ASAHI

HE13E-004E

Instruction Manual

Insert Bearing Units

(Eccentric locking collar type)

ASAHI SEIKO CO., LTD.

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1. Scope of application

This instruction manual applies to the insert bearing units shown in Tables 1.1 and 1.2.

Remarks: This instruction manual also applies to the insert bearing units marked with auxiliary marks (Note 1) and aggregation marks (Note 2) in addition to the standard products shown in Table 1.1 and 1.2.

(Note) 1. Special and change marks showing accuracy, shape, additional processing, etc. for bearings, housings and main parts.

2. Abbreviated marks for special parts whose nominal number consists of many characters and is complicated.

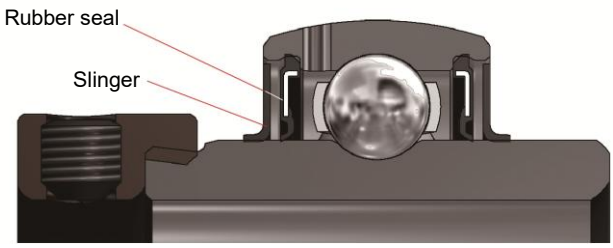
Table 1.1

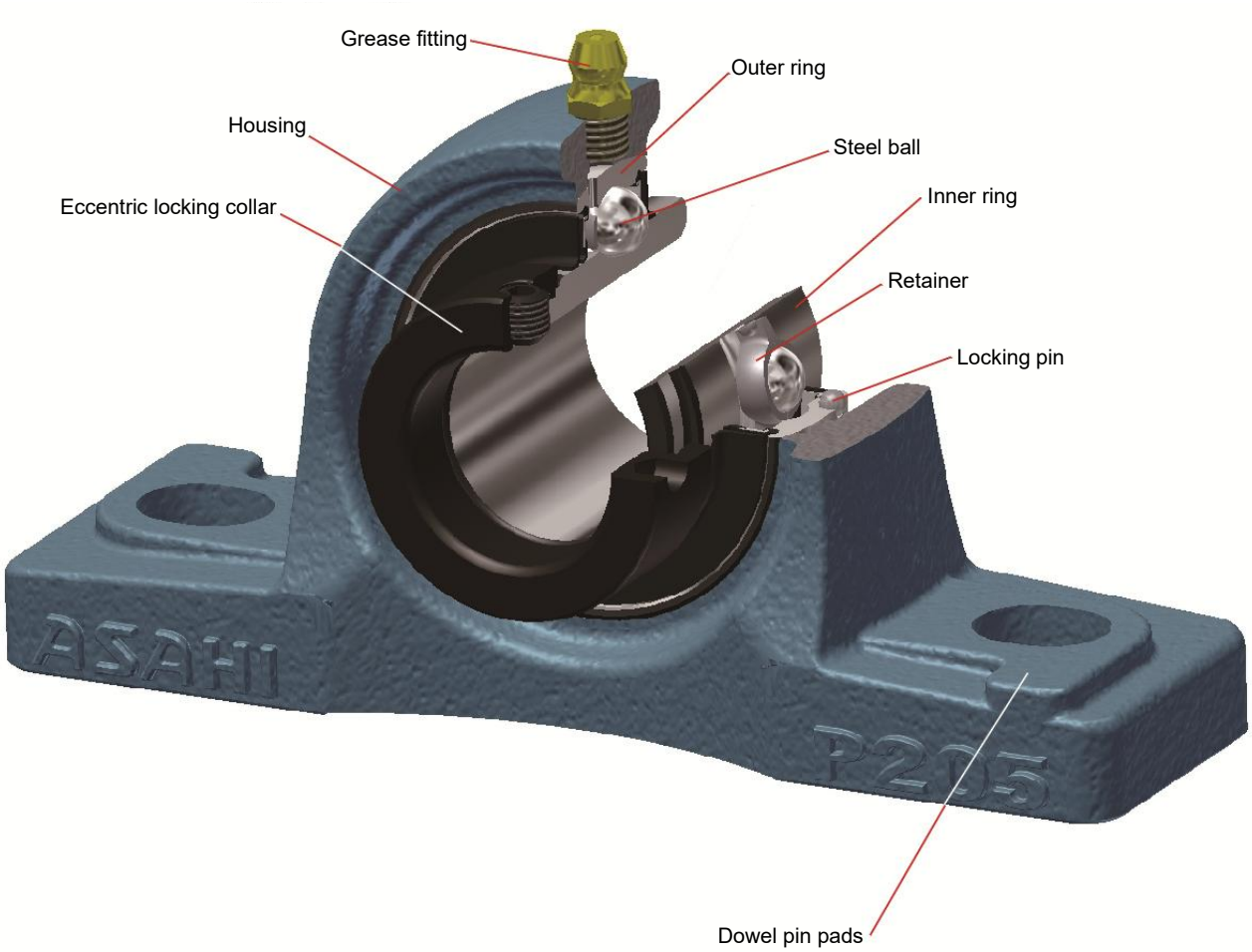
Pillow block unit				Square flange unit	Round flange unit with spigot joint	Rhombic flange unit			Take-up unit	Cartridge unit
UGP204	–	UGPH204	UGPA204	UGF204	UGFC204	UGFL204	UGFK204	UGFA204	UGT204	UGC204
UGP205	–	UGPH205	UGPA205	UGF205	UGFC205	UGFL205	UGFK205	UGFA205	UGT205	UGC205
UGP206	–	UGPH206	UGPA206	UGF206	UGFC206	UGFL206	UGFK206	UGFA206	UGT206	UGC206
UGP207	–	UGPH207	UGPA207	UGF207	UGFC207	UGFL207	UGFK207	UGFA207	UGT207	UGC207
UGP208	UGIP208	UGPH208	UGPA208	UGF208	UGFC208	UGFL208	UGFK208	UGFA208	UGT208	UGC208
UGP209	UGIP209	UGPH209	UGPA209	UGF209	UGFC209	UGFL209	UGFK209	UGFA209	UGT209	UGC209
UGP210	UGIP210	UGPH210	UGPA210	UGF210	UGFC210	UGFL210	UGFK210	UGFA210	UGT210	UGC210
UGP211	UGIP211	–	–	UGF211	UGFC211	UGFL211	–	UGFA211	UGT211	UGC211
UGP212	UGIP212	–	–	UGF212	UGFC212	UGFL212	–	–	UGT212	UGC212
UGP213	UGIP213	–	–	UGF213	UGFC213	UGFL213	–	–	UGT213	UGC213

