

Spherical Roller Thrust Bearings

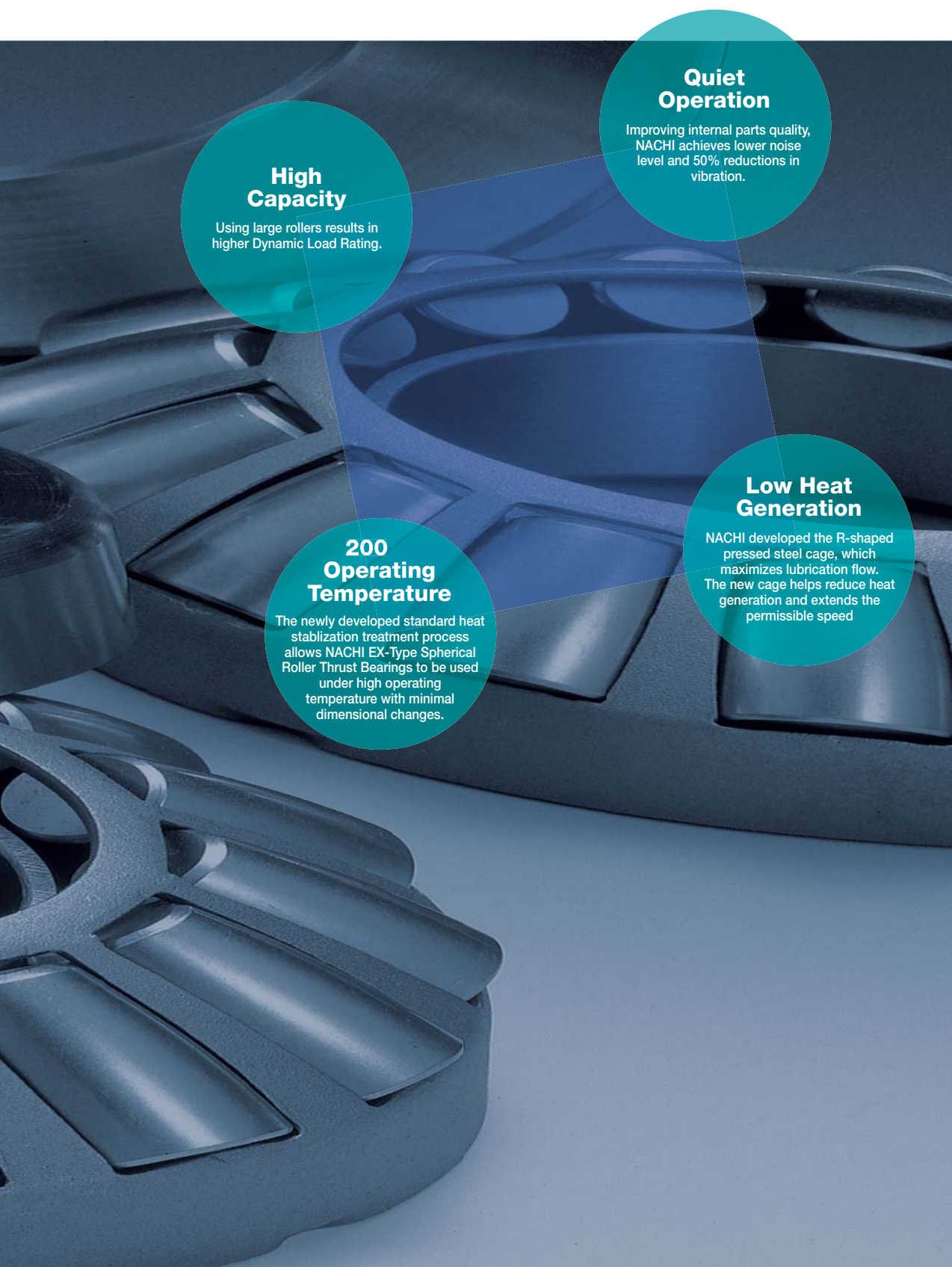
EX Type



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 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.

