

Bearing frequency data are included in this catalogue for two purposes:

- to allow machine designers to check excitation frequencies against resonant frequencies in the machine,
- to allow correct input into condition monitoring equipment that uses this data.

## Bearing Geometry and Frequencies of Bearing Parts

A roller bearing will excite vibrations at certain frequencies related to the number, size and pitch circle diameter of the rollers. To some extent this excitation is present even with new bearings in perfect condition, as the load is carried on discrete, elastic, rolling elements which are constantly changing in angular position.

The tables opposite and on the following pages indicate the frequencies of bearing parts per shaft revolution, which can be used to calculate excitation frequencies directly by multiplying the tabulated frequencies by the shaft speed.

The frequencies listed are explained as follows:

**'Cage'** – the frequency at which a point on the cage enters and leaves the loaded zone of the bearing.

**'Roller'** – the frequency at which a point on a given roller passes into contact with either the inner or outer race.

**'Outer'** – the frequency at which a point on the outer race comes into contact with successive rollers.

**'Inner'** – the frequency at which a point on the inner race comes into contact with successive rollers.

The tables also list the pitch circle diameters and number of rollers, for use with condition monitoring equipment that accepts this information.

Note that the contact angle is 0 in all cases.

## Vibration levels

Velocity readings for a properly installed new bearing may be as high as 4mm/second.

Typically, alarm levels should be set no higher than 15mm/second.

Shutdown level should be set no higher than 20mm/second.

Shaft Diameter d	Bearing Reference	Part Frequencies (per shaft rev.)				Roller details		
		Cage	Roller	Outer	Inner	PCD (mm)	No.	Diameter (mm)
35	01 B 35M	0.405	2.538	4.051	5.949	62.71	10	11.91
40	01 B 40M	0.405	2.538	4.051	5.949	62.71	10	11.91
45	01E B 45M	0.415	2.857	4.980	7.020	76.50	12	13.00
50	01E B 50M	0.415	2.857	4.980	7.020	76.50	12	13.00
	02 B 50M	0.402	2.452	4.020	5.980	80.96	10	15.88
55	01E B 55M	0.417	2.934	5.840	8.160	90.50	14	15.00
60	01E B 60M	0.417	2.934	5.840	8.160	90.50	14	15.00
	02 B 60M	0.411	2.730	4.936	7.064	98.43	12	17.46
65	01E B 65M	0.417	2.934	5.840	8.160	90.50	14	15.00
	02 B 65M	0.411	2.730	4.936	7.064	98.43	12	17.46
70	01E B 70M	0.420	3.053	5.883	8.117	106.50	14	17.00
	02 B 70M	0.411	2.719	4.932	7.068	115.89	12	20.64
75	100 B 75M	0.448	4.723	8.953	11.047	95.50	20	10.00
	01E B 75M	0.420	3.053	5.883	8.117	106.50	14	17.00
	02 B 75M	0.411	2.719	4.932	7.068	115.89	12	20.64
80	01E B 80M	0.423	3.187	6.774	9.226	124.00	16	19.00
	02 B 80M	0.417	2.917	5.833	8.167	133.35	14	22.23
85	100 B 85M	0.446	4.592	8.924	11.076	111.50	20	12.00
	01E B 85M	0.423	3.187	6.774	9.226	124.00	16	19.00
	02 B 85M	0.417	2.917	5.833	8.167	133.35	14	22.23
90	01E B 90M	0.423	3.187	6.774	9.226	124.00	16	19.00
	02 B 90M	0.417	2.917	5.833	8.167	133.35	14	22.23
95	01E B 95M	0.422	3.138	6.756	9.244	141.50	16	22.00
100	100 B 100M	0.446	4.553	8.915	11.085	129.00	20	14.00
	01E B 100M	0.422	3.138	6.756	9.244	141.50	16	22.00
	02 B 100M	0.417	2.917	5.833	8.167	152.40	14	25.40
	03 B 100M	0.384	2.038	3.839	6.161	177.80	10	41.28
105	01E B 105M	0.422	3.138	6.756	9.244	141.50	16	22.00
	02 B 105M	0.417	2.917	5.833	8.167	152.40	14	25.40
110	100 B 110M	0.442	4.251	8.840	11.160	146.50	20	17.00
	01 B 110M	0.430	3.501	6.880	9.120	158.75	16	22.23
	02 B 110M	0.417	2.917	5.833	8.167	171.45	14	28.58
	03 B 110M	0.392	2.199	3.917	6.083	190.50	10	41.28
115	01 B 115M	0.430	3.501	6.880	9.120	158.75	16	22.23
	02 B 115M	0.417	2.917	5.833	8.167	171.45	14	28.58

