81	54.6
$1 \frac{1}{4}$ -7UNC-2A	117.5	$4 \frac{5}{8}$	1 040 000	2 170 000	0.26	2.55	3.8	63.6

U	Boundary dimensions	
	mm	inch.
J		
$\frac{3}{4}$ -10UNC-2B	41.3	$1 \frac{5}{8}$
$\frac{7}{8}$ -9UNC-2B	47.6	$1 \frac{7}{8}$
$\frac{7}{8}$ -9UNC-2B	47.6	$1 \frac{7}{8}$
1-8UNC-2B	50.8	2
$1 \frac{1}{8}$ -7UNC-2B	54	$2 \frac{1}{8}$
$1 \frac{1}{4}$ -7UNC-2B	57.2	$2 \frac{1}{4}$

RCT Bearings

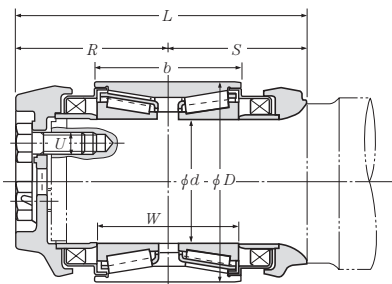


Fig.1

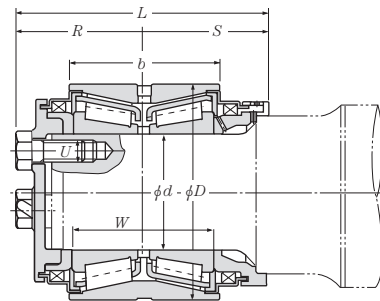


Fig.2

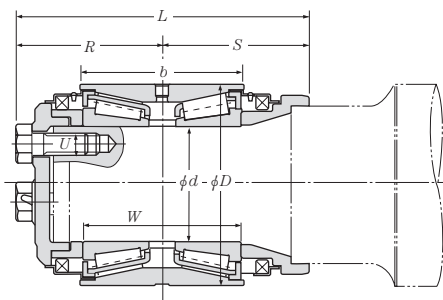


Fig.3

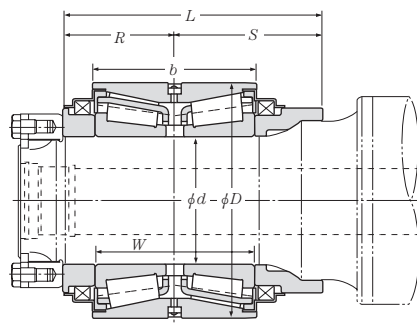


Fig.4

Bearing number	Fig. No.	Boundary dimensions							Basic load ratings			
		mm							dynamic	static	dynamic	static
		$d$	$D$	$W$	$b$	$R$	$S$	$L$	N $C_r$	N $C_{or}$	kgf $C_r$	kgf $C_{or}$
JT9	1	110	175	125	130	139	135	274	465 000	925 000	47 500	94 000
JT13	2	110	205	130	140	118.4	115	233.4	745 000	1250 000	76 000	127 000
JT14	3	110	190	145	150	134.4	137	271.4	620 000	1120 000	63 000	114 000
JT15	2	110	205	130	140	118.4	115	233.4	745 000	1250 000	76 000	127 000
JT20	3	110	188	145	150	134.4	137	271.4	620 000	1120 000	63 000	114 000
WJT1	4	120	220	150	155	105	137	242	775 000	1330 000	79 000	135 000
JT10	1	120	195	136	142	147.5	135	282.5	640 000	1270 000	65 000	129 000
JT12	5	120	220	155	155	164.4	120	284.4	905 000	1640 000	92 500	167 000
WJT12	5	120	220	155	155	157.4	120	277.4	905 000	1640 000	92 500	167 000
JT25	6	120	220	155	155	151.4	120	271.4	750 000	1230 000	76 500	126 000
JT402K	5	120	220	155	155	164.4	120	284.4	905 000	1640 000	92 500	167 000
JT23	7	125	235	165	155	107	170	277	960 000	1620 000	98 000	165 000
JT11	8	130	208	146	152	150.7	155.7	306.4	650 000	1330 000	66 500	136 000

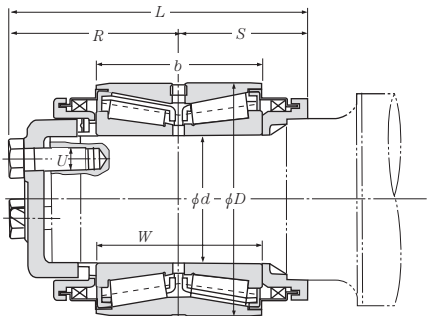


Fig.5

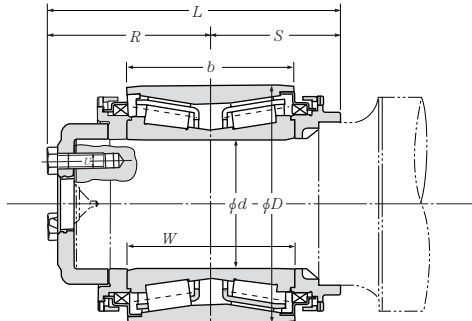
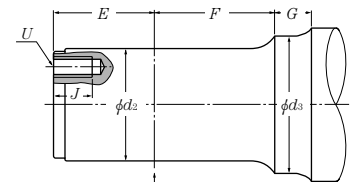


Fig.6



Bearing Center

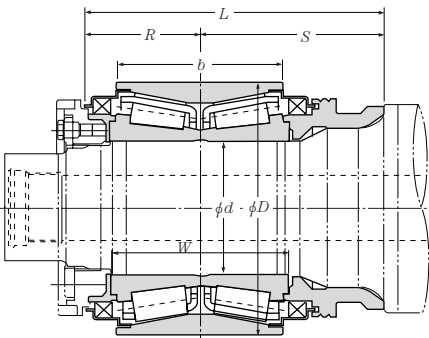


Fig.7

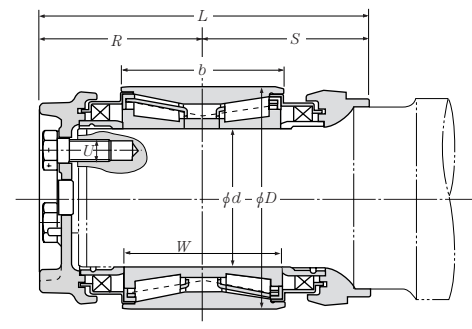


Fig.8

**Dynamic equivalent load**

$$P_r = XF_r + YF_a$$

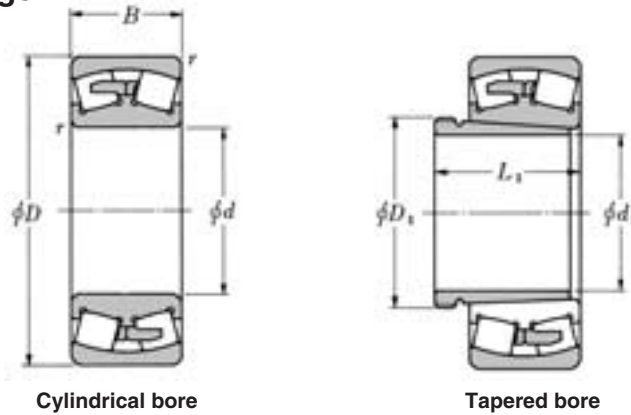
$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
X	Y	X	Y
1	Y <sub>1</sub>	0.67	Y <sub>2</sub>

For values of  $e$ ,  $Y_1$  and  $Y_2$  see the table below.

Factors	Axial load factors		Mass kg	Boundary dimensions mm						
	$Y_1$	$Y_2$		$d_2$	$d_3$	$E$	$F$	$G$	$J$	$U$
0.26	2.55	3.8	21.7	110.076 110.054	155	105	135	30	45	M22
0.26	2.55	3.8	27.6	110.059 110.037	150.068 150.043	85	105	78	45	M22
0.26	2.55	3.8	23.7	110.076 110.054	150.068 150.043	100	120	95	45	M22
0.26	2.55	3.8	28.4	110.059 110.037	150.068 150.043	85	105	78	45	M22
0.26	2.55	3.8	25.6	110.076 110.054	150.068 150.043	100	120	73	45	M22
0.26	2.55	3.8	32.0	120.059 120.037	149.125 149.1	146.5	117	53	—	—
0.25	2.74	4.08	26.5	120.076 120.059	155	113	135	30	45	M22
0.26	2.55	3.8	37.5	120.059 120.037	150.068 150.043	125	100	65	40	M22
0.26	2.55	3.8	39	120.059 120.037	150.068 150.043	168	100	100	—	—
0.26	2.55	3.8	33.5	120.059 120.037	150.068 150.043	125	100	55	35	M14
0.26	2.55	3.8	38	120.059 120.037	150.068 150.043	125	100	65	40	M22
0.26	2.55	3.8	39.2	125.068 125.043	150.125 150.1	181	117	53	—	—
0.26	2.55	3.8	31.9	130.081 130.064	171.068 171.043	115	140.7	57.3	45	M22



Spherical Roller Bearings



Cylindrical bore

Tapered bore

Bearing number		Boundary dimensions						thread $D_1$
cylindrical bore	tapered bore	mm						
		$d$	$d_1$	$D$	$B$	$L_1$	$r$	
LH-22218B	LH-22218BK ; AHX318	90	85	160	40	57	2	M100×2
23218B	23218BK ; AHX3218	90	85	190	52.4	67	2	M100×2
22318B	22318BK ; AHX2318	90	85	160	64	83	3	M100×2
22219B	22219BK ; AHX319	95	90	170	43	61	2.1	M105×2
22319B	22319BK ; AHX2319	95	90	200	67	89	3	M105×2
22220B	22220BK ; AHX320	100	95	180	46	63	2.1	M110×2
23220B	23220BK ; AHX3220	100	95	180	60.3	77	2.1	M110×2
22320B	22320BK ; AHX2320	100	95	215	73	94	3	M110×2
22222B	22222BK ; AHX3122	110	105	200	53	72	2.1	M120×2
23222B	23222BK ; AHX3222	110	105	200	69.8	86	2.1	M125×2
22322B	22322BK ; AHX2322	110	105	240	80	102	3	M125×2
23024B	23024BK ; AHX3024	120	115	180	46	64	2	M130×2
23124B	23124BK ; AHX3124	120	115	200	62	79	2	M130×2
22224B	22224BK ; AHX3124	120	115	215	58	79	2.1	M130×2
23224B	23224BK ; AHX3224	120	115	215	76	94	2.1	M135×2
22324B	22324BK ; AHX2324	120	115	260	86	109	3	M135×2
23026B	23026BK ; AHX3026	130	125	200	52	71	2	M135×2
23126B	23126BK ; AHX3126	130	125	210	64	82	2	M140×2
22226B	22226BK ; AHX3126	130	125	230	64	82	3	M140×2
23226B	23226BK ; AHX3226	130	125	230	80	102	3	M145×2
22326B	22326BK ; AHX2326	130	125	280	93	119	4	M145×2
23028B	23028BK ; AHX3028	140	135	210	53	73	2	M150×2
23128B	23128BK ; AHX3128	140	135	225	68	88	2.1	M150×2
22228B	22228BK ; AHX3128	140	135	250	68	88	3	M150×2
23228B	23228BK ; AHX3228	140	135	250	88	109	3	M155×2
22328B	22328BK ; AHX2328	140	135	300	102	130	4	M155×2
23030B	23030BK ; AHX3030	150	145	225	56	77	2.1	M160×3
23130B	23130BK ; AHX3130	150	145	250	80	101	2.1	M165×3
22230B	22230BK ; AHX3130	150	145	270	73	101	3	M165×3
23230B	23230BK ; AHX3230	150	145	270	96	119	3	M165×3
22330B	22330BK ; AHX2330	150	145	320	108	140	4	M165×3
23032B	23032BK ; AH3032	160	150	240	60	82	2.1	M170×3
23132B	23132BK ; AH3132	160	150	270	86	108	2.1	M180×3
22232B	22232BK ; AH3132	160	150	290	80	108	3	M180×3
23232B	23232BK ; AH3232	160	150	290	104	130	3	M180×3
22332B	22332BK ; AH2332	160	150	340	114	146	4	M180×3
23034B	23034BK ; AH3034	170	160	260	67	90	2.1	M180×3
23134B	23134BK ; AH3134	170	160	280	88	109	2.1	M190×3
22234B	22234BK ; AH3134	170	160	310	86	109	4	M190×3
23234B	23234BK ; AH3234	170	160	310	110	140	4	M190×3
22334B	22334BK ; AH2334	170	160	360	120	152	4	M190×3
23036B	23036BK ; AH3036	180	170	280	74	98	2.1	M190×3
23136B	23136BK ; AH3136	180	170	300	96	122	3	M200×3
22236B	22236BK ; AH3136	180	170	320	86	110	4	M200×3
23236B	23236BK ; AH3236	180	170	320	112	146	4	M200×3
22336B	22336BK ; AH2336	180	170	380	126	160	4	M200×3

## Dynamic equivalent load

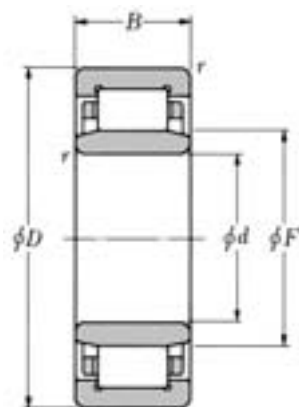
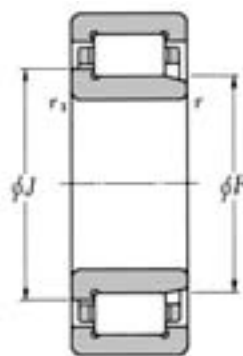
$$P_r = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
X	Y	X	Y
1	$Y_1$	0.67	$Y_2$

For values of  $e$ ,  $Y_1$  and  $Y_2$  see the table below.