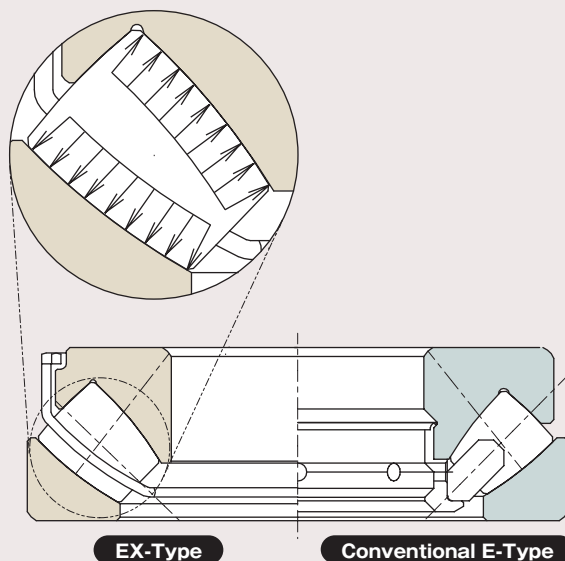
High Capacity and Quiet Operation

Spherical Roller Thrust Bearings EX Type



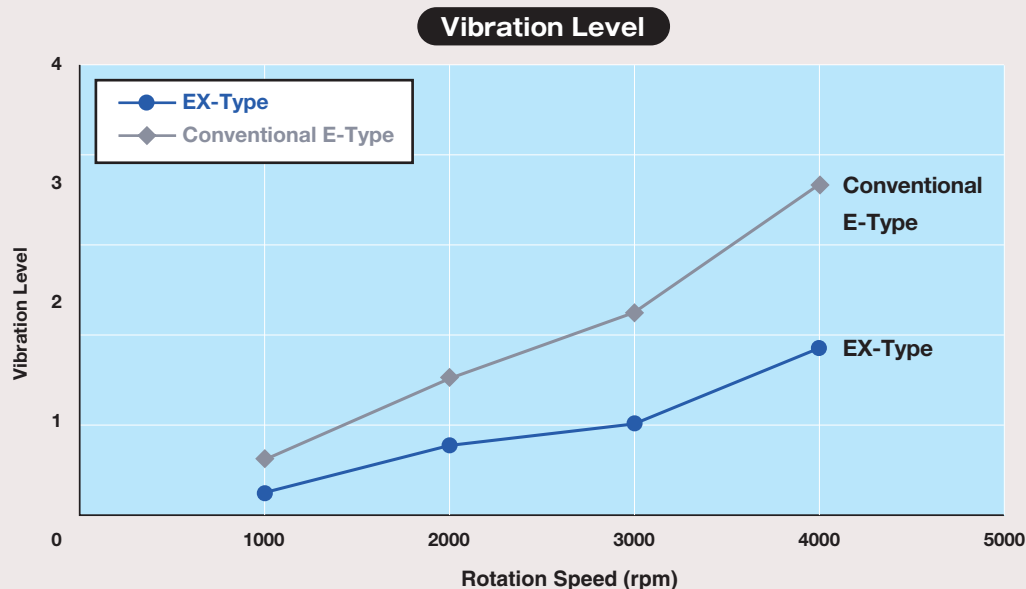
Greater load carrying capacity

- 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.



