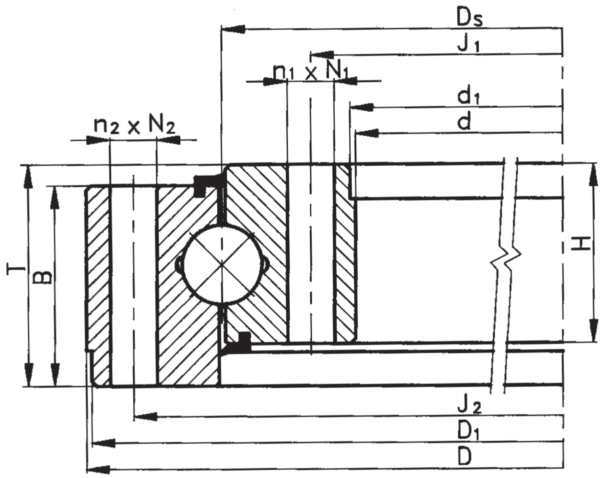
FOUR-POINT CONTACT SLEWING RINGS

- without gear [O]



Number of the Loading Curve	Boundary Dimensions d	D	T	Static Ax.Basic Load Rating C_{0a}	Designation	Weight G	Abutment Dimensions J_1	J_2	N_1	N_2	n_1	n_2	Other Specifications d_1	D_1	H	B	Note No
	[mm]			[kN]		[kg]	[mm]						[mm]				
1	**140**	300	36	359	**90-1B13-0220-0318**	11.3	170	270	18	M16	12	12	-	-	30	30	
2	**145**	300	50	440	**90-1B20-0223-0326**	15	175	270	17	17	15	16	-	-	44	44	1
3	**145**	300	50	440	**90-1B20-0223-0427**	16.7	175	270	14.27	14.27	16	16	-	-	44	44	
4	**145**	300	50	440	**90-1B20-0223-0447**	17	175	270	1/2-13 UNC	14.27	8	8	146	-	44	44	2
5	**145**	300	50	527	**90-1B22-0223-0397**	16.5	175	270	17	5/8-11 UNC	15	16	146	-	44	44	1
6	**183**	375	63	720	**90-1B25-0279-0428**	33.5	220	338	M16	M16	12	12	185	373	54	54	
7	**200**	300	35	332	**90-1B14-0250-0479**	8	220	280	M10	M10	16	16	-	-	30	30	
8	**210**	365	40	594	**90-1B20-0289-0295**	20	240	335	14	14	16	16	-	-	38	38	
9	**210**	365	40	594	**90-1B20-0289-0295-1**	18	240	335	1/2-13 UNC	1/2-13 UNC	19	16	-	-	38	38	3
10	**270**	486	63	1027	**90-1B25-0378-0401**	50	314	442	22	M20	16	16	-	-	54	54	
11	**323.6**	520.29	54.1	1140	**90-1B25-0422-0485**	46.5	365.125	479.425	17.5	5/8-11 UNC	20	20	-	-	52.3	52.3	4
12	**323.6**	520.29	54.1	1140	**90-1B25-0422-0513**	47	365.125	479.425	5/8-11 UNC	16.7	20	20	-	-	52.3	52.3	5;6
13	**333**	558	72	1469	**90-1B30-0446-0502**	66	377	514	22	22	20	20	-	-	63	63	
14	**336**	474	46	851	**90-1B20-0405-0387**	25	360	450	14	14	30	30	-	-	41	41	
15	**384**	562	59	1307	**90-1B25-0475-0204**	47	420	530	18	18	16	16	-	560	52	52	
16	**400**	580	70	1642	**90-1B30-0490-0377**	57	430	550	17	M16	18	18	-	-	61	61	
17	**400**	610	76	1666	**90-1B30-0506-0420**	76	440	570	18.3	18.3	24	24	410	600	66	66	7
18	**450**	650	75	1951	**90-1B32-0550-0418**	69	485	615	22	22	36	35	-	-	65	65	8
19	**460**	699	72	2040	**90-1B32-0580-0342**	93	504	655	22	22	22	22	-	-	63	63	
20	**468**	704	86	2609	**90-1B40-0586-0337**	108	508	664	22	22	36	35	-	-	79	79	8;9
21	**545**	730	68	1785	**90-1B25-0640-0355**	73	580	690	17.5	M12	24	24	-	-	53	59	
22	**634**	848	56	1605	**90-1B20-0744-0341**	75	662	820	M18x1.5	M18x1.5	24	24	-	-	45.5	45.5	
23	**810**	900	40	1274	**90-1B13-0854-0313**	27	826	884	9	9	24	24	-	-	33	33	
24	**872**	1016	56	2033	**90-1B20-0941-0357 S**	70	898	990	M12	M12	24	24	874	1014	46	46	
25	**878.6**	1121	74	3425	**90-1B30-1000-0380**	162	925	1075	22	22	24	24	880	1120	63.5	63.5	
26	**964**	1218	56	2827	**90-1B22-1094-0207**	142	1012	1170	M16	M16	36	36	-	-	45.5	45.5	
27	**2200**	2400	73	6588	**90-1B25-2300-0107**	300	2240	2360	22	22	60	60	-	-	63	63	

Notes

1 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/16
2 Fixing holes on outer ring are recessed on ∅20.3 into the depth of 9.7
3 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/20
4 Non-through tapped fixing holes on outer ring
5 Fixing holes on outer ring are recessed on ∅25.4 into the depth of 16.8
6 Non-through tapped fixing holes on inner ring
7 Fixing holes on both rings are recessed on ∅33 into the depth of 13
8 Fixing holes on outer ring are divided on the circumference with spacing a' 360°/16
9 Fixing holes on inner ring are recessed on ∅32 into the depth of 13

Mouting Procedure

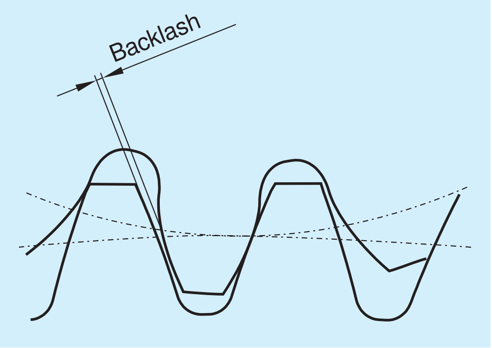
Before assembling it is necessary to clean all surfaces thoroughly from burrs, paint residues, etc. Seating surfaces should be dry, without lubricant. Furthermore it is necessary to inspect flatness of the seating surfaces. Feeler gauges are used to check slewing ring adaptation.

The unhardened area of the non rotating ring should be mounted so that it is positioned in the least loaded zone - i.e. in the plane perpendicular to the main load plane.

The unhardened area is marked on the respective ring non-functional surface with symbol "X" by stamping or with a red line.

