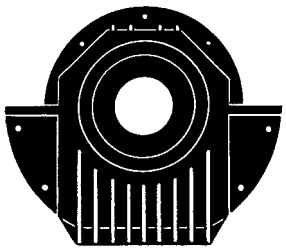
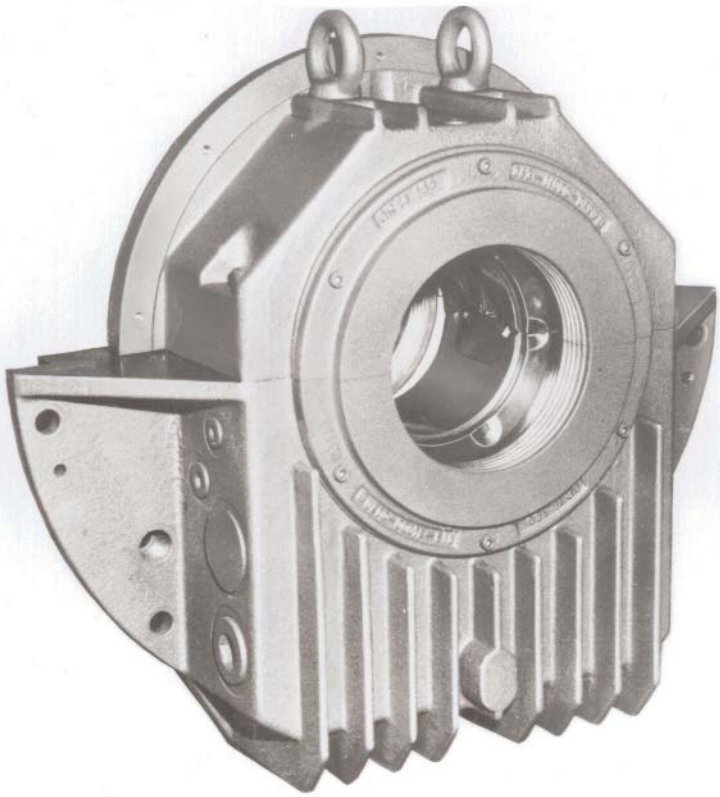
Slide Bearings Type E
For Shaft Diameter Range 80-355 mm
Main Application Field
Electric Machines

Centre flange mounted bearing type EM (DIN 31 694)



The EM-type slide bearings are a variation of the E-type bearing modular system. They are centrally flange-mounted slide bearings which are mainly used for electric machines.

This leaflet contains data required for designs incorporating EM-type bearings as far as they are not contained in the main catalogue “RENK Slide Bearings Type E”.



Technical Information

This leaflet contains information which should be considered for the majority of applications where EM-type bearings are used with electric machines. All the other facilities of the E-type bearing modular system will, of course, also apply to EM-type bearings: e.g. bearing shells with two- or four-lobe bore, with journal tilting pads or RD thrust pads (relevant details on request).

Most parts of the variants mentioned in this leaflet are available from stock.

Bearing Housing

The finned EM-type housings are made from a high-quality cast iron (EN-GJL-300) and are designed for heavy duty performance. Other materials such as, for instance, nodular cast iron EN-GJS-400-15 or cast steel GS 45 can be supplied by special arrangement.

Tapped holes for thermometer, oil inlet and outlet, oil sight glass, thermometer in the oil sump or suction line of a circulating pump are available on either side. For special cases (e.g. fitting of oil coolers or vibration detectors) finish machined housings are taken from stock and provided with additional connection holes.

Bearing Shell

The shells are spherically seated in the housing. They consist of a supporting steel body lined with lead based RENKmetal therm V6 or therm 89. Both design and manufacture are in accordance with the highest standards required in heavy engineering: trouble-free assembly and long life even under severe operating conditions.

EM-type bearings are mostly equipped with shells with plain cylindrical bore and loose oil ring.

Shells are available either for self-contained operation (E.NL.) or prepared for external oil circulation (E.ZL.).

Apart from bearings without thrust parts (type...Q) there are shells with plain white-metal lined shoulders (type...B) to absorb limited non-continous axial loads, as well as shells with build-in taper land faces (type...K) which will absorb medium axial loads.

Thrust loads of a medium size are absorbed by taper land faces integral with the shoulders and suitable for one sense of rotation (type...E).