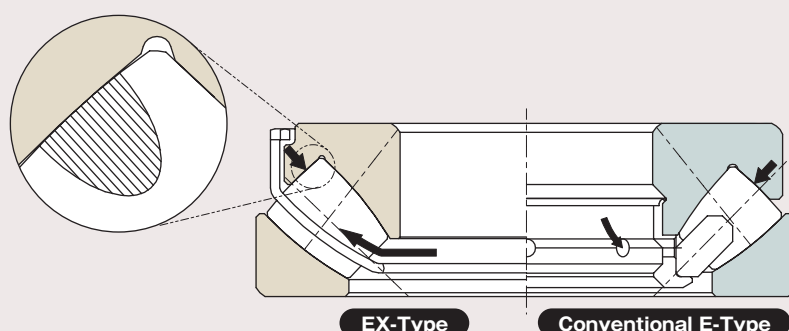
Achievement of Quiet Operation

- 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

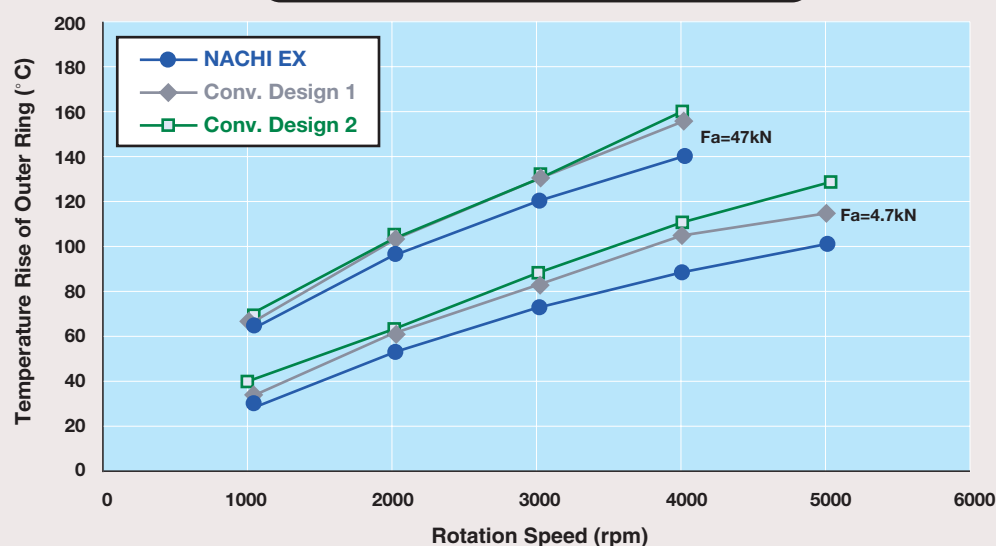
Conventional Design 1 : 29414 with Pressed Steel Cage

Conventional Design 2 : 29414 with Machined Brass Cage

Test Machine : Vertical shaft & Inner ring rotation

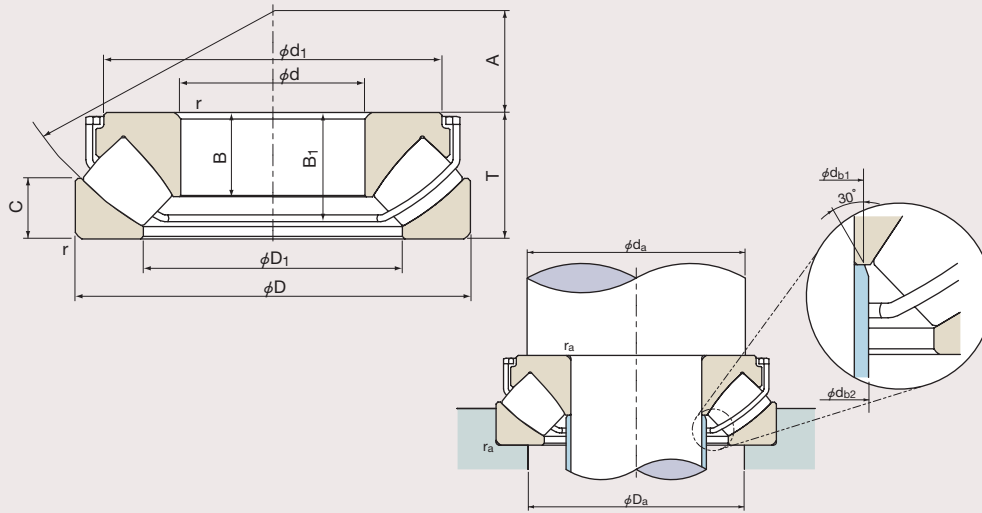
Lubrication : Oil bath (Turbin oil #68)

Temperature Rise vs Rotation Speed



High Capacity and Quiet Operation

Spherical Roller Thrust Bearings EX Type



- Dynamic equivalent axial load
 $P_a = F_a + 1.2 F_r$
- Static equivalent axial load
 $P_{0a} = F_a + 2.7 F_r$
 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 Ca (N)	Basic static load rating Coa (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	

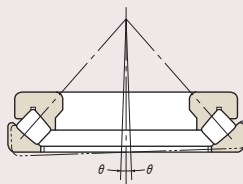
29400EX Series

Bearing No.	Boundary dimensions (mm)				Basic dynamic load rating Ca (N)	Basic static load rating Coa (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



NACHI-FUJIKOSHI CORP.

