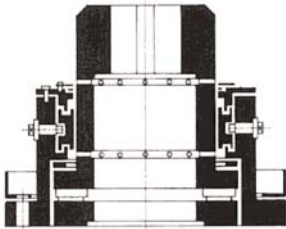


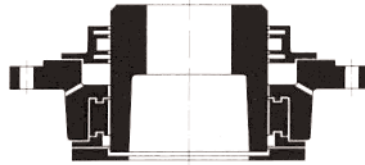
Vertical Bearings and Inserts Series EV For Highspeed Machines



Type EVE



Type EVF



RENK vertical bearings and inserts series EV are vertical bearings of the most up-to-date design. They have been developed for electrical machines, turbines, pumps and blowers of vertical construction.

Many years of experience in the manufacture of vertical bearings, plus the latest methods of computing bearing performance, together with systematic design improvements have culminated in the highly successful EV series. This leaflet offers details on type EVF, guide bearings and on type EVE, single-acting thrust and guide bearings.

The main components for the EVE type for downward thrust loads of 50 to 1300 kN are available from stock. Shafts to fit the EVE and EVF bearings range in size from 80 to 560 mm diameter.

On request, we can also supply details on type EVD, a double acting vertical bearing, suitable for taking heavy upward and downward loads.



Technical Information

Vertical bearings type EV consist of a main body, a runner and an oil tank.

The vertical bearing inserts type EVF are provided with a journal part to accommodate radial loads. Type EVE is fitted with a thrust part to take thrust loads.

The runner ensures the transfer of forces to the radial tilting pads and to the RD circular pads (RD thrust pads) respectively. The runner is connected to the shaft by a tight shrink fit or by a loose shrink fit and a fitting key. In the case of EVF type guide bearings flanged shaft and runner can be machined from one piece.

If required, the EV vertical inserts can be supplied with an oil tank of suitable size, unless the machine housing has the function of an oil tank or unless the customer prefers to fit the machine with an oil tank of his own manufacture.

Thrust Parts

One of the basic features of the EVE type bearings are the RD circular tilting pads made from mild steel (C 10) with the working surface made from RENKmetal therm V89. These circular pads are supported by cup springs which ensure an equalization of load distribution. In case of damage, the RD circular pads can be replaced individually.

When slight upward forces or shocks occur with a particular application, the EVE type bearing can be fitted with a thrust part with sliding surfaces coated with RENKmetal therm V89.

Journal Part

The journal part of an EV type bearing consists of individually adjustable radial tilting pads made from mild steel (C 10). The running surface of the pads is coated with

RENKmetal therm V89. That is why, here again, individual pads can be replaced as required.

Since the radial tilting pads are adjustable, it is possible to modify the elastic and damping characteristics of the oil film during test runs or on site. In this way the critical shaft speed with respect to bending deflection can be influenced. Individual adjustable pads allow for the rotor centre to be offset within the machine.

For special design it is possible to replace the radial tilting pads by a plain cylindrical flanged shell.

Heat Dissipation and Lubrication

Depending on operating conditions the dissipation losses of the bearing can be transferred by natural cooling through the oil reservoir surface, by additional water cooling in the oil sump or by external cooling of the circulating oil.

The safest manner to operate vertical bearings is with self-lubrication with the lubricating oil fed to the thrust and journal pads by the transfer action of the rotating runner. Whenever an oil circulating system is used, the oil reservoir should be large enough to guarantee emergency self-lubrication in case of a breakdown of the oil circulating system.

Seals

Standard oil reservoirs are fitted with seals conforming to type of protection IP 42. Seals for higher protection grades can be fitted on request. To prevent oil mist from being sucked out by external local vacuum, dual (DUO) seals are provided where internal pressure can be made to conform to external influences by the equalization of atmospheric pressure or by admission of higher pressure.

