

LUDECA Normalized Bearing File

Fault frequency information is very important in vibration analysis and reliability efforts. This information allows the analyst to correlate vibration data to specific components in the equipment that may be in some stage of failure. Correctly addressing these failure conditions will increase equipment reliability resulting in greater uptime, increased capacity, improved product quality, better safety, lower costs, and reduced risks.

Bearing related failures are one of the most common faults encountered in plant equipment. Obtaining the required information to accurately determine bearing fault frequencies is a constant challenge for vibration analysts and reliability professionals. For this reason, LUDECA, INC. has created normalized bearing information that contains approximated bearing fault frequencies without the need to know the manufacturer and other difficult to obtain bearing information.

The data available in this document is also available as direct import into our OMNITREND Condition Monitoring software.



The following information is based upon normalized calculations providing approximated order-based fault frequency values for bearings. To determine the approximate bearing fault frequency values simply look up the number of balls/rollers for the bearing and multiply the values shown by the speed of the shaft. For example, if the bearing has 22 balls/rollers and the shaft is rotating at 1800 RPM the following approximated bearing fault frequency information is obtained:

Rotational speed: 1800 RPM

Number of balls/rollers: 22

	BPFI	BPFO	BSF	FTF Units	Ref Speed
	21960	17640	7740	801 RPM	1800 RPM
	366	294	129	13.35 Hz	30 Hz
	12.2	9.8	4.3	0.445 Orders	1800 RPM

Where:

BPFI is the ball pass frequency inner race

BPFO is the ball pass frequency outer race

BSF is the ball spin frequency

FTF is the fundamental train frequency

Number of Balls/Rollers	FTF	BSF	BPFI	BPFO
5	0.260000	1.35	3.4	1.6
6	0.300000	1.60	3.9	2.1
7	0.328571	1.85	4.4	2.6
8	0.350000	2.10	4.9	3.1
9	0.366667	2.35	5.4	3.6
10	0.380000	2.60	5.9	4.1

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Number of Balls/Rollers	FTF	BSF	BPFI	BPFO
11	0.390909	1.45	6.8	4.2
12	0.400000	1.70	7.3	4.7
13	0.407692	1.95	7.8	5.2
14	0.414286	2.20	8.3	5.7
15	0.420000	2.45	8.8	6.2
16	0.425000	2.70	9.3	6.7
17	0.429412	2.95	9.8	7.2
18	0.433333	3.20	10.3	7.7
19	0.436842	3.45	10.8	8.2
20	0.440000	3.70	11.3	8.7
21	0.442857	3.95	11.8	9.2
22	0.445455	4.20	12.3	9.7
23	0.447826	4.45	12.8	10.2
24	0.450000	4.70	13.3	10.7
25	0.452000	4.95	13.8	11.2
26	0.453846	5.20	14.3	11.7
27	0.455556	5.45	14.8	12.2
28	0.457143	5.70	15.3	12.7
29	0.458621	5.95	15.8	13.2
30	0.460000	6.20	16.3	13.7
31	0.461290	6.45	16.8	14.2
32	0.462500	6.70	17.3	14.7
33	0.463636	6.95	17.8	15.2
34	0.464706	7.20	18.3	15.7
35	0.465714	7.45	18.8	16.2
36	0.466667	7.70	19.3	16.7
37	0.467568	7.95	19.8	17.2
38	0.468421	8.20	20.3	17.7
39	0.469231	8.45	20.8	18.2
40	0.470000	8.70	21.3	18.7
41	0.470732	8.95	21.8	19.2
42	0.471429	9.20	22.3	19.7
43	0.472093	9.45	22.8	20.2
44	0.472727	9.70	23.3	20.7
45	0.473333	9.95	23.8	21.2
46	0.473913	10.20	24.3	21.7
47	0.474468	10.45	24.8	22.2
48	0.475000	10.70	25.3	22.7
49	0.475510	10.95	25.8	23.2
50	0.476000	11.20	26.3	23.7
51	0.476471	11.45	26.8	24.2
52	0.476923	11.70	27.3	24.7
53	0.477358	11.95	27.8	25.2
54	0.477778	12.20	28.3	25.7
55	0.478182	12.45	28.8	26.2

