

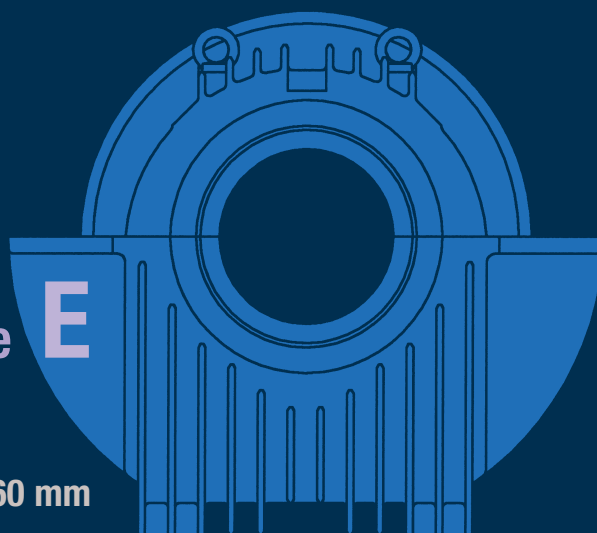


Innovative Power Transmission

Slide Bearings Type

E

Series **EM** Journal Range 300-560 mm



RENK Slide Bearings Type E

① Type	E
② Housing	M finned centre flange mounted
③ Heat dissipation	<div> <div>{</div> <div> N natural cooling Z lubrication by oil circulation with external oil cooling X⁷⁾ lubrication by circulation with external oil cooling for high oil throughput W⁷⁾ water cooling (finned tubes in oil sump) U circulating pump and natural cooling T circulating pump and water cooling (finned tubes in oil sump) </div> </div>
④ Shape of bore and type of lubrication	<div> <div>{</div> <div> C⁷⁾ plain cylindrical bore, without oil ring L plain cylindrical bore, loose oil ring lubrication F⁷⁾ plain cylindrical bore, fixed oil ring lubrication Y⁷⁾ two-lobe bore (lemon shape), without oil ring V⁷⁾ four lobe bore, without oil ring K⁷⁾ radial tilting pad, without oil ring </div> </div>
⑤ Thrust parts	<div> <div>{</div> <div> 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 supported circular tilting pads (locating bearing) </div> </div>

Example

for quoting a slide bearing type EM, circulating oil system with external oil cooling, plain cylindrical bore with loose oil ring (for emergency lubrication), thrust part with elastically supported circular tilting pads, size 35, shaft diameter 355 mm:

① ② ③ ④ ⑤
slide bearing E M Z L A 35-355

The main dimensions of the shell with plain cylindrical bore (EF.C.) and of the two-lobe bore shell (EF.Y.) are similar to the dimensions of the shell type EF.L. (plain cylindrical bore, loose oil ring lubrication) shown in the catalogue.

Information on bearings with fixed oil ring, four-lobe bore and radial tilting pads available upon request.

- 1) Seal diameters (D_S) are possible with every shaft diameter of one size.
- 2) This dimension is about 3 mm larger in case of insulated bearings.
- 3) Bore available on both sides.
- 4) Dimension refers to design with loose oil ring.
- 5) Flange DIN 2573
- 6) Number on each side
- 7) Data upon request

All weight values indicated in this catalogue are average, non-binding values. The drawings shown are not strictly binding.

We reserve the right to changes made in the interests of technical improvement.

This brochure gives details of a range of E-bearings, shaft diameters 300 to 560 mm, suitable for use on electrical machines, fans, water turbines and pumps.

For information on E-bearings with smaller shaft diameters refer to the corresponding RENK brochures.

Bearing Housing

The finned EM housings size 35 to 45 are made of high quality cast iron (EN-GJL-300) and are designed for heavy duty performance. Other materials, such as for instance EN-GJS-400-18-LT or GS 45 can be supplied in special cases.

