Pillow blocks

Feature

The spherical outside surface ball bearings of ART are deep groove ball bearings with wide and narrow inner rings, consisting of insert bearings (SA200, SB200, UC200, UEL200, UK200, UCX00 and UC300) and various housing. The type of bearing units are defined according to the different mounting methods of the bearings to shafts: the set-screws type, the adapter type, the accentric locking collar type.

The ART housing are mainly casting housing. There are pressed steel plate housing as well align with ease during operation and can be conveniently mounted or dismounted.

The bearing units can operate satisfactorily under working conditions, especially for machines operating in dusty or muddy surroundings. Thus, they are widely used in agricultural, construction and transmission machineries, etc.

There are various types of sealing devices for our products, such as synthetic rubber seals, slinger with synthetic rubber seals and triple lip seals etc.

Sufficient lubricating grease has been put into the bearing during manufacturing, which can act as lubricating as well as rust proof. No more grease is needed to put in during the lubricating period when the bearings operate under normal conditions. Lubricating grease can be added from the fittings when the relubricate bearings operate under hard conditions.

The outer ring of the bearing, has spherical outside surface which can be fitted to the concave spherical surface of the housing, and the fit between them can be clearance fit or interference fit according to different conditions. This combination provides self-alignment between the self-contained bearing and the housing, and compensates for a certain alignment errors or flexing of the shaft when the bearing is in operation. This definitely increases the bearing service life.

Lubrication

The Spherical Outside Surface Ball Bearings of ART generally use CG-2 rust proof lithium based lubricating grease, with physical chemical properties shown in the following table 1. Grease iss filled in the spherical outside surface ball bearings during manufacturing.

Static safety factors

Table 1

Density 1/mm	Without operation Operated 60 times	268 260
Dropping point °C		128
Mechanical impurities pc/gr	10-25 µm	within 1000
	25-75 µm	within 500
	above 75 µm	0
Base oil kinematical viscosity 40° cst		80,3

The bearings usually operate below the temperature of 120°C (the measuring temperature of the outer rings is 100°C). Grease life reduction has to be taken into account when the bearing continues to operate at a temperature should not be lower than -30°C.

The permissible speed of rotation is connected with the fit between shaft and bearing. It is reconnected with the fit between shaft and bearing. It is recommended that, under normal operating conditions, the fit between the bearing and the shaft is h7. Looser fit allowing lower speed is recommended when heavier load is applied.

Tolerance for bearing units

Tolerances on inner rings of bearing with cylindrical bore
Unit: 0.001 mm

Table 2

Nominal bore diameter d over	incl.	Cylindrical bore: bore diameter dm deviations high	low	d deviations high	low	width Bi deviations high	low	Radial run-out max.
mm								
10	18	+18	0	+22	-4	0	-120	12
18	30	+21	0	+25	-4	0	-120	15
30	50	+25	0	+30	-5	0	-120	18
50	80	+30	0	+36	-6	0	-150	22
80	120	+35	0	+42	-7	0	-200	28
120	150	+40	0	+48	-8	0	-250	35

Note: dm is defined as the arithmetical mean of the largest and smallest diameter obtained by two-point measurements.

Tolerances on inner rings of bearings with tapered bore
Unit: 0.001 mm

Table 3

Nominal bore diameter d over	incl.	Δd deviations high	low	Δd1-Δd max.	min.
mm					
18	30	+33	0	+21	0
30	50	+39	0	+25	0
50	80	+46	0	+30	0
80	120	+54	0	+35	0
120	150	+63	0	+40	0

Note: The deviation from nominal taper are defined by the limits of (Δd1-Δd), where Δd1 is actual deviations of d1 from nominal diameter at the largest end of bore and Δd is actual deviation of d from bearing bore nominal diameter.
d1 is obtained by the following formula:
d1 = d + 0.083333 B, where B is width of the bearing inner ring.
The nominal taper angle = 2º 23'9,4".

Please refer to the figures 1.