Shaft Diameter d	Bearing Reference	Part Frequencies (per shaft rev.)				Roller details		
		Cage	Roller	Outer	Inner	PCD (mm)	No.	Diameter (mm)
120	100 B 120M	0.447	4.627	8.932	11.068	163.46	20	17.46
	01 B 120M	0.432	3.599	6.909	9.091	174.63	16	23.81
	02 B 120M	0.417	2.917	5.833	8.167	190.50	14	31.75
	03 B 120M	0.392	2.199	3.917	6.083	190.50	10	41.28
125	01 B 125M	0.432	3.599	6.909	9.091	174.63	16	23.81
	02 B 125M	0.417	2.917	5.833	8.167	190.50	14	31.75
130	100 B 130M	0.447	4.627	8.932	11.068	163.46	20	17.46
	01 B 130M	0.432	3.599	6.909	9.091	174.63	16	23.81
	02 B 130M	0.417	2.917	5.833	8.167	190.50	14	31.75
	03 B 130M	0.398	2.360	4.781	7.219	203.20	12	41.28
135	01 B 135M	0.433	3.683	6.933	9.067	190.50	16	25.40
140	100 B 140M	0.447	4.654	8.938	11.062	179.33	20	19.05
	01 B 140M	0.433	3.683	6.933	9.067	190.50	16	25.40
	02 B 140M	0.419	3.014	5.869	8.131	206.38	14	33.34
	03 B 140M	0.393	2.226	4.714	7.286	222.25	12	47.63
145	02 B 145M	0.419	3.014	5.869	8.131	206.38	14	33.34
150	100 B 150M	0.443	4.300	8.852	11.148	193.68	20	22.23
	01 B 150M	0.438	3.938	7.875	10.125	203.20	18	25.40
	02 B 150M	0.421	3.103	6.743	9.257	222.25	16	34.93
	03 B 150M	0.395	2.270	4.737	7.263	241.30	12	50.80
155	01 B 155M	0.438	3.938	7.875	10.125	203.20	18	25.40
	02 B 155M	0.421	3.103	6.743	9.257	222.25	16	34.93
160	01 B 600-160M	0.438	3.938	7.875	10.125	203.20	18	25.40
	01 B 160M	0.438	3.997	7.891	10.109	219.08	18	26.99
	02 B 600-160M	0.421	3.103	6.743	9.257	222.25	16	34.93
	02 B 160M	0.421	3.088	5.895	8.105	241.30	14	38.10
170	03 B 160M	0.409	2.642	5.720	8.280	260.35	14	47.63
	01 B 608-170M	0.438	3.997	7.891	10.109	219.08	18	26.99
	01 B 170M	0.442	4.236	8.836	11.164	231.78	20	26.99
	02 B 170M	0.421	3.088	5.895	8.105	241.30	14	38.10
175	03 B 170M	0.409	2.642	5.720	8.280	260.35	14	47.63
	01 B 175M	0.442	4.236	8.836	11.164	231.78	20	26.99
180	02 B 175M	0.425	3.258	6.800	9.200	254.00	16	38.10
	01 B 180M	0.442	4.236	8.836	11.164	231.78	20	26.99
180	02 B 180M	0.425	3.258	6.800	9.200	254.00	16	38.10
	03 B 180M	0.411	2.717	5.753	8.247	276.23	14	49.21