Table 1.2

Pillow block unit		Square flange unit	Round flange unit with spigot joint	Two-bolt flange unit	Take-up unit	Cartridge unit
UGP306	–	UGF306	UGFS306	UGFL306	UGT306	UGC306
UGP307	–	UGF307	UGFS307	UGFL307	UGT307	UGC307
UGP308	–	UGF308	UGFS308	UGFL308	UGT308	UGC308
UGP309	–	UGF309	UGFS309	UGFL309	UGT309	UGC309
UGP310	–	UGF310	UGFS310	UGFL310	UGT310	UGC310
UGP311	–	UGF311	UGFS311	UGFL311	UGT311	UGC311
UGP312	–	UGF312	UGFS312	UGFL312	UGT312	UGC312
UGP313	UGIP313	UGF313	UGFS313	UGFL313	UGT313	UGC313
UGP314	UGIP314	UGF314	UGFS314	UGFL314	UGT314	UGC314
UGP315	UGIP315	UGF315	UGFS315	UGFL315	UGT315	UGC315
UGP316	UGIP316	UGF316	UGFS316	UGFL316	UGT316	UGC316
UGP317	UGIP317	UGF317	UGFS317	UGFL317	UGT317	UGC317
UGP318	UGIP318	UGF318	UGFS318	UGFL318	UGT318	UGC318

2. Name of parts and functions





Name of parts	Functions
Grease fitting	A part to supply lubrication grease to enable the service lives of bearings to be extended by supplying grease at an interval suitable for the use environment.
Eccentric locking collar	Secures the insert bearing and collar. This collar is provided with an eccentric part which drives several wedges on the circumferences of the inner ring eccentric part and shaft to secure the bearing to the shaft.
Dowel pin pads	Providing a pin hole at this position makes it easy to position the insert bearing unit when replacing bearings and is convenient for reinforcing the mounting bolts.
Locking pin	Prevents the outer ring from drag turning and the section between the bearing and housing from being worn.
Rubber seal	Prevents dust and moisture from intruding because it is secured to the outer ring and the lip part comes in contact with the inner ring.
Slinger	Prevents dust from intruding by centrifugal force because it is secured to the inner ring and rotates together with the inner ring.