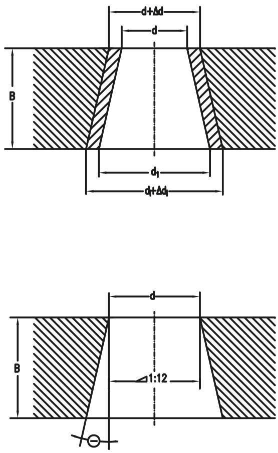


Fig. 1

Tolerances on outer ring Unit: 0.001 mm				
				Table 4
Nominal bore diameter		**D_m**		**Radial run-out**
D over	incl.	deviations high	low	max.
mm				
40	50	0	-11	20
50	80	0	-13	25
80	120	0	-15	35
120	150	0	-18	40
150	160	0	-25	45

Note: D_m is defined as the arithmetical means of the largest and the smallest diameter obtained by two-point measurement.
The low deviation of outside diameter D_m does not apply within the distance of 1/4 the width of outer ring from the sides.

Tolerance for distance "h" between the radial plane passing through center of outer ring and a side of inner ring Unit: 0.001 mm		
		Table 5
Nominal bore diameter		**n**
d over	incl.	deviations
mm		
40	50	± 200
50	80	± 250
80	120	± 300
120	160	± 350

Please refer to the figures 2.

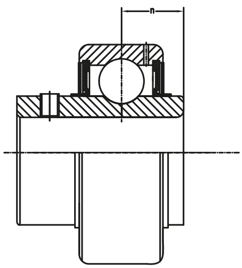


Fig. 2

Chamfer dimensions		
		Table 6
Nominal dimensions		**r**
r	max.	min.
mm		
1	1.5	0.6
1.5	2	1
2	2.5	1.5
2.5	3	2
3	3.5	2.5
3.5	4	3
4	4.5	3.5
5	6	4

Please refer to the figures 3.

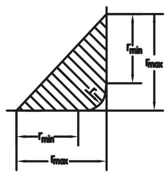


Fig. 3

Center height tolerances for pillow block type housing

Please refer to below figures 4 and table 7

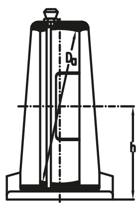


Fig. 4

Tolerances for flaged type housing (F, FS, FL, FT, FA, FB, FC)

Please refer below figures 5a, 5b and table 8a, 8b.

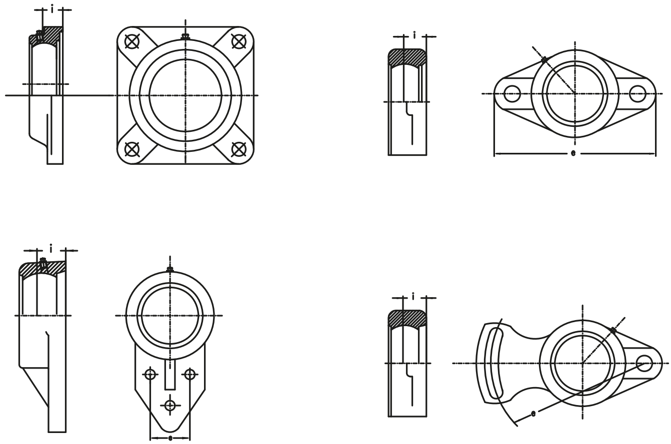


Fig. 5a

Tolerances for flanged type housings (F, FS, FL, FT, FA, FB)
Center height tolerances for pillow block type housings
Unit: 0.001 mm

Table 7

Housing number						**h** deviations
mm						
			AK204			
P203			AK205	PA203		
P204			AK206	PA204	PH204	
P205		P305	AK207	PA205	PH205	
P206	PX05	P306	AK208	PA206	PH206	±150
P207	PX06	P307	AK209	PA207	PH207	
P208	PX07	P308	AK210	PA208	PH208	
P209	PX08	P309	AK211	PA209	PH209	
P210	PX09	P310	AK212	PA210	PH210	
P211	PX10	P311	AK213	PA211	PH211	
P212	PX11	P312	AK214	PA212	PH212	
P213	PX12	P313	AK215	PA213	PH213	
P214	PX13	P314			PH214	
P215	PX14	P315			PH215	±200
P216	PX15	P316			PH216	
P217	PX16					
P218						

