

Spherical Roller Thrust Bearings

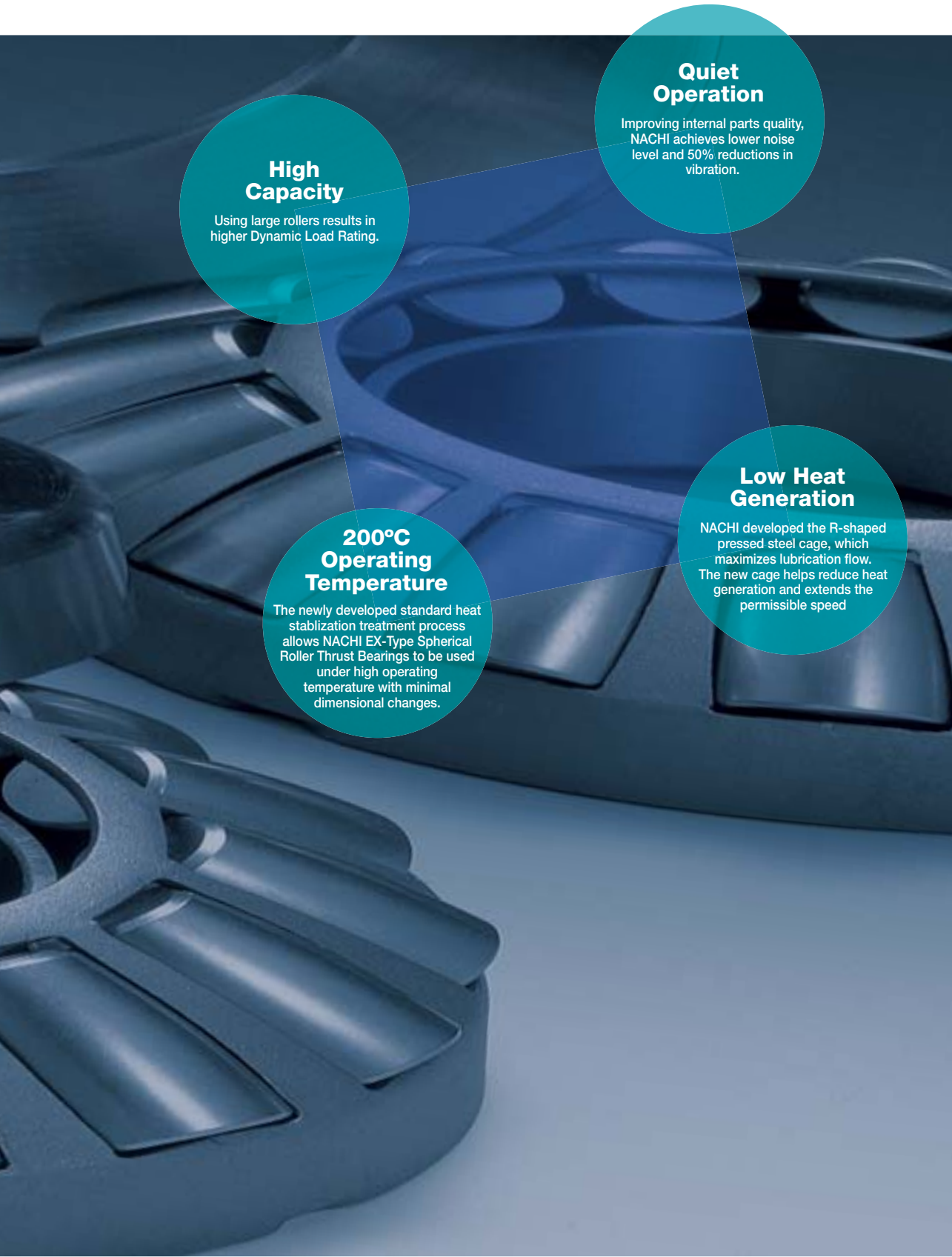
EX Type



High Capacity and Quiet Operation

Spherical Roller Thrust Bearings **EX Type**





High Capacity

Using large rollers results in higher Dynamic Load Rating.