When assembling a geared slewing ring it is important to adjust the backlash in the gear correctly. It is adjusted with a feeler gauge or with another suitable method in the zone of maximum radial gear runout. The extent of the backlash should be in the range of (0.035-0.04).m, where "m" means the gear module. The backlash should be inspected again after the slewing ring is finally fixed on the machine. The zone of the maximum radial gear runout is marked with a blue line in the gap between teeth.

Slewing rings are fixed on the machine with pre-stressed bolts. Before assembly the mounting bolts should be coated slightly with oil. The necessary tightening torgue for corresponding bolt size and material is indicated in Table 1.



Sequence of bolts tightening

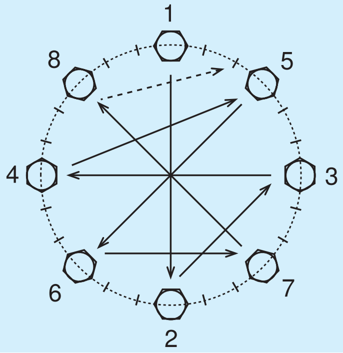


Table 1

Bolt Thread Size	Bore Diameter [mm] DIN/ISO 273	Tightening torgue at $\mu = 0.14$ [Nm] Rigidity Class of Bolt 8.8	Rigidity Class of Bolt 10.9
M 12	14	78	117
M 14	16	126	184
M 16	17.5	193	279
M 18	20	270	387
M 20	22	387	558
M 24	26	666	954
M 27	30	990	1395
M 30	33	1350	1890
		Grade 5	Grade 8
UNC 5/8“-11	18	180	260
UNC 3/4“-10	21	320	460
UNC 7/8“-9	25	520	730
UNC 1“-8	27.5	770	1100
UNC 1 1/8“-7	32	970	1560
UNC 1 1/4“-7	35	1370	2190
		Grade 5	Grade 8
UNF 5/8“-18	18	210	290
UNF 3/4“-16	21	360	510
UNF 7/8“-14	25	580	820
UNF 1“-12	27.5	860	1210
UNF 1 1/8“-12	32	1100	1760
UNF 1 1/4“-12	35	1520	2440

Slewing Ring Inspection in Operation

During service it is necessary to regularly recheck the fixing bolts torque at the in recommended intervals. Individual inspection intervals vary according to machine operation conditions.

When inspecting, the following method can be used (approximately valid for crane operation):

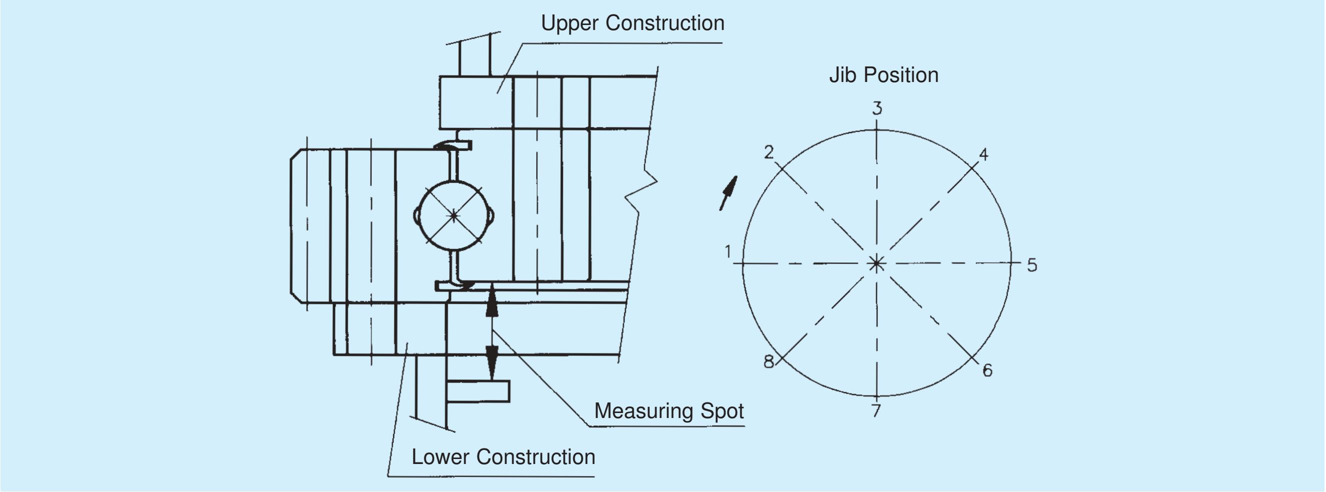
Inspection No.	Number of Operating Hours	Inspecting Action
1.	About 200 Hours	- inspection of all bolts torque - if more than 10% of bolts are loose, another inspection is necessary after about 200 operating hours
2.	About 600 Hours	- inspection of all bolts torque
3. and further	After about 2 000 Hours	- if one or more bolts are loose to less than 80% of the prescribed torque, these and both adjoining bolts must be replaced by new ones - if 20% of all bolts have less than 80% of prescribed torque, all bolts must be replaced by new ones
	Each 12 000 Hours	- replace all bolts by new ones

Note: Specified inspection intervals must be shortened by 1/2 up to 1/3 for machines loaded more heavily by vibrations or dynamically.

In addition to the fixing bolts check, raceway wear checking is also carried out in operation (mainly at significant important rotary connections) using the measurement method "tilting clearance". The tilting clearance is the difference of the mutual ring displacement in axial direction measured under load by minimum and maximum tilting moment. In the operation register of the equipment the initial tilting clearance is recorded (in the jib position 1 to 8) and its enlargement is then followed in certain time intervals. The principle of the tilting clearance measurement and an example of the measuring record are shown in Figure 3.

More detailed technical information concerning slewing ring checking can be provided by the experts of PSL, Technical Consultancy Department.

Figure 3



Slewing Ring Tables

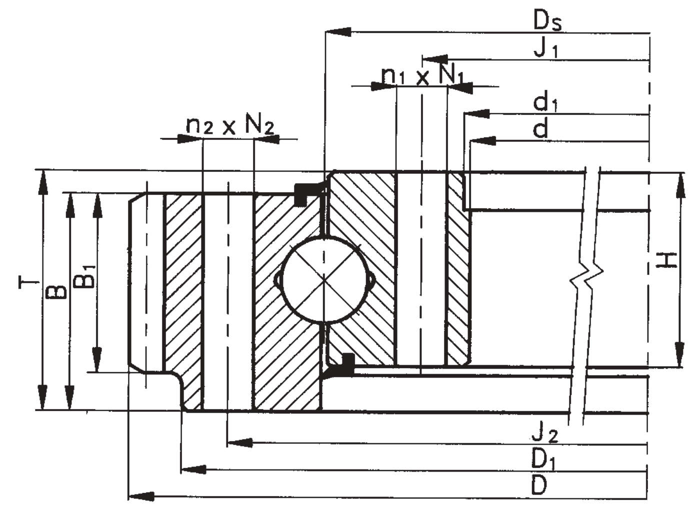
The following Tables (pages 14 - 27) show the standard PSL slewing rings whose cross-section corresponds to the figure above the Table. Any deviations are specified in the notes.