Unit: 0.001 mm

Table 8a

Housing number								e deviations	i deviations
mm									
F204		FL204		FT204	FS204	FA204	FB204		
F205	F305	FL205	FL305	FT205	FS205	FA205	FB205		
F206	F306	FL206	FL306	FT206	FS206	FA206	FB206		
F207	F307	FL207	FL307	FT207	FS207	FA207	FB207	±700	±500
F208	F308	FL208	FL308	FT208	FS208	FA208	FB208		
F209	F309	FL209	FL309	FT209	FS209	FA209	FB209		
F210	F310	FL210	FL310	FT210	FS210	FA210	FB210		
F211	F311	FL211	FL311	FT211	FS211	FA211	FB211		
F212	F312	FL212	FL312	FT212	FS212	FA212	FB212		
F213	F313	FL213	FL313	FT213	FS213	FA213	FB213		
F214	F314	FL214	FL314	FT214	FS214				
F215	F315	FL215	FL315		FS215			±1000	±800
F216		FL216							
F217		FL217							
F218		FL218							

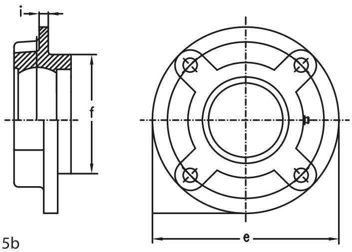


Fig. 5b

Tolerance for take-up type housing (T,ST)

Please refer to below figure 6 and table 9a, 9b.

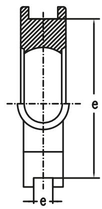


Fig. 6

Tolerance for flaged type housing (FC)
Unit: 0.001 mm

Table 8b

Housing number	f deviations high	f deviations low	e deviations	i deviations	Radial run-out of machined pilot max
mm					
FC 204					
FC 205	0	-46			
FC 206					
FC 207			± 700	± 500	200
FC 208					
FC 209	0	-54			
FC 210					
FC 211					
FC 212					
FC 213					
FC 214					
FC 215	0	-63	± 1000	± 800	300
FC 216					
FC 217					
FC 218	0	-72			

Tolerances for take-up type housing (T)
Unit: 0,001 mm

Table 9a

Housing number	k deviations high	k deviations low	e deviations	Parallelism of guide max
mm				
T204	+200		0	500
T210	0		- 500	
T211	+300		0	600
T217	0		- 800	

Tolerances for take-up type housing (ST)
Unit: 0.001 mm

Table 9b

Housing number	k deviations high	k deviations low	e deviations	Parallelism of guide max
mm				
ST204	+500		± 250	500
ST210	-250			
ST211	+1000		± 250	600
ST215	- 250			

Note:
Dam = (Da max + Da min) / 2
Da max - maximum measured value of Da
Da min - minimum measured value of Da

Dimensional tolerances for spherical inside diameter of housing are classified as H7 for clearance fit and J7 for interference fit.

As the self - contained for bearings are equipped with locking-pin, clearance fit H7 is normally applied.

Tolerances on spherical inside diameter
Unit: 0.001 mm

Table 10

Nominal spherical inside diameter D_a over	incl.	**Symbol H7** D_{am} deviations high	deviations low	D_a deviations high	deviations low	**Symbol J7** D_{am} high	deviations low	Da high	low
mm									
30	50	+25	0	+30	-5	+14	-11	+19	- 16
50	80	+30	0	+36	-6	+18	-12	+24	- 18
80	120	+35	0	+42	-7	+22	-13	+29	- 20
120	180	+40	0	+48	-8	+26	-14	+34	- 22
180	250	+46	0	+55	-9	+30	-16	+39	- 25

Machining tolerances

Table 11

Nominal dimension over	incl.	**Dimensional** tolerance
mm		
4	16	± 0,2
16	63	± 0,3
63	250	± 0,5

