Slide Bearings Type E
Series EM Journal Range 80 - 355 mm
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.

Bearings 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.

Bearings Shell

The shells are spherically seated in the housing. They consist of a supporting steel body lined with lead based RENK-metal 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 pads (type...Q) there are shells with plain white-metal lined shoulders (type...B) to absorb limited non-continuous axial loads, as well as shells with built-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 RENK plastic 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 built 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 in insulated versions. To do so, the spherical bearing shell seating within the housing is electrically insulated by using a plastic shell firmly stuck to the housing or an insulating foil. All EM-type bearing housings “with spherical insulation” are available from stock.

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 thermostors 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 the results computed can be provided on request.

We reserve the right to changes made in the interests of technical improvement.
### Dimensions of Bearings (DIN 31 694)

| Size | D   | B₁   | B₃   | b₁   | b₂   | b₃   | b₄   | b₅   | b₁₉  | d₁   | d₂   | d₃   | d₄   | d₅   | d₆   | d₇   | d₈   | d₉   | d₁₀  | d₁₁ |
|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 9    | 80  | 61,4 | 81,4 | 61,4 | 81,4 | 65   | 61,4 | 86   | 80   | 110  | 80   | 80   | 110  | 80   | 110  | 80   | 110  | 80   | 110  | 80   |
|      | 90  | 61,4 | 81,4 | 61,4 | 81,4 | 65   | 61,4 | 86   | 80   | 110  | 80   | 80   | 110  | 80   | 110  | 80   | 110  | 80   | 110  | 80   |
| 100  | 80  | 61,4 | 81,4 | 61,4 | 81,4 | 65   | 61,4 | 86   | 80   | 110  | 80   | 80   | 110  | 80   | 110  | 80   | 110  | 80   | 110  | 80   |
| 110  | 80  | 61,4 | 81,4 | 61,4 | 81,4 | 65   | 61,4 | 86   | 80   | 110  | 80   | 80   | 110  | 80   | 110  | 80   | 110  | 80   | 110  | 80   |
| 125  | 80  | 61,4 | 81,4 | 61,4 | 81,4 | 65   | 61,4 | 86   | 80   | 110  | 80   | 80   | 110  | 80   | 110  | 80   | 110  | 80   | 110  | 80   |
| 140  | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 | 105,4 |
| 160  | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 |
| 180  | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 | 135,7 |
| 200  | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 |
| 225  | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 | 140,4 |
| 250  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  | 200  |
| 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  | 300  |
| 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  | 315  |
| 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  | 335  |

1) Available only with shells type B and Q.

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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.

Dimensions in mm

1) Available only with shells type B and Q.
The indicated weights are average values (not binding). The drawings are not strictly binding.

### Example

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

\[ \text{Slide bearing E M Z L K 14-125} \]

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

<table>
<thead>
<tr>
<th>d12</th>
<th>d13</th>
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<th>d17</th>
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<th>weight [kg]</th>
<th>oil capacity approx. [l/min]</th>
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G = B.S.P.
Shaft Dimensions

Locating bearing
Type of bearing shell
E...B (d24)
E...K (d24)
E...E (d24)
E...A (Shaft design on request)**

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

Dimensions in mm

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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 b9 between the collars may be increased.
3) Tolerances of form and position to DIN 31 699.
4) Degree of accuracy B 10 (radial), Degree of accuracy B 20 (axial); others upon request.
5) General tolerance DIN 7168 m5.

Notes:
- 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 b9 between the collars may be increased.
- 3) Where a locating bearing is only required for a test run, the dimension b13 can be increased by 3...6 mm. In this case dimensions “b6” and “b6” have to be considered.
- 4) All diameters d30 are for standard machine seals and are valid for each shaft diameter D. In case of rigid seals dimensions on request.
- 5) Rigid seal.
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