Basic load ratings		Factor	Axial load factor		Mass kg	
dynamic	static		$e$	$Y_1$	$Y_2$	cylindrical bore
kN $C_r$	kN $C_{or}$					
256	345	0.26	2.55	3.80	3.5	3.88
315	455	0.33	2.04	3.03	4.45	4.9
480	590	0.37	1.80	2.69	8.35	8.94
294	390	0.26	2.63	3.92	4.1	4.54
500	615	0.37	1.80	2.69	9.76	10.4
315	415	0.26	2.55	3.80	4.95	5.42
405	580	0.34	1.98	2.94	6.47	7.05
605	755	0.37	1.80	2.69	12.4	13.1
410	570	0.27	2.51	3.74	7.2	7.8
515	760	0.35	1.91	2.84	9.71	10.5
745	930	0.36	1.87	2.79	17.1	18.1
296	495	0.25	2.69	4.01	4.05	4.65
455	705	0.31	2.17	3.24	7.7	8.41
485	700	0.27	2.47	3.68	9.1	9.84
585	880	0.36	1.89	2.82	12.1	13
880	1 120	0.37	1.80	2.69	21.5	22.6
375	620	0.26	2.63	3.92	5.9	6.62
495	795	0.30	2.23	3.32	8.47	9.28
570	790	0.28	2.39	3.56	11.2	12
685	1 060	0.35	1.92	2.86	14.3	15.5
1 000	1 290	0.37	1.81	2.69	26.8	25.2
405	690	0.25	2.73	4.06	6.35	7.03
540	895	0.30	2.25	3.35	10.2	11.1
685	675	0.28	2.39	3.55	14	15
805	1 270	0.36	1.90	2.83	18.8	20
1 130	1 460	0.37	1.80	2.69	33.8	35.3
445	775	0.24	2.76	4.11	7.73	8.6
730	1 190	0.32	2.11	3.15	15.6	16.9
775	1 165	0.27	2.46	3.66	18.1	19.5
935	1 460	0.36	1.88	2.79	24.1	25.6
1 270	1 750	0.35	1.92	2.86	42.7	44.6
505	885	0.25	2.74	4.09	9.42	11.2
840	1 370	0.32	2.11	3.15	19.8	22.4
780	1 290	0.28	2.42	3.60	22.7	25.4
1 050	1 660	0.36	1.86	2.77	30	33.2
1 410	1 990	0.35	1.94	2.89	50.8	54.4
630	1 080	0.25	2.66	3.96	12.7	14.7
885	1 490	0.31	2.15	3.21	21.5	24.2
1 000	1 520	0.28	2.39	3.56	28	30.7
1 180	1 960	0.36	1.87	2.79	36.8	40.5
1 540	2 180	0.34	1.96	2.91	59.8	63.8
740	1 290	0.26	2.59	3.85	16.7	18.9
1 030	1 730	0.32	2.11	3.15	25.1	28.4
1 040	1 610	0.27	2.49	3.70	29.3	32.3
1 230	2 000	0.35	1.91	2.84	39	43.1
1 740	1 740	0.34	1.97	2.93	70	74.3

## Cylindrical Roller Bearings Standardized by UIC

Fig.1  
Type WUFig.2  
Type WJ

Bearing number	Fig. No.	Boundary dimensions								Basic load ratings		Mass kg
		mm								dynamic	static	
		$d$	$D$	$B$	$r$	$r_1$	$b_t$	$F$	$J$	$N_{Cr}$	$N_{Cor}$	
WU110×215 WJ110×215 WJP110×215 WUJ110×215	1 2 3 4	110	215	73	4	4	13	135.5	147	445 000	600 000	12.1 12.5 12.5 13.1
WJ120×220 WJP120×220	2 3	120	220	73	4	10	–	145	155	470 000	665 000	12.6 12.6
WJ120×225 WJP120×225	2 3	120	225	80	4	10	–	150	161	500 000	730 000	14.7 14.7
WU120×240 WJ120×240 WJP120×240 WUJ120×240	1 2 3 4	120	240	80	4	10	14	150	161	560 000	750 000	17 17.5 17.5 18.6
WJ130×240 WJP130×240	2 3	130	240	80	4	10	–	157	167.5	495 000	695 000	16.5 16.5
WU130×260 WJ130×260 WJP130×260 WUJ130×260	1 2 3 4	130	260	86	4	10	14	164	178	710 000	965 000	21.4 22 22 23.4
WJ140×260 WJP140×260	2 3	140	260	80	4	10	–	170	182	585 000	820 000	19.5 19.5
WJ140×280 WJP140×280	2 3	140	280	93	5	10	–	174	188	790 000	1 080 000	27.8 27.8
WJ150×280 WJP150×280	2 3	150	280	86	5	10	–	181	195	745 000	1 050 000	24.5 24.5
WJ150×300 WJP150×300	2 3	150	300	102	5	10	–	188	203	880 000	1 230 000	35 35

Note: Please refer to NTN for the bearing internal clearance and specification of cage.

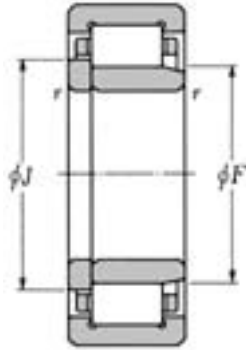


Fig.3  
Type WJP

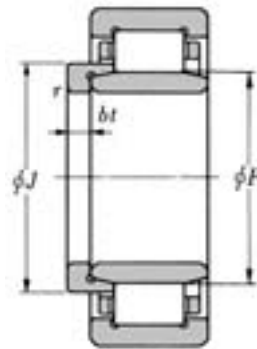


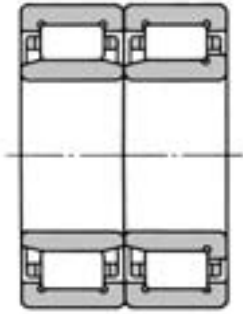
Fig.4  
Type WUJ

Bearing number	Fig. No.	Boundary dimensions								Basic load ratings		Mass kg
		mm								dynamic	static	
		$d$	$D$	$B$	$r$	$r_1$	$b_t$	$F$	$J$	$N_{C_r}$	$N_{C_{or}}$	
<b>WJ160×300</b> <b>WJP160×300</b>	2 3	160	300	93	5	10	–	194	208	825 000	1 180 000	30.5 30.5
<b>WJ160×320</b> <b>WJP160×320</b>	2 3	160	320	102	5	10	–	200	216	970 000	1 360 000	40 40
<b>WJ180×320</b> <b>WJP180×320</b>	2 3	180	320	93	5	10	–	214	229	895 000	1 340 000	33 33
<b>WU180×340</b> <b>WJ180×340</b> <b>WUJ180×340</b>	1 2 4	180	340	100	5	5	15	220	236	1 010 000	1 480 000	41 42.5 44.5

Note: Please refer to NTN for the bearing internal clearance and specification of cage.

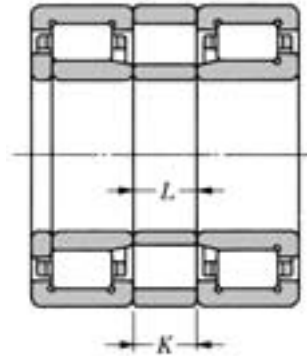
## Double row Cylindrical Roller Bearings Standardized by UIC

This model allows axial load in only one direction.



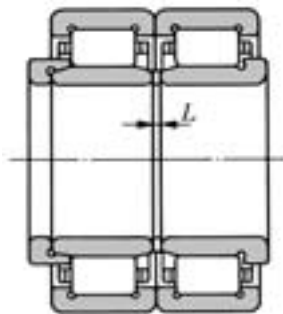
WJ/WU

Insert spacer rings between both the inner ring and outer ring. The inner ring spacer width should be 1 to 3 mm (0.04 to 0.12 inch) wider than the outer ring spacer.



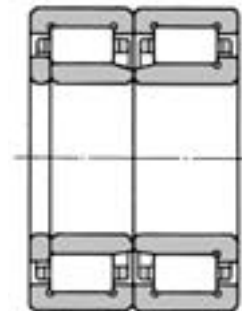
WJ/WJP+K/L

Insert a spacer of 1 to 3 mm width (0.04 to 0.12 inch) between the two inner rings. Overall width of the bearing set is directly related to the spacer width.



WJ/WUJ+O/L

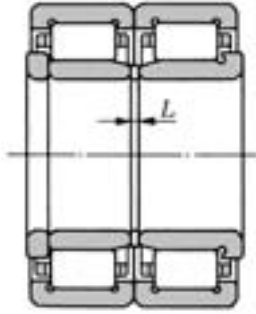
Axial internal clearance should be less than 1 mm 0.04 inch.



WJ/WJP

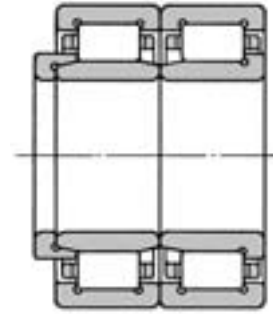
Note: Please refer to NTN for interchangeability of bearing components with other brand.

Insert a spacer of 1 to 3 mm width (0.04 to 0.12 inch) between the two inner rings. Overall width of the bearing set is directly related to the spacer width.



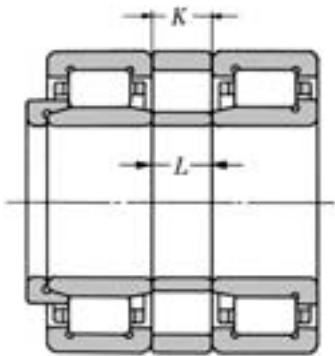
**WJ/WJP+O/L**

Axial internal clearance should be less than 1 mm 0.04 inch.



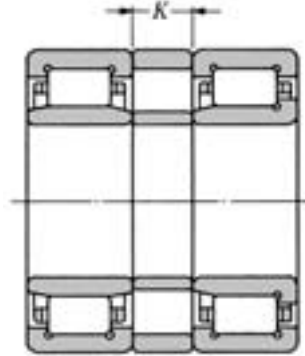
**WJ/WUJ**

Insert spacer rings between both the inner ring and outer ring. The inner ring spacer width should be 1 to 3 mm (0.04 to 0.12 inch) wider than the outer ring spacer.



**WJ/WUJ+K/L**

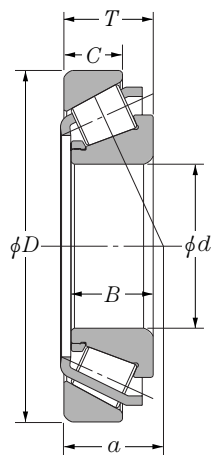
This model allows axial load in only one direction. Spacer rings in equal dimensions in width, should be applied to the inner and outer rings.



**WJ/WU+K**

Note: Please refer to NTN for interchangeability of bearing components with other brand.

## Bearings for Driving Gears



## Tapered Roller Bearings

Bearing types	Bearing basic part numbers	Boundary dimensions					Basic load ratings	
		mm					dynamic	static
		<i>d</i>	<i>D</i>	<i>T</i>	<i>B</i>	<i>C</i>	N <i>C<sub>r</sub></i>	N <i>C<sub>or</sub></i>
Pinion bearing	QT30	60	130	33.5	31	22	136 000	154 000
	QT9A	70	150	38	35	25	161 000	179 000
	QT9B	70	150	38	35	25	167 000	194 000
	QT9C	70	150	38	35	25	167 000	194 000
	QT31	70	150	40	37	27	181 000	209 000
	QT7AV2	75	160	40	37	27	157 000	186 000
	QT7AV5	75	160	40	37	27	177 000	198 000
	QT4A	80	170	42.5	39	28	210 000	240 000
	QT18	85	180	45.5	42	29	242 000	282 000
	4T-30313D	65	140	36	33	23	173 000	204 000
	4T-30314D	70	150	38	35	25	193 000	229 000
	30315DU	75	160	40	37	26	215 000	256 000
	30316DU	80	170	42.5	39	27	236 000	283 000
	32320U	100	215	77.5	73	60	570 000	770 000
	32321U	105	225	81.5	77	63	610 000	825 000
Gear bearing	QT29	193.675	282.575	50.8	47.625	36.512	355 000	595 000
	QT26	195	280	58	60	41	410 000	740 000
	QT25	200	280	51	48	41	370 000	705 000
	QT27	200	290	55	60	41	400 000	750 000
	QT34	202	290	58	60	41	445 000	805 000
	QT5	210	320	70	66	56	610 000	1 060 000
	QT24	210	320	70	75	56	590 000	1 010 000
	QT19	214	330	70	70	56	680 000	1 200 000
	QT35	215	315	65	70	49	595 000	1 140 000
	QT32	218	315	65	70	49	595 000	1 140 000
	32038XUE1	190	290	64	64	48	655 000	1 210 000
	32940XUE1	200	280	51	51	39	485 000	895 000
	32040XUE1	200	310	70	70	53	800 000	1 470 000

Note: Please refer to NTN for the bearing specification of cage.

**Dynamic equivalent load**

$$P_r = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
$X$	$Y$	$X$	$Y$
1	0	0.4	$Y_2$

For values of  $Y_1$  and  $Y_2$   
see the table below.

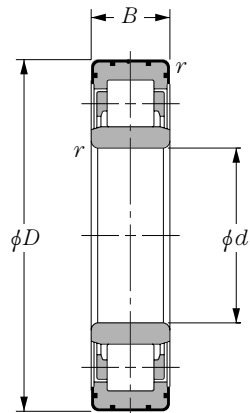
mm	Axial load factor	Factor	Mass
$a$	$Y_2$	$e$	kg
40.7	0.73	0.83	2
46.2	0.74	0.81	2.83
47.5	0.74	0.81	2.94
47.5	0.74	0.81	2.93
48.3	0.74	0.81	3.1
49.5	0.74	0.81	3.33
49.6	0.74	0.81	3.49
52.5	0.74	0.81	3.88
55.4	0.74	0.81	4.84
44	0.73	0.83	2.42
47	0.73	0.83	2.92
50	0.73	0.83	3.47
53.5	0.73	0.83	4.11
53	1.74	0.35	12.7
55	1.74	0.35	14.5
54.6	1.44	0.42	9.34
53.9	1.62	0.37	10.8
53.6	1.6	0.37	9.1
56	1.6	0.37	11.9
53.4	1.62	0.37	11.9
70.9	1.49	0.4	19.0
70.8	1.49	0.4	19.2
68.7	1.49	0.4	21.1
60.9	1.6	0.37	17.4
60.9	1.6	0.37	16.8
62.5	1.36	0.44	15.1
53.5	1.52	0.39	8.88
66.5	1.39	0.43	19.3

It is possible to correspond also with cylindrical roller bearing for driving gear besides the tapered roller bearing and refer to NTN.