Casting tolerances on lenght

Table 12

Nominal dimension over	incl.	**Dimensional** tolerance
mm		
up	100	± 1,5
100	200	± 2,0
200	400	± 3,0
400	800	± 4,0

Casting tolerances on thickness

Table 13

Nominal dimension over	incl.	**Dimensional** tolerance
mm		
up	5	± 1
5	10	± 1,5
10	20	± 2
20	30	± 3
30	50	± 3,5

One side maching tolerances

Table 14

Nominal dimension over	incl.	**Dimensional** tolerance
mm		
up	5	± 1
5	100	± 1,5
100	200	± 2
200	400	± 3

Note:
Dimensional tolerances and deviations are for ordinary grade;
Dimensional tolerances on lenght and thickness may be added with deviations on draft taper.

Radial internal clearance of bearings

The radial internal clearance of the bearing for the unit is the same as the value of ISO 5753, the internal radial clearance for the spherical outside surface ball bearing is usually greater than that for the same size of deep groove ball bearing. The clearance for the cylindrical bore bearing is shown in table 15, while the clearance for the tapered bore bearing is shown in table 16.

Radial internal clearance of cylindrical bore bearings
(with set-screws and eccentric locking collar)
Unit: 0,001 mm

Table 15

Nominal bore diameter		**Clearance symbol**					
d		C2		normal		c3	
over	incl.	min.	max.	min.	max.	min.	max.
mm							
10	18	3	18	10	25	18	33
18	24	5	20	12	28	20	36
24	30	5	20	12	28	23	41
30	40	6	20	13	33	28	46
40	50	6	23	14	36	30	51
50	65	8	28	18	43	38	61
65	80	10	30	20	51	46	71
80	100	12	36	24	58	53	84
100	120	15	41	28	66	61	97
120	140	18	48	33	88	71	114

Radial internal clearance of tapered bore bearings
(with adapter sleeve)
Unit: 0,001 mm

Table 16

Nominal bore diameter		**Clearance symbol**					
d		C2		normal		c3	
over	incl.	min.	max.	min.	max.	min.	max.
mm							
10	18	10	25	18	33	25	45
18	24	12	28	20	36	28	48
24	30	12	28	23	43	30	61
30	40	13	33	28	46	40	64
40	50	14	36	30	51	45	73
50	65	18	43	38	61	55	90
65	80	20	51	46	71	65	105
80	100	24	58	53	84	75	120
100	120	28	66	61	97	90	140
120	140	33	81	71	114	150	160

Bearing Size selection

The bearing size is usually selected according to the required life and reliability under a specific type of load charged on the spherical outside surface ball bearing

The load applied to the bearing operating under static or slow oscillating and rotating (n<10r/min) condition is defined as dynamic load.

The load capacity of the bearing is expressed by the basic dynamic load rating which is shown in the spherical outside surface ball bearing's table.

Under normal mounting, lubricating and maintaining conditions, the operating bearing will have fatigue flaking due to the repeating action of variable load charged on the contact area between the rings and rolling elements. Generally, the fatigue flaking is the cause of normal damage of rolling bearings. Therefore, the usual bearing life refers to the bearing fatigue life. The life of group of apparently identical bearings operating under a considerable dispersion. For this reason, the bearing life is closely connected with the damaging probability or the reliability requirement.

The radial rating load of ball bearing with 90% reliability and 500 hours minimum life is shown in figure 7.

Life: The life of a rolling bearing is defined as the total number of revolution which the bearing is capable of enduring before the first evidence of fatigue flaking develops on any one rings or rolling elements.

Reliability: The reliability is the percentage of the bearings of a group of apparently identical bearings operating under identical conditions which can expect to attain or exceed a certain defined life. The reliability of individual bearings is the probability of the bearing to attain or exceed a defined life.

Basic rating life: For a group of apparently identical rolling bearings operating under identical conditions, the basic rating life is defined as the total number of revolutions that 90% of the bearings can be expected to complete or exceed.

