

Self-aligning ball bearing

The outer ring raceway of self-aligning ball bearing is a spherical surface, its center of curvature corresponds with the bearing center. Therefore, the inner ring, outer race, ball and cage can inclines at a certain degree, and can rotate freely around the bearing center. Its automatic self-aligning ability can correct the misalignment caused by improper processing and mounting automatically. It is applicable where shaft and housing centering is difficult and shaft is easy to be deflected.

Self-aligning ball bearing is mostly used to take radial load. While bearing radial load, it can also take a small amount of axial load, but not suitable to take pure axial load. Thanks to the self-aligning ability of this bearing, it is suited where the speed is low and self-aligning is required. Where the loading capacity of the self-aligning ball bearing is not enough, the spherical roller bearing with the same self-aligning ability shall be used.

Application scope of self-aligning ball bearing: driving shafts of woodworking machinery and textile machinery.

Self-aligning ball bearing's bore is cylindrical inner bore or tapered inner bore. The tapering of tapered inner bore is 1:12 (suffix is K). C&U can provide self-aligning ball bearings whose bore surfaces have cylindrical inner bores or tapered inner bores.

C&U can provide self-aligning ball bearings with seal, both sides of which are equipped with contact seal. The sealing lips are attached to the smooth oblique angles of the inner rings by light press. Please consult the technical center of C&U Group if required.

The special bore tolerances of self-aligning ball bearings with lengthened inner rings can facilitate the mounting and dismounting. Please consult the technical center of C&U Group if required.

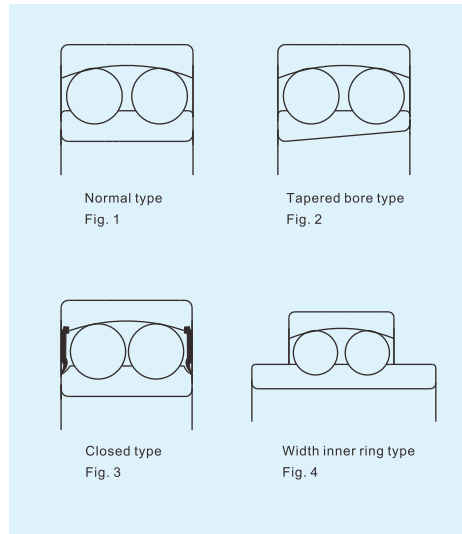
1. Structure

1. Normal type (Fig. 1): Self-aligning ball bearing whose internal bore surface is cylindrical;

2. Tapered bore type (Fig. 2): Self-aligning ball bearing whose internal bore surface is tapered. The tapering is 1:12;

3. Closed type (Fig. 3): Self-aligning ball bearing with seals on both sides;

4. Wide inner ring type (Fig. 4): Self-aligning ball bearing whose inner ring is lengthened.



2. Dimension accuracy & running accuracy

C&U can also provide various self-aligning ball bearings above the ordinary grade. Please see Table 5.3 Page 34 of the technical specification for relevant dimension precision and running accuracy.

3. Radial clearance

C&U standard type cylindrical bore self-aligning ball bearings adopt normal Group clearance. Tapered self-aligning ball bearings take C3 Group clearance as standard type. Self-aligning ball bearings with clearance greater than or less than standardized Group can be provided on request. The clearance of inner ring lengthened self-aligning ball bearings is between C2 Group and normal Group.

Please see Table 6.11 Page 62 of the technical specification for the radial clearance of self-aligning ball bearings with cylindrical bores and Table 6.12 Page 62 for the radial clearance of self-aligning ball bearings with tapered bores. These data are clearance values before the bearing mounting without load.

4. Cage

The Cages of self-aligning ball bearings often adopt either pressed steel or glass fiber reinforced nylon. If self-aligning ball bearings with nylon Cages are required, please consult the technical center of C&U Group.

5. Allowable self-aligning angle

The internal structure design of self-aligning ball bearings enable them the self-aligning function, which can make the bearings correct the angle alignment errors between the inner and outer rings by themselves. In normal load and working conditions, the misalignment angle values given in Table 1 are permitted when the inner ring is running. Whether the given values can be reached completely also depends on the designs and sealing types of the reference bearing structures, etc.