3. Selection of shafts

For the shaft on which the insert bearing unit is mounted, use one that is not bent and does not have burrs, and perform chamfering of the shaft end.

The press-fitting of the inner ring and shaft is mostly performed by a running fit in general for convenience in handling. The values shown in Table 3.1 are considered appropriate for the shaft dimensional tolerance in the case of loose press-fitting.

For high precision operation, high speed rotation, heavy and/or shock load application, interference fit is recommended for the fit between the shaft and the bearing inner ring. When applying tight fit like this, it is recommended to follow the dimensional tolerance for the shaft as shown as per the Table 3.2. For such tight fit between the bearing and the shaft, the initial bearing internal clearance must be larger than its standard clearance.

Table 3.1: Shaft dimensional tolerance (for loose press-fitting)

Shaft diameter (mm)		Shaft dimensional tolerance (μm)		
Over	Or less	js7	h7	h8
10	18	±9	0 to -18	0 to -27
18	30	±10.5	0 to -21	0 to -33
30	50	±12.5	0 to -25	0 to -39
50	80	±15	0 to -30	0 to -46
80	120	±17.5	0 to -35	0 to -54

Remarks: In general, js7 shall be applied.

Table 3.2: Shaft dimensional tolerance (for tight press-fitting)

Shaft diameter (mm)		Shaft dimensional tolerance (μm)			
Over	Or less	n6	n7	m6	m7
10	18	+23 to +12	+30 to +12	+18 to +7	+25 to +7
18	30	+28 to +15	+36 to +15	+21 to +8	+29 to +8
30	50	+33 to +17	+42 to +17	+25 to +9	+34 to +9
50	80	+39 to +20	+50 to +20	+30 to +11	+41 to +11
80	120	+45 to +23	+58 to +23	+35 to +13	+48 to +13

Remarks: If the shaft diameter is 30mm or less, it is better that values other than m6 are not used.

4. Mounting method

1) Slide the insert bearing unit onto the shaft slowly and bring it to the predetermined position. (Photo 4.1)

Photo 4.1

2) Mount the insert bearing unit on the machine base and secure it firmly with bolts. (Photo 4.2)

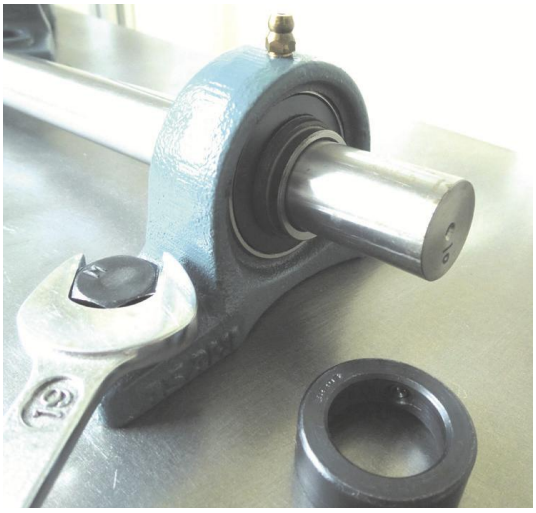


Fig. 4.2

3) Press-fit the eccentric part of the eccentric locking collar into the eccentric part provided on the bearing inner ring. (Photo 4.3)
4) Tighten the eccentric locking collar in the shaft rotation direction.
5) Tighten the set-screws with a hexagonal wrench key to secure the eccentric locking collar to the shaft.

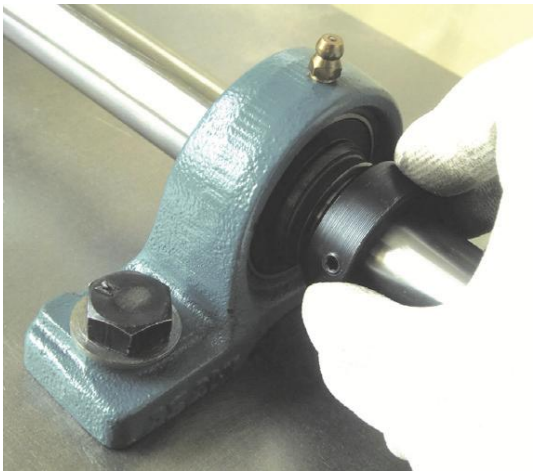


Fig. 4.3

Remarks: 1. Before sliding the eccentric locking collar onto the shaft, check that the tips of set-screws do not protrude from the inside diameter of bearing. If a tip protrudes, loosen the set-screw.