Basic rating life

The fatigue rating life of spherical outside surface ball bearings is calculated by the following formula:

$$L_{10} = \left(\frac{C}{P}\right)^3, \text{ or } \frac{C}{P} = L_{10}^{1/3}$$

where:

L_{10} - basic rating life, 10^6r

P - basic dynamic load rating, N

N - equivalent dynamic bearing load, N

The basic dynamic load rating C is a hypothetical constant load with a fixed direction under which the bearing can attain a basic life of one milion revolutions theoretically. For radial bearings, the load refers to the radial load.

The equivalent dynamic bearing load P is a constant load with a fixed direction under which the bearing life is identical to that of the bearing operating under actual load.

For a bearing operating with a constant rotation speed, the basic rating life can be expressed in terms of operating hours:

$$L_{10h} = \frac{10^6}{60\,n}\left(\frac{C}{P}\right)^3, \text{ or } L_{10h} = \frac{10^6}{60\,n}\ L_{10h} = \frac{16666}{n}\left(\frac{C}{P}\right)^3$$

where:

L_{10h} - basic rating life, h

n - bearing operating speed of rotation, r/min

For easier calculation, 500 hours as base of rating life is taken, and the speed factor f_n and the life factor f_h is introduced.

$$f_n = \left(\frac{331/3}{n}\right),\ f_h = \left(\frac{L_{10h}}{500}\right)$$

In this, the formula is simplified to:

$$C = \frac{f_h}{f_n} P \ ,$$

The values of f_h and f_n can be found in figure 7 by referring to the operation speed n and the anticipated bearing service life L_{10h}. Then, with the radial load (or the equivalent dynamic bearing load), the basic dynamic load rating can be determined according to the spherical outside surface ball bearing's table. If the bearing operate under indeterminate loads and rotaion speed, the following formula should be applied when calculating the bearing life:

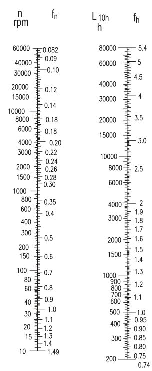
$$P_m = \sqrt[3]{\frac{1}{N}\int_0^N P^3 dN}$$

where:

P_m - mean equivalent dynamic bearing load, N

P - equivalent dynamic bearing load, N

N - total revolution numbers with one load changing cycle, r



Anticipated bearing service life

When selecting a bearing, one should usually predetermine an appropriate service life according to the relevant machine type, operating condition and reliability requirement. Generally the anticipated bearing service life can be determined by refering to the maintenance period of a machine.

Calculating method of equivalent dynamic bearing load P.

The basic equivalent dynamic bearing load is determined under a hypothetical condition. When calculating the bearing life, the actual load has to be converted to dynamic bearing load which is in conformity with the load condition determining the dynamic load rating. General equation for calculating the equivalent dynamic bearing load:

$$P = XF_r + YF_a,$$

where:

- P - equivalent dynamic bearing load, N
- F_r - actual radial load, N
- F_a - actual axial load, N
- X - radial factor
- Y - thrust factor

The values of X and Y are determined by the ratio between the applied axial load Fa and the basic static load rating C0. The axial load which the spherical outside surface ball bearing can carry is determined by the mounting method of the bearing on the shaft.

For bearing of set-screw Locking type or eccentric Locking collar type, if flexible shafts are applied and the set-screws are tightened enough, the axial load Fa which the bearings can carry not surpass 20% of the radial load Fr.

For bearing of adapter sleeve Locking type, if the nut is properly tightened, the axial load Fa can be maximally 15% to 20% of the radial load.

The value of radial and thrust factors X and Y for spherical outside surface ball bearings can be obtained from the following Table 17.