Further Tables (pages 28 - 30) show special slewing rings whose cross-section does not correspond to the figures over the Tables, or they differ from the standard design (e.g. they have irregular spacing of the fastening holes, special gear, higher tolerance class, are non-sealed from one or both sides, or have non-standard shape of the rings, etc.). More detailed information concerning these slewing rings can be provided by the experts of the PSL Technical Consultancy Department, address - see page 2.

The tables of the special slewing rings show some types designated by the designation PSL 912-... They are slewing rings of the old three-ring design (one ring is split).

FOUR-POINT CONTACT BALL SLEWING RINGS

-with external gear [E]



Number of the Loading Curve	Boundary Dimensions d	D	T	Static Ax.Basic Load Rating C_{oa}	Designation	Weight G	Abutment Dimensions J_1	J_2	N_1	N_2	n_1	n_2	Other Specifications d_1	D_1	H	B	B_1	m(DP)	z	x	Permisible circumferencial force F_{TDov}	$F_{TmaxDov}$	Note No
	[mm]			[kN]		[kg]	[mm]						[mm]								[kN]		
28	**145**	316.58	50	440	**9E-1B20-0221-0493**	16.5	175	270	5/8-11 UNC	5/8-11 UNC	16	16	-	-	44	44	44	(5)	60	-	16	33	1
29	**145**	316.6	50	440	**9E-1B20-0223-0201**	16.5	175	270	5/8-11 UNC	5/8-11 UNC	15	16	-	-	44	44	44	5	61	-	16	32	2; 3
30	**145**	316.6	50	440	**9E-1B20-0223-0282**	16.5	175	270	5/8-11 UNC	5/8-11 UNC	15	16	-	-	44	44	44	5	61	-	16	32	2; 3
31	**145**	312	50	440	**9E-1B20-0223-0287**	16.5	175	270	5/8-11 UNC	5/8-11 UNC	15	16	-	-	44	44	44	(5/7)	60	-	19	39	3; 4
32	**171**	318.6	40	441	**9E-1B17-0235-0182**	13	195	275	13	13	12	12	173	-	35	35	35	4	78	-	10	20	
33	**235**	403.5	55	742	**9E-1B22-0308-0443**	23.5	259	358	13	13	27	30	-	330	46	46	42	5	79	-	16	32	5; 6
34	**263.5**	434.08	50	849	**9E-1B22-0344-0396**	29	295	390	5/8-11 UNC	5/8-11 UNC	23	18	-	-	44	44	44	(5/7)	84	-	20	41	4; 7
35	**265**	433.5	50	714	**9E-1B20-0345-0273**	25.5	295	390	5/8-11 UNC	5/8-11 UNC	24	18	-	-	43	43	43	(5/7)	84	-	20	40	4
36	**265**	433.5	50	714	**9E-1B20-0345-0286**	25.5	295	390	5/8-11 UNC	17	24	18	-	-	43	43	43	(5/7)	84	-	20	40	4
37	**265**	433.9	50	714	**9E-1B20-0343-0311**	28.5	295	390	14	1/2-13 UNC	8	9	-	-	44	44	44	(5/7)	84	-	20	41	4
38	**265**	437.34	50	708	**9E-1B20-0343-0492**	25.5	295	390	5/8-11 UNC	5/8-11 UNC	24	18	-	-	44	44	44	5	85	-	17	34	2
39	**323.7**	520.3	54	1140	**9E-1B25-0422-0354**	46	365.1	479.4	5/8-11 UNC	5/8-11 UNC	20	20	-	-	52.3	52.3	52.3	(5/7)	101	-	25	51	4
40	**323.7**	537.21	57.15	1140	**9E-1B25-0422-0477**	47	365.1	479.425	20.65	3/4-10 UNC	16	18	-	-	50.8	50.8	50.8	(4)	83	-	24	49	8; 9
41	**323.85**	520.14	54.1	1140	**9E-1B25-0422-0481**	46	365.125	479.425	5/8-11 UNC	5/8-11 UNC	20	20	-	-	52.3	52.3	52.3	(5/7)	101	-	25	51	9; 10
42	**324**	527.8	60	1043	**9E-1B22-0422-0516**	48	365	479.4	M16	M16	20	20	-	-	51	51	51	5	103	-	20	41	2; 9
43	**383**	589.5	75	1646	**9E-1B32-0475-0470**	58.5	410	540	16	16	35	36	384	565	63	60	52	4.5	129	-	12	24	11
44	**428.75**	721.36	104.65	2778	**9E-1B45-0572-0522**	166	473.075	644.525	24	3/4-10 UNC	23	24	431.8	692.15	87.38	98.55	82.55	(4)	112	-	41	83	7; 8; 12; 13
45	**431.8**	721.36	88.9	2470	**9E-1B40-0559-0390**	141	473.075	644.525	20.6	20	23	18	-	-	81	81	81	(4)	112	-	49	98	7; 14; 15
46	**431.8**	721.36	87	2470	**9E-1B40-0559-0457**	138	472.948	644.525	20	20	28	24	-	-	82	82	82	(4)	112	-	41	83	8; 14; 16
47	**545**	765.4	68	1785	**9E-1B25-0640-0150**	84	580	700	17.5	M16	24	24	-	-	53	59	59	8	92	+1	45	91	13
48	**552.45**	816	123.9	2434	**9E-1B32-0678-0430**	167	604.012	753	20.5	20.5	35	36	-	786	92	92	82.5	6	132	+1.0922	57	114	11
49	**556**	742.3	53.5	1382	**9E-1B20-0644-0208**	51	595	685	13.5	M12	44	44	-	-	44.5	44.5	44.5	6	122	-	21	42	17
50	**667**	888	69	2122	**9E-1B25-0762-0321**	107	703	819	17.5	M16	32	32	-	-	57	60	60	8	108	+0.6	56	111	13
51	**714.37**	981.71	125.4	4275	**9E-1B45-0857-0407**	261	762	908.05	7/8-14 UNC	7/8-14 UNC	24	20	720.725	952.5	98.55	122.25	88.9	(4/5)	153	-	65	130	4; 9
52	**717.55**	981.71	124.97	4275	**9E-1B45-0854-0343**	253	762	908.05	28.575	1-8 UNC	29	24	720.85	952.5	95.25	115.06	83.06	(4/5)	153	-	60	121	4; 13; 18
53	**717.55**	981.71	124.97	4275	**9E-1B45-0854-0343-1**	250	762	908.05	1-8 UNC	1-8 UNC	35	36	720.85	952.5	95.25	115.06	83.06	(4/5)	153	-	60	121	4; 9; 11
54	**730**	1006.6	98	3385	**9E-1B35-0845-0476**	196	770	920	M20	M20	20	20	-	965	79	80	70	8	122	+1	64	129	
55	**778**	1102	80	4141	**9E-1B40-0910-0345**	205	830	990	26	26	39	40	780	-	72	72	72	12	89	+0.5	100	200	19
56	**806.45**	1155.7	125.5	4802	**9E-1B45-0947-0484**	371	854.456	1038.86	11/8 - 12 UNC	27.5	29	30	812.8	1089.66	98.6	122.25	88.9	(2)	89	-	106	212	18; 20
57	**812.8**	1072.9	92.2	3355	**9E-1B32-0924-0503**	195	850.9	993.775	3/4-16 UNF	3/4-16 UNF	36	36	-	1030.22	68.33	82.55	76.2	(2.5)	104	-	74	148	21
58	**885**	1173.6	82	3662	**9E-1B32-1000-0223**	195	929	1070	22	22	51	52	-	-	68	68	68	12	95	+0.5	78	157	22
59	**889**	1082.8	82	2768	**9E-1B25-0984-0451**	140	922.02	1014.98	17.5	5/8-11 UNC	30	30	-	-	74.7	73.7	73.7	(2.5)	105	-	71	143	13
60	**955**	1324	137	5597	**9E-1B45-1105-0329**	480	1010	1200	26	M24	42	42	960	1260	117	122	100	14	91	+0.93	154	308	13