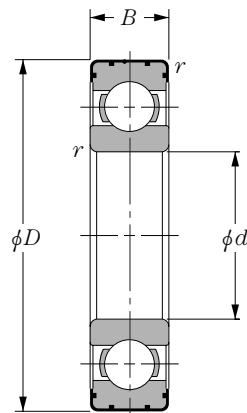
The boundary dimensions of cylindrical roller bearing can correspond by the one of the NTN General Catalogue description. (CAT. NO. 2202-VII/E)



### Insulated Bearings-Resin Coated type for Traction Motor



Cylindrical roller bearings

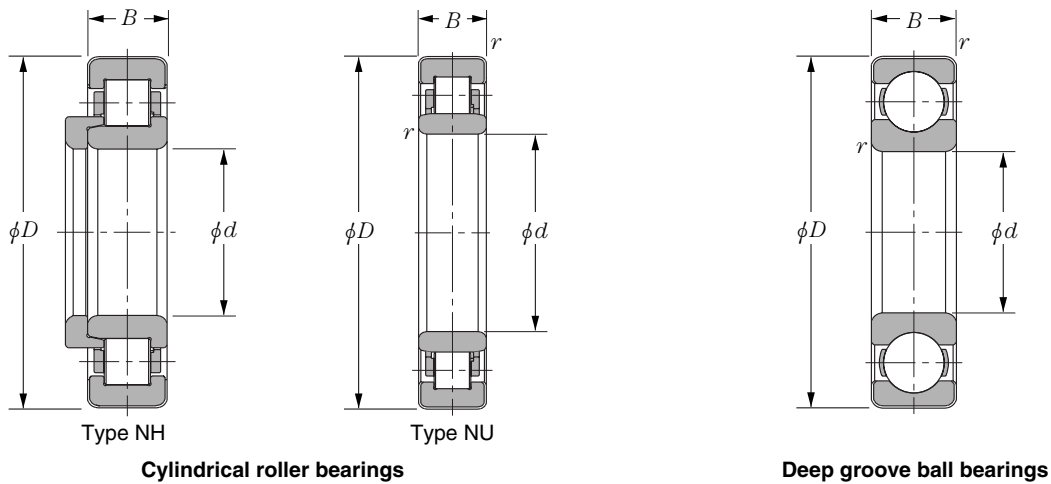


Deep groove ball bearings

Bearing types	Bearing basic part numbers	Boundary dimensions				Basic load ratings	
		mm				dynamic	static
		$d$	$D$	$B$	$r$ 's min	N $C_r$	N $C_{or}$
Cylindrical roller bearings	7MP2-NU214	70	125	24	1.5	83 500	95 000
	7MP2-NU314	70	150	35	2.1	158 000	168 000
	7MP2-NU215	75	130	25	1.5	101 000	118 000
	7MP2-NU315	75	160	37	2.1	190 000	205 000
	7MP2-NU316	80	170	39	2.1	201 000	223 000
	7MP2-NU217	85	150	28	2	126 000	149 000
	7MP2-NU219	95	170	32	2.1	166 000	195 000
Deep groove ball bearings	7MP2-6310	50	110	27	2	62 000	38 500
	7MP2-6311	55	120	29	2	71 500	45 000
	7MP2-6312	60	130	31	2.1	82 000	52 000
	7MP2-6314	70	150	35	2.1	104 000	68 000
	7MP2-6217	85	150	28	2	83 500	64 000
	7MP2-6219	95	170	32	2.1	109 000	82 000

Note: Please refer to NTN for the bearing internal clearance and specification of cage.  
The table lists the current production bearings. For additional sizes, please contact NTN.

## Insulated Bearings-Ceramic Coated type for Traction Motor



Cylindrical roller bearings

Deep groove ball bearings

Bearing types	Bearing basic part numbers	Boundary dimensions				Basic load ratings		Rid numbers	Boundary dimensions				
		mm				dynamic	static		mm				
		$d$	$D$	$B$	$r_{1s}$ min	N $C_r$	N $C_{or}$		$d$	$d_1$	$B_1$	$B_2$	$r_{1s}$ min
Cylindrical roller bearings	7MC-NU214	70	125	24	1.5	83 500	95 000	—	—	—	—	—	—
	7MC-NU314	70	150	35	2.1	158 000	168 000	—	—	—	—	—	—
	7MC-NU316	80	170	39	2.1	201 000	223 000	—	—	—	—	—	—
	7MC-NH318	90	190	43	3	240 000	265 000	HJ318	90	125	12	21	3
	7MC-NH320	100	215	47	3	299 000	335 000	HJ320	100	140.5	13	22.5	3
	7MC-NH322	110	240	50	3	360 000	400 000	HJ322	110	155.5	14	23	3
	7MC-NU326	130	280	58	4	560 000	665 000	—	—	—	—	—	—
	7MC-NU330	150	320	65	4	665 000	805 000	—	—	—	—	—	—
Deep groove ball bearings	7MC-6311	55	120	29	2	71 500	45 000	—	—	—	—	—	—
	7MC-6312	60	130	31	2.1	82 000	52 000	—	—	—	—	—	—

Note: Please refer to NTN for the bearing internal clearance and specification of cage.  
The table lists the current production bearings. For additional sizes, please contact NTN.

Prefix 7MC- : Heavy duty application  
7MC2-: Medium duty application

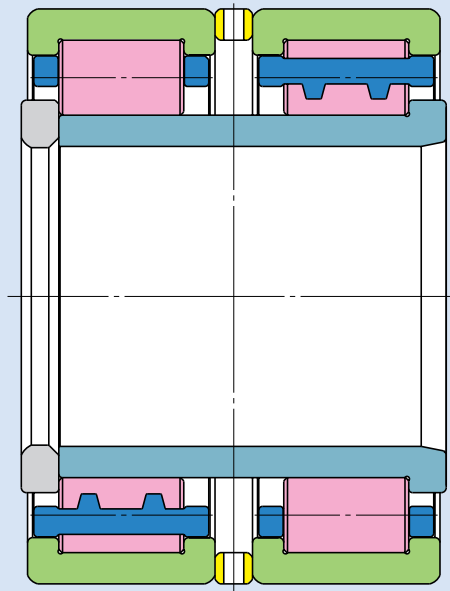
It is possible to correspond also with non-insulation cylindrical roller bearing for the traction motor and refer to NTN. The boundary dimensions of non-insulation cylindrical roller bearing can correspond by the one of the NTN General Catalogue description. (CAT. NO. 2202-VII/E)

## ***JR (Japan Railway) Central Super Express Train, 300 Series***

JR Central has developed the 300 series which runs between Tokyo and Shin-Osaka (550 km) in 2 and a half hours. Maximum speed is 270km/h. 300 series has been in operation since April 1992. JR-West has introduced Series 300N in December 1992. 300 series and 300N started operation between Tokyo and Hakata in March 1993.



- **Structure**



- **Features**

Bearing No. : JC34

Bearing Type : Double Row Cylindrical Roller Bearing

Bearing Bore : 120mm

Lubrication : Oil bath

Maximum Speed : 270km/h

## **JR-West Super Express Train, 500 Series**

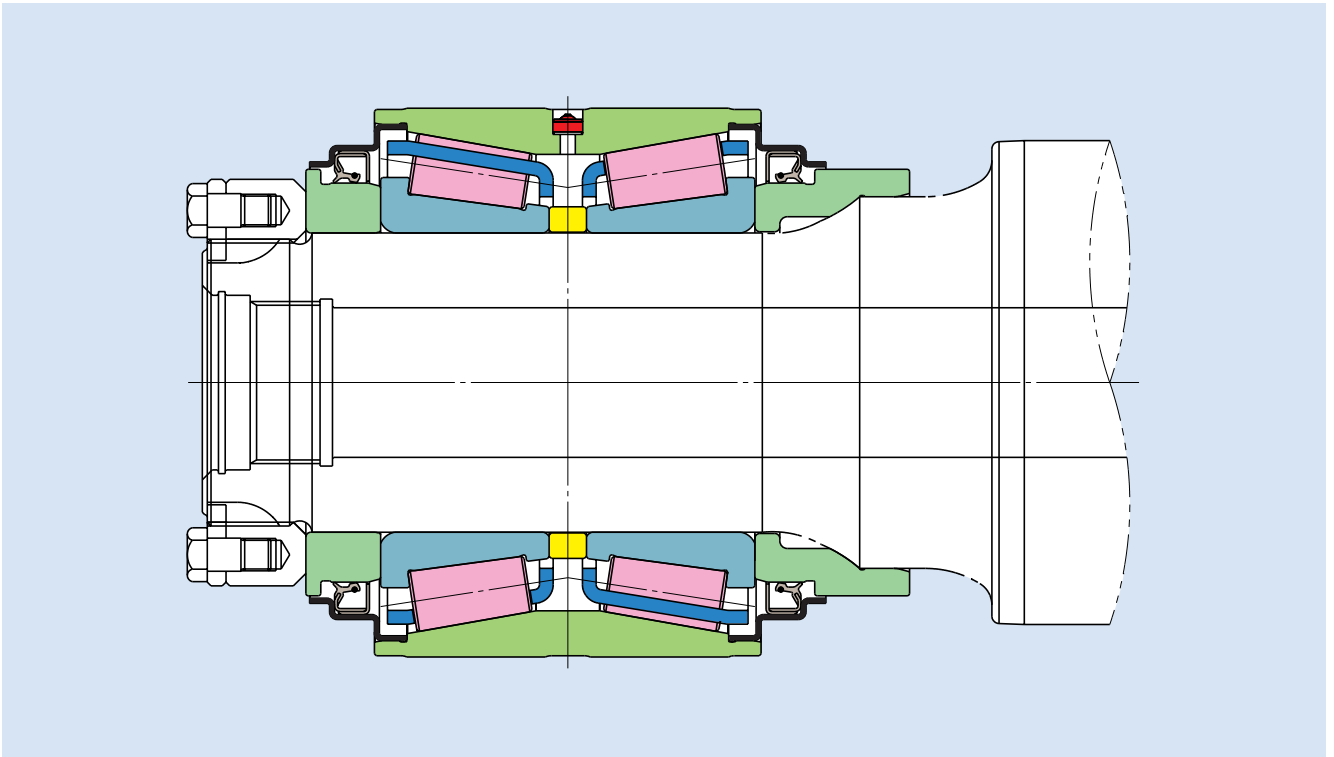
---

JR-West has developed Series 500 in March 1997. Which runs between Shin-Osaka and Hakata. 500 series has extended its service between Hakata and Tokyo with maximum service speed of 300km/h. (since November 1997.)



© JR-West

## • Structure



## • Features

Bearing No. : WJT1

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 120mm

Lubrication : Grease

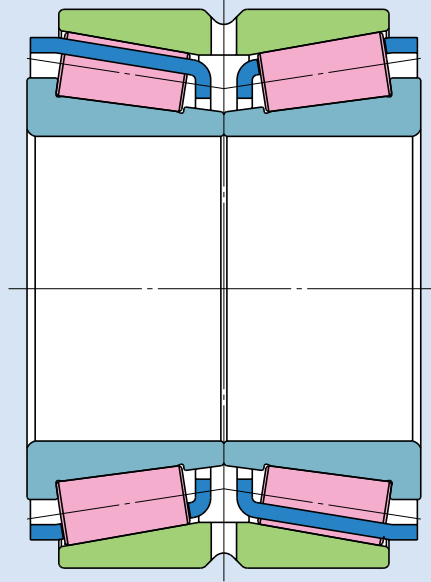
Maximum Speed : 300km/h

## ***JR-Central Super Express Train, 700 Series***

JR Central has developed 700 series which provides, more comfortable acomodations.  
(since1999.)