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Number of Balls/Rollers	FTF	BSF	BPM	BPM
56	0.478571	12.70	29.3	26.7
57	0.478947	12.95	29.8	27.2
58	0.479310	13.20	30.3	27.7
59	0.479661	13.45	30.8	28.2
60	0.480000	13.70	31.3	28.7
61	0.480328	13.95	31.8	29.2
62	0.480645	14.20	32.3	29.7
63	0.480952	14.45	32.8	30.2
64	0.481250	14.70	33.3	30.7
65	0.481538	14.95	33.8	31.2
66	0.481818	15.20	34.3	31.7
67	0.482090	15.45	34.8	32.2
68	0.482353	15.70	35.3	32.7
69	0.482609	15.95	35.8	33.2
70	0.482857	16.20	36.3	33.7
71	0.483099	16.45	36.8	34.2
72	0.483333	16.70	37.3	34.7
73	0.483562	16.95	37.8	35.2
74	0.483784	17.20	38.3	35.7
75	0.484000	17.45	38.8	36.2
76	0.484211	17.70	39.3	36.7
77	0.484416	17.95	39.8	37.2
78	0.484615	18.20	40.3	37.7
79	0.484810	18.45	40.8	38.2
80	0.485000	18.70	41.3	38.7
81	0.485185	18.95	41.8	39.2
82	0.485366	19.20	42.3	39.7
83	0.485542	19.45	42.8	40.2
84	0.485714	19.70	43.3	40.7
85	0.485882	19.95	43.8	41.2
86	0.486047	20.20	44.3	41.7
87	0.486207	20.45	44.8	42.2
88	0.486364	20.70	45.3	42.7
89	0.486517	20.95	45.8	43.2
90	0.486667	21.20	46.3	43.7
91	0.486813	21.45	46.8	44.2
92	0.486957	21.70	47.3	44.7
93	0.487097	21.95	47.8	45.2
94	0.487234	22.20	48.3	45.7
95	0.487368	22.45	48.8	46.2
96	0.487500	22.70	49.3	46.7
97	0.487629	22.95	49.8	47.2
98	0.487755	23.20	50.3	47.7
99	0.487879	23.45	50.8	48.2
100	0.488000	23.70	51.3	48.7

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Number of Balls/Rollers	FTF	BSF	BPM	BPM
101	0.488119	23.95	51.8	49.2
102	0.488235	24.20	52.3	49.7
103	0.488350	24.45	52.8	50.2
104	0.488462	24.70	53.3	50.7
105	0.488571	24.95	53.8	51.2
106	0.488679	25.20	54.3	51.7
107	0.488785	25.45	54.8	52.2
108	0.488889	25.70	55.3	52.7
109	0.488991	25.95	55.8	53.2
110	0.489091	26.20	56.3	53.7
111	0.489189	26.45	56.8	54.2
112	0.489286	26.70	57.3	54.7
113	0.489381	26.95	57.8	55.2
114	0.489474	27.20	58.3	55.7
115	0.489565	27.45	58.8	56.2
116	0.489655	27.70	59.3	56.7
117	0.489744	27.95	59.8	57.2
118	0.489831	28.20	60.3	57.7
119	0.489916	28.45	60.8	58.2
120	0.490000	28.70	61.3	58.7
121	0.490083	28.95	61.8	59.2
122	0.490164	29.20	62.3	59.7
123	0.490244	29.45	62.8	60.2
124	0.490323	29.70	63.3	60.7
125	0.490400	29.95	63.8	61.2
126	0.490476	30.20	64.3	61.7
127	0.490551	30.45	64.8	62.2
128	0.490625	30.70	65.3	62.7
129	0.490698	30.95	65.8	63.2
130	0.490769	31.20	66.3	63.7
131	0.490840	31.45	66.8	64.2
132	0.490909	31.70	67.3	64.7
133	0.490977	31.95	67.8	65.2
134	0.491045	32.20	68.3	65.7
135	0.491111	32.45	68.8	66.2
136	0.491176	32.70	69.3	66.7
137	0.491241	32.95	69.8	67.2
138	0.491304	33.20	70.3	67.7
139	0.491367	33.45	70.8	68.2
140	0.491429	33.70	71.3	68.7
141	0.491489	33.95	71.8	69.2
142	0.491549	34.20	72.3	69.7
143	0.491608	34.45	72.8	70.2
144	0.491667	34.70	73.3	70.7
145	0.491724	34.95	73.8	71.2