Table 1

Bearing series	Permitted misalignment angle values
1200 series	2.5°
1300 series	3°
2200 series	2.5°
2300 series	3°

6. Dynamic equivalent load

When $F_r/F_i < e$, $P = F_r + Y_1 F_i$.

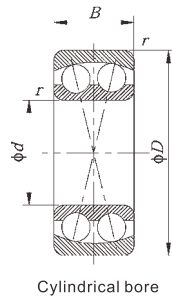
When $F_r/F_i > e$, $P = 0.65 F_r + Y_2 F_i$.

The relevant calculating coefficient e , Y_1 and Y_2 for each bearing can be found in the specification table.

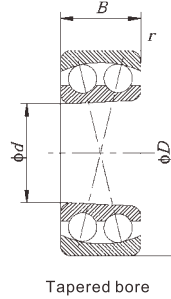
7. Static equivalent load

$F_0 = F_r + Y_0 F_i$.

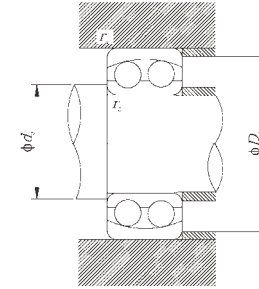
The coefficient value Y_0 for each bearing has been given in the specification table.



Cylindrical bore

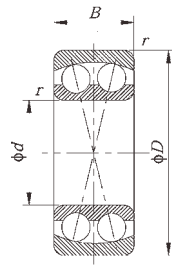


Tapered bore

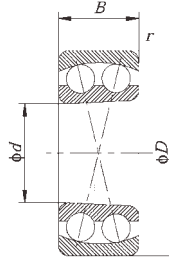


d 10~30 mm

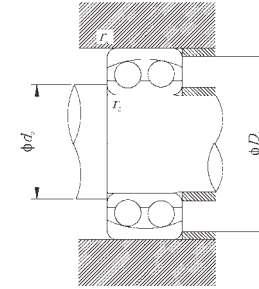
<i>d</i>	Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions			Reference mass (kg)	Calculating coefficients			
	<i>D</i>	<i>B</i>	<i>r</i> (Min)	<i>C_r</i>	<i>C_{0r}</i>	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	<i>d_s</i> Min	<i>D_s</i> Max	<i>r_s</i> Max		<i>e</i>	<i>Y₁</i>	<i>Y₂</i>	<i>Y₀</i>
10	30	9	0.6	5.53	1.18	24,000	30,000	1200	1200K	1200	111200	14.0	26.0	0.6	0.035	0.33	1.9	3	2
	30	14	0.6	8.06	1.73	22,000	28,000	2200	—	1500	—	14.0	26.0	0.6	0.050	0.54	1.15	1.8	1.3
	35	11	0.6	7.35	1.62	20,000	24,000	1300	1300K	1300	111300	14.0	31.0	0.6	0.060	0.35	2.8	1.8	1.9
	35	17	0.6	9.20	2.01	18,000	22,000	2300	—	1600	—	14.0	31.0	0.6	0.090	0.71	1.4	0.89	0.93
12	32	10	0.6	6.24	1.43	22,000	28,000	1201	1201K	1201	111201	16.0	28.0	0.6	0.042	0.33	1.9	3	2
	32	14	0.6	8.52	1.90	20,000	26,000	2201	—	1501	—	16.0	28.0	0.6	0.060	0.50	1.25	2	1.3
	37	12	1.0	9.36	2.16	18,000	22,000	1301	1301K	1301	111301	17.0	32.0	1.0	0.070	0.35	1.8	2.8	1.8