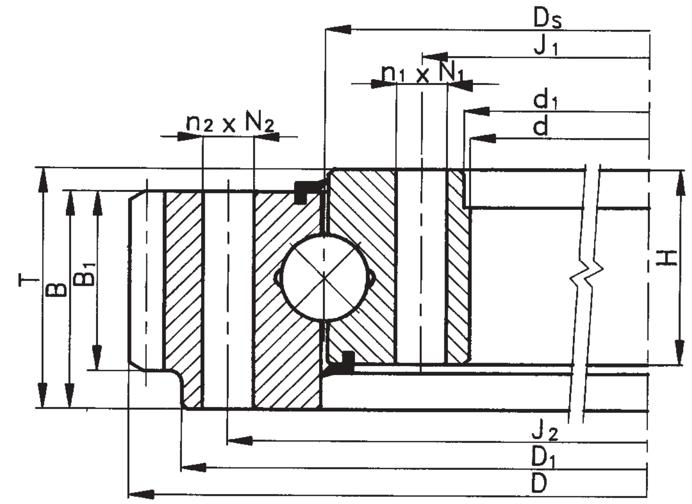
Notes

1. Right-hand helical gear α = 20°; β = 6°
2. Right-hand helical gear α = 14°30'; β = 6°
3. Fixing holes on inner ring are divided on the circumference with spacing a' 360°/16
4. Gear Fellows Stub α = 20°
5. Fixing holes on inner ring are divided on the circumference with spacing a' 360°/28
6. Centering diameter is on the opposite bearing face
7. Fixing holes on inner ring are divided on the circumference with spacing a' 360°/24
8. Gear Involute Stub α = 20°
9. Non-through tapped fixing holes on both rings
10. Gear Fellow Stub Tooth System Special-Full Fillet Radius α = 20°
11. Fixing holes on inner ring are divided on the circumference with spacing a' 360°/36
12. Fixing holes on inner ring are recessed on ∅50 into the depth of 6.35
13. Non-through tapped fixing holes on outer ring
14. Fixing holes on both rings ring are recessed on ∅30 into the depth of 19.1
15. Gear Agma Stub α = 20°
16. Fixing holes on inner ring are divided on the circumference with spacing a' 360°/30 (two places a' 180° are not occupied)
17. Fixing holes on inner ring are recessed on ∅21 into the depth of 11.5
18. Fixing holes on inner ring are divided on the circumference with spacing a' 360°/30
19. Fixing holes on inner ring are divided on the circumference with spacing a' 360°/40
20. Fixing holes on outer ring are recessed on ∅41.3 into the depth of 28.6
21. Gear Involute Stub-Full Fillet radius α = 20°
22. Fixing holes on inner ring are divided on the circumference with spacing a' 360°/52
23. Fixing holes on both rings ring are recessed on ∅34 into the depth of 16

FOUR-POINT CONTACT BALL SLEWING RINGS

-with external gear [E]

(continued)



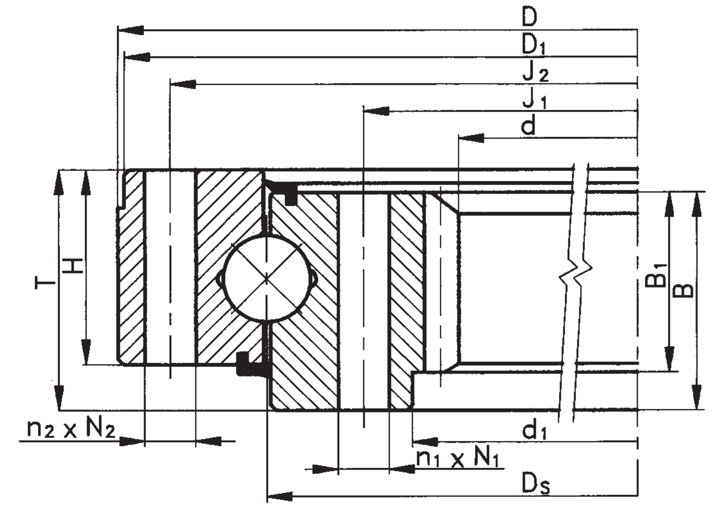
Number of the Loading Curve	Boundary Dimensions d	D	T	Static Ax.Basic Load Rating C_{oa}	Designation	Weight G	Abutment Dimensions J_1	J_2	N_1	N_2	n_1	n_2	Other Specifications d_1	D_1	H	B	B_1	m(DP)	z	x	Permisible circumferencial force F_{TDov}	$F_{TmaxDov}$	Note No
	[mm]			[kN]		[kg]	[mm]						[mm]								[kN]		
61	**991.36**	1396.746	120.65	7462	**9E-1B57-1165-0388**	538	1050.925	1276.35	33	33	35	27	-	1331.98	111.25	111.25	101.6	(2)	108	-	103	206	11
62	**1020**	1268	90	3858	**9E-1B30-1122-0455**	212	1058	1185	17	M16	40	40	-	-	62	80	80	10	123	+0.9	77	154	13
63	**1057.15**	1391.92	155.45	7887	**9E-1B57-1223-0344**	553	1120.775	1282.7	11/4 - 7 UNC	11/4 - 7 UNC	24	24	1060.45	1339.85	117.35	146.05	101.6	(2)	108	-	123	247	9; 15
64	**1063.75**	1366.5	130.05	6211	**9E-1B45-1209-0468**	400	1114.425	1257.3	1-8 UNC	1-8 UNC	35	30	1069.85	1314.45	104.65	114.3	76.2	(2)	106	-	77	154	8; 9
65	**1079.5**	1450.34	114.3	6909	**9E-1B50-1224-0370**	495	1127.125	1320.8	27	27	35	28	1082.55	1365.25	101.6	114.3	101.6	(1.5)	84	-	120	240	11
66	**1092.2**	1377.7	101.6	5535	**9E-1B40-1213-0433**	335	1135.13	1290.07	23.8	23.8	36	36	-	1330.45	88.9	85.9	82.6	(2.5)	134	-	74	148	15
67	**1095**	1380	110	5535	**9E-1B40-1212-0478**	348	1135	1290	23	23	36	36	1100	1330	101	101	93	10	136	-	74	148	23
68	**1680**	2028	120	8461	**9E-1B40-1830-0521**	620	1745	1915	30	30	48	48	-	-	100	90	90	10	200	+0.4	72	144	