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Number of Balls/Rollers	FTF	BSF	BPM	BPM
146	0.491781	35.20	74.3	71.7
147	0.491837	35.45	74.8	72.2
148	0.491892	35.70	75.3	72.7
149	0.491946	35.95	75.8	73.2
150	0.492000	36.20	76.3	73.7
151	0.492053	36.45	76.8	74.2
152	0.492105	36.70	77.3	74.7
153	0.492157	36.95	77.8	75.2
154	0.492208	37.20	78.3	75.7
155	0.492258	37.45	78.8	76.2
156	0.492308	37.70	79.3	76.7
157	0.492357	37.95	79.8	77.2
158	0.492405	38.20	80.3	77.7
159	0.492453	38.45	80.8	78.2
160	0.492500	38.70	81.3	78.7
161	0.492547	38.95	81.8	79.2
162	0.492593	39.20	82.3	79.7
163	0.492638	39.45	82.8	80.2
164	0.492683	39.70	83.3	80.7
165	0.492727	39.95	83.8	81.2
166	0.492771	40.20	84.3	81.7
167	0.492814	40.45	84.8	82.2
168	0.492857	40.70	85.3	82.7
169	0.492899	40.95	85.8	83.2
170	0.492941	41.20	86.3	83.7
171	0.492982	41.45	86.8	84.2
172	0.493023	41.70	87.3	84.7
173	0.493064	41.95	87.8	85.2
174	0.493103	42.20	88.3	85.7
175	0.493143	42.45	88.8	86.2
176	0.493182	42.70	89.3	86.7
177	0.493220	42.95	89.8	87.2
178	0.493258	43.20	90.3	87.7
179	0.493296	43.45	90.8	88.2
180	0.493333	43.70	91.3	88.7
181	0.493370	43.95	91.8	89.2
182	0.493407	44.20	92.3	89.7
183	0.493443	44.45	92.8	90.2
184	0.493478	44.70	93.3	90.7
185	0.493514	44.95	93.8	91.2
186	0.493548	45.20	94.3	91.7
187	0.493583	45.45	94.8	92.2
188	0.493617	45.70	95.3	92.7
189	0.493651	45.95	95.8	93.2
190	0.493684	46.20	96.3	93.7

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Number of Balls/Rollers	FTF	BSF	BPFI	BPFO
191	0.493717	46.45	96.8	94.2
192	0.493750	46.70	97.3	94.7
193	0.493782	46.95	97.8	95.2
194	0.493814	47.20	98.3	95.7
195	0.493846	47.45	98.8	96.2
196	0.493878	47.70	99.3	96.7
197	0.493909	47.95	99.8	97.2
198	0.493939	48.20	100.3	97.7
199	0.493970	48.45	100.8	98.2
200	0.494000	48.70	101.3	98.7
201	0.494030	48.95	101.8	99.2
202	0.494059	49.20	102.3	99.7
203	0.494089	49.45	102.8	100.2
204	0.494118	49.70	103.3	100.7
205	0.494146	49.95	103.8	101.2
206	0.494175	50.20	104.3	101.7
207	0.494203	50.45	104.8	102.2
208	0.494231	50.70	105.3	102.7
209	0.494258	50.95	105.8	103.2
210	0.494286	51.20	106.3	103.7
211	0.494313	51.45	106.8	104.2
212	0.494340	51.70	107.3	104.7
213	0.494366	51.95	107.8	105.2
214	0.494393	52.20	108.3	105.7
215	0.494419	52.45	108.8	106.2
216	0.494444	52.70	109.3	106.7
217	0.494470	52.95	109.8	107.2
218	0.494495	53.20	110.3	107.7
219	0.494521	53.45	110.8	108.2
220	0.494545	53.70	111.3	108.7
221	0.494570	53.95	111.8	109.2
222	0.494595	54.20	112.3	109.7
223	0.494619	54.45	112.8	110.2
224	0.494643	54.70	113.3	110.7
225	0.494667	54.95	113.8	111.2
226	0.494690	55.20	114.3	111.7
227	0.494714	55.45	114.8	112.2
228	0.494737	55.70	115.3	112.7
229	0.494760	55.95	115.8	113.2
230	0.494783	56.20	116.3	113.7
231	0.494805	56.45	116.8	114.2
232	0.494828	56.70	117.3	114.7
233	0.494850	56.95	117.8	115.2
234	0.494872	57.20	118.3	115.7
235	0.494894	57.45	118.8	116.2