Shaft Diameter d	Bearing Reference	Part Frequencies (per shaft rev.)				Roller details		
		Cage	Roller	Outer	Inner	PCD (mm)	No.	Diameter (mm)
190	01 B 190M	0.448	4.712	9.846	12.154	257.18	22	26.99
	02 B 190M	0.428	3.389	6.844	9.156	285.75	16	41.28
	03 B 190M	0.413	2.796	5.786	8.214	311.15	14	53.98
200	01 B 200M	0.448	4.712	9.846	12.154	257.18	22	26.99
	02 B 200M	0.428	3.389	6.844	9.156	285.75	16	41.28
	03 B 200M	0.413	2.796	5.786	8.214	311.15	14	53.98
220	01 B 220M	0.450	4.950	9.900	12.100	285.75	22	28.58
	02 B 220M	0.434	3.703	7.806	10.194	311.15	18	41.28
	03 B 220M	0.414	2.808	4.964	7.036	349.25	12	60.33
230	01 B 230M	0.450	4.950	9.900	12.100	285.75	22	28.58
	02 B 230M	0.434	3.703	7.806	10.194	311.15	18	41.28
240	01 B 240M	0.455	5.455	11.818	14.182	314.33	26	28.58
	02 B 240M	0.435	3.792	7.833	10.167	342.90	18	44.45
	03 B 240M	0.418	2.971	5.853	8.147	368.30	14	60.33
250	01 B 250M	0.455	5.455	11.818	14.182	314.33	26	28.58
	02 B 250M	0.435	3.792	7.833	10.167	342.90	18	44.45
	03 B 250M	0.418	2.971	5.853	8.147	368.30	14	60.33
260	01 B 1000-260M	0.455	5.455	11.818	14.182	314.33	26	28.58
	01 B 260M	0.454	5.354	10.889	13.111	342.90	24	31.75
	02 B 260M	0.435	3.792	7.833	10.167	342.90	18	44.45
	03 B 260M	0.418	2.971	5.853	8.147	368.30	14	60.33
270	01 B 270M	0.454	5.354	10.889	13.111	342.90	24	31.75
275	01 B 275M	0.454	5.354	10.889	13.111	342.90	24	31.75
280	01 B 280M	0.454	5.354	10.889	13.111	342.90	24	31.75
	02 B 280M	0.436	3.836	7.846	10.154	371.48	18	47.63
	03X B 280M	0.425	3.240	6.794	9.206	400.05	16	60.33
	03E B 280M	0.423	3.160	6.764	9.236	390.53	16	60.33
290	01 B 290M	0.457	5.807	11.889	14.111	371.48	26	31.75
	03 B 290M	0.426	3.326	6.824	9.176	431.80	16	63.50
300	01 B 300M	0.457	5.807	11.889	14.111	371.48	26	31.75
	02 B 300M	0.440	4.140	8.810	11.190	400.05	20	47.63
	03 B 300M	0.426	3.326	6.824	9.176	431.80	16	63.50
320	01 B 320M	0.458	5.910	11.908	14.092	396.88	26	33.34
	02 B 320M	0.443	4.297	8.852	11.148	428.63	20	49.21
	03 B 320M	0.423	3.184	5.927	8.073	476.20	14	73.03