Notes

1 Right-hand helical gear $\alpha = 20°$; $\beta = 6°$
2 Right-hand helical gear $\alpha = 14°30'$; $\beta = 6°$
3 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/16
4 Gear Fellows Stub $\alpha = 20°$
5 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/28
6 Centering diameter is on the opposite bearing face
7 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/24
8 Gear Involute Stub $\alpha = 20°$
9 Non-through tapped fixing holes on both rings
10 Gear Fellow Stub Tooth System Special-Full Fillet Radius $\alpha = 20°$
11 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/36
12 Fixing holes on inner ring are recessed on ∅50 into the depth of 6.35
13 Non-through tapped fixing holes on outer ring
14 Fixing holes on both rings ring are recessed on ∅ 30 into the depth of 19.1
15 Gear Agma Stub $\alpha = 20°$
16 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/30 (two places a' 180° are not occupied)
17 Fixing holes on inner ring are recessed on ∅21 into the depth of 11.5
18 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/30
19 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/40
20 Fixing holes on outer ring are recessed on ∅41.3 into the depth of 28.6
21 Gear Involute Stub-Full Fillet radius $\alpha = 20°$
22 Fixing holes on inner ring are divided on the circumference with spacing a' 360°/52
23 Fixing holes on both rings ring are recessed on ∅ 34 into the depth of 16

FOUR-POINT CONTACT BALL SLEWING RINGS

-with internal gear [I]



Number of the Loading Curve	Boundary Dimensions d	D	T	Static Ax.Basic Load Rating C_{oa}	Designation	Weight G	Abutment Dimensions J_1	J_2	N_1	N_2	n_1	n_2	Other Specifications d_1	D_1	H	B	B_1	m(DP)	z	x	Permisible circumferencial force F_{TDov}	$F_{TmaxDov}$	Note No.
	[mm]			[kN]		[kg]	[mm]						[mm]								[kN]		
69	**256.95**	418	50	708	**9I-1B20-0342-0351**	25	295	390	5/8-11 UNC	5/8-11 UNC	24	18	-	-	44	44	44	(5/7)	52	-	27	54	1
70	**323.8**	520.5	54	1140	**9I-1B25-0422-0283**	46	365.1	479.4	5/8-11 UNC	5/8-11 UNC	20	20	-	-	52.3	52.3	52.3	(5/7)	65	-	29	58	1; 2
71	**380**	545	55	988	**9I-1B20-0465-0136**	38	420	510	M12x1.25	13	16	16	400	-	45	45	40	4	96	-0.375	14	28	3
72	**427.99**	654.05	69.85	1533	**9I-1B25-0560-0467**	84	495.3	622.3	5/8-11 UNC	17.5	24	18	-	-	60.45	60.45	60.45	(4)	69	-	34	69	3; 4
73	**427.99**	663.45	80.26	1995	**9I-1B32-0560-0449**	101.5	495.3	628.65	3/4-10 UNC	20.1	24	18	-	660.4	69.09	76.2	76.2	(4)	69	-	44	88	3; 4
74	**428**	670	69.85	1533	**9I-1B25-0559-0496**	88.5	495.3	628.65	3/4-10 UNC	20.6	30	24	-	-	60.45	60.45	60.45	(4)	69	-	34	69	3; 4
75	**546**	716	69	1382	**9I-1B20-0644-0135**	55	605	690	M12	13.5	40	40	-	-	46	60	60	6	93	-	31	63	3
76	**560**	825	90	3095	**9I-1B36-0715-0317**	137.5	645	785	M20	22	44	43	-	-	78	78	78	10	57	-0.5	90	180	5
77	**619.76**	910.06	87.88	3515	**9I-1B40-0780-0454**	182	700	859.99	3/4-10 UNC	20.6	30	30	-	907.16	79	79	79	(3.5)	87	-	50	101	4
78	**633**	870	72	2572	**9I-1B29-0761-0411**	121	697	825	3/4-10 UNC	3/4-10 UNC	36	30	-	-	63	63	63	(4)	101	-	34	69	2; 4
79	**633**	870	92	3011	**9I-1B35-0761-0414**	160	697	825	3/4-16 UNF	3/4-16 UNF	36	30	-	-	83	83	83	(4)	101	-	34	69	2; 4
80	**648.2**	851	70	2123	**9I-1B25-0763-0186**	95	705	820	M16	M16	24	24	677	850	55	60	55	6	109	-0.5	38	76	
81	**650.24**	848.36	55.88	1588	**9I-1B20-0741-0400**	82	701.8	812.8	1/2-13 UNC	17.5	28	15	-	-	45.7	45.7	45.7	(4)	104	-	23	47	3; 4
82	**656**	868	77	2009	**9I-1B22-0782-0444**	104	730	834	M16	18	24	24	694	-	55	68	64	8	82	-1	49	98	
83	**670**	857	88.9	2122	**9I-1B25-0762-0391**	120	727.075	822.325	3/4-10 UNC	3/4-10 UNC	24	20	696.97	-	73.15	86.1	51.05	(4)	107	-	28	56	2; 4
84	**736**	950	70	2403	**9I-1B25-0860-0157**	98.5	805	920	M16	M16	30	30	775	-	55	60	55	8	94	-	46	92	
85	**786.54**	990.6	114.3	3267	**9I-1B32-0897-0198**	170	849.884	944.118	3/4-10 UNC	3/4-10 UNC	30	30	820.42	-	85.85	90.42	50.8	(3.5)	110	-	38	76	2; 4
86	**786.7**	990.6	114.3	3545	**9I-1B35-0895-0415**	168	849.884	944.118	3/4-10 UNC	3/4-10 UNC	30	30	817.4	-	85.85	90.42	76.2	(3.5)	110	-	47	95	2; 4
87	**944**	1159	79	3021	**9I-1B25-1065-0134**	161	1015	1124	M16	17.5	36	36	-	-	54	70	70	8	118	-1	64	129	3
88	**945.4**	1200	100	3781	**9I-1B29-1103-0323**	240	1040	1165	M20x1.5	21.5	36	36	-	-	80	82	82	12	80	-	95	190	3
89	**961**	1177	90	3702	**9I-1B30-1070-0372**	181	1040	1134	5/8-11 UNC	17.8	36	36	1011.2	1174	77	80.5	70.1	(2.5)	94	-	75	150	3; 6
90	**957.07**	1168.4	100.08	3970	**9I-1B32-1087-0421**	190	1039.88	1134.11	3/4-10 UNC	3.4-10 UNC	36	36	1005.84	1165.35	83.06	83.06	55.12	(2.5)	96	-	58	117	2; 7; 8
91	**957.07**	1168.4	119.38	4977	**9I-1B40-1086-0450**	205	1039.88	1134.11	3/4-10 UNC	3/4-10 UNC	36	36	1005.84	1165.35	93.98	95.25	55.12	(2.5)	96	-	58	117	2; 7
92	**1007.87**	1298.45	90.42	4277	**9I-1B32-1167-0504**	282	1092.2	1247.775	1-8 UNC	27	20	22	1057.15	-	79.25	68.33	65.79	(2.5)	100	-	69	139	3; 9
93	**1048.51**	1320.8	128.52	6037	**9I-1B45-1187-0352**	349	1130.18	1279.52	7/8-9 UNC	23.8	40	36	1091.44	-	50.8	119.13	101.6	(2.5)	104	-	107	214	3; 9
94	**1060.7**	1339.85	121.41	5534	**9I-1B40-1204-0197**	361	1149.35	1295.4	1-8 UNC	27	30	30	1104.9	1336.55	98.55	104.9	76.2	(2.5)	106	-	67	134	3; 4
95	**1071**	1305	98	4408	**9I-1B32-1200-0392**	245	1156	1265	M16	21	48	48	1120	-	82	90	88	10	106	-1.5495	102	204	3
96	**1083.6**	1310	110	4172	**9I-1B29-1213-0324**	243	1170	1275	M20x1.5	21.5	36	36	-	-	80	94	94	14	79	-	127	254	3
97	**1140**	1404	112	3667	**9I-1B25-1296-0180**	303	1232	1360	M20	22	48	48	-	-	70	103	103	10	115	-0.5	119	238	
98	**1162**	1460	120	5905	**9I-1B38-1340-0325**	402	1270	1420	M24x2	25	36	35	1227	-	95	105	98	14	85	-	131	263	3; 10
99	**1610**	2000	150	12609	**9I-1B60-1830-0267**	885	1720	1940	30	30	54	54	1665	-	125	125	100	12	135	-0.5	139	278	