High thrust loads can be taken by tilting RD thrust pads (type... A). In addition to the oil film, the cup springs supporting the RD thrust pads have damping properties and intercept shocks elastically.

This design requires lubrication by circulating oil, e.g. the use of an oil pump.

Seals

EM-type bearings with floating labyrinth seals (type 10) are used for standard applications. This seal conforms to protection grade IP 44. Higher protection grades (up to IP 56) can be fitted under the modular system.

To protect machines fitted with EM-type bearings against any interference from inside (e.g. vacuum or strong air circulation), EM-type bearings are generally supplied with additional “machine seals”, These machine seals are made of non-corrosive alloy.

The seals are fitted directly to the housing forming a sealing gap with the shaft.

In order to improve the function the space between housing and machine seal is connected to atmosphere via two hoses. Optionally the airtightness of this machine seal can be improved by inserting a hemp tallow packing in the standard circumferential groove of the seal.

All seal types (type 10, 12 and the machine seal insert) are made of fiber reinforced, high temperature resistant RENKplastic therm 50 and are resistant to wear.

Oil Supply

Self-lubrication by means of a loose oil ring for peripheral shaft speeds up to 20 m/s. The lubricating oil delivered to the internal perimeter is transferred by the loose oil ring directly to the shaft. Where bearings are lubricated by oil circulation systems, loose oil rings can be used with peripheral shaft speeds of up to 26 m/s to permit emergency shut-down without causing any damage. Loose oil rings can also be used for marine applications. In this case additional guide bushes are build into the shells (details on request).

Electrical Insulation

As a protection against stray currents conducted by the shaft, EM-type bearings can also be supplied as insulated versions. To do so, the spherical bearing shell seating within the housing is electrically insulated by using PTFE insulating foil or inserts made of fiber reinforced, high temperature resitant RENKplastic therm 50.

Heat dissipation

Frictional heat is often dissipated merely by radiation and convection only: “natural cooling”. Depending on the shaft diameter, speeds of up to 3600 min^{-1} are admissible.

Because of their advanced design, EM-type bearings with natural cooling can now be used for a wide range of applications.

Oil coolers (with seawater-resistant finned cooler tubes) incorporated in the oil sump can be used in addition. Dimensions on request. EM-type housings are generally suitable for connection to an oil circulating system.

In such case the oil level in the housing is defined by the weir in the oil outlet pipe of our supply.

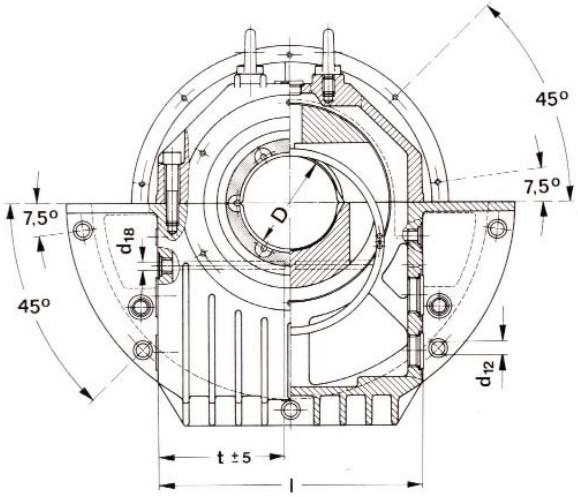
Temperature Control

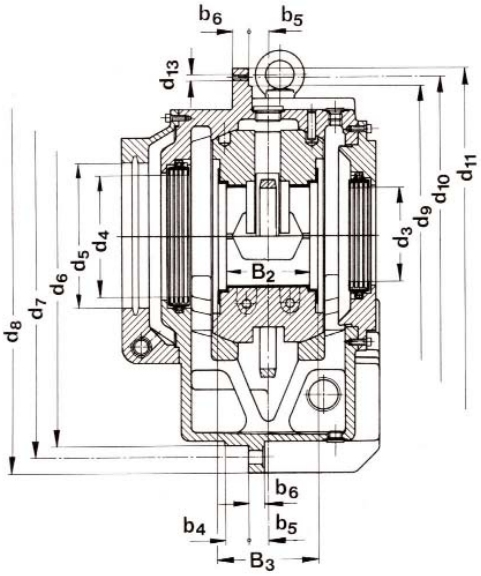
Two independent commercially available thermosensors can be used for temperature control. We recommend the use of RENK resistance thermometers or RENK angle thermometers for direct visual control.