2. When sliding the insert bearing unit onto the shaft, do not allow the shaft to come in direct contact with the side of the inner ring or the slinger and use extra caution to prevent it from being twisted.
   If strong impact is applied to the insert bearing unit, it is possible that the slingers on both sides may move and come in contact with the rubber seal. In this case, the rotation torque becomes larger, which may cause abnormal heating and noise to be generated if the insert bearing unit is used in such condition. After mounting the insert bearing unit, applying strong impact when mounting transmission system parts such as pulleys, sprockets, etc. on the shaft may cause the same phenomenon, so extra caution should be taken to prevent strong impact from being applied to the insert bearing unit.

3. The machine base on which the insert bearing unit is mounted must have high rigidity and high flatness to prevent the housing from being deformed.
   (Excluding cartridge type and take-up type models)

Inside diameter number	Flatness
13 or less (shaft diameter: Φ65 or less)	0.1mm or less
14 or higher (shaft diameter: Φ70 or more)	0.15mm or less

4. In case of systems rotating in both normal and reverse directions, the following method should be taken.
   a) After tightening the eccentric locking collar by hand, tighten it further with a larger torque. (Insert a jig such as a chisel and tighten further with a plastic hammer.) (Photo 4.4)
   b) Use a stepped shaft and apply the inner ring to the shoulder.
   c) When using the insert bearing unit with 2 eccentric locking collars in pairs, mount it properly so that both eccentric locking collars are positioned on the outside or inside. (At this time, the insert bearing unit cannot bear large axial loads.)
   d) Secure the inner ring using the collar for securing in the axial direction.

Photo 4.4

5. The values shown in Table 4.1 are considered appropriate for the tightening torque of set-screws.
6. The values shown in Table 4.2 are considered appropriate for tightening torque of housing mounting bolts.
7. Use washers to prevent the housing from being damaged when fixing the bearing unit on the mounting base with bolts.

Table 4.1: Appropriate tightening torque of set-screws

Bearing nominal number UG+ER		Set-screw nominal number	Hexagonal wrench key nominal number	Appropriate tightening torque (N·m)
204, 205	—	M6 × 0.75	3	4.9
206	306	M8 × 1	4	11.8
207 to 210	307 to 310	M10 × 1.25	5	23.5
211, 212	311 to 313	M12 × 1.5	6	39
—	314	M14 × 1.5	6	39
—	315 to 317	M16 × 1.5	8	66.6
—	318	M18 × 1.5	8	66.6

Table 4.2: Tightening torque of housing mounting bolts (reference values)

Bolt nominal number	Torque (N·m)	Bolt nominal number	Torque (N·m)	Bolt nominal number	Torque (N·m)
M5	1.7 to 2.7	M14	38 to 61	M24	196 to 319
M6	2.8 to 4.5	M16	59 to 95	M27	294 to 466
M8	6.9 to 11	M18	81 to 130	M30	397 to 632
M10	14 to 22	M20	118 to 186	M33	539 to 862
M12	24 to 38	M22	157 to 250	M36	691 to 1107

5. Inspection

After finishing mounting the insert bearing unit, inspect whether the mounting conditions are appropriate or not.
First, turn the shaft by hand to check that the insert bearing unit rotates smoothly. If no problem is observed, rotate it by electric power to inspect for noise or temperature increases.

5.1 Noise

Touch the housing with a listening rod or screwdriver and listen for noises during operation to check for abnormalities. (Photo 5.1)
For normal operation conditions, a smooth rotation noise is generated, but if there is an abnormality in mounting, an abnormal noise may be generated.

Photo 5.1: Checking the rotation noise with a listening rod

5.2 Rise of temperature

Measure the temperature on the outer circumferences of the bearing outer ring and housing. (Photos 5.2 and 5.3)
The rise of temperature reaches saturation 2 to 3 hours after start of operation and the insert bearing unit reaches to the regular conditions in general; however, if there are abnormalities in mounting, etc., the temperature will increases excessively, which will prevents the insert bearing unit from reaching the regular conditions. (For temperature measurement of cartridge type bearings, measure at the side of housing.)