Quiet Operation

Improving internal parts quality, NACHI achieves lower noise level and 50% reductions in vibration.

200°C Operating Temperature

The newly developed standard heat stabilization treatment process allows NACHI EX-Type Spherical Roller Thrust Bearings to be used under high operating temperature with minimal dimensional changes.

Low Heat Generation

NACHI developed the R-shaped pressed steel cage, which maximizes lubrication flow. The new cage helps reduce heat generation and extends the permissible speed.

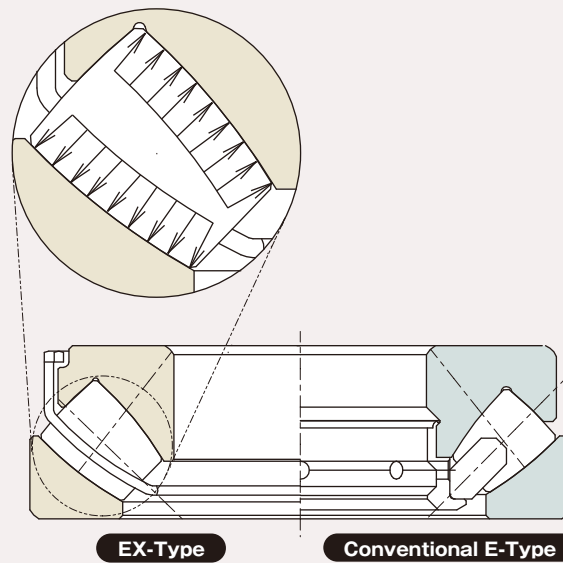
High Capacity and Quiet Operation

Spherical Roller Thrust Bearings EX Type



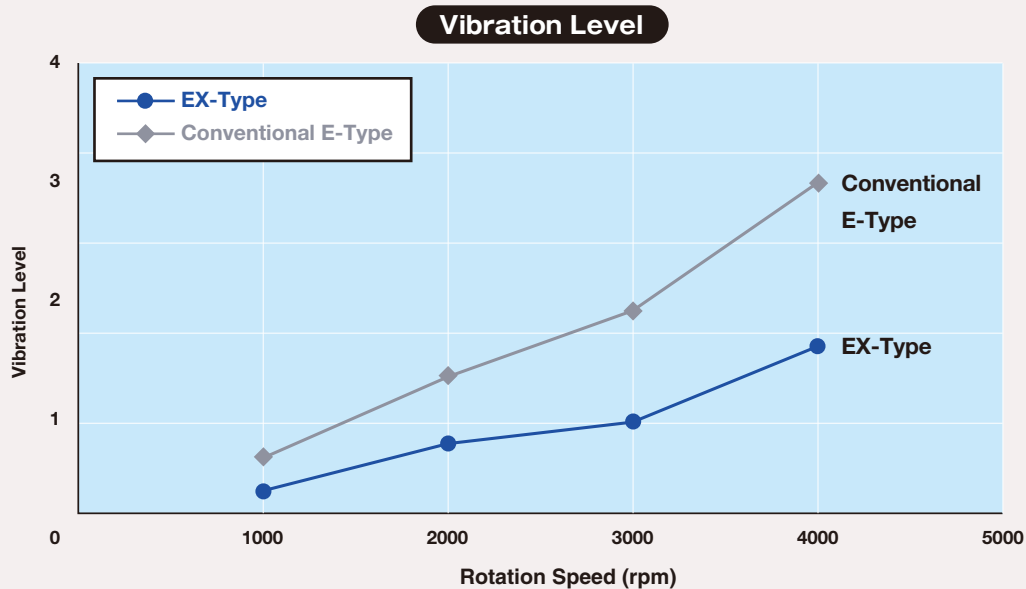
Greater load carrying capacity

- To obtain maximum capacity of basic dynamic carrying load in the dimensionally restricted section, the diameter, quantity and effective length of roller has been maximized. The stress is distributed equally along the contact areas of outer ring/roller and inner ring /roller due to a optimized internal design.
- Due to the above improvements, bearing life has been increased by 1.5~2.0 times that of NACHI conventional E-Type.