	37	17	1.0	11.70	2.70	17,000	20,000	2301	—	1601	—	17.0	32.0	1.0	0.100	0.60	1.05	1.6	1.1
15	35	11	0.6	7.41	1.76	19,000	24,000	1202	1202K	1202	111202	19.0	31.0	0.6	0.051	0.33	1.9	3	2
	35	14	0.6	8.71	2.04	18,000	22,000	2202	2202K	1502	111502	19.0	31.0	0.6	0.060	0.43	1.5	2.3	1.6
	42	13	1.0	10.80	2.60	17,000	20,000	1302	1302K	1302	111302	20.0	37.0	1.0	0.100	0.31	2	3.1	2.2
	42	17	1.0	11.90	2.90	15,000	18,000	2302	—	1602	—	20.0	37.0	1.0	0.110	0.52	1.2	1.9	1.3
17	40	12	0.6	8.84	2.20	18,000	22,000	1203	1203K	1203	111203	21.0	36.0	0.6	0.076	0.31	2	3.1	2.2
	40	16	0.6	10.60	2.55	17,000	20,000	2203	2203K	1503	111503	21.0	36.0	0.6	0.090	0.43	1.5	2.3	1.6
	47	14	1.0	12.70	3.40	14,000	17,000	1303	1303K	1303	111303	22.0	42.0	1.0	0.140	0.30	2.1	3.3	2.2
	47	19	1.0	14.60	3.55	13,000	16,000	2303	—	1603	—	22.0	42.0	1.0	0.170	0.52	1.2	1.9	1.3
20	47	14	1.0	12.70	3.40	15,000	18,000	1204	1204K	1204	111204	25.0	42.0	1.0	0.120	0.30	2.1	3.3	2.2
	47	18	1.0	16.80	4.15	14,000	17,000	2204	2204K	1504	111504	25.0	42.0	1.0	0.150	0.40	1.6	2.4	1.6
	52	15	1.1	14.30	4.00	12,000	15,000	1304	1304K	1304	111304	26.5	45.5	1.0	0.170	0.28	2.2	3.5	2.5
	52	21	1.1	18.20	4.75	11,000	14,000	2304	2304K	1604	111604	26.5	45.5	1.0	0.220	0.52	1.2	1.9	1.3
25	52	15	1.0	14.30	4.00	13,000	16,000	1205	1205K	1205	111205	30.0	47.0	1.0	0.140	0.28	2.2	3.5	2.5
	52	18	1.0	16.80	4.40	11,000	14,000	2205	2205K	1505	111505	30.0	47.0	1.0	0.190	0.35	1.8	2.8	1.8
	62	17	1.1	19.00	5.40	9,500	12,000	1305	1305K	1305	111305	31.5	55.5	1.0	0.260	0.28	2.2	3.5	2.5
	62	24	1.1	24.20	6.55	9,500	12,000	2305	2305K	1605	111605	31.5	55.5	1.0	0.350	0.48	1.3	2	1.4
30	62	16	1.0	15.60	4.65	10,000	13,000	1206	1206K	1206	111206	35.0	57.0	1.0	0.230	0.25	2.5	3.9	2.5
	62	20	1.0	23.80	6.70	9,500	12,000	2206	2206K	1506	111506	35.0	57.0	1.0	0.260	0.33	1.9	3	2