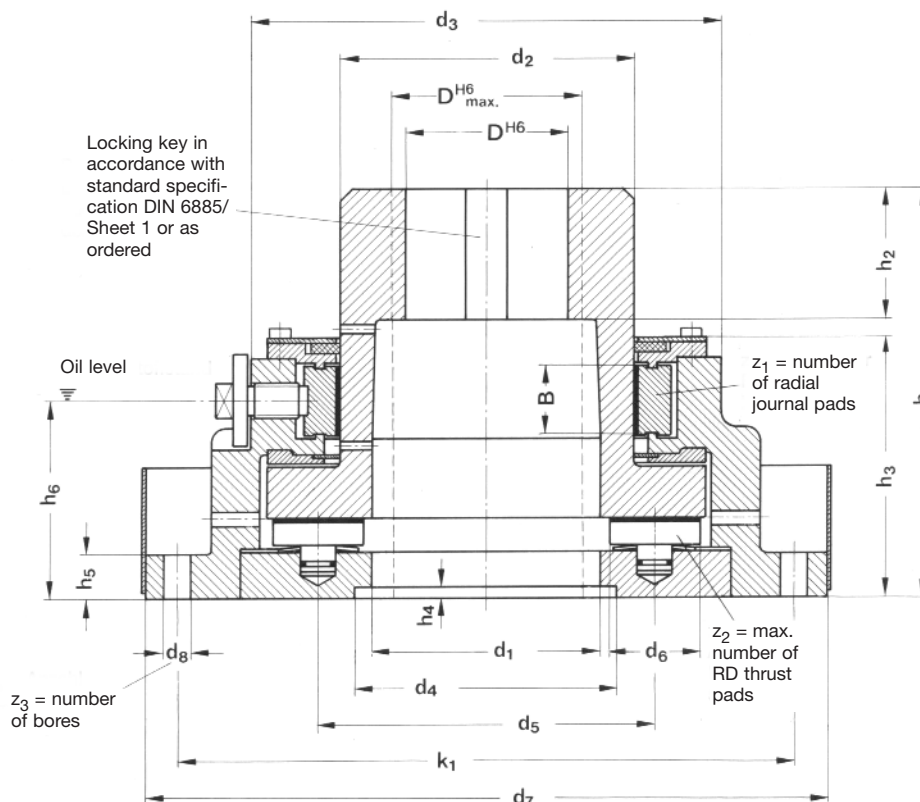
Admissible Thrust Loads

The table on the right indicates the admissible continuous upwards loads for the EVE type inserts equipped with plain sliding surfaces (B) or with taper land surfaces (K) for both senses of rotation.

Size	B kN	K kN
01	1,5	11,9
02	1,7	13,3
03	2,0	14,8
04	2,2	16,2
05	2,7	28,1
06	3,1	27,7
07	3,7	29,9
08	4,2	32,7
09	6,4	48,2
010	6,8	55,0
011	6,7	56,8
012	7,8	62,6
013	9,3	91,3
014	10,7	98,6
015	12,8	121,9
016	14,5	133,6
017	20,3	180,3
018	23,6	202,9

① Series	EV
② Type	<ul style="list-style-type: none"> E single-acting thrust bearing with RD pads and guide bearings D¹⁾ double-acting thrust bearing with RD pads and guide bearings F guide bearing only
③ Thrust part	<ul style="list-style-type: none"> K radial journal pads C¹⁾ plain cylindrical bore or other special design
④ Housing	<ul style="list-style-type: none"> O mounting flange - top (with guide bearings only) U mounting flange - bottom
Example	
for quoting a vertical bearing main body as a single-acting thrust bearing, with RD pads and guide bearing with radial journal pads, mounting flange of housing at the bottom, size 05:	
① ② ③ ④	
Vertical Bearing Insert Type EV E K U 05	
*) Full specification and technical information on request.	

