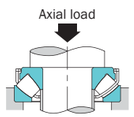
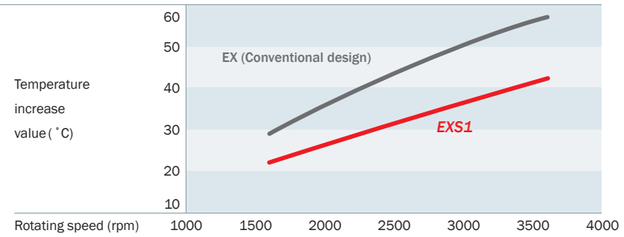
Bearing performance

Vertical shaft temperature increase test

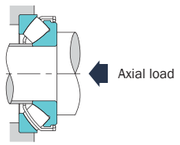
- Bearing number 29412EXS1 and 29412EX
- Axial load 22kN(5%Ca)
- Rotating speed 2000～3600rpm
- Lubrication method Oil lubrication (Forced lubrication)

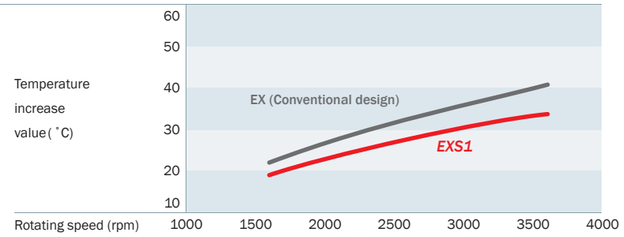




Horizontal shaft temperature rise test

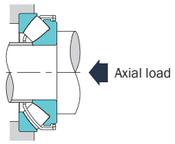
- Bearing number 29412EXS1 and 29412EX
- Axial load 22kN(5%Ca)
- Rotating speed 2000～3600rpm
- Lubrication method Oil lubrication (Forced lubrication)

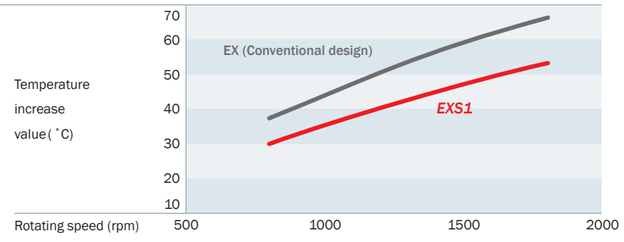




Horizontal shaft temperature rise test with grease lubrication

- Bearing number 29412EXS1 and 29412EX
- Axial load 22kN(5%Ca)
- Rotating speed 1000～1800rpm
- Lubrication method Grease lubrication





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CATALOG NO. B3206E-1 2018.05.MT

NACHI

Spherical Roller Thrust Bearings

High-load Capacity **High Speed** **Low Temperature Rise**

EXS1 SERIES

Features of the EXS1 series

High-load capacity

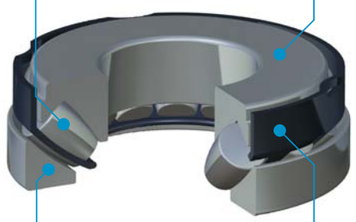
- World's highest load capacity by using large-diameter rollers.
- Long life has been achieved by using ultra clean steel.

Lower temperature rise and higher permissible operating speeds.

- Greatly reduced sliding resistance is achieved through cage design optimization.
- Temperature rise is minimized through cage design optimization. Greatly reduced temperature increase with grease lubrication, particularly on horizontal shaft applications when compared to conventional bearings.
- Reduced rotational torque is achieved by improving the surface finish of the end faces of the rollers.
- World's highest permissible rotating speed is achieved because of low temperature rise.

Roller
- High-load capacity by using large-diameter rollers.
- Reduced rotational torque is achieved by improving the surface finish of the end faces of the rollers.

Inner ring
- Even stress distribution is achieved by optimizing the curvature of the raceway surface.
- Capable of continuous operating temperatures up to 200°C.



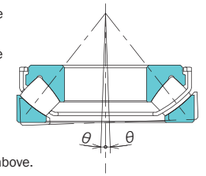
Outer ring
- Uniform stress by optimizing the curvature of the raceway surface.
- Capable of continuous operating temperatures up to 200°C.