- **Structure**



- **Features**

Bearing No. : JT21

Bearing Type : Double Row Tapered Roller Bearing Indirect Mounting

Bearing Bore : 120mm

Lubrication : Oil bath

Maximum Speed : 270km/h

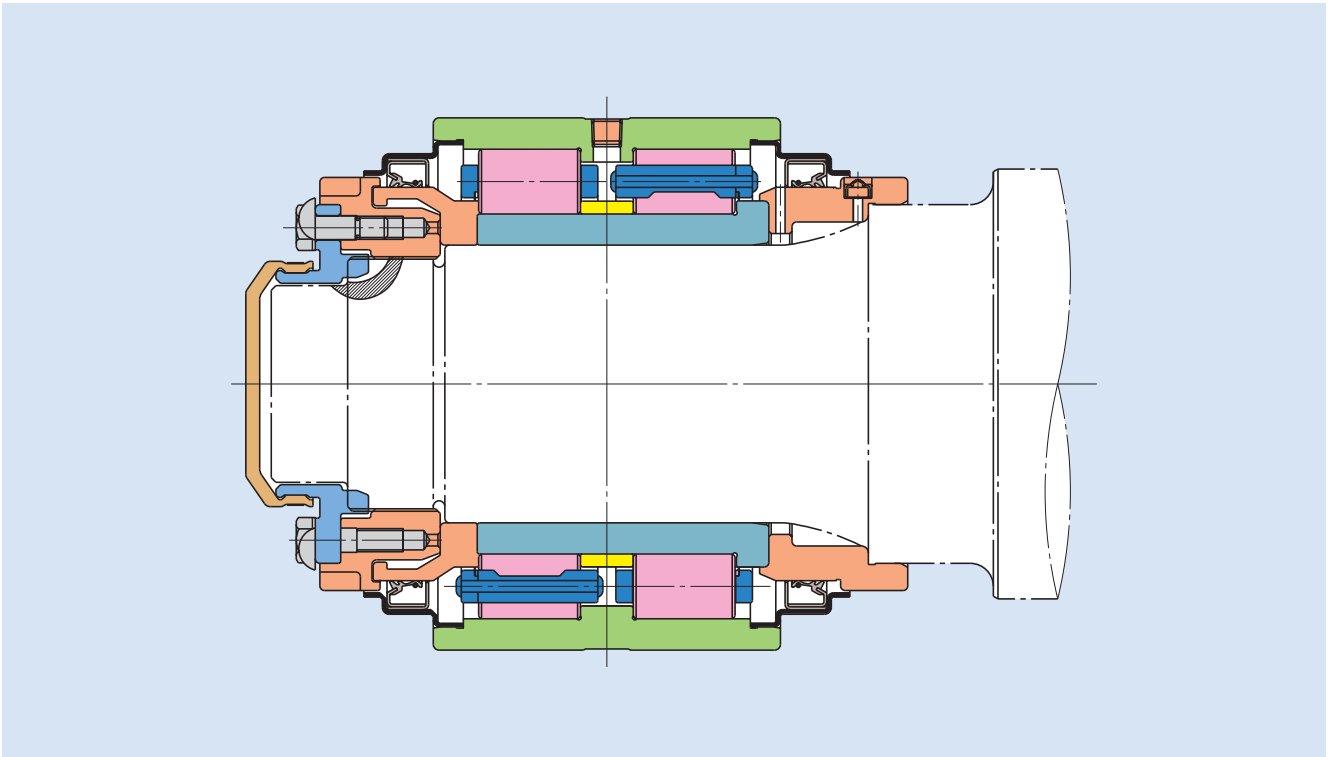


## ***JR-Central Limited Express, Diesel Train, Type KIHA 85***

KIHA 85 is one of the most modernized express train equipped with diesel engines. It runs on Kansai and Takayama Line.



- **Structure**



- **Features**

Bearing No. : JC32

Bearing Type : Double Row Cylindrical Roller Bearing with Seals (RCC Bearing)

Bearing Bore : 120mm

Lubrication : Grease

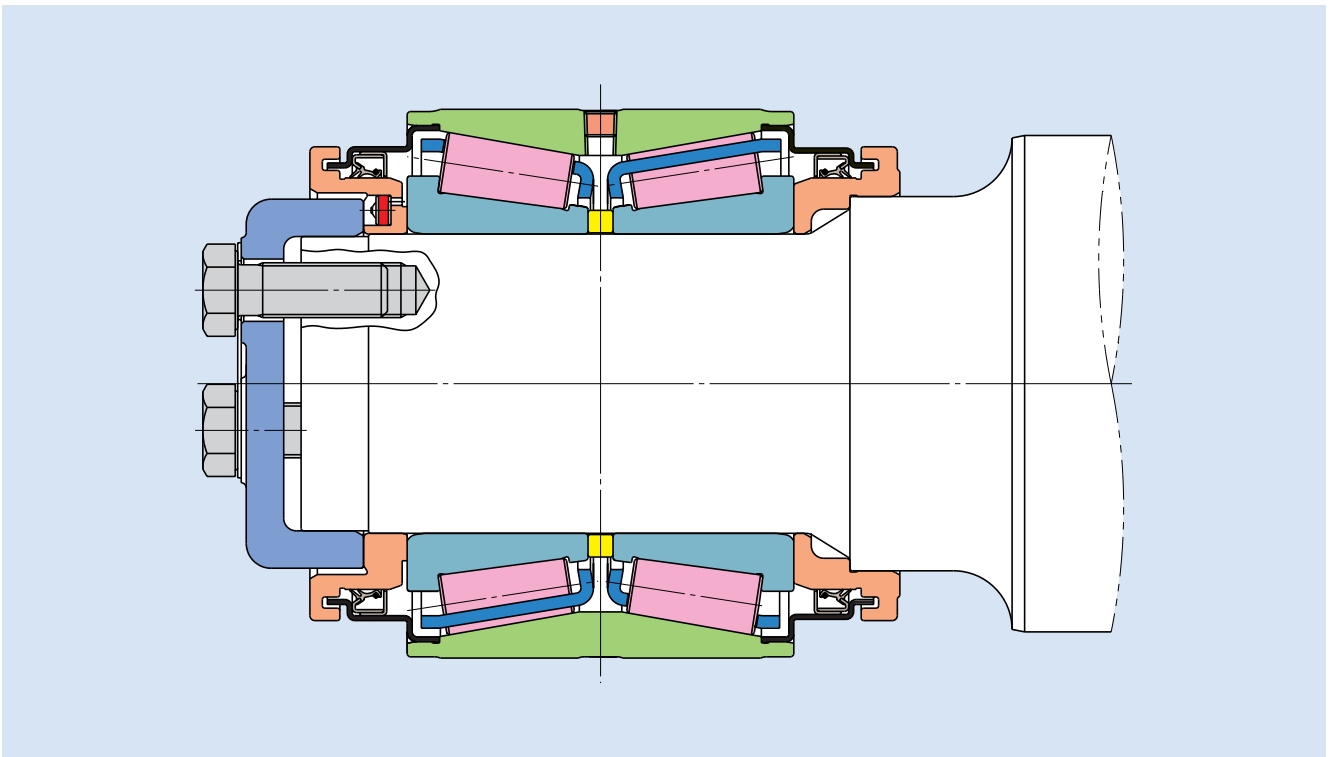
Maximum Speed : 110km/h

## ***JR-Central Limited Express, Electric Train, 383 Series***

383 series has lightweight body with a low center of gravity and a pendulum suspension system for maintaining high speeds even on the lines with many curves.



- **Structure**



- **Features**

Bearing No. : C-JT12

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 120mm

Lubrication : Grease

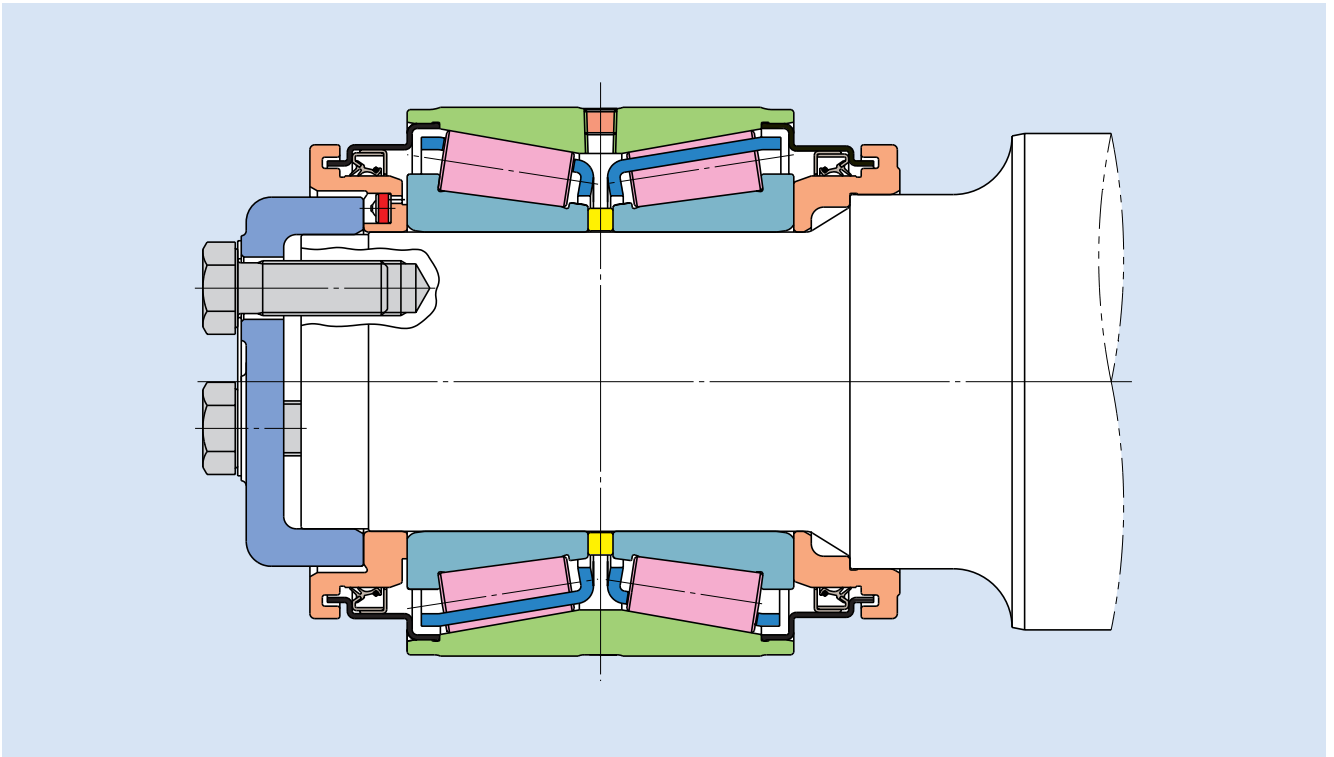
Maximum Speed : 130km/h

## ***JR-Central Electric Train, 313 Series***

313 series is the most newly designed commuter train for medium distance travel in central area of Japan.



- **Structure**



- **Features**

Bearing No. : C-JT12

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 120mm

Lubrication : Grease

Maximum Speed : 130km/h

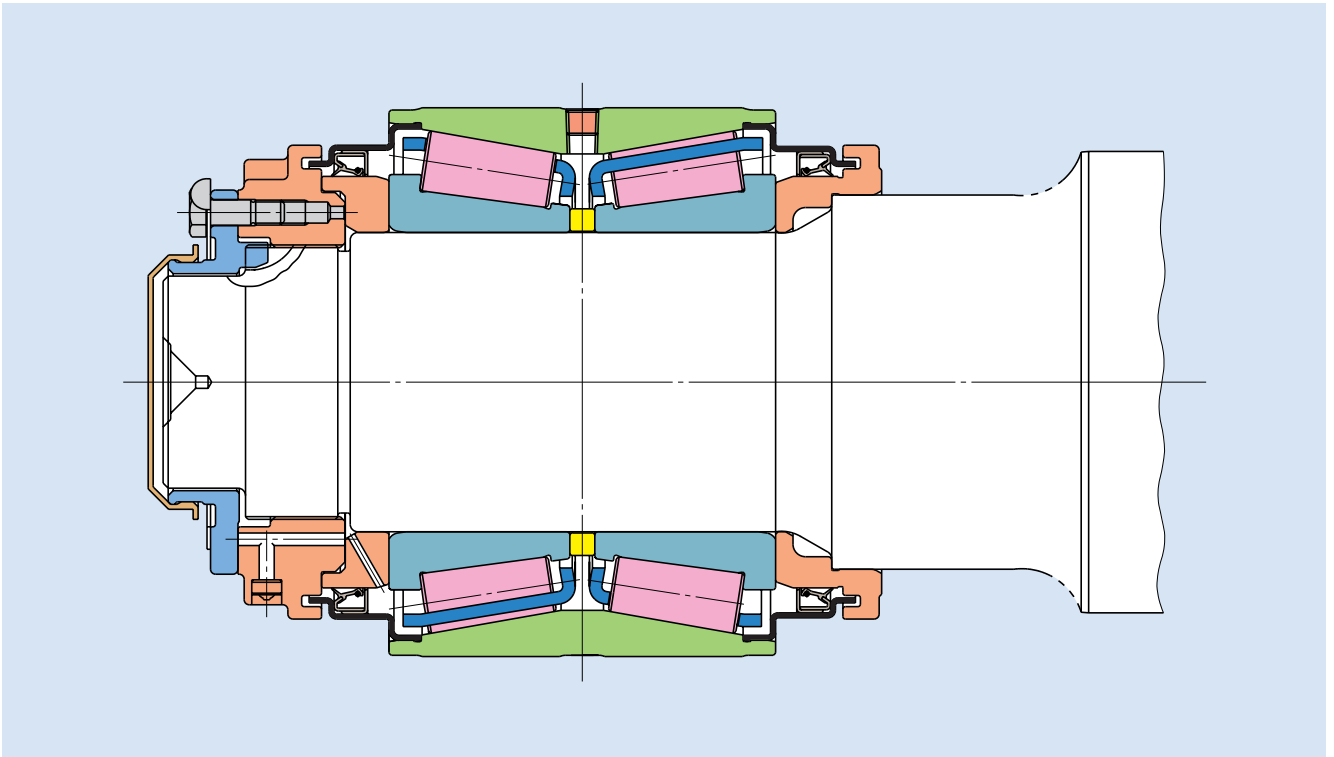
## **JR-West** **Limited Express, Electric Train, 681 Series**

681 series runs Hokuriku line, which connect the northeast and southwest sides of the main Japan island with the speed up to 160km/h.  
The code name is "Thunder Bird".