Bearing Shells

The shells are manufactured from steel (C 10) and have a spherical seating. They are lined with RENKmetal therm 89 and the working surfaces and the oil-ways are configured to give long life under severe operating conditions. Being fully interchangeable ensures trouble free assembly at all times.

E-type bearing sizes 35 to 45 are mostly equipped with shells having a plain cylindrical bore and a natural cooling form. However, shells suitable for connection to an external oil circulation system are also available. If required, shells with a two lobe bore ("lemon bore"), four lobe bore or with radial tilting pads can also be supplied.

Apart from bearings without thrust parts (type...Q) there are shells with plain white-metal lined shoulders (type...B) to absorb non-continuous axial loads of limited magnitude, as well as shells with

bi-directional taper land faces (type...K) which can absorb axial loads of medium magnitude.

Alternatively the taper land faces can be supplied suitable for only one sense of rotation (type...E) to absorb high axial loads.

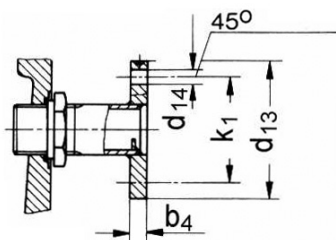
For high thrust loads elastically supported circular tilting pads (RD thrust pads) are fitted in the ends of the shell (type...A). The cup springs supporting the RD thrust pads have damping properties and can also absorb any shock loads elastically.

Seals

For normal applications the E-type bearings sizes 35 to 45 are equipped with rigid seals (type 20). These seals are made of corrosion resistant aluminium alloys and correspond to protection grade IP 44. Higher protection grade (up to IP 56) upon request.

To counteract the influence of negative pressure or high air velocity from the inside of the machine, the flange side of the EM bearings is provided with an adjustable rigid seal (type 32) (connection to be done by customer). This seal type has an additional sealing area connected to the external atmosphere by two hoses in this way, the inner seal is not affected by negative pressure or strong air turbulence.

Special types of seals such as air seals or seals for application with ex equipment machines are also available on request.



Dimensions of oil outlet

The oil outlet pipes are mounted to the housing by means of a SAE flange. The X design can be provided with larger oil outlet pipes, depending on the necessary quantity of lubricant.

size	design Z					
	oil outlet	l / min	b ₄	d ₁₃	d ₁₄	k ₁
35	DN 65	28	16	160	14	130
45	DN 80	42	18	190	18	150

Oil Supply

Self contained oil bath lubrication, by means of two loose oil rings, is supplied for shaft speeds up to 20 m/s. The loose oil rings take the lubricant direct to the shaft. If the bearings are supplied with cool oil from an external lubrication system, the loose oil rings can be retained as a back-up for shaft speeds up to 26 m/s. Such an arrangement will permit emergency shut-down without damage to the shells.

Lubrication by loose oil ring is also possible for marine applications. Further details upon request. Information on E-bearings with lubrication by fixed oil ring (EMNF.) or without oil ring (EMXC./ EMXY/ EMXV/ EMXK.) upon request.

An external oil lubrication system can be used in addition to self-lubrication or it can be operated as oil supply unit for the bearing.

When the bearing is subject to frequent reversals, or if the type...A need large quantities of oil, a pump is fitted to the bearing to suck cool oil from the bearing sump and deliver it to the oil inlet position. Filters and oil cooler can be incorporated into the oil circulation system.

Electrical Insulation

To prevent problems from electrical eddy currents, the EM bearing can be electrically insulated, internally. In such cases the spherical seating of the shell is coated with a layer of insulating plastic material.

Heat Dissipation

Frictional heat generated is usually dissipated by radiation and natural convection.

Water cooling can also be used, through seawater resistant cooling tubes submerged in the oil sump. Dimensions for connection upon request.