Stamped steel cage
- Reduced sliding resistance by optimizing the design.
- Allow to be used on horizontal shaft as well as on vertical shaft applications.

Precautions for use

■ Permissible alignment angle

Under general service conditions, it is permissible to operate with up to a 2° misalignment angle θ. Note that this may be restricted depending on the machine structure surrounding the bearing.



■ Safety factor

Ensure that the safety factor So is normally 4 or above.

■ Permissible radial load

Ensure that the effective radial load is 50% or less of the axial load.

■ Minimum axial load

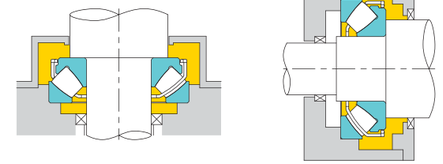
To prevent skidding between the rollers and raceway, the spherical roller thrust bearing must be always subjected to a minimum axial load. The minimum axial load Famin is as mentioned on the right.

$$Famin = \frac{Coa}{1000}$$

■ Precautions for Lubrication

The spherical roller thrust bearing design does not allow easy lubrication of the roller end face and the inner ring flange surface. Ensure that they are fully lubricated.When grease is used for lubrication, it is recommended to completely fill 100% of free space volume of the bearing and housing with grease as shown in the figure below.
(For the free space volume of the bearing, see the Dimension Table.)

100% fill the space volume with the grease in the part marked with yellow.



When used in a vertical shaft application　　When used in a horizontal shaft application

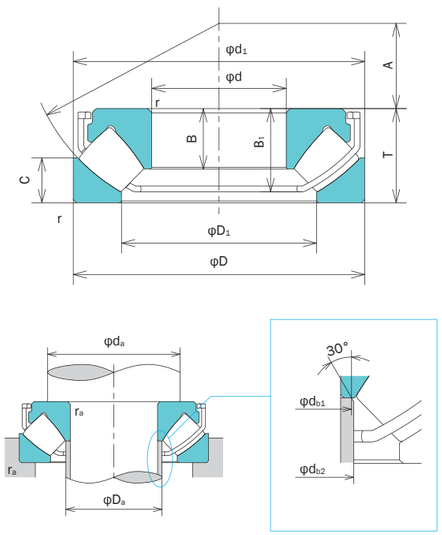
Product Range

293SERIES

Bearing number	Main dimensions (mm)				Basic dynamic load rating Ca(kN)	Basic static load rating Coa(kN)	Permissible rotating speed(rpm)*		Reference dimensions (mm)						Mounting related dimensions (mm)			Spacer dimensions (mm)		Mass(kg) (Reference)	Space volume (cm^3) (Reference)
	d	D	T	r (min.)			Grease	Oil	d_1	D_1	B	B_1	C	A	d_a** (min.)	D_a (max.)	r_a (max.)	d_{b1} (max.)	d_{b2} (min.)		
29317EXS1	85	150	39	1.5	455	1,060	1,600	3,500	134	110.5	25	35	19	50	115	135	1.5	90	90	2.67	125
29318EXS1	90	155	39	1.5	445	1,070	1,600	3,500	135.2	116	23.8	35.1	19	52	120	140	1.5	95	95	2.75	135
29320EXS1	100	170	42	1.5	545	1,400	1,500	3,200	146.9	126	27	38.2	21	58	130	150	1.5	105	107	3.61	160
29322EXS1	110	190	48	2	695	1,730	1,300	2,700	165.1	140.6	30.9	44	23	64	145	165	2	116	117	5.22	240
29324EXS1	120	210	54	2.1	835	2,160	1,100	2,400	184.5	155	34.5	48.7	26	70	160	180	2	127	128	7.3	325
29326EXS1	130	225	58	2.1	960	2,440	1,000	2,300	197.4	165.8	36.8	52.7	28	76	170	195	2	136	138	8.82	410
29328EXS1	140	240	60	2.1	1,080	2,840	950	2,100	218.4	179	38.5	54.8	29	82	185	205	2	147.5	149	10.5	450
29332EXS1	160	270	67	3	1,300	3,500	850	1,800	243.4	199.8	44	61.4	32	92	210	235	2.5	166	174	14.5	635