Notes

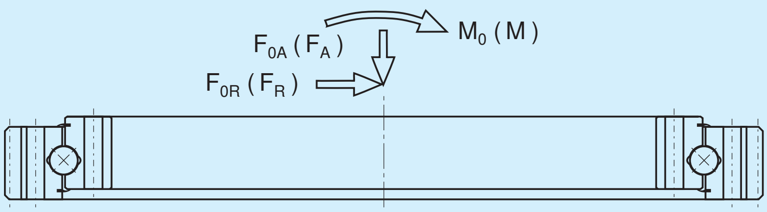
1. Gear Fellow Stub Tooth System α = 20°
2. Non-through tapped fixing holes on both rings
3. Non-through tapped fixing holes on inner ring
4. Gear Involute Stub α = 20°
5. Fixing holes on outer ring are divided on the circumference with spacing a' 360°/52
6. Centering diameter ∅ 1011.2 is on both sides of the ring (on the front face into the depth of 1. on the opposite face into the depth 9.4)
7. Gear Involute Stub-Full Fillet Radius α = 20°
8. Opposite face of the inner ring is fitted on ∅ 1010.92 into the depth 7.11
9. Gear Involute Modification Stub-Full Fillet Radius α = 20°
10. Fixing holes on outer ring are divided on the circumference with spacing a' 360°/36

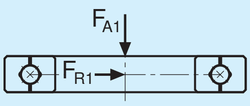
SELECTION OF SLEWING RING TYPE AND SIZE

Selection of a suitable slewing ring for common applications can be carried out from the point of view of the static load rating by means of the diagrams (curves) for the limiting static load of the raceways and fixing bolts (pages 32 - 62 of this publication) based on the calculated equivalent axial and moment static load.

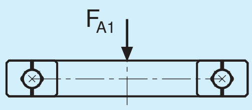
Slewing rings allow accomodation of combined loads, i.e. both axial and radial forces and tilting moments including eccentric loads. Typical examples of loading are shown in the following table.

Loading - Typical Examples

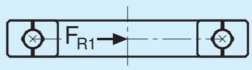




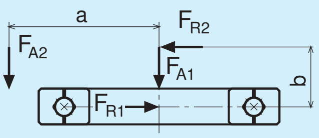
$F_A = F_{A1}$
$F_R = F_{R1}$
$M = 0$



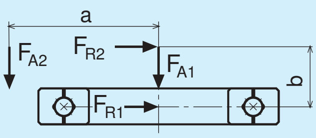
$F_A = F_{A1}$
$F_R = 0$
$M = 0$



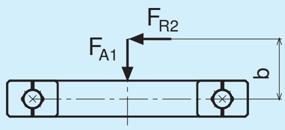
$F_A = 0$
$F_R = F_{R1}$
$M = 0$



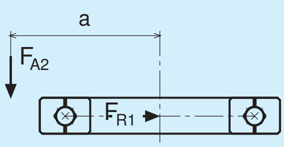
$F_A = F_{A1} + F_{A2}$
$F_R = |F_{R2} - F_{R1}|$
$M = F_{A2} . a + F_{R2} . b$



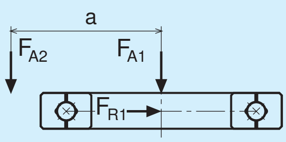
$F_A = F_{A1} + F_{A2}$
$F_R = F_{R1} + F_{R2}$
$M = |F_{A2} . a - F_{R2} . b|$



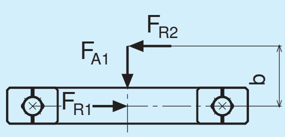
$F_A = F_{A1}$
$F_R = F_{R2}$
$M = F_{R2} . b$



$F_A = F_{A2}$
$F_R = F_{R1}$
$M = F_{A2} . a$



$F_A = F_{A1} + F_{A2}$
$F_R = F_{R1}$
$M = F_{A2} . a$



$F_A = F_{A1}$
$F_R = |F_{R2} - F_{R1}|$
$M = F_{R2} . b$

Calculation of Equivalent Axial and Moment Static Load

Slewing Rings	Formula	Valid if	
Four-Point Contact Ball Slewing Rings	$F'_{OA} = (F_{OA}+5.05.F_{OR}).s_O$ $M'_{OK} = M_{OK}.s_O$	$0.1 < \frac{F_{OR}}{F_{OA}} < 8$	$e > 2$
	$F'_{OA} = (1.23.F_{OA}+2.68.F_{OR}).s_O$ $M'_{OK} = 1.23.M_{OK}.s_O$	$0.1 < \frac{F_{OR}}{F_{OA}} < 8$	$e \leq 2$
Crossed Roller Slewing Rings	$F'_{OA} = (F_{OA}+2.05.F_{OR}).s_O$ $M'_{OK} = M_{OK}.s_O$	$0.1 < \frac{F_{OR}}{F_{OA}} < 8$	

Where: F_{OA} - Σ of axial static forces for slewing ring [kN]
F_{OR} - Σ of radial static forces for slewing ring [kN]
M_{OK} - Σ of tilting moments for slewing ring (static) [kNm]
s_O - coefficient of static safety (values - see Table 3) [–]
$e = \frac{2000.M_{OK}}{F_{OA}.D_S}$ - parameter of the load eccentricity [–]
D_S - slewing ring mean diameter [mm]

Note: - if: $\frac{F_{OR}}{F_{OA}} < 0.1$ - when calculating the equivalent load, radial force need not be taken into account.