Dimensions of Bearing Inserts Thrust Bearings EVE



Dimensions in mm

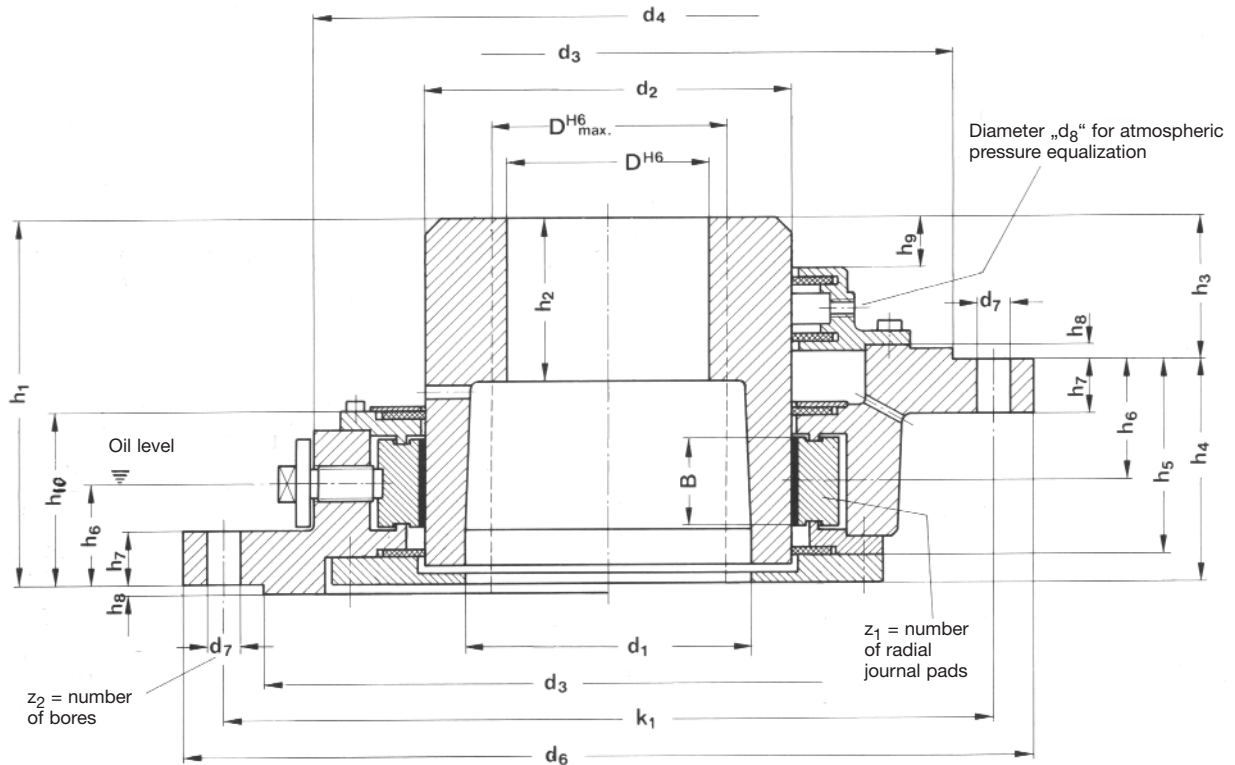
F_S = vertical starting load

F_A = vertical operating load

Size	D	D max.	B	d_1	d_2	d_3	d_4	d_5	d_6	d_7	d_8	h_1	h_2	h_3	h_4	h_5	h_6	k_1	z_1	z_2	z_3	F_S kN	F_A kN	Weight kg
01	70	80	31	98	125	205	110	150	40	300	11	190	55	126	6	22	95	270	5	10	5	31	50	40
02	80	90	31	110	140	220	125	170	40	320	11	190	55	126	6	22	95	290	5	12	5	38	60	45
03	90	100	40	125	160	260	140	190	50	370	13,5	225	70	146	6	25	110	335	5	10	5	49	79	70
04	100	110	40	138	180	280	160	215	50	395	13,5	225	70	146	6	25	110	360	5	12	5	59	94	80
05	110	125	50	155	200	320	180	230	63	465	17,5	280	90	178	8	30	135	420	5	10	5	78	125	135
06	125	140	50	175	225	345	200	260	63	495	17,5	280	90	178	8	30	135	450	5	12	6	94	150	155
07	140	160	63	194	250	400	225	290	80	575	22	345	110	220	8	35	165	520	6	10	6	126	201	250
08	160	180	63	220	280	430	250	325	80	620	22	345	110	220	8	35	165	565	6	12	6	151	241	290
09	180	200	80	245	315	490	280	375	100	685	26	415	140	258	10	40	195	620	6	10	6	196	314	395
010	200	225	80	265	335	510	315	400	100	710	26	415	140	258	10	40	195	645	6	12	6	236	377	425
011	225	250	100	295	375	575	335	450	112	820	33	510	180	308	10	50	235	740	6	12	6	285	456	700
012	250	280	100	335	425	625	375	510	112	880	33	510	180	308	10	50	235	800	6	14	6	333	532	805
013	280	315	125	365	475	700	425	520	125	1000	39	615	225	365	12	60	275	900	8	12	8	368	589	1255
014	315	355	125	410	530	755	475	580	125	1060	39	615	225	365	12	60	275	960	8	14	8	430	687	1410
015	355	400	160	470	600	860	530	650	140	1200	45	750	280	445	12	70	335	1080	8	14	8	539	862	2300
016	400	450	160	530	670	930	600	740	140	1280	45	750	280	445	12	70	335	1160	8	16	8	616	985	2620
017	450	500	200	590	750	1040	670	780	160	1430	52	930	355	529	14	80	390	1290	8	14	8	704	1125	4050
018	500	560	200	670	850	1140	750	860	160	1530	52	930	355	529	14	80	390	1390	8	16	8	804	1286	4640