© JR-West

## • Structure



## • Features

Bearing No. : WJT12

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 120mm

Lubrication : Grease

Maximum Speed : 160km/h



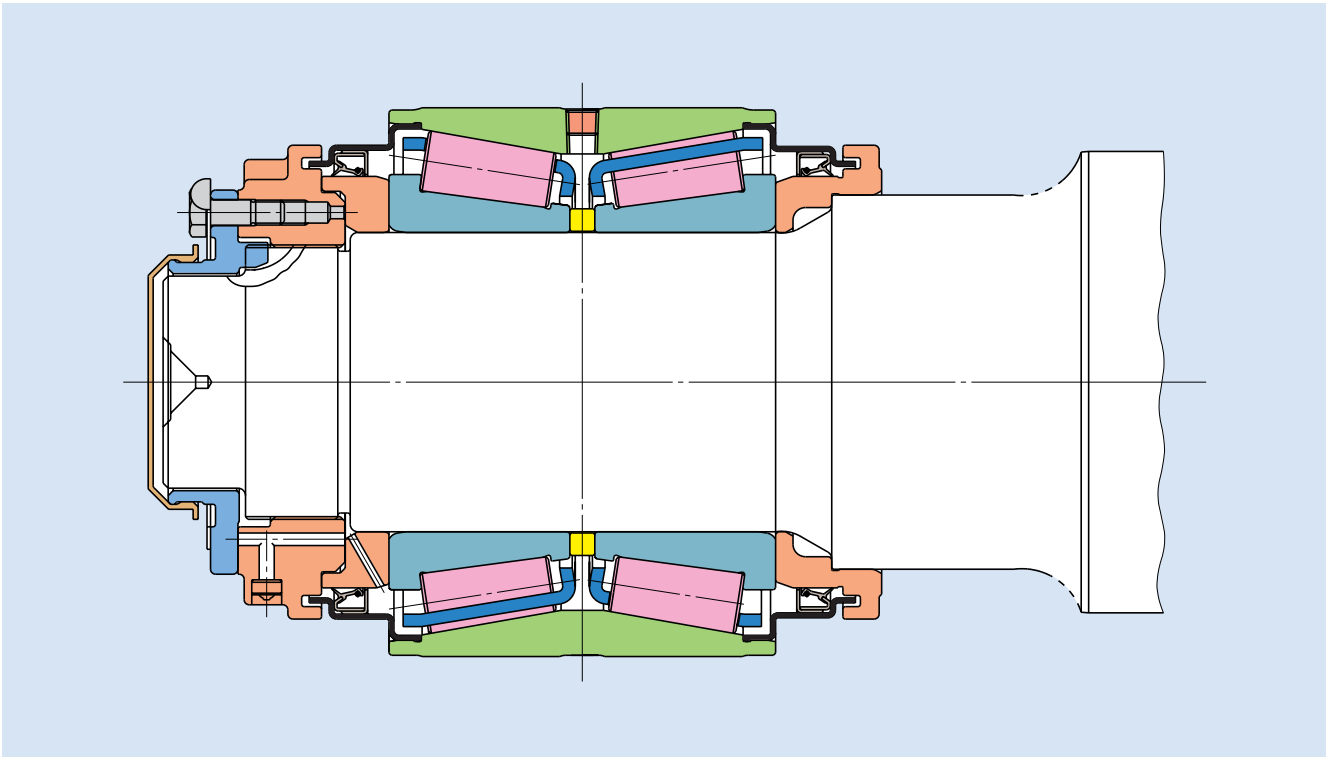
## **JR-West Electric Train, 223 Series**

JR-West has developed 223 series as the most common express train in Kansai area which connect three big cities, Kyoto, Osaka, Kobe.



© JR-West

## • Structure



## • Features

Bearing No. : WJT12

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 120mm

Lubrication : Grease

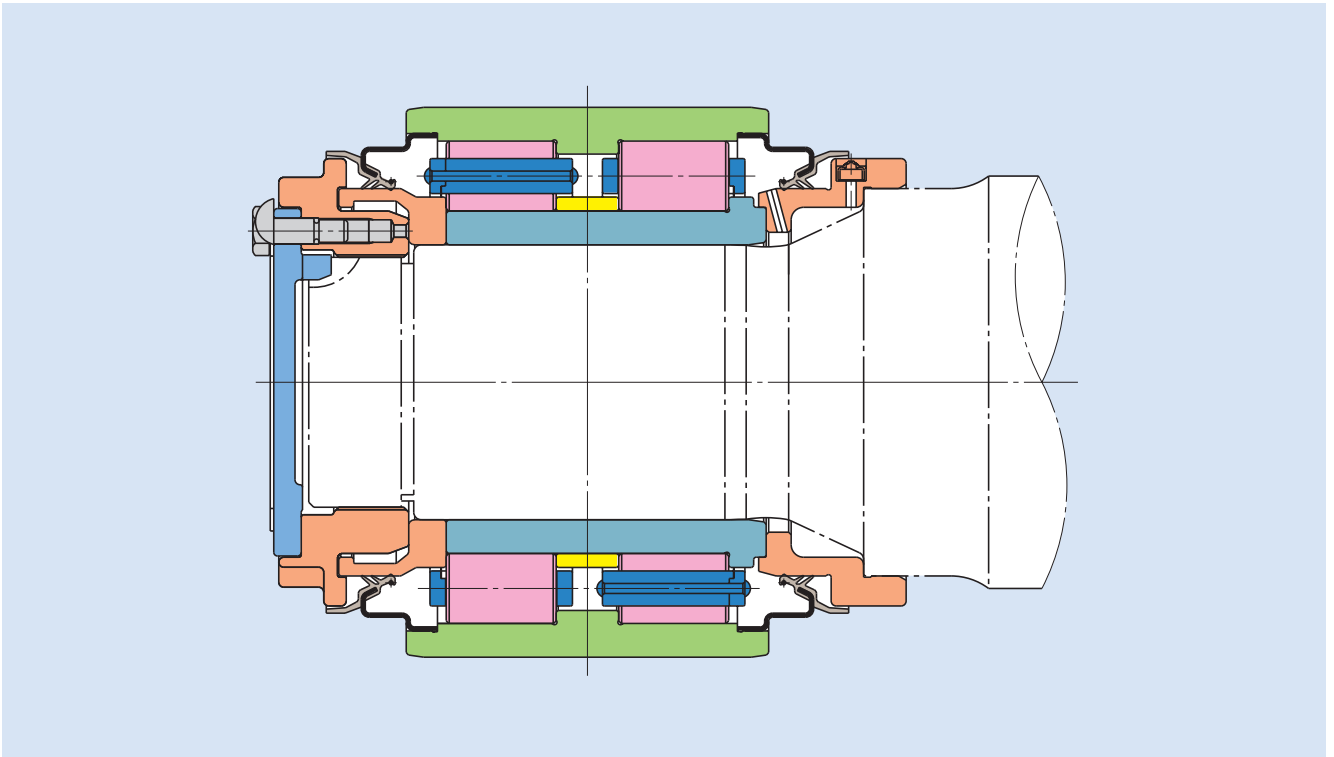
Maximum Speed : 130km/h

## **JR Shikoku Limited Express, Diesel Train, KIHA 2000**

JR Shikoku has developed KIHA 2000 to reduce the traveling time from Honshu island to Shikoku island over Seto-bridge. It has a pendulum suspension system for maintaining high speed in mountain area with many curves on Shikoku island.



- **Structure**



- **Features**

Bearing No. : JC33

Bearing Type : Double Row Cylindrical Roller Bearing with Seals (RCC Bearing)

Bearing Bore : 110mm (4.3307inch)

Lubrication : Grease

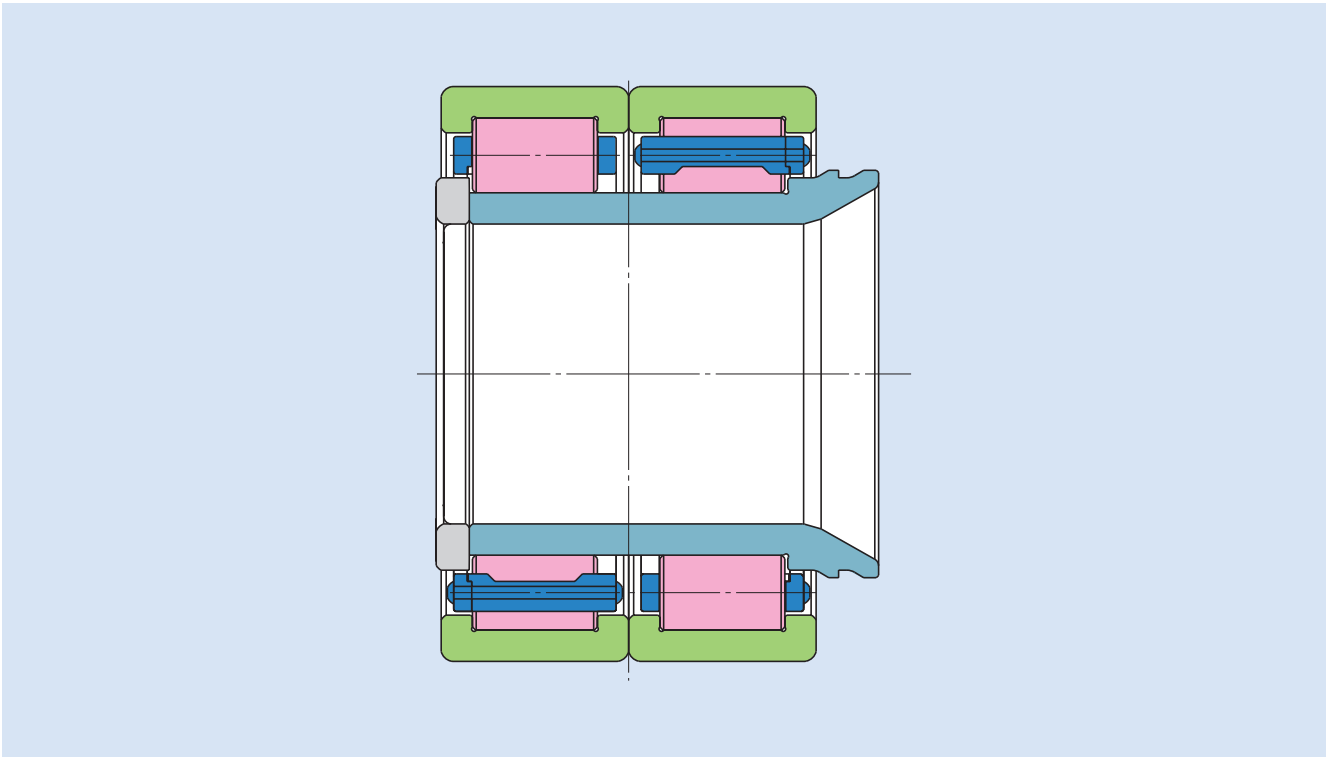
Maximum Speed : 110km/h

## **JR Kyushu Limited Express, Electric Train, 783 Series**

JR Kyushu has introduced a new 783 express train which operates all over Kyushu island at high speed.



- **Structure**



- **Features**

Bearing No. : JC400KA

Bearing Type : Double Row Cylindrical Roller Bearing

Bearing Bore : 120mm

Lubrication : Grease

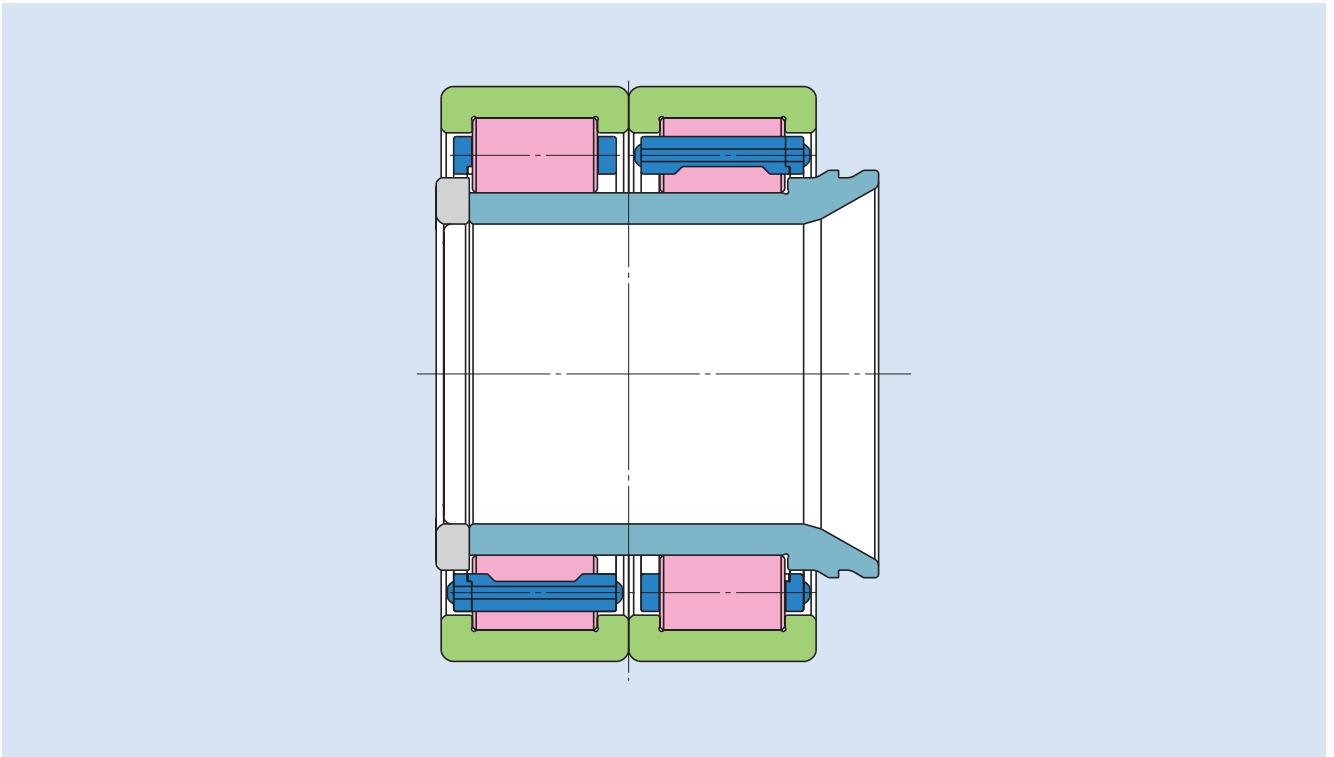
Maximum Speed : 130km/h

## **JR Kyushu Electric Train, 813 Series**

813 series is designed for improved transportation in northern Kyushu island.