The calculated values of the axial and moment static load define the coordinates of the working point in the diagram for the limiting static load of the slewing ring. The working point must lie under the curve for the bolt static load. Example - see chapter DIAGRAMS FOR LIMITING STATIC LOAD, page 31.

Suitability for a given application from the point of view of gear dimensioning can be evaluated by comparison of the real nominal and maximal circumferential forces with allowed circumferential forces for the gear. Allowed nominal and maximal circumferential forces - Slewing Ring Tables.

Calculation of the nominal and maximal circumferential force:

$$F_{Tmen} = \frac{2000.M_{Tmen}}{m.(z+2x)}$$

$$F_{Tmax} = \frac{2000.M_{Tmax}}{m.(z+2x)}$$

Where:
F_{Tmen} - nominal circumferential force [kN]
F_{Tmax} - maximal circumferential force [kN]
M_{Tmen} - nominal rotating moment [kNm]
M_{Tmax} - maximal rotating moment [kNm]
m - gear module [mm]
z - number of teeth [–]
x - unit displacement of the basic profile (unit correction) [–]

The main criteria for evaluating of the gear suitability is the fatigue resistance of bending and max. static load transmission. Following conditions must be fulfilled:

$F_{Tmen} \leq F_{TDov}$ - for fatigue resistance of bending (values - see Slewing Ring Tables)
$F_{Tmax} \leq F_{TmaxDov}$ - for max. static load transmission (values - see Slewing Ring Tables)