Photo 5.2: Temperature measurement (contact type)

Photo 5.3: Temperature measurement (non-contact type)

Inspect the above items during commissioning and start operating the insert bearing unit fully after checking that there is no abnormality.
Further, it is recommended that inspections also be performed periodically at the predetermined interval during operation to detect failures in the bearings at an early stage.
In addition, monitoring to check that there are no changes in noise or increases in temperature by comparing the differences between the results of periodic inspections and other inspections is an effective measure for preventing accidents and damage to machinery.
For the bearing failure and its preventive measures during the test run and the periodical inspection of the insert bearing units, please refer to our General Catalogue and/or access ASAHI WEBSITE to ‘Inspection and Failure’.

6. Lubrication

6.1 Lubrication grease

This insert bearing has been factory-lubricated with the grease shown in Table 6.1. Therefore, it is recommended that the same grease as the factory-lubricated grease be used for replenishment.
However, since “Alvania Grease S3” has been discontinued in general market, it is recommended to use the successor product, "Shell Gadus S2 V125J 3(S)" for grease replenishment.

Table 6.1: Properties of standard factory-lubricated grease

Type	Auxiliary mark	Product name	Manufacturer name	NLGI No.	Soap-based grease	Drop point (°C)	Usable temperature point (°C)	Remarks
For general use	—	Alvania Grease S Shell Gadus S2 V125J3(S)	Shell Lubricants Japan	3	Li	182	-20 to +135	—
For heat-resistant use	HR4 HR5	Super Lube	Yuken Kogyo	3	Ca-mixed	300 or more	-20 to +200	—
For low-temperature-resistant use	CR2A	AeroShell Grease 7	Shell Lubricants Japan	—	(Microgel)	Approx. 250	-70 to +150	Equivalent with the level between NLGI No. 1 and 2
For food machines use	FD HR20	CLARION ® FOOD MACHINERYHTEP GREASE, NO.2	CITGO Petroleum Corporation	2	Al-mixed	260	-12 to +163	—

Remarks: 1. The usable temperature ranges in the above table are the ranges for the grease. The usable temperature ranges for the insert bearing unit are as follows:

2. For heat-resistant specifications, the bearing radial inside clearance has been designed to be larger originally; therefore, clearance marks such as C3, C4, etc. are added as auxiliary marks.

Type	Auxiliary mark	Range of operating temperature point (°C)
For general use	—	-15 to +100
For heat-resistant use	HR4	Normal temperature to +120
	HR5	Normal temperature to +200
	HR23	Normal temperature to +230
For low-temperature-resistant use	CR2A	-40 to +100
For food machines use	FD	-10 to +100
	HR20 (heat-resistant)	-10 to +150

*** HR23 specifications**

For HR23 specifications, the insert bearing chamber has been filled with fluorinated high-quality heat-resistant grease and lubrication-free insert bearing units are provided as standard.

The lubrication-free type shows all insert bearing units having specifications not equipped with a grease filling mechanism, such as specifications using completely-lubrication-free type housings whose housing nominal number includes an auxiliary mark “G00”, specifications whose housing grease fitting hole is blocked with “KU” and “KA” steel plugs, etc. (Figs. 6.1 to 6.3)

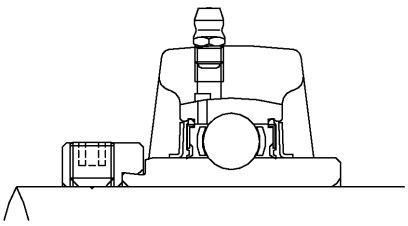


Fig. 6.1: Lubrication type insert bearing unit
Example of nominal number: UGP205

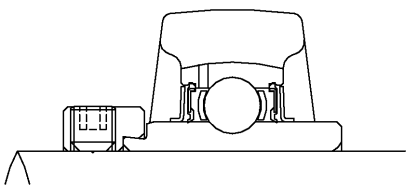


Fig. 6.2: Lubrication-free type insert bearing unit (G00 specifications)
Example of nominal number: UGP205G00

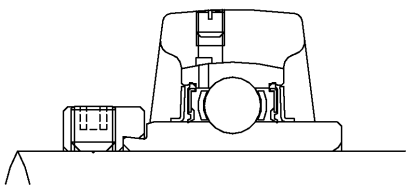


Fig. 6.3: Lubrication-free type insert bearing unit (Steel-plug filled specifications)
Example of nominal number: UGP205/KU

6.2 Grease replenishing method

Replenish grease using a grease gun (Photo 6.1) from the grease fitting mounted on the housing. Be careful to prevent dust or other foreign materials from getting into the grease to be replenished. If the grease fitting is contaminated, wipe it off before replenishing.