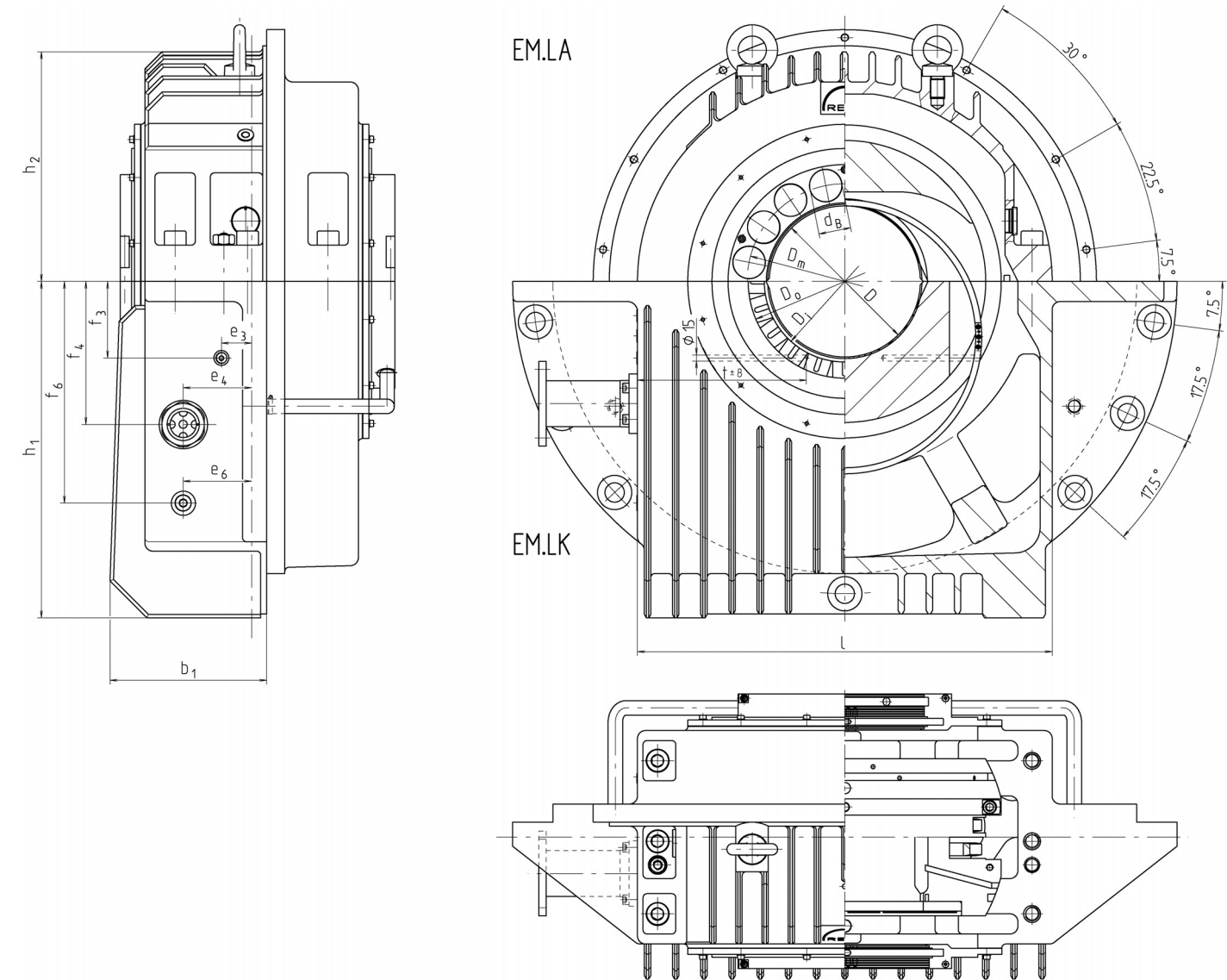
Temperature Control

Two independent commercially available thermosensors can be used for monitoring the temperature of the bearing. We recommend the use of RENK resistance thermometers; alternatively RENK angle thermometers for direct visual reading.