Main Office: Shiodome Sumitomo Bldg. 17F, 1-9-2 Higashi-Shinbashi, Minato-ku, Tokyo 105-0021, JAPAN
Phone: 03-5568-5111 Fax: 03-5568-5206 URL: <http://www.nachi-fujikoshi.co.jp/>

Overseas Sales Companies

NACHI AMERICA INC. HEADQUARTERS

17500 Twenty-Three Mile Road, Macomb, Michigan, 48044, U.S.A.
Phone: +1-586-226-5151 Fax: +1-888-383-8665
URL: <http://www.nachiamerica.com/>

INDIANA BRANCH

715 Pushville Road, Greenwood, Indiana, 46143, U.S.A.
Phone: +1-317-535-5527 Fax: +1-317-535-3659

WEST COAST BRANCH

12652 E. Alondra Blvd. Cerritos, California, 90703, U.S.A.
Phone: +1-562-802-0055 Fax: +1-562-802-2455

MIAMI BRANCH-LATIN AMERICA DIV.

2315 N.W. 107th Ave., Doral, Florida, 33172, U.S.A.
Phone: +1-305-591-0054/0059/2604 Fax: +1-305-591-3110

ATLANTA OFFICE

Six Concourse Parkway, Suite 2995 Atlanta, GA 30328, U.S.A.
Phone: +1-770-393-0270 Fax: +1-770-393-0271

NACHI ROBOTIC SYSTEMS INC.

22285 Roethel Drive, Novi, Michigan, 48375, U.S.A.
Phone: +1-248-305-6545 Fax: +1-248-305-6542
URL: <http://www.nachirobotics.com/>

NACHI CANADA INC.

89 Courtland Ave., Unit No.2, Concord, Ontario, L4K 3T4, CANADA
Phone: +1-905-660-0088 Fax: +1-905-660-1146
URL: <http://www.nachicanada.com/>

NACHI MEXICANA, S.A. DE C.V.

Gral. Mariano Arista No.54, Local 5, Col. Argentina C.P. 11230, Mexico D.F. MEXICO
Phone: +52-55-5386-1396 Fax: +52-55-5386-1336

NACHI EUROPE GmbH

Bischofstrasse 99, 47809, Krefeld, GERMANY
Phone: +49-(0)2151-65046-0 Fax: +49-(0)2151-65046-90
URL: <http://www.nachi.de/>

SPAIN BRANCH

Av. Alberto Alcacer 28, 1-A, 28036, Madrid, SPAIN
Phone: +34-(0)91-302-6440 Fax: +34-(0)91-383-9486

BARCELONA OFFICE

Josep Tarradellas, 58, 1-5, 08029 Barcerona, SPAIN
Phone: +34-(0)93-430-6247 Fax: +34-(0)93-419-0897

CZECH BRANCH

Mostni 73, kolin 4, 28002, CZECH
Phone: +420-321-710-200 Fax: +420-321-710-200

U.K. BRANCH

Unit 7, Junction Six Industrial Estate, Electric Avenue, Birmingham B6 7JJ, U.K.
Phone: +44-(0)121-250-1890 Fax: +44-(0)121-250-1899

NACHI-FUJIKOSHI CORP. ITALY REPRESENTATIVE OFFICE

Via delle Lame 75, 3° piano-interno 8 40122, Bologna, ITALY
Phone: +39-051-649-4808 Fax: +39-051-528-2149

NACHI-FUJIKOSHI CORP. THAILAND REPRESENTATIVE OFFICE

Chai-ho Wongwaiwat Bldg. 889 Srinakarin Road, Samutprakarn, THAILAND 10270
Phone: +66-2-748-7322~4 Fax: +66-2-748-7325

NACHI SINGAPORE PTE. LTD.

No.2 Joo Koon Way, Jurong Town, Singapore 628943, SINGAPORE
Phone: +65-65587393 Fax: +65-65587371

VIETNAM OFFICE

Room 1608, 16/F Saigon Tower 29 Le Duan Street, District 1, Ho Chi Minh City, VIETNAM
Phone: +84-8-823-6299 Fax: +84-8-823-6288

FUJIKOSHI-NACHI (MALAYSIA) SDN. BHD.

No.17, Jalan USJ 21/3, 47630 UEP Subang Jaya, Selangor Darul Ehsan, MALAYSIA
Phone: +60-(0)3-80247900 Fax: +60-(0)3-80235884

P.T.NACHI INDONESIA

Jl.H.R.Rasuna Said Kav.X-O Kuningan, Jakarta 12950, INDONESIA
Phone: +62-021-527-2841 Fax: +62-021-527-3029

NACHI PILIPINAS INDUSTRIES, INC.