When twist load is applied to the bearing, the equivalent dynamic bearing load is calculated by the following equation:

$$P_m = f_m P$$

where:

- P_m - equivalent dynamic bearing load when considering twist load
- f_m - twist load factor, which is defined as follows:
  - when the twist load is small: fm = 1,5
  - when the twist load is big: fm = 2

Example of bearing size selection

When shocking load is applied to the bearing, the equivalent dynamic bearing load can be calculated by the following equation:

$$P_d = f_d P$$

where:

- P_d - equivalent dynamic bearing load when considerating shocking load
- f_d - shocking load factor, which is defined as follows:
  - when no shocking load or mirror shocking load is applied: fd = 1-1,2
  - when adequate shocking load is applied: fd = 1,2 - 1,8

How to select the size of bearing: one spherical outside surface ball bearings is to operate at a rotation speed of 1000r/min under only a radial load of F_r = 3000 N, with a basic rating life of a least 20,000 hours.

Select the bearing size

From the required rotation speed it can be found that: f_n = 0,322 (figure 7 shows about 0,32, refer to page 631).

From the required basic rating life (anticipated service life), it can be found that:

f_h = 3,42 (figure 7 shows about 3,4, refer to page 631).

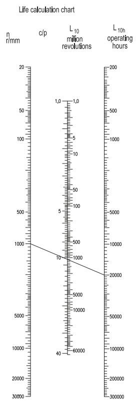
Under only radial load, i.e.

P = Fr = 3000 N

Therefore,

$$C = \frac{\int h}{\int n} P = \frac{3,42}{0,322} = 31,863\,N$$

A simplified way to calculate the bearing life can be applied by using figure 8.



Radial and thrust factors X and Y for spherical outiside surface ball bearings

Table 17

Clearance for normal						Clearance for C3				
$\frac{Fa}{Ca}$	$\frac{Fa}{Fr} \le e$		$\frac{Fa}{Fr} > e$		e	$\frac{Fa}{Fr} \le e$		$\frac{Fa}{Fr} > e$		e
	X	Y	X	Y		X	Y	X	Y	
0,025	1	0	0,56	2	0,22	1	0	0,46	1,74	0,3
0,04	1	0	0,56	1,8	0,24	1	0	0,46	1,61	0,33
0,07	1	0	0,56	1,6	0,27	1	0	0,46	1,46	0,36
0,13	1	0	0,56	1,4	0,31	1	0	0,46	1,3	0,41
0,25	1	0	0,56	1,2	0,37	1	0	0,46	1,14	0,47
0,5	1	0	0,56	1	0,44	1	0	0,46	1	0,54

By connecting n and the required basic rating life L_{10h} with a straight line, it can be found that C/P value is 10,6.

As is know, P = F_r = 3000 N, thus the required basic dynamic load rating is:

C = 3000 x 10,6 = 31,800, N

In this way, we can select the shperical outside surface ball bearings inside this catalogue (refer to pages 699-705).

Adjusted rating life equation

The basic rating life L10 calculated with bearing life calculation formula can be applied to calculate the rating life of bearings made of ordinary bearing steel (i.e. bearing life with reliability of 90%)

Due to more and more of machinery products demanding higher reliability and better quality steel (ISO 281/1-1977), an adjusted rating life calculation equation is suggested. i.e.

L_n = a1 a2 a3 L10

For spherical outside surface ball bearing:

L_n = a1 a2 a3 $(C/P)^3$

where:

- Ln - under specified material and lubricating conditions, bearing life with (100-n)% no breaking probability (i.e. reability).
- a1 - life adjustment factor for reability (table 18)
- a2 - life adjustment factor materials (table 19)
- a3 - life adjustment factor for operating conditions (table 20)

Life adjustment factor for reability a_1

Table 18

Reability	90	95	96	97	98	99
%						
L_n	L_{10}	L_5	L_4	L_3	L_2	L_1
a1	1	0,62	0,53	0,44	0,33	0,21

Life adjustment factor for materials a_2

Table 19

Normal chromium bearing steel		a2 = 1
Special smelted bearing steel	Vacuum degassed bearing steel	a2 = 3
	Vacuum resmelted bearing steel	a2 = 5
When material hardness lowered by high frequency	tempering	a2 < 1

Life adjustment factor for operating conditions a_3

Table 20

When under normal operating conditions: - properly mounted - sufficiently lubricated - without outside matters intrustion	a3 = 1
When under operating temperature, the spherical outside surface ball bearings lubricating grease viscosity lower than 13 mm^2/s	a3 < 1

Selection of shaft

The shaft on which bearing units are mounted shall be free from band and flexure.