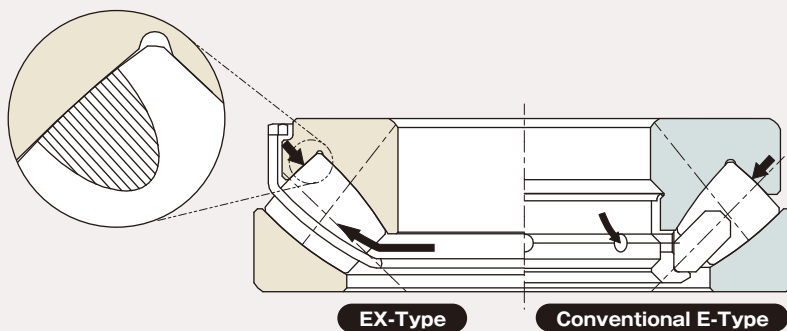
Achievement of Quiet Operation

- Improving internal parts quality, NACHI achieves lower noise level and 50% reductions in vibration.



Low heat generation even during the high speed operation

- In order to maximize a lubrication flow, NACHI developed R shape pressed steel cage.
- Most of the heat generated is caused by the sliding motion between inner ring flange and roller end at high speed operation. NACHI analyzes this critical area by using Hertz & Lubrication theory and have optimized the design to reduce heat build up.
- Due to the above improvements, the heat generation of EX-Type bearings can be reduced by over 10% and the permissible speed can be extended by over 10% compared with the conventional design.



High Speed Rotating Test

- The above test results show that the high speed capability of EX-series bearings have improved.

- Tested Bearings

NACHI EX Design : 29414EX

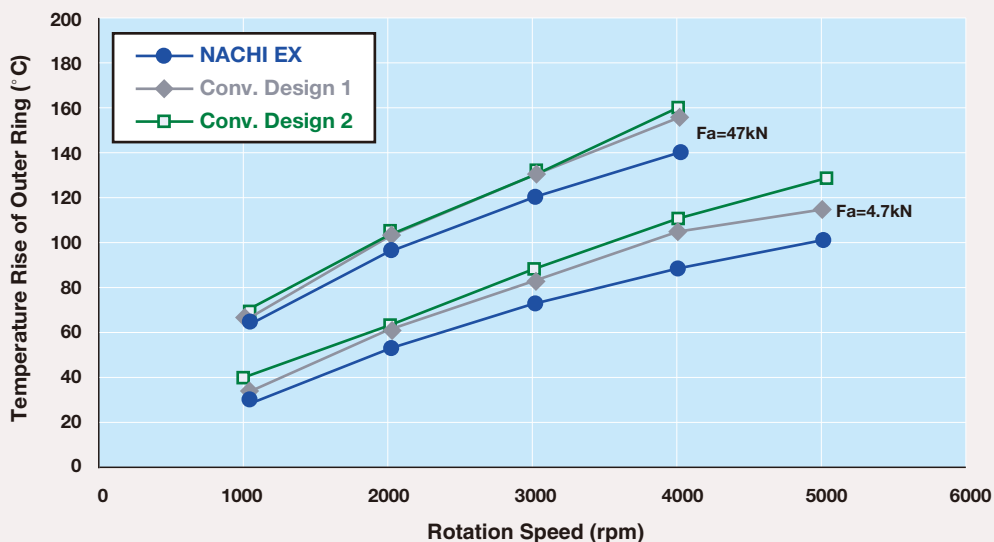
Conventional Design 1 : 29414 with Pressed Steel Cage