Dimensions of Bearings Inserts

Guide Bearings EVF

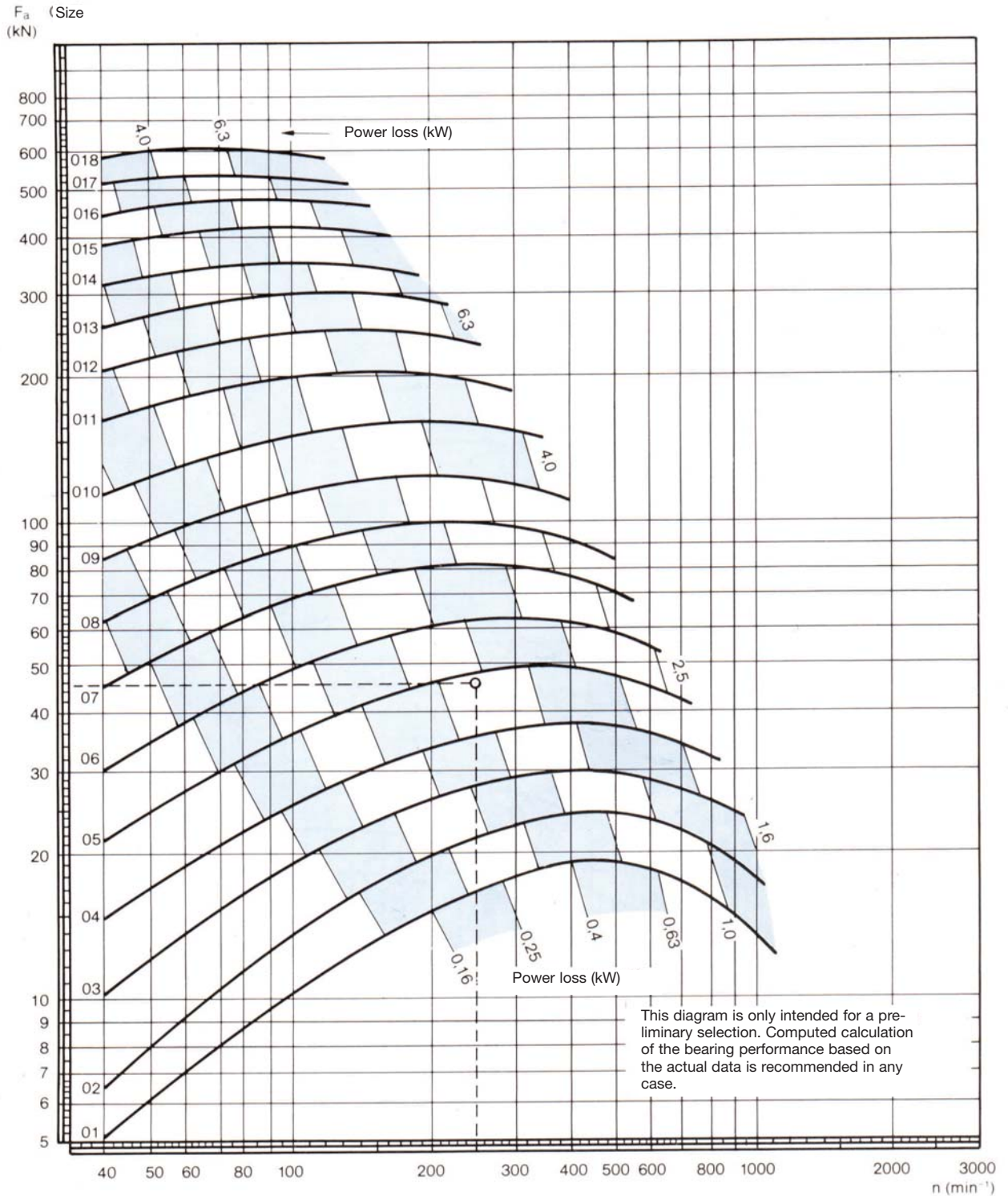


Dimensions in mm

G = R.P.M.

Size	D	D max.	B	d_1	d_2	d_3	d_4	d_6	d_7	d_8	h_1	h_2	h_3	h_4	h_5	h_6	h_7	h_8	h_9	h_{10}	k_1	z_1	z_2	Weight kg
01	70	80	31	98	125	240	205	300	11	G 1/4	161	70	59	88	79	51	22	6	4	82	270	5	5	25
02	80	90	31	110	140	260	220	320	11	G 1/4	161	70	59	88	79	51	22	6	4	82	290	5	5	28
03	90	100	40	125	160	300	260	370	13,5	G 1/4	169	70	61	98	87	54	25	6	6	90	335	5	5	45
04	100	110	40	138	180	325	280	395	13,5	G 3/8	169	70	61	98	87	54	25	6	6	90	360	5	5	50
05	110	125	50	155	200	375	320	465	17,5	G 3/8	212	90	78	122	107	67	30	8	13	110	420	5	5	81
06	125	140	50	175	225	405	345	495	17,5	G 3/8	212	90	78	122	107	67	30	8	13	110	450	5	6	93
07	140	160	63	194	250	465	400	575	22	G 1/2	252	110	108	139	122	72	35	8	37	127	520	6	6	150
08	160	180	63	220	280	510	430	620	22	G 1/2	252	110	108	139	122	72	35	8	37	127	565	6	6	175