294SERIES

Bearing number	Main dimensions (mm)				Basic dynamic load rating Ca(kN)	Basic static load rating Coa(kN)	Permissible rotating speed(rpm)*		Reference dimensions (mm)						Mounting related dimensions (mm)			Spacer dimensions (mm)		Mass(kg) (Reference)	Space volume (cm^3) (Reference)
	d	D	T	r (min.)			Grease	Oil	d_1	D_1	B	B_1	C	A	d_a** (min.)	D_a (max.)	r_a (max.)	d_{b1} (max.)	d_{b2} (min.)		
29412EXS1	60	130	42	1.5	445	915	1,800	3,600	113	87	27	37.1	20	38	91	108	1.5	66	66	2.5	120
29413EXS1	65	140	45	2	520	1,110	1,700	3,500	123	93.5	29.5	40	21	42	99	115	2	72	72	3.2	135
29414EXS1	70	150	48	2	610	1,350	1,600	3,100	128.3	98.4	32	42.7	23	44	106	125	2	75.5	77.5	3.82	175
29415EXS1	75	160	51	2	670	1,470	1,600	3,000	140	105.6	34.5	45.6	24	47	113	132	2	82.5	82.5	4.7	200
29416EXS1	80	170	54	2.1	760	1,630	1,500	2,700	149	113	36	48.2	26	50	120	140	2	88	88	5.6	240
29417EXS1	85	180	58	2.1	820	1,810	1,300	2,600	158.2	120.5	37	50.6	28	54	130	150	2	94	94	6.69	290
29418EXS1	90	190	60	2.1	935	2,080	1,300	2,400	162	127	40.5	53	29	56	135	157	2	99	99	7.83	320
29420EXS1	100	210	67	3	1,150	2,530	1,100	2,200	181	139	44.5	59.6	32	62	150	175	2.5	108	110	10.6	440
29422EXS1	110	230	73	3	1,350	3,150	950	1,900	199.6	153.4	48	64.4	35	69	165	190	2.5	119.5	120	14	550
29424EXS1	120	250	78	4	1,510	3,750	900	1,800	218	166.5	54	70.9	37	74	180	205	3	131	132	17.6	700
29426EXS1	130	270	85	4	1,750	4,300	850	1,500	236.4	181	56	75	41	81	195	255	3	141.5	143	22.3	890
29428EXS1	140	280	85	4	1,760	4,350	850	1,500	246	196	53.6	74.4	41	86	205	235	3	153	160	22.8	1,000
29430EXS1	150	300	90	4	2,130	5,150	800	1,400	264.4	207.5	58.5	80.8	44	92	220	250	3	163	169	27.8	1,200
29432EXS1	160	320	95	5	2,350	5,750	750	1,300	283.8	222	62.5	85.7	45	99	230	265	4	174.5	181	33.4	1,450



Dynamic equivalent axial load

Pa=Fa+1.2Fr

Static equivalent axial load

Poa=Fa+2.7Fr
Fa:Axial load
Fr:Radial load
However Fr/Fa≦0.55

* Permissible rotating speed is defined as follows.
●Oil lubrication When operated with a lubricant of VG32 viscosity supplied at a flowrate of 1 liter/min of circulating oil lubrication under 5% of the basic static load capacity (Coa), the rotating speed shall allow the outer ring temperature to operate at 80°C or less.
●Grease lubrication When operated after filling 100% of the internal free space volume with an NLGI3 consistency grease under 5% of the basic static load capacity (Coa), the rotating speed shall allow the outer ring temperature to operate at 80°C or less.
With either lubrication method, the bearing temperature will increase differently if the operating conditions (applied load, rotating speed, lubricating conditions, etc.) vary. Select the appropriate permissible rotating speed mentioned in the catalog.

**In case of heavy applied loads (generally exceeding 12% Ca), the value of da should be high enough to support the inner ring flange. Consult NACHI.