Oil Selection

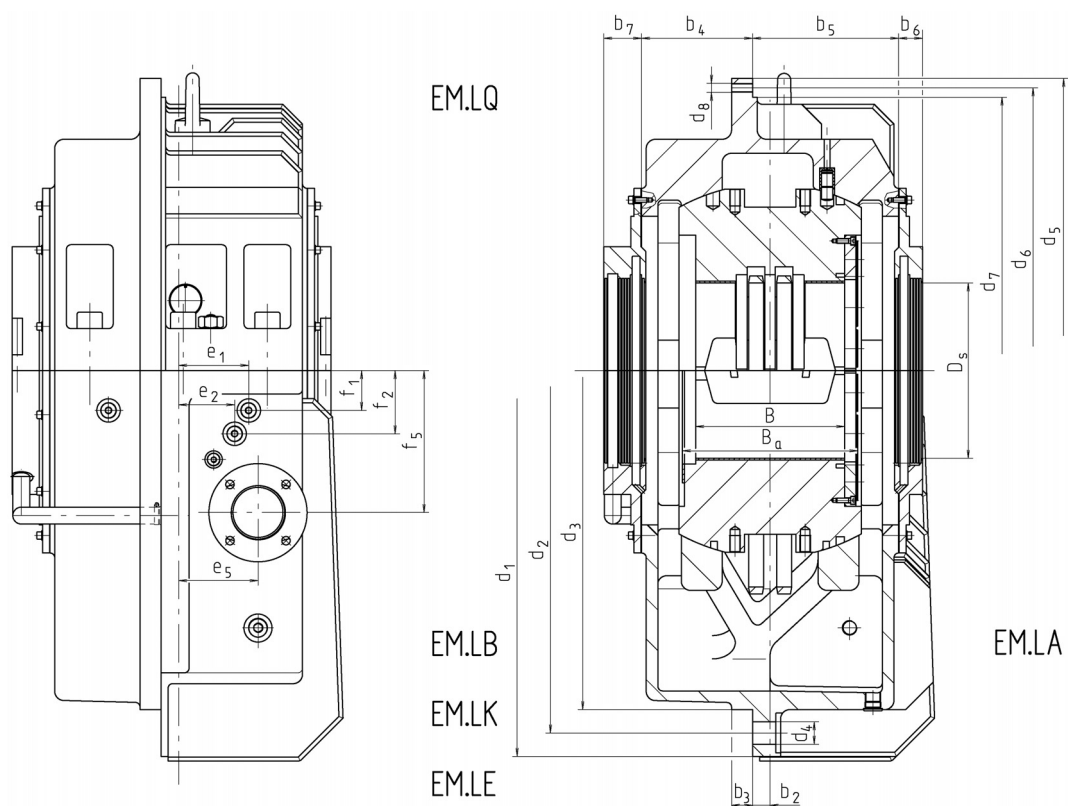
Generally, any branded oil of low foaming tendency can be used as a lubricant. The correct viscosity for each operating condition will be determined by EDP calculation. Such calculations are always carried out at the design stage. A print-out of the results can be provided on request.

Dimensions of Bearings



Dimensions in mm

Size	D	B	B _a	D _i	D _o	D _m	d _B	RD-thrust pads ⁶⁾	b ₁	b ₂	b ₃	b ₄	b ₅	h ₁	h ₂	l	d ₁	d ₂	d ₃	d ₄	d ₅	d ₆	
35	300	254	300 -0,24	320	385	390	63	16	332,5	37,5	45	192,5	267,5	705	450	850	1400	1325	1250 h ₆	40 for M36	1060	1030	
	315			335	400	405		18															
	335			355	425	425		20															
	355			375	450	445		24															
	375	263,2		395	470	455	50	—															—
	400			420	495	470																	
	425			445	515	—																	
	450			—	—	—																	
45	375	318,8	375 -0,24	400	480	485	80	16	392,5	37,5	45	237,5	312,5	835	570	1030	1650	1550	1450 h ₆	48 for M42	1250	1210	
	400			425	505	510		18															
	425			450	530	535		20															
	450			475	555	560		26															
	475	329		500	580	580	63	—															—
	500			525	605	590																	
	530			555	635	—																	
	560			585	665	—																	