For the units with cylindrical bore (with set-screws or eccentric locking collar) clearance fit is usually adopted for mounting the units on the shaft, and shaft tolerances in table 21 are recommended for such loose fit, but for high speed or highly accurate operation or such application which is accompanied by heavy shock loads, interference fit is to be adopted. Table 22 shows recommended shaft with inerference fit, the eccentric locking collar may omitted.

Tapered bore bearings permit wider tolerances of the shaft since they are locked to the shaft by means of adapted sleeves.

Recommended shaft tolerances for tapered bore bearings listed in table 23.

Shaft tolerances for clearance fit for bearing with cylindrical bore

Table 21

Shaft diameter		**Deviation of tolerances in saft**							
		For lower speed		**For medium speed**		**For rather high speed**		**For high speed**	
over	incl.	h9		h8		h7		J6	
mm		max.	min.	max.	min.	max.	min.	max.	min.
10	18	0	-43	0	-27	0	-18	+8	-3
18	30	0	-52	0	-33	0	-21	+9	-4
30	50	0	-62	0	-39	0	-25	+11	-5
50	80	0	-74	0	-46	0	-30	+12	-7
80	120	0	-87	0	-54	0	-35	+13	-9
120	180	0	-100	0	-63	0	-40	+14	-11

Shaft tolerances for interference fit for bearing with cylindrical bore

Table 22

Shaft diameter		**Deviation of tolerances in saft**							
		Higher speed		**Rather heavy load**		**Highest load**		**Heavy load**	
over	incl.	m6		m7		m6		m7	
mm		max.	min.	max.	min.	max.	min.	max.	min.
10	18	+18	+7	+25	+7	+23	+12	+30	+12
18	30	+21	+8	+29	+8	+28	+15	+36	+15
30	50	+25	+9	+34	+9	+33	+17	+42	+17
50	80	+30	+11	+41	+11	+39	+20	+50	+20
80	120	+35	+13	+48	+13	+45	+23	+58	+23
120	180	+40	+15	+55	+15	+52	+27	+67	+27

Shaft tolerances for bearing with tapered bore

Table 23

Shaft diameter		Deviation of tolerances For shot shaft		Deviation of tolerances For shot shaft	
over	incl.	h9		h10	
mm		max.	min.	max.	min.
10	18	0	-43	0	-70
18	30	0	-52	0	-84
30	50	0	-62	0	-100
50	80	0	-74	0	-120
80	120	0	-87	0	-140
120	180	0	-100	0	-160

Mounting of bearing units on shaft

The bearing units can be easy installed in principle at any place. However, in order to have a long service life, it is desirable that the mounting base if flat and rigid.

In case of either the vibration is caused to the bearing, the alternating movement takes place, the load applied to the bearing is large, or the shaft rotation speed is rapid, it is desired to provide with the filed seat or concave section at the part where the set-screws contact with the shaft. If large thrust load is charged, it is recommended that joggling tightened with nuts be used to install the bearing most effectively to the shaft: as shown in figure 9.

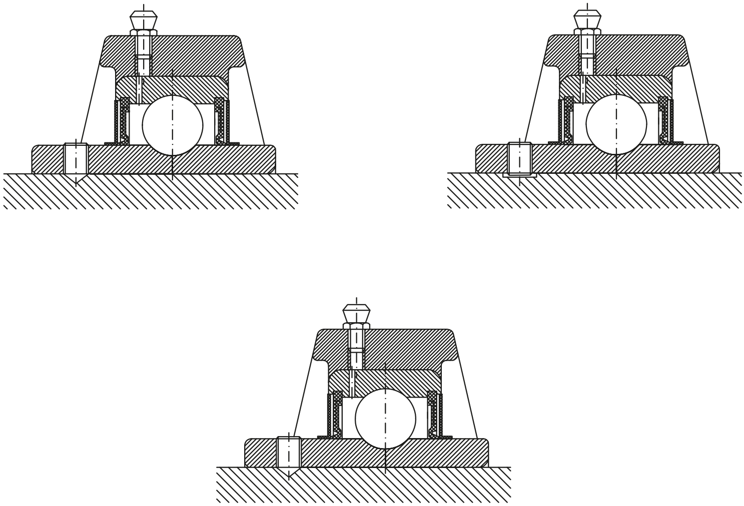


Fig. 9

Bearings units with adapter sleeve

Bearing unit with adapter sleeve permits wider shaft tolerance and can be used in applications where vibrations and shocks are heavly.