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Number of Balls/Rollers	FTF	BSF	BPFI	BPFO
236	0.494915	57.70	119.3	116.7
237	0.494937	57.95	119.8	117.2
238	0.494958	58.20	120.3	117.7
239	0.494979	58.45	120.8	118.2
240	0.495000	58.70	121.3	118.7
241	0.495021	58.95	121.8	119.2
242	0.495041	59.20	122.3	119.7
243	0.495062	59.45	122.8	120.2
244	0.495082	59.70	123.3	120.7
245	0.495102	59.95	123.8	121.2
246	0.495122	60.20	124.3	121.7
247	0.495142	60.45	124.8	122.2
248	0.495161	60.70	125.3	122.7
249	0.495181	60.95	125.8	123.2
250	0.495200	61.20	126.3	123.7
251	0.495219	61.45	126.8	124.2
252	0.495238	61.70	127.3	124.7
253	0.495257	61.95	127.8	125.2
254	0.495276	62.20	128.3	125.7
255	0.495294	62.45	128.8	126.2
256	0.495313	62.70	129.3	126.7
257	0.495331	62.95	129.8	127.2
258	0.495349	63.20	130.3	127.7
259	0.495367	63.45	130.8	128.2
260	0.495385	63.70	131.3	128.7
261	0.495402	63.95	131.8	129.2
262	0.495420	64.20	132.3	129.7
263	0.495437	64.45	132.8	130.2
264	0.495455	64.70	133.3	130.7
265	0.495472	64.95	133.8	131.2
266	0.495489	65.20	134.3	131.7
267	0.495506	65.45	134.8	132.2
268	0.495522	65.70	135.3	132.7
269	0.495539	65.95	135.8	133.2
270	0.495556	66.20	136.3	133.7
271	0.495572	66.45	136.8	134.2
272	0.495588	66.70	137.3	134.7
273	0.495604	66.95	137.8	135.2
274	0.495620	67.20	138.3	135.7
275	0.495636	67.45	138.8	136.2
276	0.495652	67.70	139.3	136.7
277	0.495668	67.95	139.8	137.2
278	0.495683	68.20	140.3	137.7
279	0.495699	68.45	140.8	138.2
280	0.495714	68.70	141.3	138.7

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Number of Balls/Rollers	FTF	BSF	BPFI	BPFO
281	0.495730	68.95	141.8	139.2
282	0.495745	69.20	142.3	139.7
283	0.495760	69.45	142.8	140.2
284	0.495775	69.70	143.3	140.7
285	0.495789	69.95	143.8	141.2
286	0.495804	70.20	144.3	141.7
287	0.495819	70.45	144.8	142.2
288	0.495833	70.70	145.3	142.7
289	0.495848	70.95	145.8	143.2
290	0.495862	71.20	146.3	143.7
291	0.495876	71.45	146.8	144.2
292	0.495890	71.70	147.3	144.7
293	0.495904	71.95	147.8	145.2
294	0.495918	72.20	148.3	145.7
295	0.495932	72.45	148.8	146.2
296	0.495946	72.70	149.3	146.7
297	0.495960	72.95	149.8	147.2
298	0.495973	73.20	150.3	147.7
299	0.495987	73.45	150.8	148.2
300	0.496000	73.70	151.3	148.7
301	0.496013	73.95	151.8	149.2
302	0.496026	74.20	152.3	149.7
303	0.496040	74.45	152.8	150.2
304	0.496053	74.70	153.3	150.7
305	0.496066	74.95	153.8	151.2
306	0.496078	75.20	154.3	151.7
307	0.496091	75.45	154.8	152.2
308	0.496104	75.70	155.3	152.7
309	0.496117	75.95	155.8	153.2
310	0.496129	76.20	156.3	153.7
311	0.496141	76.45	156.8	154.2
312	0.496154	76.70	157.3	154.7
313	0.496166	76.95	157.8	155.2
314	0.496178	77.20	158.3	155.7
315	0.496190	77.45	158.8	156.2
316	0.496203	77.70	159.3	156.7
317	0.496215	77.95	159.8	157.2
318	0.496226	78.20	160.3	157.7
319	0.496238	78.45	160.8	158.2
320	0.496250	78.70	161.3	158.7
321	0.496262	78.95	161.8	159.2
322	0.496273	79.20	162.3	159.7
323	0.496285	79.45	162.8	160.2
324	0.496296	79.70	163.3	160.7
325	0.496308	79.95	163.8	161.2