- **Structure**



- **Features**

Bearing No. : JC400KA

Bearing Type : Double Row Cylindrical Roller Bearing

Bearing Bore : 120mm

Lubrication : Grease

Maximum Speed : 130km/h

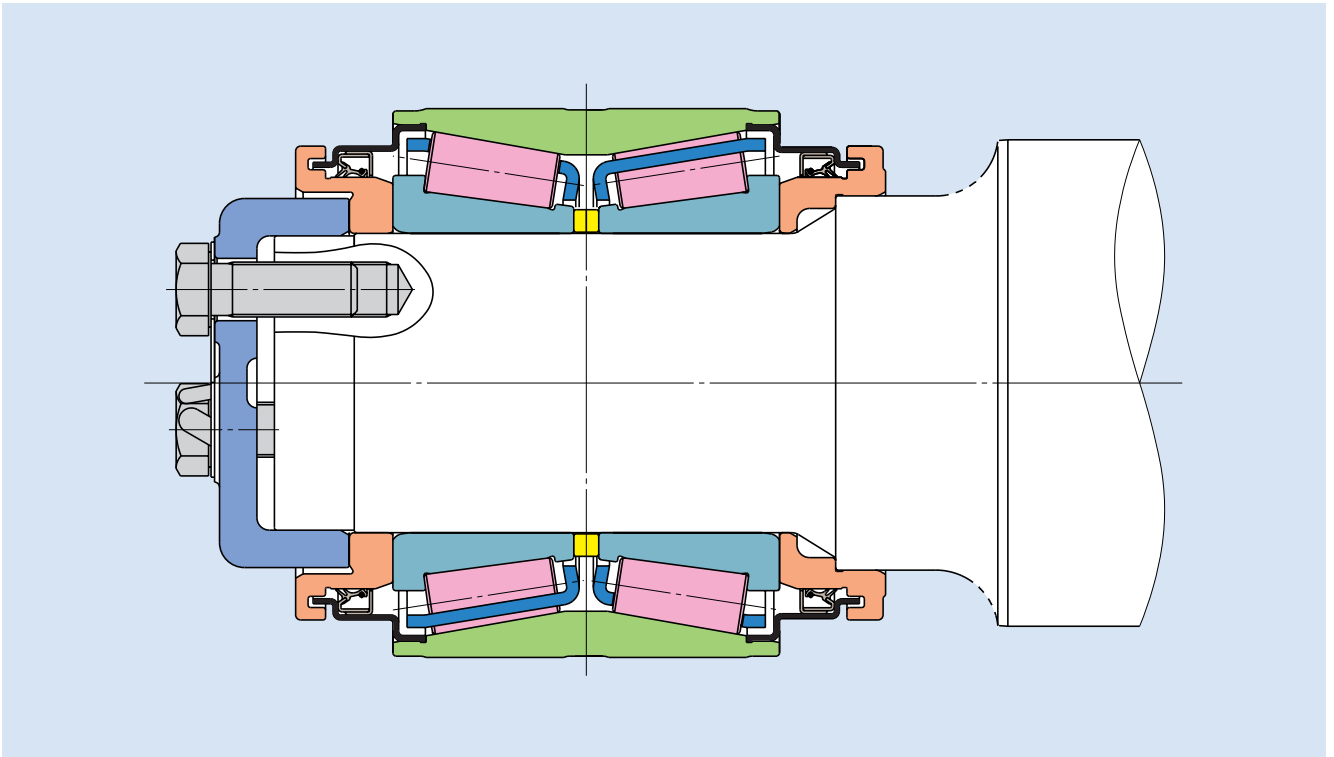


## **JR Kyushu Electric Train 815 Series**

A new type of suburban electric train introduced on Kyushu island in 1999.



- **Structure**



- **Features**

Bearing No. : JT402K

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 120 mm

Lubrication : Grease

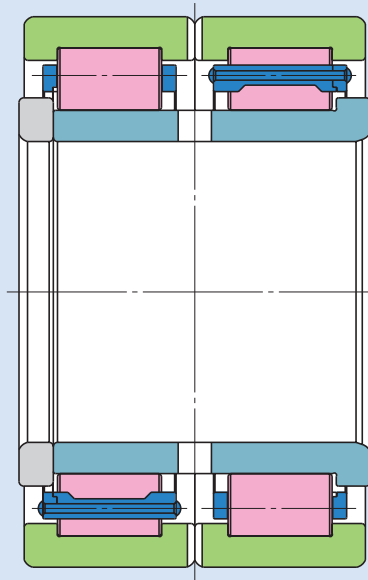
Maximum Speed : 120 km/h

## **Sagami Railways Electric Train, 8000 Series**

Sagami Railways operates new 8000 series as the urban commuter which has a VVVF (Variable Voltage Variable Frequency) inverter system.



- **Structure**



- **Features**

Bearing No. : 2RNUP2625

Bearing Type : Double Row Cylindrical Roller Bearing with Ribs

Bearing Bore : 130mm

Lubrication : Oil bath

Maximum Speed : 100km/h

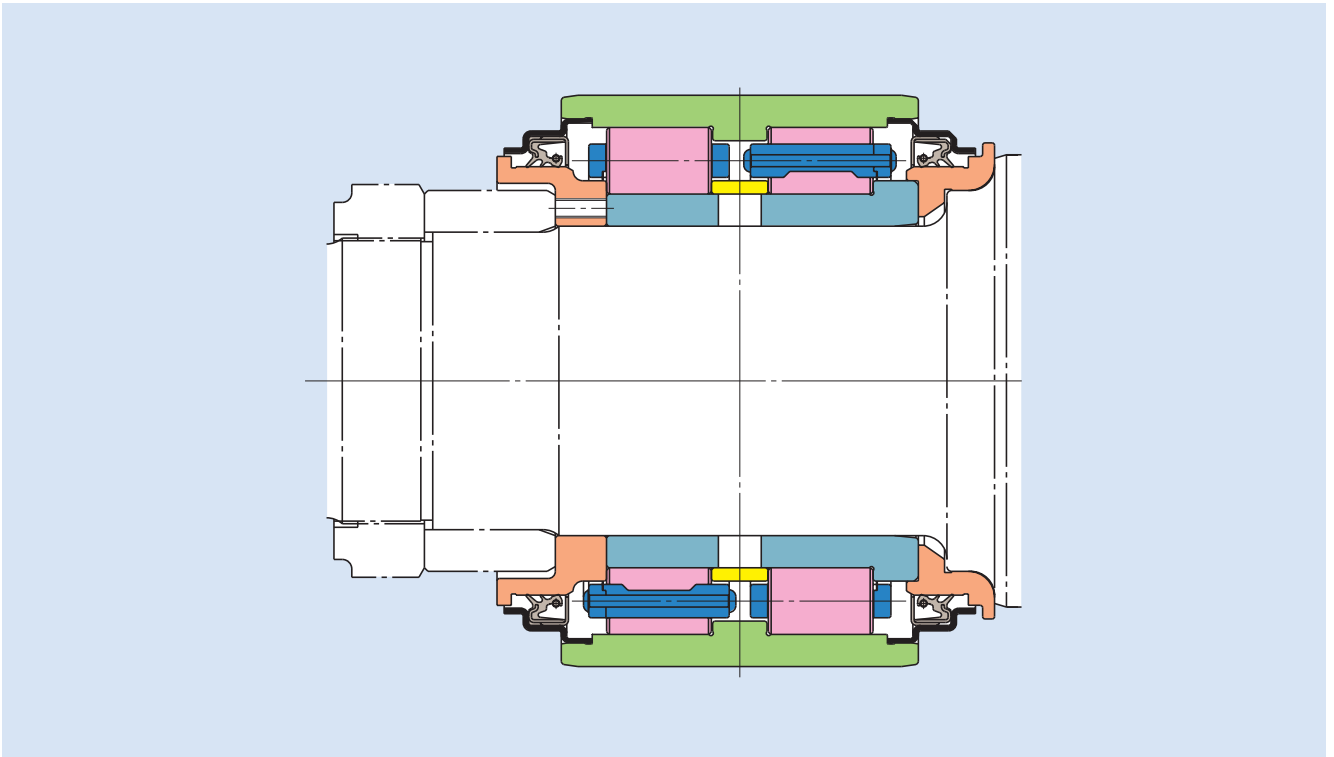
## **Sagami Railways Electric Train, 9000 Series**

9000 series also has a VVVF inverter system.

It is the first electric train which has used sealed bearings to extend the service mileage for Sagami Railways.



- **Structure**



- **Features**

Bearing No. : 2R2662LL

Bearing Type : Double Row Cylindrical Roller Bearing with Seals (RCC Bearing)

Bearing Bore : 130mm (5.1181inch)

Lubrication : Grease

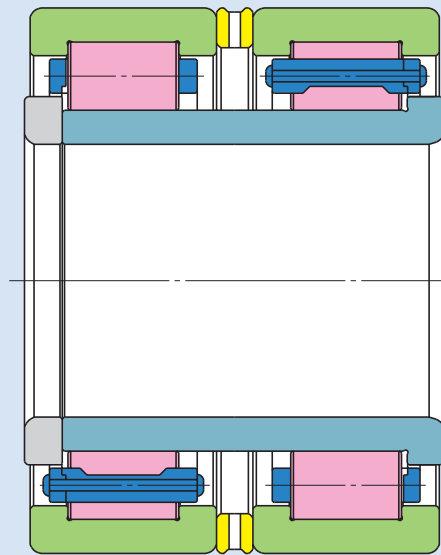
Maximum Speed : 100km/h

## ***NANKAI Electric Railways Electric Train, 11000 Series***

NANKAI has been operating 11000 series which is an express train between Kohya and Osaka frequently used by visitors to Kohya-San temple. The train is designed to be comfortable for the passenger.



- **Structure**



- **Features**

Bearing No. : 2RNUP2459

Bearing Type : Double Row Cylindrical Roller Bearing with Ribs

Bearing Bore: 120mm

Lubrication : Oil bath

Maximum Speed : 120km/h

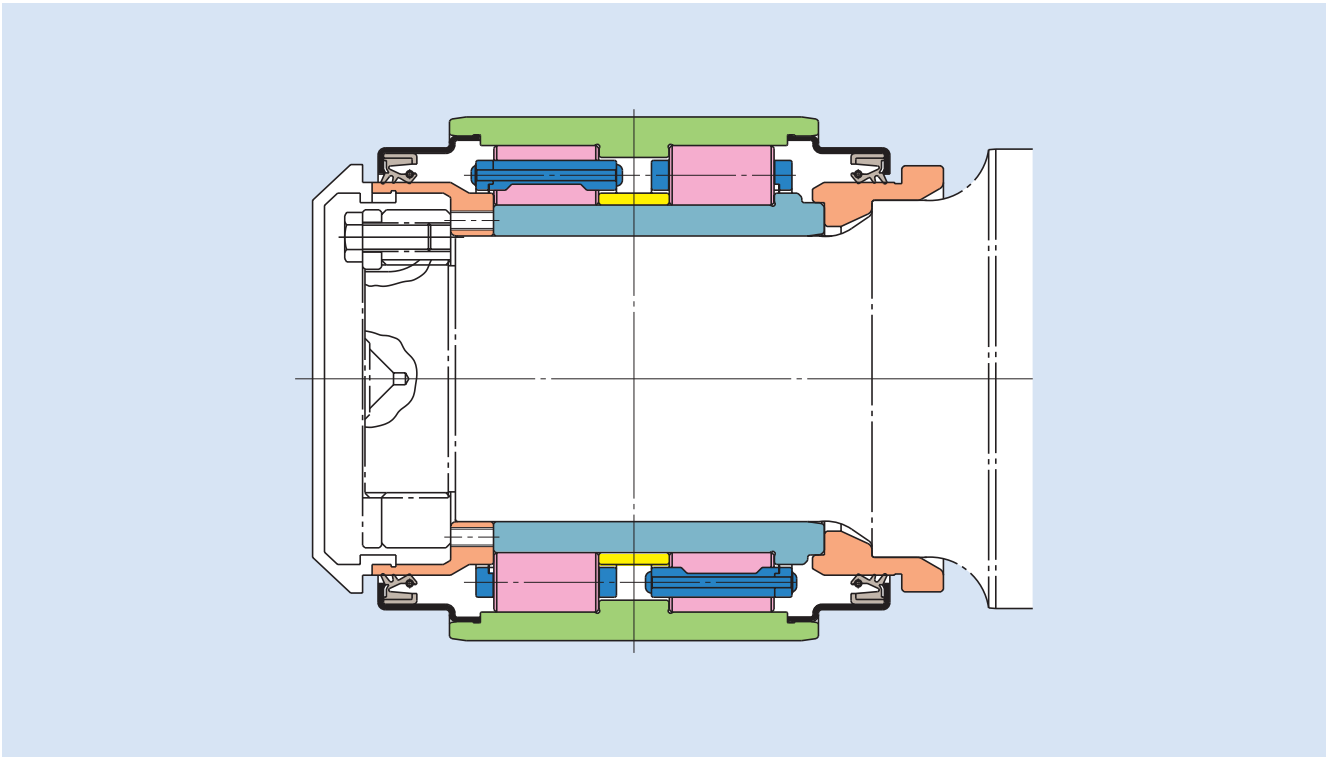


## ***Kinki Nippon Railways Limited Express, Electric Train 23000 Series***

Kinki Nippon Railways has developed 23000 series which shows a streamline shape and bright yellow color, runs toward the Ise-shima ocean resort.