09	180	200	80	245	315	555	490	685	26	G 1/2	314	140	126	173	152	94	40	10	50	157	620	6	6	240
010	200	225	80	265	335	580	510	710	26	G 3/4	314	140	126	173	152	94	40	10	50	157	645	6	6	255
011	225	250	100	295	375	660	575	820	33	G 3/4	379	180	171	200	172	104	50	10	80	177	740	6	6	420
012	250	280	100	335	425	720	625	880	33	G 3/4	379	180	171	200	172	104	50	10	80	177	800	6	6	485
013	280	315	125	365	475	800	700	1000	39	G 1	454	225	226	229	199	114	60	12	126	204	900	8	8	755
014	315	355	125	410	530	860	755	1060	39	G 1	454	225	226	229	199	114	60	12	126	204	960	8	8	845
015	355	400	160	470	600	960	860	1200	45	G 1 1/2	557	280	273	285	247	142	70	12	166	252	1080	8	8	1380
016	400	450	160	530	670	1040	930	1280	45	G 1 1/2	557	280	273	285	247	142	70	12	166	252	1160	8	8	1575
017	450	500	200	590	750	1150	1040	1430	52	G 1 1/2	692	355	388	320	285	152	80	14	269	291	1290	8	8	2430
018	500	560	200	670	850	1250	1140	1530	52	G 1 1/2	692	355	388	320	285	152	80	14	269	291	1390	8	8	2785