Cylindrical bore

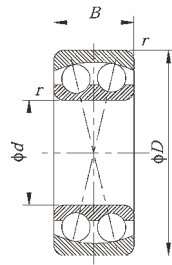


Tapered bore

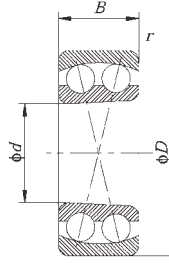


d 30~60 mm

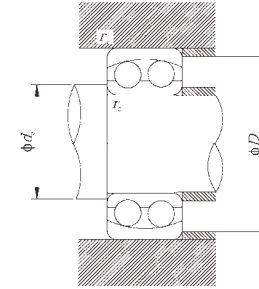
<i>d</i>	Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions			Reference mass (kg)	Calculating coefficients			
	<i>D</i>	<i>B</i>	<i>r</i> (Min)	<i>C_r</i>	<i>C_{0r}</i>	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	<i>d_s</i> Min	<i>D_o</i> Max	<i>r_s</i> Max		<i>e</i>	<i>Y₁</i>	<i>Y₂</i>	<i>Y₀</i>
30	72	19	1.1	22.50	6.80	9,000	11,000	1306	1306K	1306	111306	36.5	65.5	1.0	0.400	0.25	2.5	3.9	2.5
	72	27	1.1	31.20	8.80	8,500	10,000	2306	2306K	1606	111606	36.5	65.5	1.0	0.500	0.44	1.4	2.2	1.4
35	72	17	1.1	19.00	6.00	9,000	11,000	1207	1207K	1207	111207	41.5	65.5	1.0	0.320	0.23	2.7	4.2	2.8
	72	23	1.1	30.70	8.80	8,500	10,000	2207	2207K	1507	111507	41.5	65.5	1.0	0.440	0.31	2	3.1	2.2
	80	21	1.5	26.50	8.50	7,500	9,000	1307	1308K	1307	111307	43.0	72.0	1.5	0.540	0.25	2.5	3.9	2.5
	80	31	1.5	39.70	11.20	7,000	8,500	2307	2307K	1607	111607	43.0	72.0	1.5	0.680	0.46	1.35	2.1	1.4
40	80	18	1.1	19.90	6.95	8,500	10,000	1208	1208K	1208	111208	46.5	73.5	1.0	0.410	0.22	2.9	4.5	2.8
	80	23	1.1	31.90	10.00	7,500	9,000	2208	2208K	1508	111508	46.5	73.5	1.0	0.530	0.28	2.2	3.5	2.5
	90	23	1.5	33.80	11.20	6,700	8,000	1308	1308K	1308	111308	48.0	82.0	1.5	0.710	0.23	2.7	4.2	2.8
	90	33	1.5	54.00	16.00	6,300	7,500	2308	2308K	1608	111608	48.0	82.0	1.5	0.930	0.40	1.6	2.4	1.6
45	85	19	1.1	22.90	7.80	7,500	9,000	1209	1209K	1209	111209	51.5	78.5	1.0	0.490	0.21	3	4.6	3.2
	85	23	1.1	32.50	10.60	7,000	8,500	2209	2209K	1509	111509	51.5	78.5	1.0	0.550	0.26	2.4	3.7	2.5
	100	25	1.5	39.00	13.40	6,300	7,500	1309	1309K	1309	111309	53.0	92.0	1.5	0.960	0.23	2.7	4.2	2.8
	100	36	1.5	63.70	19.30	5,600	6,700	2309	2309K	1609	111609	53.0	92.0	1.5	1.250	0.33	1.9	3	2
50	90	20	1.1	26.50	9.15	7,000	8,500	1210	1210K	1210	111210	56.5	83.5	1.0	0.540	0.21	3	4.6	3.2
	90	23	1.1	33.80	11.20	6,300	7,500	2210	2210K	1510	111510	56.5	83.5	1.0	0.680	0.23	2.7	4.2	2.8
	110	27	2.0	43.60	14.00	5,600	6,700	1310	1310K	1310	111310	59.0	101.0	2.0	1.210	0.24	2.6	4.1	2.8
	110	40	2.0	63.70	20.00	5,300	6,300	2310	2310K	1610	111610	59.0	101.0	2.0	1.640	0.43	1.5	2.3	1.6
55	100	21	1.5	27.60	10.60	6,300	7,500	1211	1211K	1211	111211	63.0	92.0	1.5	0.720	0.19	3.3	5.1	3.6
	100	25	1.5	39.00	13.40	6,000	7,000	2211	2211K	1511	111511	63.0	92.0	1.5	0.810	0.23	2.7	4.2	2.8
	120	29	2.0	50.70	18.00	5,000	6,000	1311	1311K	1311	111311	64.0	111.0	2.0	1.580	0.23	2.7	4.2	2.8
	120	43	2.0	76.10	24.00	4,800	5,600	2311	2311K	1611	111611	64.0	111.0	2.0	2.100	0.40	1.6	2.4	1.6
60	110	22	1.5	31.20	12.20	5,600	6,700	1212	1212K	1212	111212	68.0	102.0	1.5	0.900	0.19	3.3	5.1	3.6
	110	28	1.5	48.80	17.00	5,300	6,300	2212	2212K	1512	111512	68.0	102.0	1.5	1.100	0.24	2.6	4.1	2.8
	130	31	2.1	58.50	22.00	4,500	5,300	1312	1312K	1312	111312	71.0	119.0	2.0	1.960	0.23	2.7	4.2	2.8
	130	46	2.1	87.10	28.50	4,500	5,300	2312	2312K	1612	111612	71.0	119.0	2.0	2.600	0.33	1.9	3	2