- **Structure**



- **Features**

Bearing No. : 2R2482LLC3, 2R2483LLC3

Bearing Type : Double Row Cylindrical Roller Bearing with Seals (RCC Bearing)

Bearing Bore : 120mm

Lubrication : Grease

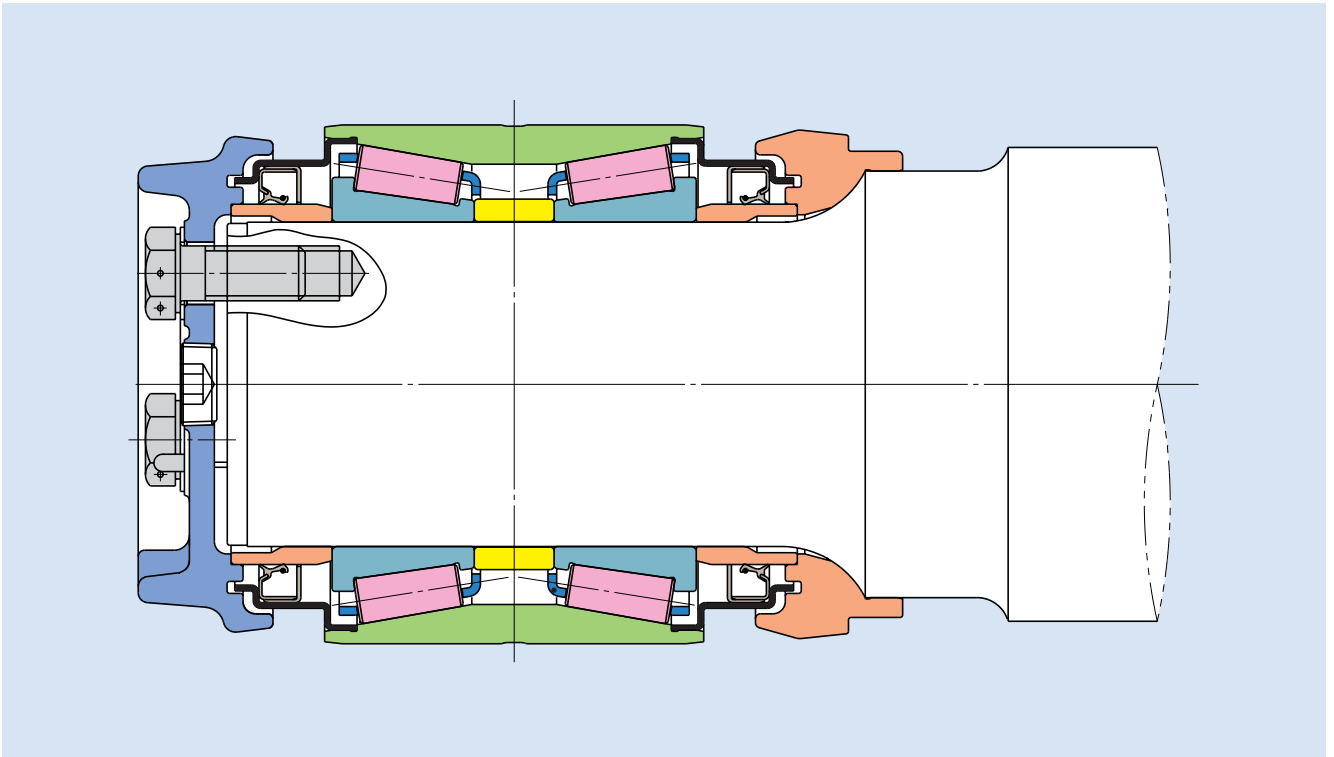
Maximum Speed : 130km/h

## **JR Freight KOKI 106 Series**

KOKI 106 series is the most modernized flat wagon for transporting containers, and is able to run at a maximum speed of 110km/h.



## • Structure



## • Features

Bearing No. : JT11B

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 130 mm

Lubrication : Grease

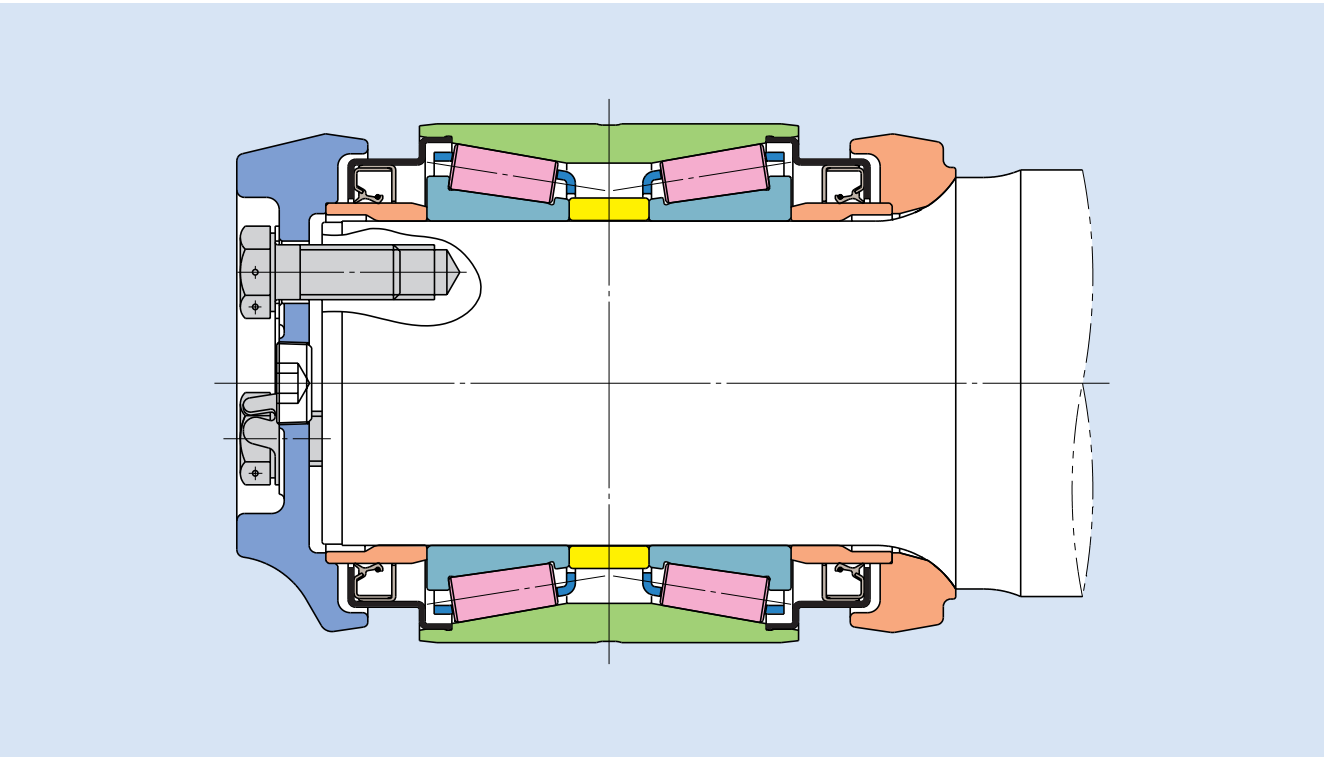
Maximum Speed : 110 km/h

## **JR Freight** **KOKI 50000 Series**

KOKI 50000 series was the most popular wagon for transporting 5-ton containers around Japan before JR-Freight developed their new KOKI 100 Series.



- **Structure**



- **Features**

Bearing No. : JT11A

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 130 mm

Lubrication : Grease

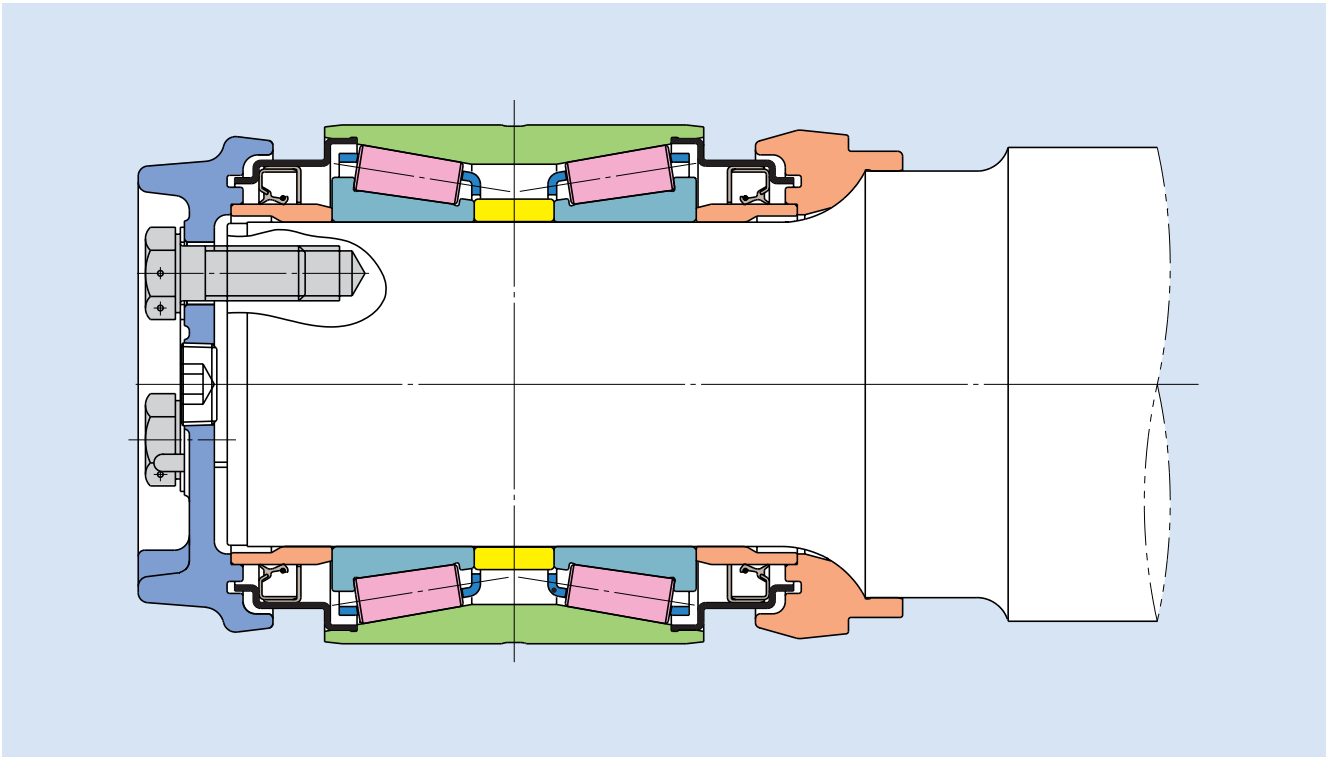
Maximum Speed : 95~110 km/h

## **JR Freight KOKI 71**

As low-floored freight car, KOKI 71 can transport both automobiles and containers. It has the capacity for carrying 4 passenger cars bound for the destination and 2 containers for the return trip. It is operated at the maximum speed of 110 km/h.



## • Structure



## • Features

Bearing No. : JT11C

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 130 mm

Lubrication : Grease

Maximum Speed : 110 km/h

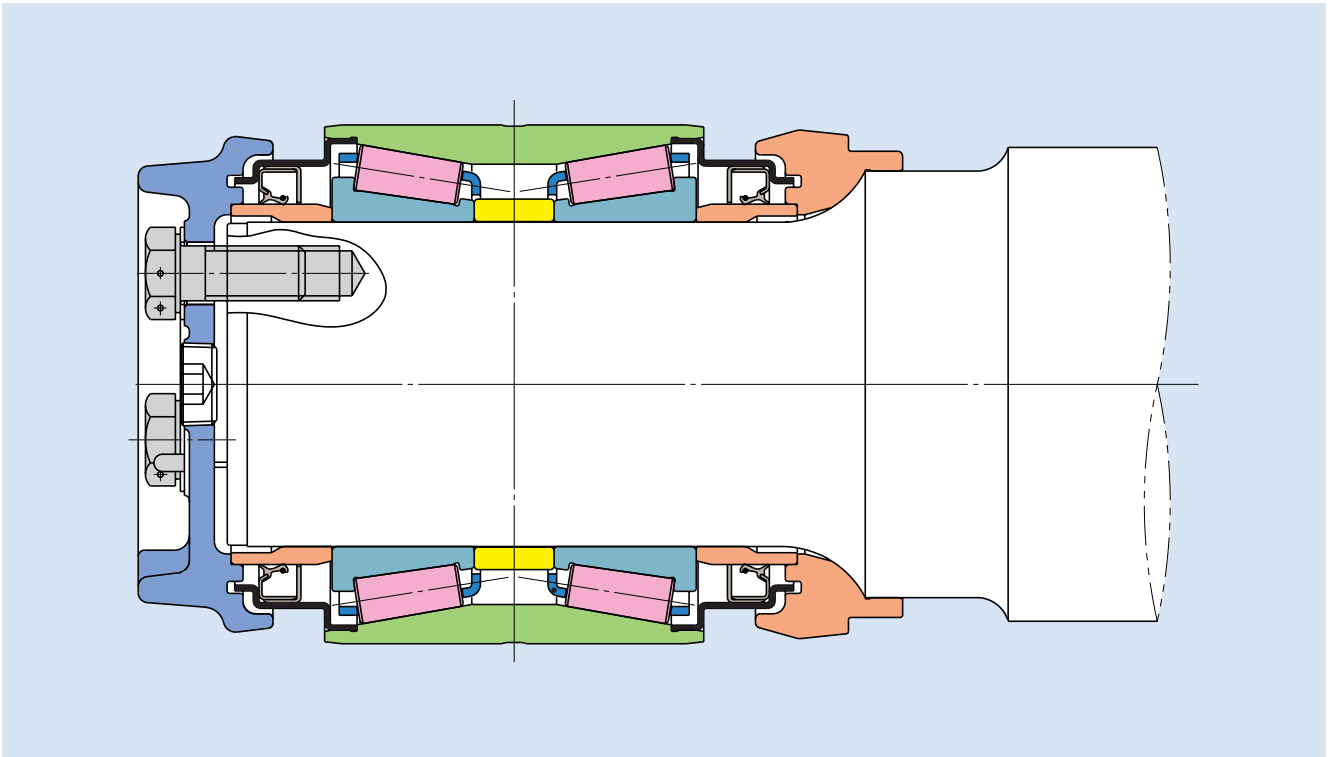


## **JR Freight KOKI 72**

KOKI 72 series is proud of its carrier capacity with 48-ton and high-speed service. With the large capacity, KOKI 72 can carry two 20-foot marine containers or one 40-foot container. KOKI 72 series has been introduced at beginning of 1997, and its operating speed is 110 km/h.