Mounting processes of these units as follows:

First, the sleeve is instaled to an arbitrary position. After the shark proof washer is inserted, the nut is tightened.

The proper nut tightening condition can be obtained if it is tightened enough by hand and then rotated by 2/5 to 3/5 revolution with a spanner.

After tightening the nut, bend the shark proof washer within the slot. Otherwise, the nut may be loosened and creep may be caused between the shaft and sleeve. It is necessary the nut can not be tightened too much.

Bearings units with eccentric locking collar

The eccentric part of the collar mates with the inner ring of the bearing which is made eccentric with the collar. When locked to the shaft by hand in direction of the shaft rotation, the eccentric locking collar tightens automatically to the shaft by force of working radial load. Then, lock the set-srews provided on the collar to fix the eccentric collar to the shaft. At the shaft rotation force or load is not charged on the set-screws directly, it will not loosen during operation.

Bearing units with set-screws

There are two set-screws located at two places on one side of the wide inner ring 120 apart with which the bearing units can be mounted to the shaft. When mounting the bearing to the shaft, the torque shown in the following table 23 is recommended to tighten the set screws to shaft.

The material for cast iron housing

The material of cast iron housing under ISO/DIS GG20, the mechanical properties please refer to table 24.

Proper tightening torque of set-screws

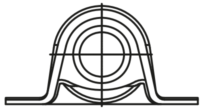
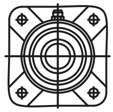
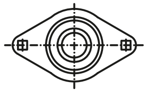
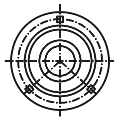
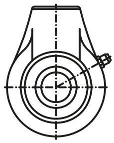
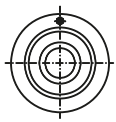
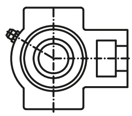
Table 24

Set-screws type	Bearing type	Tightening torque		
mm	inch		N.m	lbf.in
M 5x0,8	No. 10-32 UNF	SB 201 - SB 203, UC 201 - UC 203	3 - 3,5	28
M 6x1	1/4-28 UNF	SB 204 - SB 207, UC 204 - UC 206 SA 201 - SA 206, UEL 201 - UEL 205 UC X05, UC 305 - UC 306	3,5 - 4	30 - 35,4
M 8x1	5/16-24 UNF	SB 208, UC 207 - UC 209 SA 207 - SA 210, UEL 206 - UEL 210 UC X06 - UC X08, UC 307	8,0 - 8,5	69 - 73,5
M 10X1,25	3/8-24 UNF	UC 210 - UC 212 SA 211, UEL 211 - UEL 215 UC X09 - UC X11, UC308 - 309	16,5 - 17,5	144 - 152
M 12X1,25	7/16-20 UNF	UC 213 - UC 218 UC X12 - UC X16 UC 310 - UC 314	26,5 - 27,5	235 - 243
M 14X1,5	1/2-20 UNF	UC 315 - UC 316	33,5 - 34,5	296 - 304

The mechanical properties of cast iron housing

Table 25

Number	Major wall thickness of casting piece	Strain stress	Hardness m6
	mm	N/mm^2	HB
ISO/DIS GG20	2,5-10	220	
U.S.A. Grade 35	>10-20	195	170 - 220
JIS FC20	>20-30	170	
	30-50	160	

Pillow block type	
Flanged units type	
Two bolts flanged units type	
Flanged cartridge units type	
Hanger units type	
Cylindrical cartridge units type	
Take up units type	
Insert bearings