Photo 6.1: Grease gun

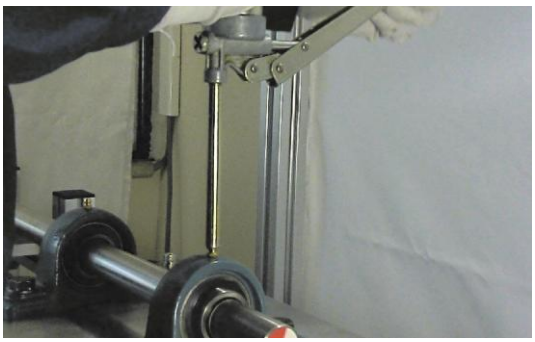


Photo 6.2: Example of filling with a grease gun

Grease is injected into the inside of the bearing from the grease hole of the outer ring through the grease groove provided on the circumference of the spherical bearing seat from the grease fitting replenishing port. Injected grease is stirred by the rotation of the bearing and mixed with previously-injected grease in the bearing and excess grease is discharged from the section between the slinger and outer ring through the rubber seal lip part. (Photo 6.3, Fig. 6.4)

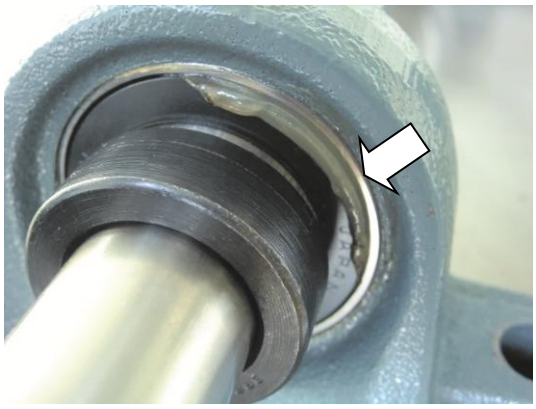


Photo 6.3: Normal grease discharging conditions from inside the bearing

Re-lubrication should be performed during operation to cause the grease to be spread into every corner of the inside of the bearing. However, if it is difficult to replenish grease during operation because replenishment during operation at high speed may cause dangerous accidents, after replenishing the grease while operation is stopped, continue to replenish while performing intermittent operation to cause the grease to be mixed by manual operation or regular operation. **Replenishing with a large amount of grease at one time while operation is stopped may cause the rubber seal to be peeled by internal pressure acting on the rubber seals on both sides from the grease and the seals may come in contact with the slinger. In this case, the rotation torque will increase, which may cause abnormal heating conditions to be generated if the insert bearing unit is operated without correcting the situation.**

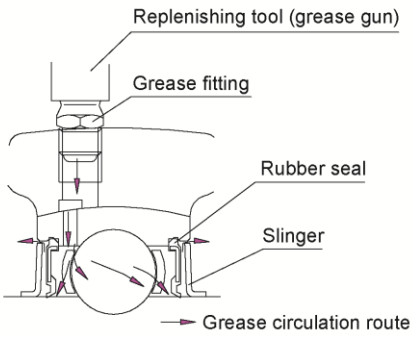


Fig. 6.4: Grease circulation route

*** Low torque specifications (auxiliary: TAA)**

Low-torque specifications are exhibited as "TAA" in which non-contact type rubber seals (Fig. 6.5) are used, Alvania Grease S1 (NLGI No. 1) is used as the factory-lubricated grease. The pre-lubricated grease amount is designed to be 1/3 of standard amount; note that if grease is replenished, the amount of inside grease increases.

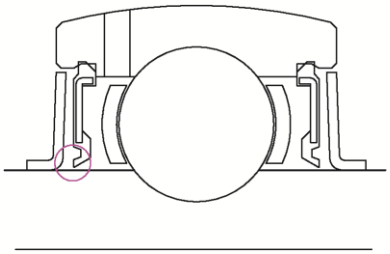


Fig. 6.5: Non-contact seal

6.3 Grease replenishment amount

The values shown in Table 6.2 are considered appropriate for grease replenishment amounts. If it is difficult to replenish grease quantitatively, replenish grease until deteriorated grease comes out from the clearance between the outer ring and slinger as a reference of the replenishment amount. (Photo 6.3)

Table 6.2: Grease replenishment amount Unit: g

Bearing nominal number	Grease replenishment amount	Bearing nominal number	Grease replenishment amount
UG204	1.2	—	—
UG205	1.4	—	—
UG206	2.2	UG306	3.8
UG207	3.2	UG307	5.7
UG208	3.9	UG308	7.8
UG209	5	UG309	9.4
UG210	5.4	UG310	12.8
UG211	7.4	UG311	16.4
UG212	10	UG312	21
UG213	11.8	UG313	26
—	—	UG314	31.5
—	—	UG315	38
—	—	UG316	41
—	—	UG317	52
—	—	UG318	62

(Note) The replenishment amount shows the amount per one shot.