Load Diagram Admissible Thrust Loads For Natural Cooling



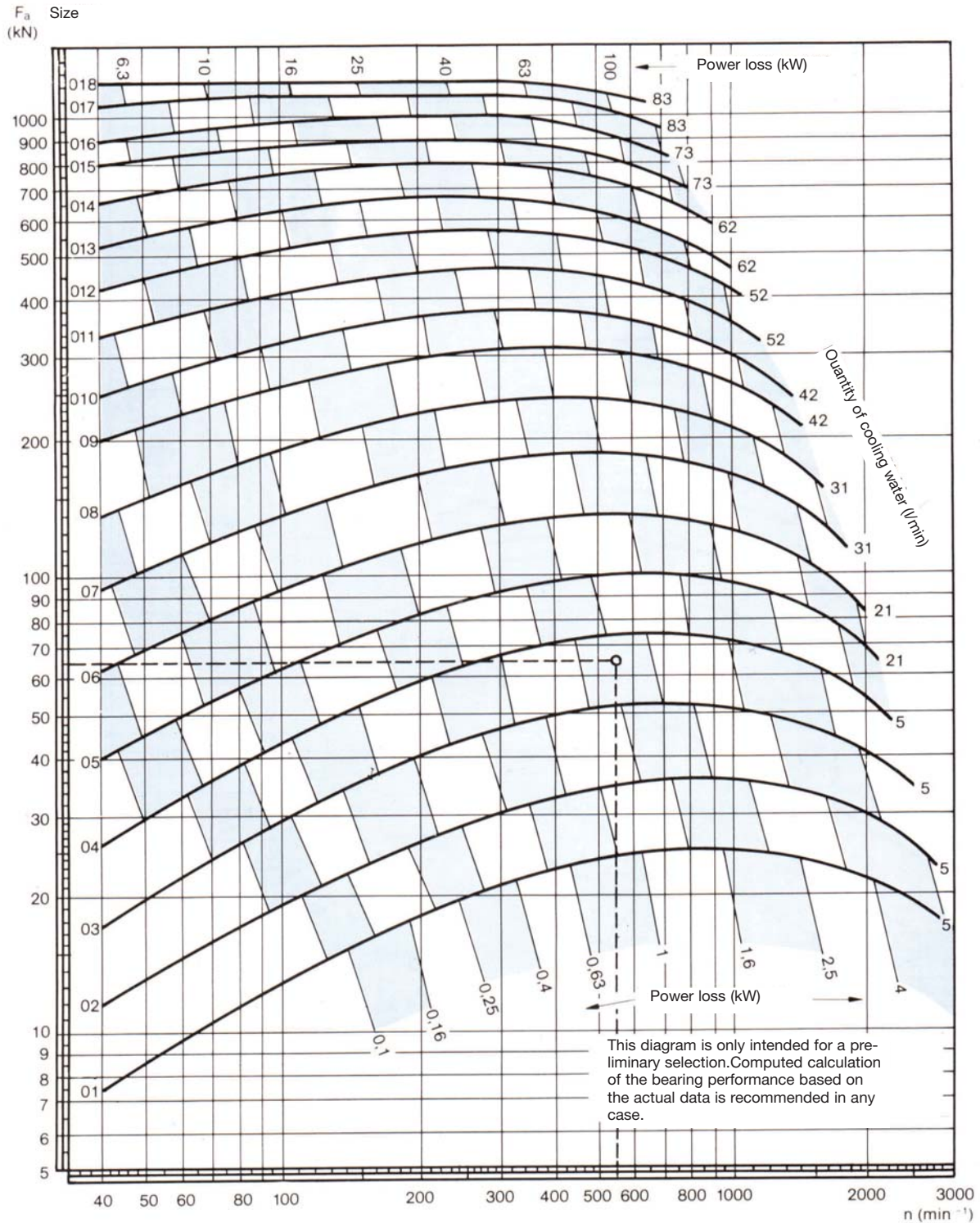
This diagram is only intended for a preliminary selection. Computed calculation of the bearing performance based on the actual data is recommended in any case.