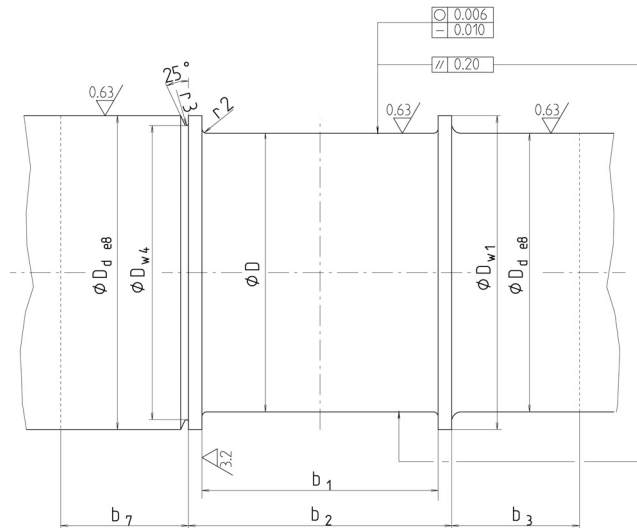
The location of the tapped holes is interchangeable.

d ₇	d ₈	D _S ¹⁾	b ₆ ²⁾	b ₇ ²⁾	oil inlet for type...A		oil inlet (radial)		thermosensor ³⁾			oil sight glass		oil outlet ⁵⁾		thermosensor (oil sump) ³⁾		oil l	weight quantity kg		
					e ₁	f ₁	e ₂	f ₂	e ₃	f ₃	t	e ₄	f ₄ ⁴⁾	e ₅	f ₅ ⁴⁾	e ₆	f ₆				
1000	M16	300/315 335/355 375/400 425/450	51	81	115	75	95	130	65	160	360 ± 8	G21/2	150	295	DN 65	150	262,5	130	500	approx. 75	approx. 1350
										170											
										180											
										190											
										200											
										210											
										225											
										235											
1170	M20	375/400 425/450 475/500 530/560	91	150	85	120	135	75	190	415 ± 8	G3	170	370	DN 80	170	330	170	550	approx. 125	approx. 2500	
									205												
									215												
									230												
									245												
									255												
									270												
									285												