## • Structure



## • Features

Bearing No. : JT11C

Bearing Type : Double Row Tapered Roller Bearing with Seals (RCT Bearing)

Bearing Bore : 130 mm

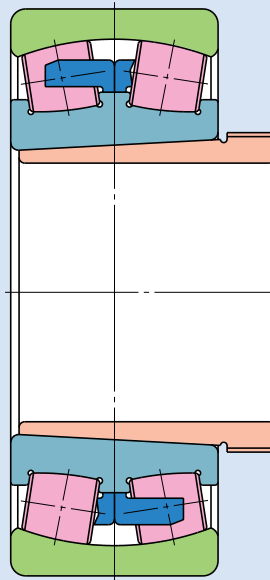
Lubrication : Grease

Maximum Speed : 110 km/h

## *Argentinean Railway*



- **Structure**



- **Features**

Bearing No. : I-37906C3

Bearing Type :Spherical Roller Bearings with withdrawal sleeve

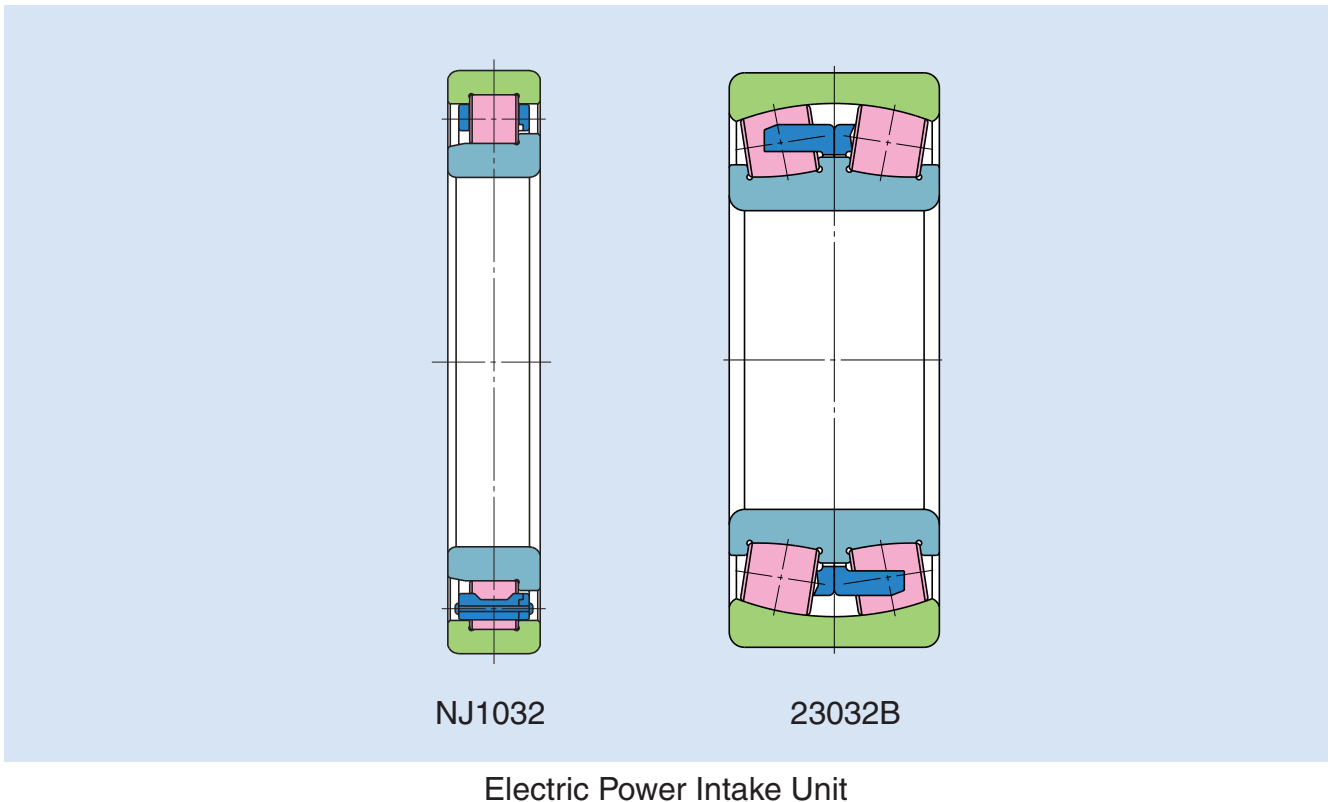
Bearing Bore : 130 mm

Lubrication : Grease

## *London Underground 5066 Series*



## • Structure



## • Features

Bearing No. : NJ1032

23032B

Bearing Type : Single Row Cylindrical Roller Bearing with Rib  
Spherical Roller Bearing

Bearing Bore : 152 mm

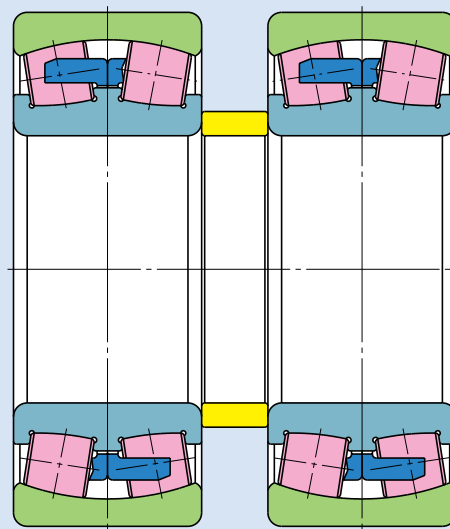
153 mm

Lubrication : Grease

## *Singapore Subway*



- **Structure**



- **Features**

Bearing No. : 23026B

Bearing Type : Two Spherical Roller Bearings with inner spacer

Bearing Bore : 130 mm

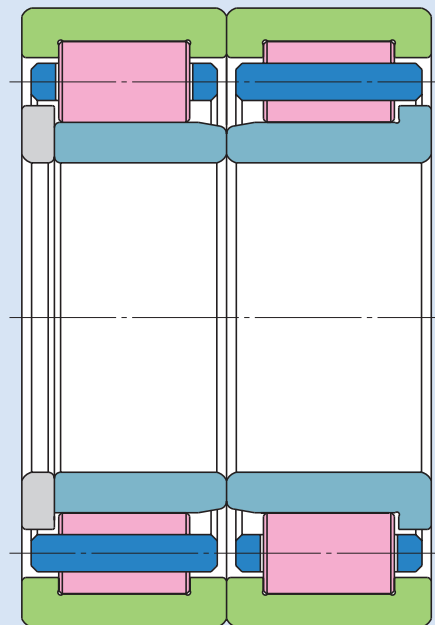
Lubrication : Grease



## **DB (Deutsche Bahn AG)**



- **Structure**



- **Features**

Bearing No. : WJ/WJP130×240×T2

Bearing Type : Double Row Cylindrical Roller Bearings (UIC Standard)

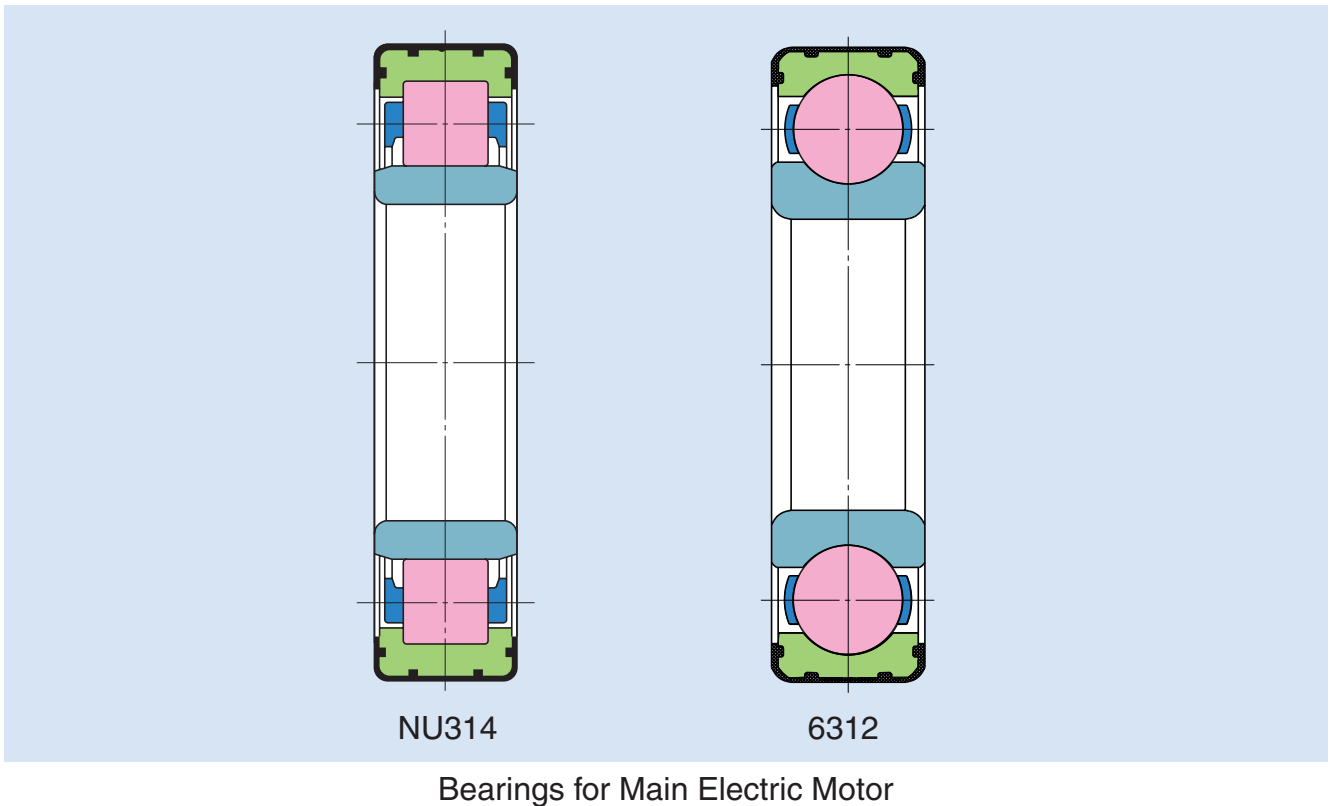
Bearing Bore : 130 mm

Lubrication : Grease

## Seoul Subway



- Structure



- Features

Bearing No. : NU314 (Resin Coated Type)

6312 (Resin Coated Type)

Bearing Type : Single Row Cylindrical Roller Bearing

Single Row Deep Groove Ball Bearing

Bearing Bore : 70 mm

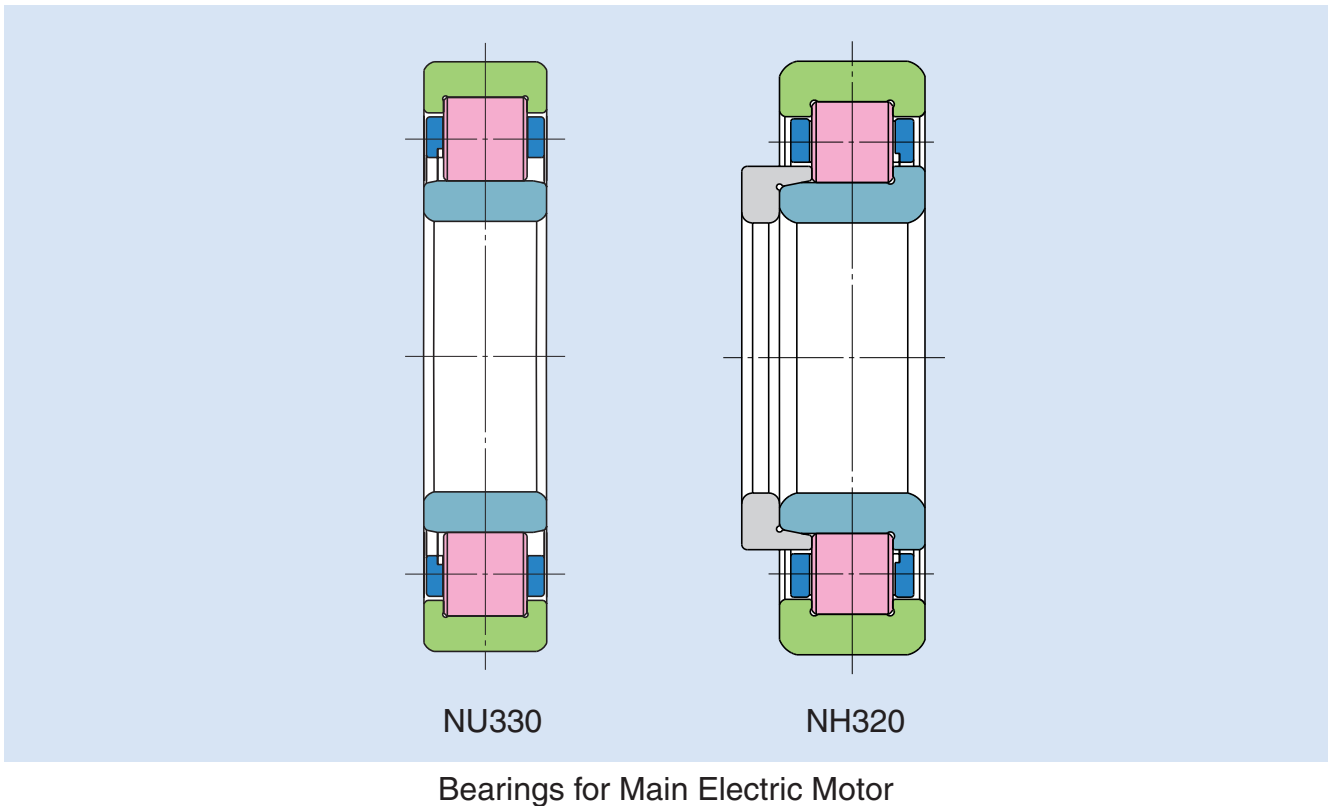
60 mm

Lubrication : Grease

## *Indian National Railway*



## • Structure



## • Features

Bearing No. : NU330

NH320

Bearing Type : Single Row Cylindrical Roller Bearing

Single Row Cylindrical Roller Bearing with Ribs

Bearing Bore : 150 mm

100 mm

Lubrication : Grease