Oil Selection

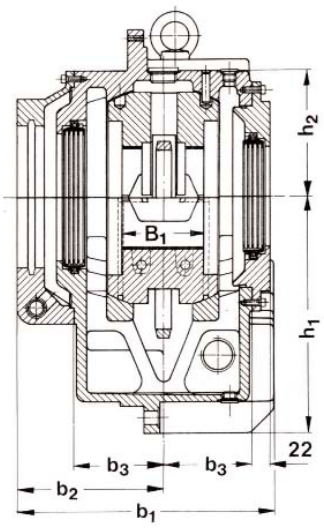
Generally any branded mineral oil of low foaming tendency and good resistance to ageing can be used as a lubricant. The correct viscosity for each operating condition should be checked by EDP calculation. Such calculations are carried out at the design stage. A printout of results computed can be provided on request.

Dimensions of Bearings (DIN 31 694)

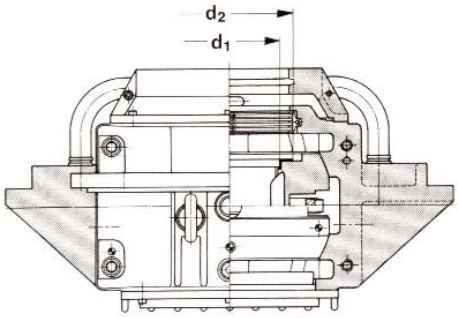




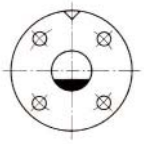
EM.LB
EM.LK

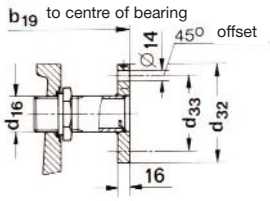


EM.LQ



As for bearing types EMZL., the oil outlet with weir is to be mounted horizontally at the bottom. The mark at the flange will then be visible centrally at the top.





flange DIN 2573
oil outlet

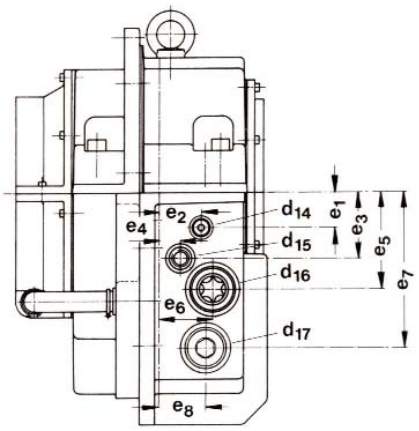
Dimensions in mm

Size	D	B_1	B_1[3]	B_3	b_1	b_2	b_3	b_4	b_5	b_6	b_{19}	d_1	d_2	d_3	d_4	d_5	d_6	d_7	d_8	d_9	d_{10}	d_{11}
	80	61,4										86	110			111,5						
9	90	61,4	(60)	80	250	145	80	30	20	16	205	96	120	80/90/100/110	100	121,5	375	400	425	270	285	300
	100	65		-0,22								106	130			131,5						
	100	81,4										108	135			136,5						
11	110	81,4	(80)	100	280	160	95	30	20	18	230	118	150	100/110/125/140	125	151,5	450	475	500	320	340	355
	125	85		-0,22								133	160			161,5						
	125	105,4	(105)									135	170		160	171,5						
14	140	105,4	(105)	125	325	185	112,5	30	25	20	280	150	190	125/140/160/180	160	191,5	530	560	600	380	400	425
	160	106,4	(105)	-0,22								170	200		160	201,5						
	180[1]	106,4										190	220		180	221,5						
	160	135,7	(135)									172	215		200	216,5						
18	180	135,7	(135)	160	375	210	132,5	30	25	25	310	192	240	160/180/200/225	200	241,5	630	670	710	450	475	500
	200	140,4	(135)	-0,22								212	250		200	251,5						
	225[1]	140,4										237	275		225	276,5						
	200	168,5	(170)									214	265		250	266,5						
	225	168,5	(170)									239	290		250	291,5						
22	250	175,7	(170)	200	445	245	167,5	30	30	30	385	264	315	200/225/250/280/300	250	316,5	800	850	900	570	600	630
	280[1]	175,7		-0,22								294	345		280	346,5						
	300[1]	175,7										310	345		300	346,5						
	250	213,2	(215)									266	325		315	326,5						
	280	213,2	(215)									296	355		315	356,5						
28	300	218,5	(215)	250	550	300	212,5	35	30	35	465	316	375	250/280/300/315/355	315	376,5	1000	1060	1120	730	765	800
	315	218,5		-0,24								331	390		315	391,5						
	335[2]	218,5										351	410		355	431,5						
	355[2]	218,5										371	430		355	431,5						

[1] Available only with shells B und Q.