Shaft Dimensions

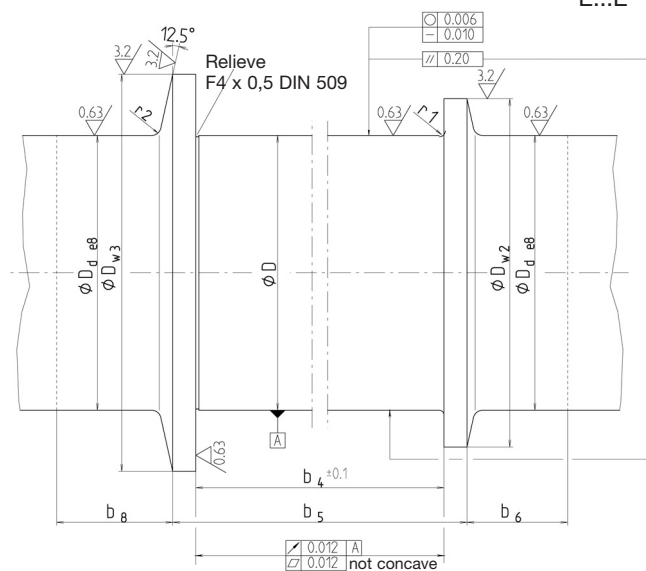
Non-locating bearing

Type of bearing shell E...Q



Locating bearing

Type of bearing shell E...A



Locating bearing

Type of bearing shell E...B
E...K
E...E

Dimensions in mm

Size	D	b ₁ ⁴⁾	b ₂	b ₃	b ₄ ¹⁾	b ₅	b ₆	b ₇	b ₈	D _{W1}	D _{W2}	D _{W3}	D _d ²⁾	D _d / D _{W4} ^{2) 3)}	r ₁	r ₂	r ₃
35	300									335	385	458					
	315									355	400	473					
	335									375	425	493	300/315	300/ —, 315/300			
	355	315	335	130	300,5	360	115	160	145	400	450	513	335/375	335/315, 355/335	8	12	2,5
	375									425	470	510	400/425	375/355, 400/375			
	400									450	495	525	450	425/400, 450/425			
	425									475	515	—					
	450									500	—	—					
45	375									425	480	570					
	400									450	505	595					
	425									475	530	620	375/400	375/ —, 400/375			
	450	400	425	130	375,5	445	120	160	150	500	555	645	425/450	425/400, 450/425	10	16	4
	475									530	580	648	500/530	475/450, 500/475			
	500									560	605	658	560	530/500, 560/530			
	530									600	645	—					
	560									630	665	—					

Shafts for bearings with fixed oil ring lubrication E.NF. on request.
Shafts for high oil throughput with type...A on request.

- 1) A normal axial clearance is approx. 0.6 mm. Where directional changes of axial loads or where axial shock loads can be expected (marine applications, rolling mills, fans), the dimension "b₄" can be reduced by 0.3 mm. Where a locating bearing is required only for the test run, the axial clearance can amount to 3 to 6 mm. In this case dimensions "b₆" and "b₈" have to be considered.
- 2) Diameters "D_d" and "D_d/D_{W4}" apply to any shaft diameter "D" of one size.

- 3) The groove "D_{W4}" may be omitted, if "D_d" equal to or smaller than shaft diameter "D".

- 4) If the non-locating bearing is to allow higher end floats (for instance because of heat elongation), the distance "b₁" between the collars has to be increased, taking into consideration "b₃" and "b₇". If the shaft ends within the bearing, the length of the journal equals "b₁".

Tolerances of form and position follow DIN 31 699.

Degree of accuracy B 10 (radial). Degree of accuracy B 20 (axial); others upon request.

Size	shaft-Ø D [mm]	F_R (1) [kN]	F_R (2) [kN]	thrust part B F_A [kN]	thrust part K $F_A^{(3)}$ [kN]	thrust part E $F_A^{(3)}$ [kN]	thrust part A $F_A^{(4)}$ [kN]
35	300	191	305	9	28	45	125
	315	200	320	10	29	48	140
	335	213	340	11	34	55	140
	355	225	361	13	38	63	156
	375	247	395	13	40	66	118
	400	263	421	14	42	69	118
	425	280	447	14	41	67	—
	450	296	474	—	—	—	—
45	375	299	478	13	44	72	201
	400	319	510	14	46	76	226
	425	339	542	15	49	79	226
	450	359	574	16	51	84	251
	475	391	625	17	53	89	203
	500	411	658	18	56	92	203
	530	436	698	19	59	98	—
	560	461	737	20	62	102	—

The table serves only to select the size of E-Type bearing. Before booking an order, however, it will be necessary to carry out an EDP calculation, taking into account the reciprocal influence of operating parameters.

1. Radial loads F_R in [kN] as permanent load without hydrostatic jacking (maximum value) for plain cylindrical bores.

2. Radial loads F_R in [kN] as permanent load with hydrostatic jacking (maximum value) for plain cylindrical bores.

3. Axial load F_A in [kN] as permanent load (maximum value).

Load values for other bore shapes upon request.

4. Axial load F_A [kN] as maximum admissible load at start-up. During operation, this load can be increased by approx. 60%.

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