Oil viscosity: ISO VG 68
Ambient temperature: 40°C

Example:
 $F_a = 46$ kN, $n = 250$ min⁻¹

Selected: type EV bearing main body, size 05
Power loss: approx. 0,8 kW

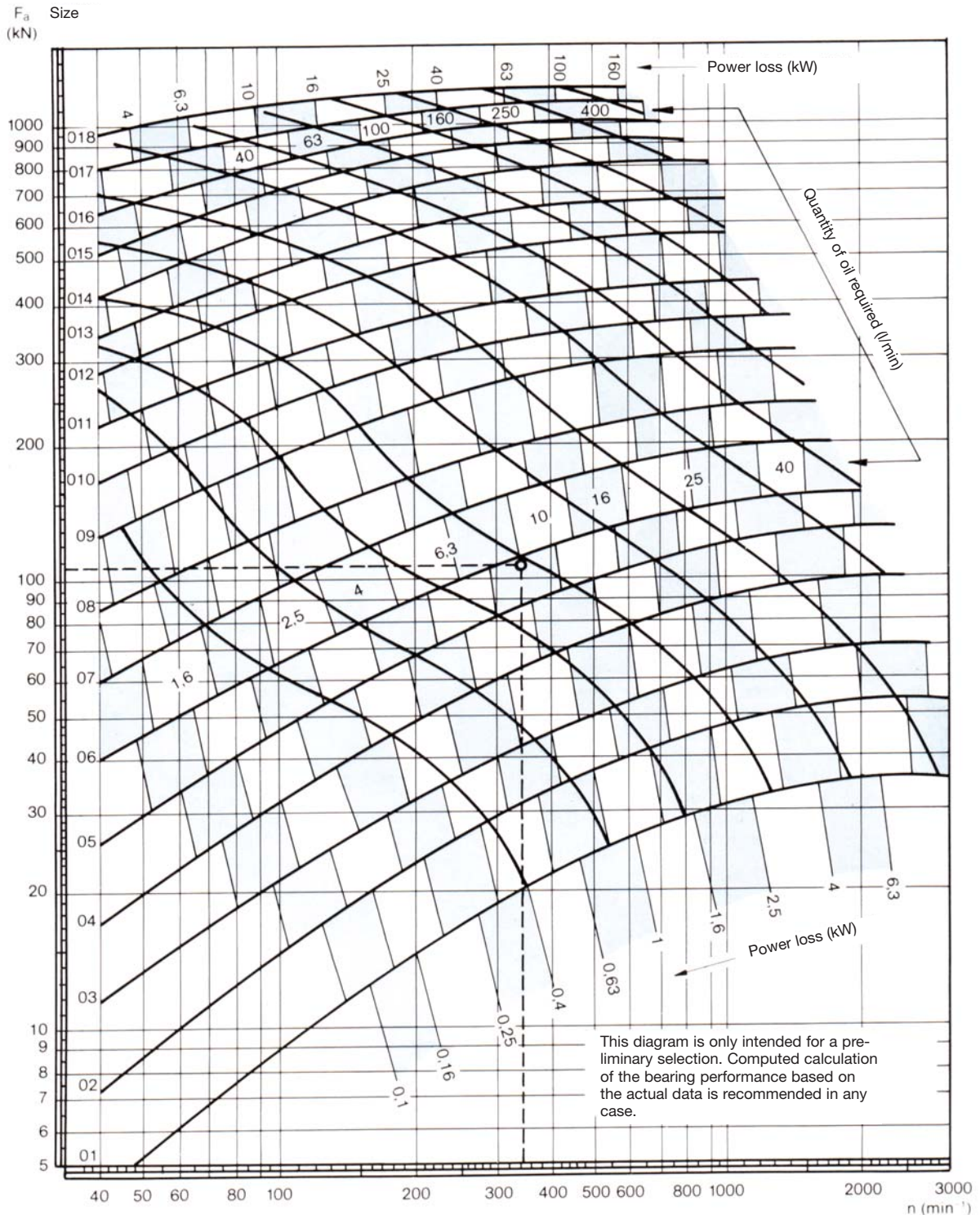
Load Diagram Admissible Thrust Loads For Water Cooling