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Number of Balls/Rollers	FTF	BSF	BPM	BPM
326	0.496319	80.20	164.3	161.7
327	0.496330	80.45	164.8	162.2
328	0.496341	80.70	165.3	162.7
329	0.496353	80.95	165.8	163.2
330	0.496364	81.20	166.3	163.7
331	0.496375	81.45	166.8	164.2
332	0.496386	81.70	167.3	164.7
333	0.496396	81.95	167.8	165.2
334	0.496407	82.20	168.3	165.7
335	0.496418	82.45	168.8	166.2
336	0.496429	82.70	169.3	166.7
337	0.496439	82.95	169.8	167.2
338	0.496450	83.20	170.3	167.7
339	0.496460	83.45	170.8	168.2
340	0.496471	83.70	171.3	168.7
341	0.496481	83.95	171.8	169.2
342	0.496491	84.20	172.3	169.7
343	0.496501	84.45	172.8	170.2
344	0.496512	84.70	173.3	170.7
345	0.496522	84.95	173.8	171.2
346	0.496532	85.20	174.3	171.7
347	0.496542	85.45	174.8	172.2
348	0.496552	85.70	175.3	172.7
349	0.496562	85.95	175.8	173.2
350	0.496571	86.20	176.3	173.7
351	0.496581	86.45	176.8	174.2
352	0.496591	86.70	177.3	174.7
353	0.496601	86.95	177.8	175.2
354	0.496610	87.20	178.3	175.7
355	0.496620	87.45	178.8	176.2
356	0.496629	87.70	179.3	176.7
357	0.496639	87.95	179.8	177.2
358	0.496648	88.20	180.3	177.7
359	0.496657	88.45	180.8	178.2
360	0.496667	88.70	181.3	178.7
361	0.496676	88.95	181.8	179.2
362	0.496685	89.20	182.3	179.7
363	0.496694	89.45	182.8	180.2
364	0.496703	89.70	183.3	180.7
365	0.496712	89.95	183.8	181.2
366	0.496721	90.20	184.3	181.7
367	0.496730	90.45	184.8	182.2
368	0.496739	90.70	185.3	182.7
369	0.496748	90.95	185.8	183.2
370	0.496757	91.20	186.3	183.7

LUDECA Normalized Bearing File

Number of Balls/Rollers	FTF	BSF	BPFI	BPFO
371	0.496765	91.45	186.8	184.2
372	0.496774	91.70	187.3	184.7
373	0.496783	91.95	187.8	185.2
374	0.496791	92.20	188.3	185.7
375	0.496800	92.45	188.8	186.2
376	0.496809	92.70	189.3	186.7
377	0.496817	92.95	189.8	187.2
378	0.496825	93.20	190.3	187.7
379	0.496834	93.45	190.8	188.2
380	0.496842	93.70	191.3	188.7
381	0.496850	93.95	191.8	189.2
382	0.496859	94.20	192.3	189.7
383	0.496867	94.45	192.8	190.2
384	0.496875	94.70	193.3	190.7
385	0.496883	94.95	193.8	191.2
386	0.496891	95.20	194.3	191.7
387	0.496899	95.45	194.8	192.2
388	0.496907	95.70	195.3	192.7
389	0.496915	95.95	195.8	193.2
390	0.496923	96.20	196.3	193.7
391	0.496931	96.45	196.8	194.2
392	0.496939	96.70	197.3	194.7
393	0.496947	96.95	197.8	195.2
394	0.496954	97.20	198.3	195.7
395	0.496962	97.45	198.8	196.2
396	0.496970	97.70	199.3	196.7
397	0.496977	97.95	199.8	197.2
398	0.496985	98.20	200.3	197.7
399	0.496992	98.45	200.8	198.2
400	0.497000	98.70	201.3	198.7