Cylindrical bore

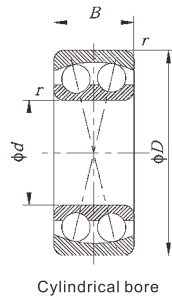


Tapered bore

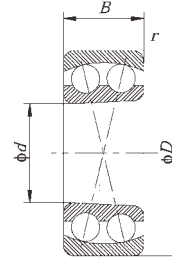


d 65~95 mm

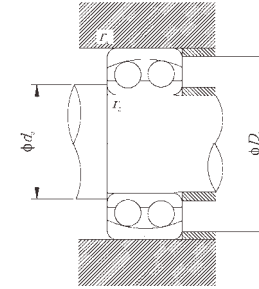
Boundary dimensions (mm)				Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions			Reference mass (kg)	Calculating coefficients			
d	D	B	r (Min)	C _r	C _{0r}	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	d _s Min	D _s Max	r _s Max		e	Y ₁	Y ₂	Y ₀
65	120	23	1.5	35.10	14.00	5,300	6,300	1213	1213K	1213	111213	73.0	112.0	1.5	0.920	0.18	3.5	5.4	3.6
	120	31	1.5	57.20	20.00	5,000	6,000	2213	2213K	1513	111513	73.0	112.0	1.5	1.500	0.24	2.6	4.1	2.8
	140	33	2.1	65.00	25.50	4,300	5,000	1313	1313K	1313	111313	76.0	129.0	2.0	2.390	0.22	2.9	4.5	2.8
	140	48	2.1	95.60	32.50	4,000	4,800	2313	2313K	1613	111613	76.0	129.0	2.0	3.200	0.37	1.7	2.6	1.8
70	125	24	1.5	34.50	13.70	5,000	6,000	1214	1214K	1214	111214	78.0	117.0	1.5	1.290	0.18	3.5	5.4	3.6
	125	31	1.5	44.20	17.00	4,800	5,600	2214	2214K	1514	111514	78.0	117.0	1.5	1.620	0.27	2.3	3.6	2.5
	150	35	2.1	74.10	27.50	4,000	4,800	1314	1314K	1314	111314	81.0	139.0	2.0	3.000	0.22	2.9	4.5	2.8
	150	51	2.1	111.00	37.50	3,800	4,500	2314	2314K	1614	111614	81.0	139.0	2.0	3.900	0.37	1.7	2.6	1.8
75	130	25	1.5	39.00	15.60	4,800	5,600	1215	1215K	1215	111215	83.0	122.0	1.5	1.350	0.17	3.7	5.7	4
	130	31	1.5	44.20	18.00	4,500	5,300	2215	2215K	1515	111515	83.0	122.0	1.5	1.720	0.25	2.5	3.9	2.5
	160	37	2.1	79.30	30.00	3,800	4,500	1315	1315K	1315	111315	86.0	149.0	2.0	3.600	0.22	2.9	4.5	2.8
	160	55	2.1	124.00	43.00	3,400	4,000	2315	2315K	1615	111615	86.0	149.0	2.0	4.700	0.37	1.7	2.6	1.8
80	140	26	2.0	39.70	17.00	4,500	5,300	1216	1216K	1216	111216	89.0	131.0	2.0	1.650	0.16	3.9	6.1	4
	140	33	2.0	65.00	25.50	4,000	4,800	2216	2216K	1616	111516	89.0	131.0	2.0	2.190	0.22	2.9	4.5	2.8
	170	39	2.1	88.40	33.50	3,600	4,300	1316	1316K	1316	111316	91.0	159.0	2.0	4.200	0.22	2.9	4.5	2.8
	170	58	2.1	135.00	49.00	3,200	3,800	2316	2316K	1616	111616	91.0	159.0	2.0	5.700	0.37	1.7	2.6	1.8
85	150	28	2.0	48.80	20.80	4,000	4,800	1217	1217K	1217	111217	94.0	141.0	2.0	2.100	0.17	3.7	5.7	4
	150	36	2.0	58.50	23.60	3,800	4,500	2217	2217K	1517	111517	94.0	141.0	2.0	2.530	0.25	2.5	3.9	2.5
	180	41	3.0	97.50	38.00	3,400	4,000	1317	1317K	1317	111317	98.0	167.0	2.5	5.000	0.22	2.9	4.5	2.8
	180	60	3.0	140.00	51.00	3,000	3,600	2317	2317K	1617	111617	98.0	167.0	2.5	6.700	0.37	1.7	2.6	1.8
90	160	30	2.0	57.20	23.60	3,800	4,500	1218	1218K	1218	111218	99.0	151.0	2.0	2.500	0.17	3.7	5.7	4
	160	40	2.0	70.20	28.50	3,600	4,300	2218	2218K	1518	111518	99.0	151.0	2.0	3.220	0.27	2.3	3.6	2.5
	190	43	3.0	117.00	44.00	3,200	3,800	1318	1318K	1318	111318	103.0	177.0	2.5	6.000	0.22	2.9	4.5	2.8
	190	64	3.0	153.00	57.00	2,800	3,400	2318	2318K	1618	111618	103.0	177.0	2.5	7.900	0.37	1.7	2.6	1.8
95	170	32	2.1	63.70	27.00	3,600	4,300	1219	1219K	1219	111219	106.0	159.0	2.0	3.000	0.17	3.7	5.7	4
	170	43	2.1	83.20	34.50	3,400	4,000	2219	2219K	1519	111519	106.0	159.0	2.0	4.200	0.27	2.3	3.6	2.5