Oil viscosity: ISO VG 68
 Ambient temperature: 40°C
 Water temperature: 20°C

Example:
 $F_a = 65 \text{ kN}$, $n = 540 \text{ min}^{-1}$
 Selected: type EV bearing main body, water cooled, size 04
 Quantity of cooling water: 5 l/min
 Power loss: approx. 2 kW

Load Diagram Admissible Thrust Load For Oil Circulation Lubrication



Oil viscosity: ISO VG 68
 Ambient temperature: 40°C
 Oil inlet temperature: 40°C

Example:
 $F_a = 105 \text{ kN}$, $n = 345 \text{ min}^{-1}$
 Selected: type EV bearing main body, oil circulation lubrication, size 06
 Quantity of oil required: 6,3 l/min
 Power loss: approx. 1,9 kW

Sales Organisation



Headquarters and Manufacturing Plant



RENK AKTIENGESELLSCHAFT
Werk Hannover
Weltausstellungsallee 21
D-30539 Hannover
Phone: +49 (5 11) 86 01-0
Fax: +49 (5 11) 86 01-288
Email: info.hannover@renk.biz
Internet: www.renk.biz

Manufacturing Plant

OMEGA RENK BEARINGS PVT. LTD.
Anand Nagar, Raisen Road
Bhopal - 462 021
India
Phone: (91 -7 55) 5 28 45 61
Fax: (91 -7 55) 2 75 16 26
Email: omtec@sancharnet.in
Internet: www.omegarenk.com

Sales Agencies

Australia	Liechtenstein
Austria	Luxembourg
Belgium	Mexico
Brazil	Netherlands
Canada	Norway
Czech Republic	PR China
Croatia	Slovak Republic
Finland	Slovenia Republic
France	South Africa
G.B. and Ireland	South Korea
Hungary	Spain
India	Switzerland
Italy	USA
Japan	

Assembly and Distribution Centers with Sales and Engineering Support



RENK Corporation
304, Tucapau Road
29334 Duncan S.C.
USA
Phone: (1-8 64) 4 33 00 69
Fax: (1-8 64) 4 33 06 36



COFICAL RENK MANCAIS DO BRASIL LTDA.
Rodovia BR-280,
km 54 - Em frente ao Parque Municipal de
Exposições
CEP 89270-000 - Guaramirim - SC - Brasil
Phone: (55-4) 737 36 400
Fax: (55-4) 737 36 499



MAN B&W Diesel
MAN B&W (Japan) Ltd.
RH Division;
Fuji Building (Room 121)
3-2-3 Marunouchi
Chiyoda-ku, Tokyo 100-0005
Japan
Phone: (81-3) 3215 1310
Fax: (81-3) 3284 0867