Figure 1

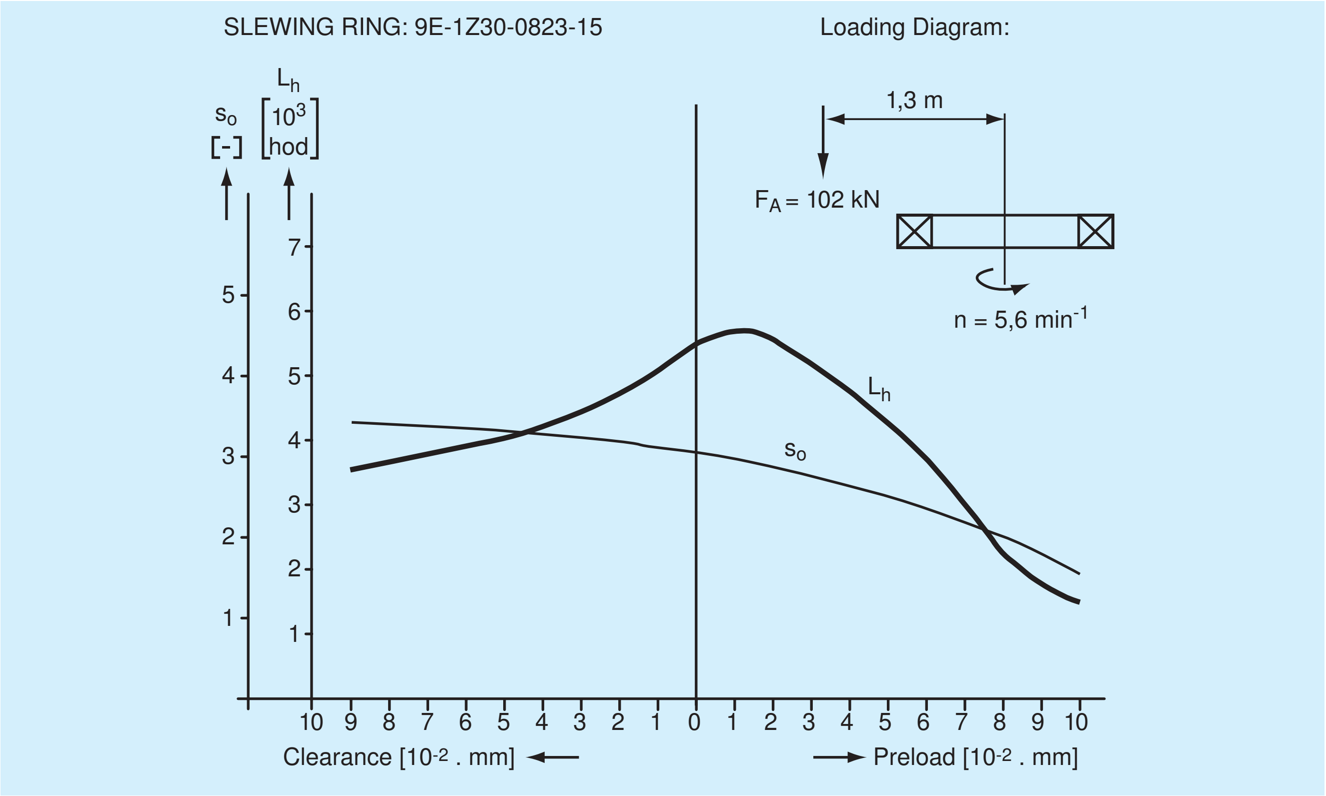
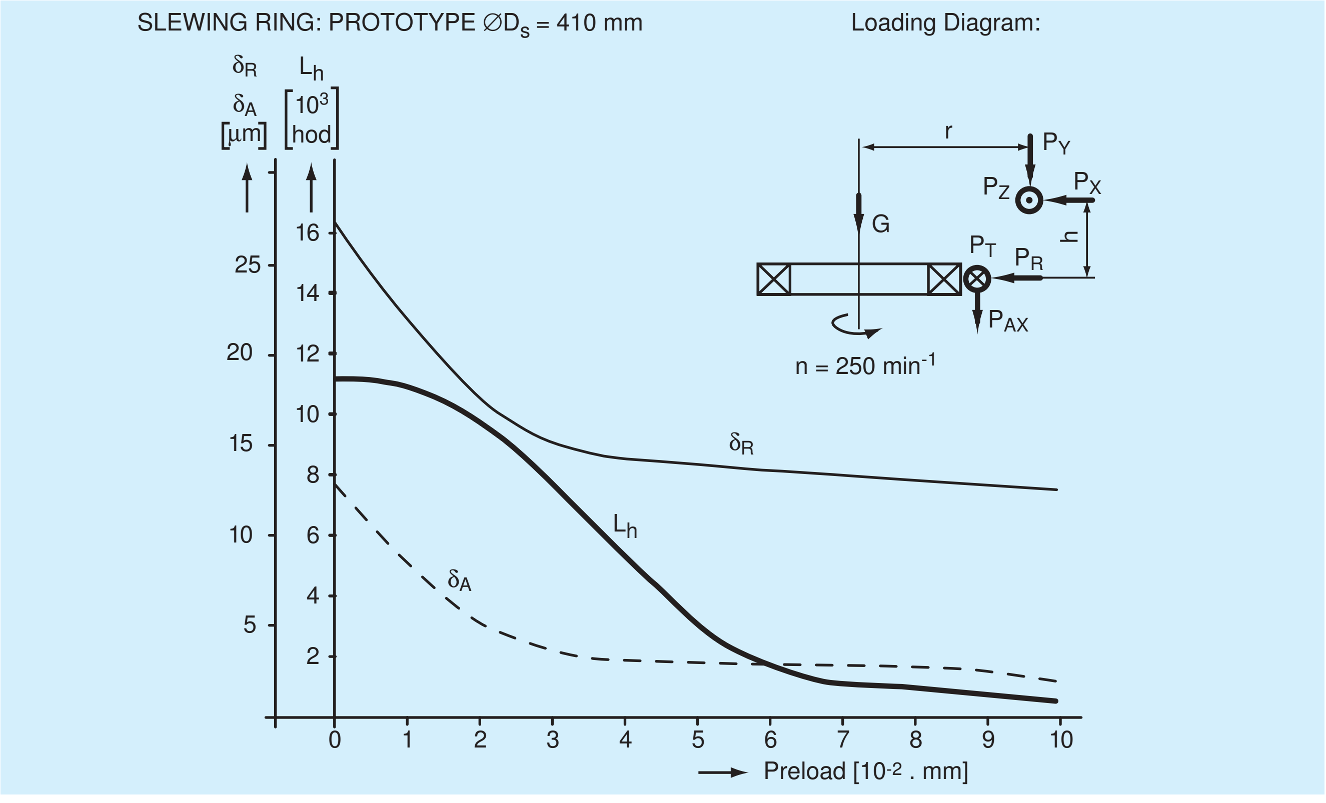
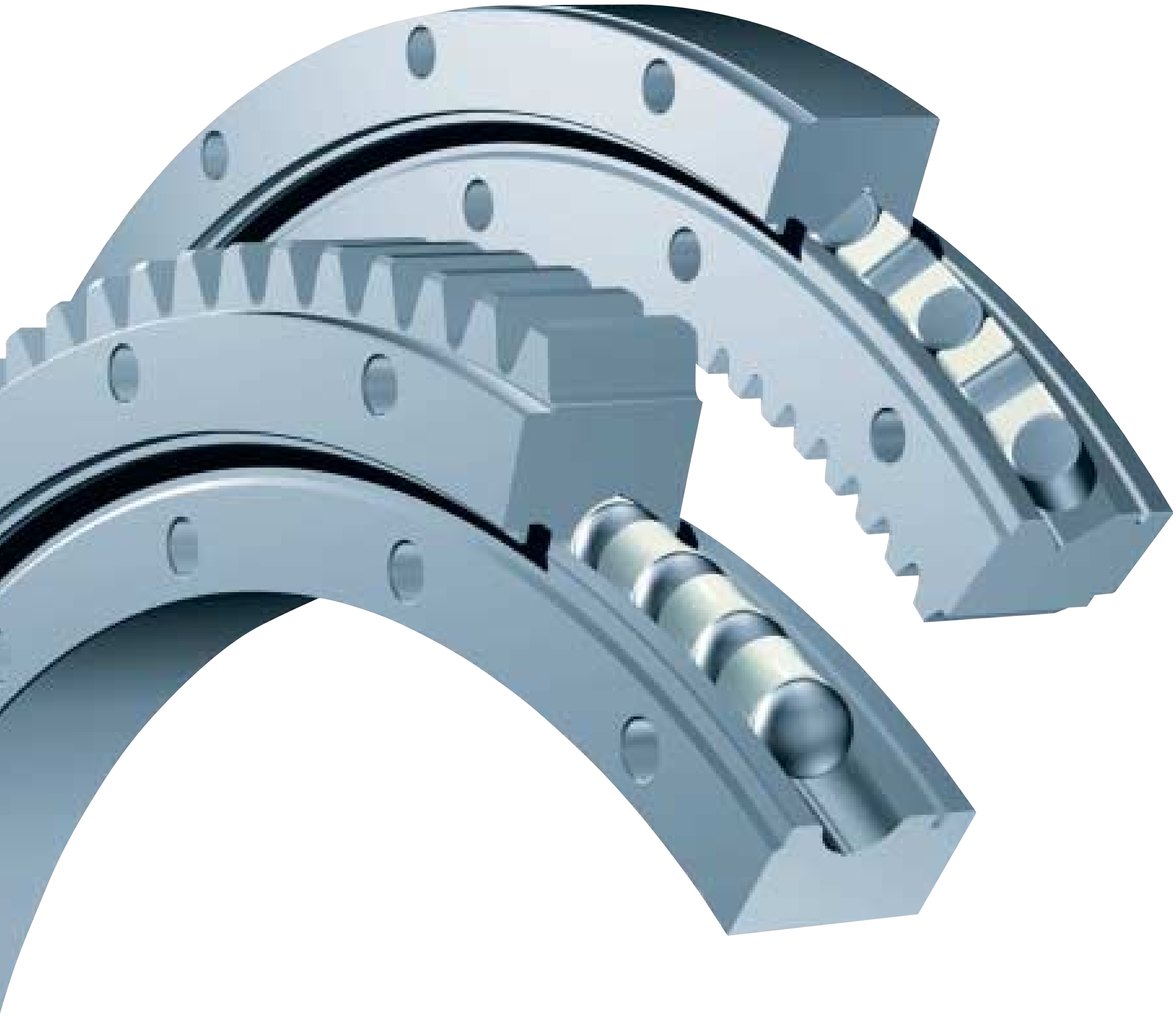


Figure 2





SLEWING RING CHARACTERISTICS, APPLICATIONS

Slewing rings are large-sized bearings which are able to accommodate combined load, i.e. axial, radial loads and tilting moment. They are usually provided with holes for fixing bolts, internal or external gear, lubrication holes and seals, which allow a compact and economical arrangement. They often enable elimination of many components necessary in the classical bearing arrangement.

PSL slewing rings have proven ability in the following applications
- construction, mobile and pillar cranes,
- shovel, digging-wheel excavators,
- revolving grabs and winches,
- graders,
- logging industry machines,
- loaders, vehicles for waste removal, hydraulic grippers,
- axles and undercarriages,
- assembly and access platforms,
- robots, manipulators and positioners,
- machine tools,
- special equipment (rescue vehicles, aerials, feller bunchers and tunnel machines, drilling equipment, wind-power plants, cleaning and bottle filling machines).

Compactness, accuracy and smooth operation with relatively high rigidity, together with simple mounting and reliability in operation are qualities that allow the use of these bearings in all industrial branches.