[2] Not available with shells type A.

[3] The dimensions in brackets will be dropped in the future.



d_{14} = oil inlet if connected to oil circulating system or circulating pump
d_{15} = thermometer connection on both sides G ½
d_{16} = oil level or oil outlet if connected to circulating system
oil level with self-contained lubrication middle of sight glass
oil level for circulating oil approx. 6 mm above lower edge of sight glass
d_{17} = screw plug
(connection for heater, oil pump thermometer,
suction pipe for circulating pump, finned tube oil cooler)
on both sides G 1¼

① Type	E	
② Housing	M =	centrally flange mounted
③ Heat dissipation	N =	natural cooling
	Z =	lubrication by oil circulation with external oil cooling
	X =	lubrication by oil circulation with external oil cooling for high oil througput
	W =	water cooling (finned tube cooler in oil sump)
	U =	circulating pump and natural cooling
	T =	circulating pump and water cooling
④ Shape of bore and type of lubrication	L =	plain cylindrical bore with loose oil ring lubrication
⑤ Thrust surface	Q =	without thrust parts (non-locating bearing)
	B =	plain sliding surfaces (locating bearing)
	K =	taper land faces for both senses of rotation (locating bearing)
	E =	taper land faces for one sense of rotation (locating bearing)
	A =	elastically suported circular tilting pads (locating bearing)

Example
for quoting a slide bearing, type EM, lubrication by oil circulation with external oil cooling, cylindrical bore with loose oil ring lubrication (for emergency operation), thrust part with taper land faces, size 14, shaft diameter 125 mm:

	①②③④⑤
Slide bearing	**E M Z L K 14-125**

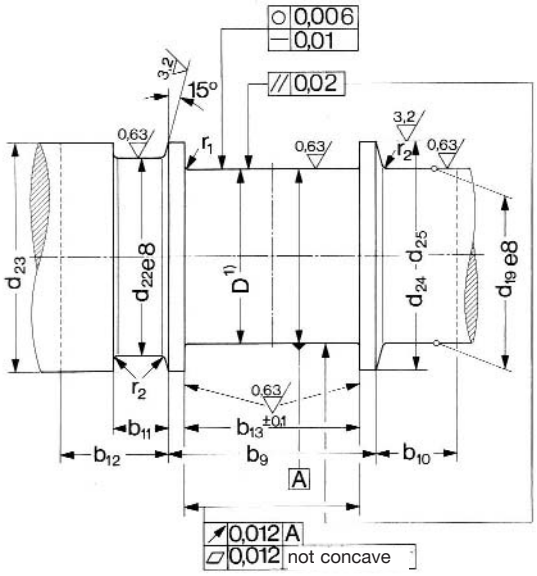
The indicated weights are average values (not binding).
The drawings are not strictly binding.

d_{12}	d_{13}	d_{14}	d_{16}	d_{18}	d_{32}	d_{33}	e_1	e_2	e_3	e_4	e_5	e_6	e_7	e_8	h_1	h_2	l	t	weight approx. [kg]	oil quantity [Liter]
11	M6	G 3/8	G 1¼	11	120	90	27,5	35,5	60	20	85	67,5	142	45	212	110	250	105 105 105	55	2,4
14	M6	G 3/8	G 1¼	11	120	90	35	42	70	22,5	100	70	167	55	250	130	300	130 130 122	85	4,2
18	M6	G 3/8	G 1½	11	130	100	45	55	85	27,5	125	85	200	70	300	160	355	158 158 137 117	140	6,3
22	M8	G ½	G 1½	13	130	100	60	68	105	30	155	80	240	80	355	190	425	190 190 170 145	230	10,0
26	M10	G ¾	G 2	13	140	110	70	83	135	40	175	100	310	100	450	235	530	242 242 228 182 166	425	24,4
33	M12	G ¾	G 2½	13	160	130	95	106	155	50	220	130	385	130	560	300	670	312 312 262 257 232 219	860	44,4