Conventional Design 2 : 29414 with Machined Brass Cage

- Test Machine : Vertical shaft & Inner ring rotation

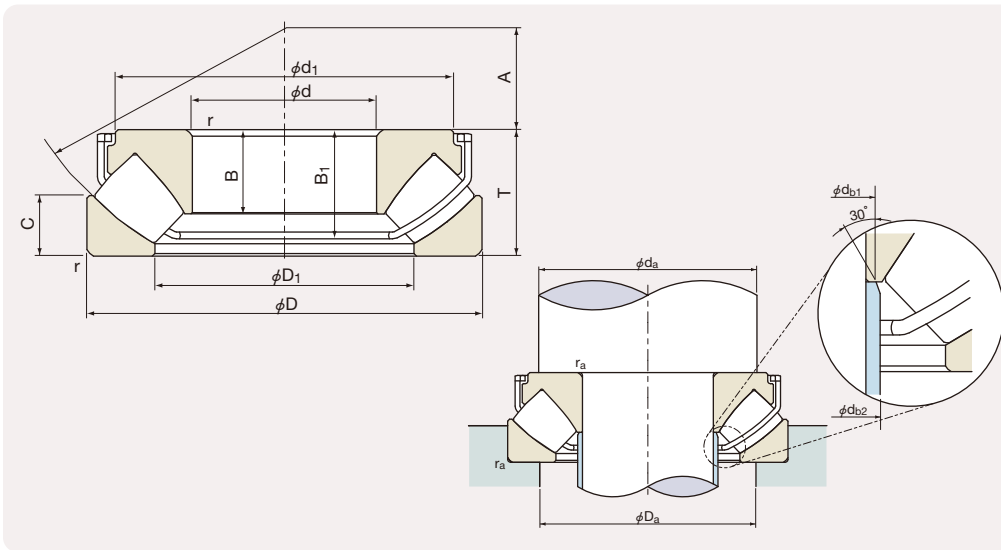
- Lubrication : Oil bath (Turbin oil #68)

Temperature Rise vs Rotation Speed



High Capacity and Quiet Operation

Spherical Roller Thrust Bearings EX Type



- Dynamic equivalent axial load
 $P_a = F_a + 1.2F_r$
- Static equivalent axial load
 $P_{0a} = F_a + 2.7F_r$
where, F_a : Axial load
 F_r : Radial load
- However $\frac{F_r}{F_a} \leq 0.55$ must be satisfied
- In case of applied radial load, not exceed 50% of axial load.

29300EX Series

1N=0.102kgf

Bearing No.	Boundary dimensions (mm)				Basic dynamic load rating C_a (N)	Basic static load rating C_{0a} (N)	Limiting speed (rpm)	
	d	D	T	r (min)			Grease lubrication	Oil lubrication
29317EX	85	150	39	1.5	365,000	1,060,000	1,600	2,700
29318EX	90	155	39	1.5	355,000	1,070,000	1,600	2,700
29320EX	100	170	42	1.5	435,000	1,400,000	1,500	2,500
29322EX	110	190	48	2	550,000	1,730,000	1,300	2,100
39324EX	120	210	54	2.1	670,000	2,160,000	1,100	1,900
29326EX	130	225	58	2.1	770,000	2,440,000	1,000	1,800
29328EX	140	240	60	2.1	860,000	2,840,000	950	1,600
29332EX	160	270	67	3	1,040,000	3,500,000	850	1,400

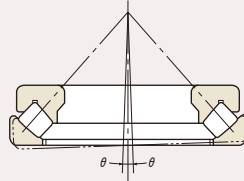
29400EX Series

Bearing No.	Boundary dimensions (mm)				Basic dynamic load rating C_a (N)	Basic static load rating C_{0a} (N)	Limiting speed (rpm)	
	d	D	T	r (min)			Grease lubrication	Oil lubrication
29412EX	60	130	42	1.5	350,000	915,000	1,800	2,800
29413EX	65	140	45	2	410,000	1,110,000	1,700	2,700
29414EX	70	150	48	2	490,000	1,350,000	1,600	2,400
29415EX	75	160	51	2	525,000	1,470,000	1,600	2,300
29416EX	80	170	54	2.1	580,000	1,630,000	1,500	2,100
29417EX	85	180	58	2.1	640,000	1,810,000	1,300	2,000
29418EX	90	190	60	2.1	710,000	2,080,000	1,300	1,900
29420EX	100	210	67	3	870,000	2,530,000	1,100	1,700
29422EX	110	230	73	3	1,060,000	3,150,000	950	1,500
29424EX	120	250	78	4	1,210,000	3,750,000	900	1,400
29426EX	130	270	85	4	1,400,000	4,300,000	850	1,200
29428EX	140	280	85	4	1,410,000	4,350,000	850	1,200
29430EX	150	300	90	4	1,630,000	5,150,000	800	1,100
29432EX	160	320	95	5	1,820,000	5,750,000	750	1,000