# VIBRATION DATA

Shaft Diameter d	Bearing Reference	Part Frequencies (per shaft rev.)				Roller details		
		Cage	Roller	Outer	Inner	PCD (mm)	No.	Diameter (mm)
330	01 B 330M	0.458	5.910	11.908	14.092	396.88	26	33.34
	02 B 330M	0.443	4.297	8.852	11.148	428.63	20	49.21
340	01 B 1300-340M	0.458	5.910	11.908	14.092	396.88	26	33.34
	01 B 340M	0.461	6.294	12.895	15.105	422.28	28	33.34
	02 B 340M	0.443	4.337	8.862	11.138	460.38	20	52.39
	03E B 340M	0.428	3.405	6.850	9.150	485.78	16	69.85
350	01 B 350M	0.461	6.294	12.895	15.105	422.28	28	33.34
	02 B 350M	0.443	4.337	8.862	11.138	460.38	20	52.39
360	01 B 1400-360M	0.461	6.294	12.895	15.105	422.28	28	33.34
	01 B 360M	0.461	6.416	12.915	15.085	450.85	28	34.93
	02 B 360M	0.443	4.337	8.862	11.138	460.38	20	52.39
	03E B 360M	0.428	3.405	6.850	9.150	485.78	16	69.85
	03X B 360M	0.427	3.362	6.835	9.165	501.65	16	73.03
380	01 B 380M	0.461	6.416	12.915	15.085	450.85	28	34.93
	02 B 380M	0.446	4.552	9.806	12.194	482.60	22	52.39
	03 B 380M	0.429	3.429	6.857	9.143	533.40	16	76.20
390	01 B 390M	0.463	6.782	13.900	16.100	476.25	30	34.93
400	01 B 400M	0.463	6.782	13.900	16.100	476.25	30	34.93
	02 B 400M	0.447	4.682	9.839	12.161	511.18	22	53.98
	03 B 400M	0.429	3.429	6.857	9.143	533.40	16	76.20
420	01 B 420M	0.465	7.147	14.886	17.114	501.65	32	34.93
	02 B 420M	0.449	4.806	9.868	12.132	539.75	22	55.56
	03E B 420M	0.435	3.759	8.693	11.307	566.00	20	74.00
440	01 B 440M	0.467	7.512	15.873	18.127	527.05	34	34.93
	02 B 440M	0.451	5.008	10.814	13.186	561.98	24	55.56
	03E B 440M	0.435	3.759	8.693	11.307	566.00	20	74.00
460	01 B 460M	0.467	7.512	15.873	18.127	527.05	34	34.93
	02 B 460M	0.451	5.008	10.814	13.186	561.98	24	55.56
	03E B 460M	0.433	3.683	7.800	10.200	600.00	18	80.00
	03X B 460M	0.432	3.598	6.909	9.091	628.65	16	85.73
480	01 B 480M	0.467	7.576	14.949	17.051	555.63	32	36.51
	02 B 480M	0.453	5.267	11.777	14.223	590.55	26	55.56
	03X B 480M	0.432	3.598	6.909	9.091	628.65	16	85.73
500	01 B 500M	0.469	7.925	15.932	18.068	581.03	34	36.51
	02 B 500M	0.455	5.469	12.731	15.269	612.78	28	55.56
	03 B 500M	0.437	3.900	7.864	10.136	679.45	18	85.73

Shaft Diameter d	Bearing Reference	Part Frequencies (per shaft rev.)				Roller details		
		Cage	Roller	Outer	Inner	PCD (mm)	No.	Diameter (mm)
530	01 B 530M	0.470	8.362	16.927	19.073	612.78	36	36.51
	02 B 530M	0.453	5.322	11.789	14.211	647.70	26	60.33
	03 B 530M	0.437	3.900	7.864	10.136	679.45	18	85.73
560	01 B 560M	0.471	8.711	17.913	20.087	638.18	38	36.51
	02 B 560M	0.455	5.561	12.751	15.249	676.28	28	60.33
	03E B 560M	0.440	4.107	8.800	11.200	714.38	20	85.73
580	01 B 580M	0.471	8.721	17.914	20.086	666.75	38	38.10
	02 B 580M	0.461	6.432	13.841	16.159	698.50	30	53.98
600	01 B 600M	0.472	9.056	18.899	21.101	692.15	40	38.10
	02 B 600M	0.458	5.958	13.750	16.250	723.90	30	60.33
	03E B 600M	0.442	4.244	9.722	12.278	740.00	22	86.00