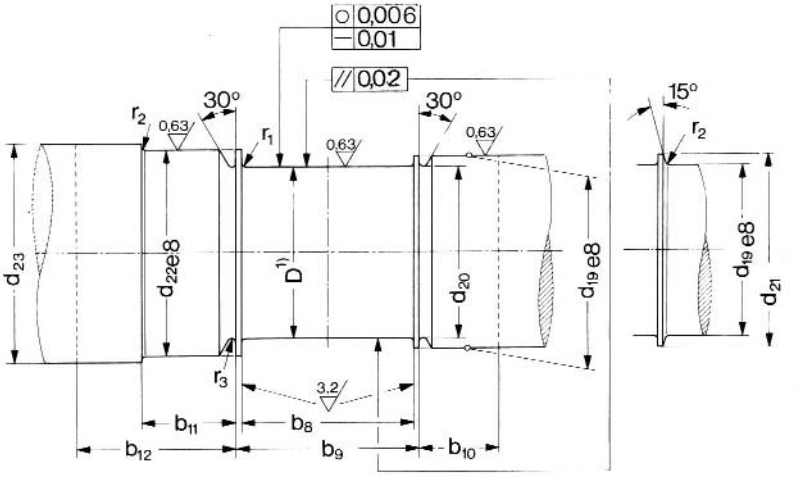
G = B.S.P.

Shaft Dimensions

Locating bearing
Type of bearing shell E...B (mit d_{24})
E...K (mit d_{24})
E...E (mit d_{24})
E...A (mit d_{25})



Non-locating bearing
Type of bearing shell E...Q



chamfered edges 0,5 x 45°
surface condition DIN ISO 1302

Dimensions in mm

Size	D[1]	b_8[2]	b_9	b_{10}	b_{11}	b_{12}	b_{13}[3]	$\frac{d_{19}}{d_{20}}$	d_{21}	d_{22}	d_{23}	d_{24}	d_{25}	r_1	r_2	r_3
	80								90		110	110	132			
9	90	90	100	55	60	95	80,4	80 / 90 / 100 / 110	100	100	120	120	142	2,5	4	1,6
	100							– / 80 / 90 / 100	110		130	130	143			
	100								110		135	135	157			
11	110	110	120	60	65	105	100,4	100 / 110 / 125 / 140	125	125	150	150	162	2,5	4	1,6
	125							– / 100 / 110 / 125	140		160	160	168			
	125								140	160	170	170	192			
14	140	140	150	65	75	115	125,4	125 / 140 / 160 / 180	160	160	190	190	207	4	6	2,5
	160							– / 125 / 140 / 160	180	160	200	200	217			
	180								200	180	220	220	–			
	160								180	200	215	215	244			
18	180	180	190	65	75	120	160,4	160 / 180 / 200 / 225	200	200	240	240	264	4	6	2,5
	200							– / 160 / 180 / 200	225	200	250	250	273			
	225								250	225	275	275	–			
	200								225	250	265	265	308			
	225								250	250	290	290	328			
22	250	220	240	75	80	130	200,4	200 / 225 / 250 / 280	280	250	315	315	339	6	10	4
	280							– / 200 / 225 / 250	315	280	345	345	–			
	300								330	300	345	345	–			
	250								280	315	325	325	378			
	280								310	315	355	355	408			
28	300	280	300	90	90	155	250,4	250 / 280 / 300 / 315 / 335 / 355	330	315	375	375	408	6	10	6
	315							– / 250 / 280 / 280 / 315 / 335	345	315	390	390	423			
	335								365	355	430	410	–			
	355								385	355	430	430	–			

1) For shaft tolerances see “Manual for the application of RENK slide bearings”.
2) Where a non-locating bearing is to permit greater axial movement (e.g. to allow for thermal expansion), the distance b_8 between the collars may be increased.

Tolerances of form and position follow DIN 31 699.
Degree of accuracy B 10 (radial). Degree of accuracy B 20 (axial); others upon request.
General tolerance DIN 7168 mS.

3) The normal axial clearance is 0,5 mm. When directional changes of thrust loads or axial shocks are to be anticipated, the dimensions b_{13} may be reduced by a further 0,3 mm. Where a locating bearing is only required for test run, the dimension b_{13} can be increased by 3...6 mm. In this case dimensions “b_6“ and “b_8” have to be considered.
4) All diameters d_{23} are valid for each shaft diameter D.

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