Because there are many sliding surfaces in Spherical Roller Thrust Bearings (cage-to-guide-sleeve and roller-ends-to-rib), oil lubricant (not grease) should be used.

●Aligning angle

Maximum permissible misalignment angle is about 2° under general service conditions. If the aligning advantages of this bearing type are to be realized, care must be taken to provide clearance for parts in the surrounding structure.



●The safety-factor "So" must be over 4.

●Minimum axial load

To prevent damage caused by sliding motion between the rollers and raceway, spherical roller thrust bearings must be subjected to a load more than the minimum load, $F_{a \min}$.

$$F_{a \min} = \frac{C_{0a}}{1000}$$

	Reference dimensions (mm)						Abutment and fillet dimensions (mm)			Spacer dimensions (mm)		Mass (kg) (Reference)	Bearing No.
	d_1	D_1	B	B_1	C	A	d_a (min)	D_a (max)	r_a (max)	db_1 (max)	db_2 (max)		
	134	110.5	25	35	19	50	115	135	1.5	90	90	2.67	29317EX
	135.2	116	23.8	35.1	19	52	120	140	1.5	95	95	2.75	29318EX
	146.9	126	27	38.2	21	58	130	150	1.5	105	107	3.61	29320EX
	165.1	140.6	30.9	44	23	64	145	165	2	116	117	5.22	29322EX
	184.5	155	34.5	48.7	26	70	160	180	2	127	128	7.30	39324EX
	197.4	165.8	36.8	52.7	28	76	170	195	2	136	138	8.82	29326EX
	218.4	179	38.5	54.8	29	82	185	205	2	147.5	149	10.5	29328EX
	243.4	199.8	44	61.4	32	92	210	235	2.5	166	174	14.5	29332EX

	Reference dimensions (mm)						Abutment and fillet dimensions (mm)			Spacer dimensions (mm)		Mass (kg) (Reference)	Bearing No.
	d_1	D_1	B	B_1	C	A	d_a (min)	D_a (max)	r_a (max)	db_1 (max)	db_2 (max)		
	113	87	27	37.1	20	38	91	108	1.5	66	66	2.50	29412EX
	123	93.5	29.5	40	21	42	99	115	2	72	72	3.20	29413EX
	128.3	98.4	32	42.7	23	44	106	125	2	75.5	77.5	3.82	29414EX
	140	105.6	34.5	45.6	24	47	113	132	2	82.5	82.5	4.70	29415EX
	149	113	36	48.2	26	50	120	140	2	88	88	5.60	29416EX
	158.2	120.5	37	50.6	28	54	130	150	2	94	94	6.69	29417EX
	162	127	40.5	53	29	56	135	157	2	99	99	7.83	29418EX
	181	139	44.5	59.6	32	62	150	175	2.5	108	110	10.6	29420EX
	199.6	153.4	48	64.4	35	69	165	190	2.5	119.5	120	14	29422EX
	218	166.5	54	70.9	37	74	180	205	3	131	132	17.6	29424EX
	236.4	181	56	75	41	81	195	255	3	141.5	143	22.3	29426EX
	246	196	53.6	74.4	41	86	205	235	3	153	160	22.8	29428EX
	264.4	207.5	58.5	80.8	44	92	220	250	3	163	169	27.8	29430EX
	283.8	222	62.5	85.7	45	99	230	265	4	174.5	181	33.4	29432EX

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