Cylindrical bore



Tapered bore



d 95~110 mm

<i>d</i>	Boundary dimensions (mm)			Basic load ratings (kN)		Limiting speeds (r/min)		Nominal numbers		Nominal numbers (old)		Mounting dimensions			Reference mass (kg)	Calculating coefficients			
	<i>D</i>	<i>B</i>	<i>r</i> (Min)	<i>C_r</i>	<i>C_{0r}</i>	Grease	Oil	Cylindrical bore	Tapered bore	Cylindrical bore	Tapered bore	<i>d_s</i> Min	<i>D_s</i> Max	<i>r_s</i> Max		<i>e</i>	<i>Y₁</i>	<i>Y₂</i>	<i>Y₀</i>
95	200	45	3.0	133.00	51.00	3,000	3,600	1319	1319K	1319	111319	108.0	187.0	2.5	7.000	0.23	2.7	4.2	2.8
	200	67	3.0	165.00	64.00	2,600	3,200	2319	2319K	1619	111619	108.0	187.0	2.5	9.200	0.37	1.7	2.6	1.8
100	180	34	2.1	68.90	30.00	3,400	4,000	1220	1220K	1220	111220	111.0	169.0	2.0	3.700	0.17	3.7	5.7	4
	180	46	2.1	97.50	40.50	3,200	3,800	2220	2220K	1520	111520	111.0	202.0	2.5	5.000	0.27	2.3	3.6	2.5
	215	47	3.0	143.00	57.00	2,800	3,400	1320	1320K	1320	111320	113.0	202.0	2.5	8.640	0.23	2.7	4.2	2.8
	215	73	3.0	190.00	80.00	2,400	3,000	2320	2320K	1620	111620	113.0	202.0	2.5	12.40	0.37	1.7	2.6	1.8
105	190	36	2.1	74.10	32.50	3,200	3,800	1221	1221K	1221	111221	116.0	179.0	2.0	4.520	0.17	3.7	5.7	4
	190	50	2.1	108.00	45.00	3,000	3,600	2211	2211K	2211	112211	116.0	179.0	2.0	5.640	0.28	2.2	3.5	2.5
	225	49	3.0	154.00	64.50	2,600	3,200	1311	1311K	1311	111311	118.0	212.0	2.5	10.00	0.23	2.7	4.2	2.8
	225	77	3.0	200.00	87.00	2,400	3,000	2311	2311K	2311	112311	118.0	212.0	2.5	14.40	0.37	1.7	2.6	1.8
110	200	38	2.1	88.40	39.00	3,000	3,600	1222	1222K	1222	111222	121.0	189.0	2.0	5.330	0.17	3.7	5.7	4
	200	53	2.1	124.00	52.00	2,800	3,400	2222	2222K	2222	112222	121.0	189.0	2.0	6.640	0.28	2.2	3.5	2.5
	240	50	3.0	163.00	72.00	2,400	3,000	1322	1322K	1322	111322	123.0	227.0	2.5	12.00	0.22	2.9	4.5	2.8
	240	80	3.0	216.00	95.00	2,200	2,800	2322	2322K	2322	112322	123.0	227.0	2.5	17.40	0.37	1.7	2.6	1.8