1st Avenue, Manalac Compound, Sta. Maria Industrial Estate, Bagumbayan, Taguig, Metro Manila, PHILIPPINES
Phone: +63-(0)2-838-3620 Fax: +63-(0)2-838-3623

MANILA OFFICE

Km23 East Service Road, Capang Muntinlupa, City Metro Manila, PHILIPPINES

Phone: +63-(0)2-850-0864 Fax: +63-(0)2-850-0864

那智不二越(上海)貿易有限公司

NACHI (SHANGHAI) CO., LTD.

Rm No.1602, Ocean Towers No. 550, Yanan Road.E. Huangpu District, Shanghai 200001, CHINA

Phone: +86-(0)21-6360-3680 Fax: +86-(0)21-6360-3682

NACHI-FUJIKOSHI CORP. TAIPEI REPRESENTATIVE OFFICE

3F No.276, Sec3, Chung Ching N. Road, Taipei, TAIWAN
Phone: +886-(0)2-2596-0118 Fax: +886-(0)2-2596-5346

NACHI-FUJIKOSHI CORP. KOREA REPRESENTATIVE OFFICE

2F Dongsan Bldg. 276-4, Sungsu 2GA-3DONG Sungdong-Ku. Seoul 133-123, KOREA

Phone: +82-(0)2-469-2254 Fax: +82-(0)2-469-2264

NACHI (AUSTRALIA) PTY. LTD.

Unit 1, 23-29 South Street, Rydalmere, N.S.W. 2116, AUSTRALIA
Phone: +61-(0)2-9898-1511 Fax: +61-(0)2-9898-1678

URL: <http://www.nachi.com.au/>

Overseas Manufacturing Companies

NACHI TECHNOLOGY INC.

713 Pushville Road, Greenwood, Indiana, 46143, U.S.A.
Phone: +1-317-535-5000 Fax: +1-317-535-8484

URL: <http://nachitech.com/>

NACHI MACHINING TECHNOLOGY CO.

17500 Twenty-three Mile Road, Macomb, Michigan, 48044, U.S.A.
Phone: +1-586-263-0100 Fax: +1-586-263-4571

URL: <http://www.nachimtc.com/>

NACHI BRASIL LTDA.

Avenida João XX III, No.2330, Jardim São Pedro, Mogi das Cruzes, S.P., BRAZIL, CEP 08830-000

Phone: +55-11-4793-8800 Fax: +55-11-4793-8870

URL: <http://www.nachi.com.br/>

NACHI INDUSTRIAL, S.A.

Poligono Industrial, El Montalvo, Parcelas 74 y 75, 37080 Salamanca, SPAIN

Phone: +34-(0)923-19-0516 Fax: +34-(0)923-19-0527

NACHI CZECH S.R.O.

Prumyslova 2732, 440 01 Louny, CZECH
Phone: +420-415-930-930 Fax: +420-415-930-940

NACHI TECHNOLOGY (THAILAND) CO., LTD.

3/16 M, 2, Rojana Industrial Estate Nongbua, Ban Khai, Rayong, 21120, THAILAND

Phone: +66-38-961-682 Fax: +66-38-961-683

NACHI INDUSTRIES PTE. LTD.

No.2 Joo Koon Way, Jurong Town, Singapore 628943, SINGAPORE
Phone: +65-68613944 Fax: +65-68611153

URL: <http://www.nachinip.com.sg/>

建越工業股份有限公司

NACHI C.Y. CORP.

No.109, Kao Young North Rd, Lung-Tan Hsin, Tao-Yuan Hsien, TAIWAN
Phone: +886-(0)3-471-7651 Fax: +886-(0)3-471-8402

東莞建越精密軸承有限公司

DONGGUAN NACHI C.Y. CORPORATION

Dangyong Village, Hongmei Town Dongguan City, Guangdong, CHINA
Phone: +86-(0)769-843-1300 Fax: +86-(0)769-843-1330

上海不二越精密軸承有限公司

SHANGHAI NACHI BEARINGS CO., LTD.

258, Fengmao Rd. Malu Town, Jiading, Shanghai, CHINA
Phone: +86-(0)21-6915-6200 Fax: +86-(0)21-6915-6202

大成・NACHI油圧工業(株)

DAESUNG-NACHI HYDRAULICS CO., LTD.

289-22, Yousan-Dong, Yangsan-Si Kyungnam 626-800, KOREA
Phone: +82-(0)55-385-7891~3 Fax: +82-(0)55-384-3270

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