6.4 Grease replenishment interval

The recommended grease replenishment interval is shown in Table 6.3.

Table 6.3: Grease replenishment interval

Bearing operation temperature (℃)	Environment conditions		
	Very clean	Very dirty	Very dirty, very humid, much splashing
50 or less	3 years	6 months	3 months
70	1 year	2 months	1 month
100	2.5 months	2 weeks	1 week
120	1.5 months	1 week	3 days
150	2 weeks	3 days	Every day

7. Replacement of bearing

When replacing the insert bearing unit with a new one, if either the bearing or housing is slightly damaged, replacement of either one is possible instead of replacing both ones.

When assembling the bearing into the housing, position the bearing outer ring at right angles to the bearing seat, and press-fit it into the notched part of housing, and then turn the bearing. (Photo 7.1)

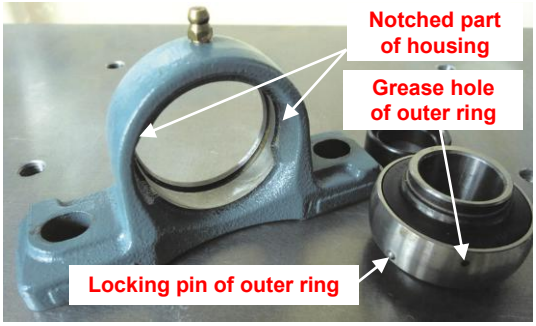


Photo 7.1

At this time, ensure that the outer ring locking pin is inserted into the notched part of housing. **Note that forcibly pressing the locking pin in the bearing seat other than at the notched part may cause outer ring cranking.** (Photo 7.2)

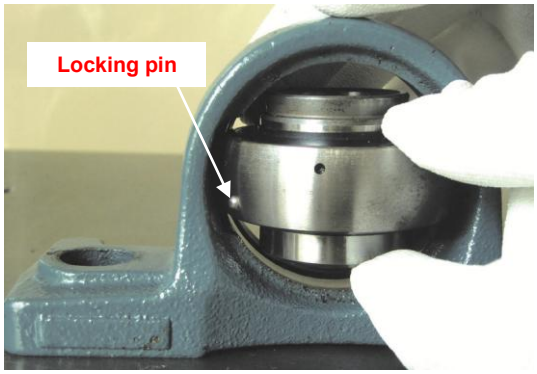


Photo 7.2

Further, when replenishing grease, in order to help the grease spread into every corner of the inside of the bearing, it is recommended to assemble the bearing so that the grease hole of outer ring is located near the grease fitting of housing. (Photo 7.3)

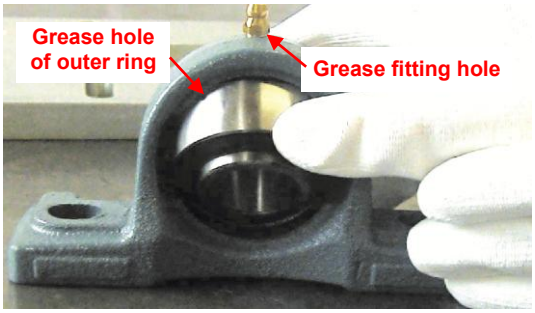
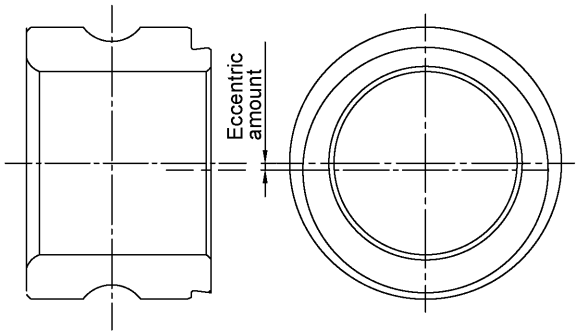


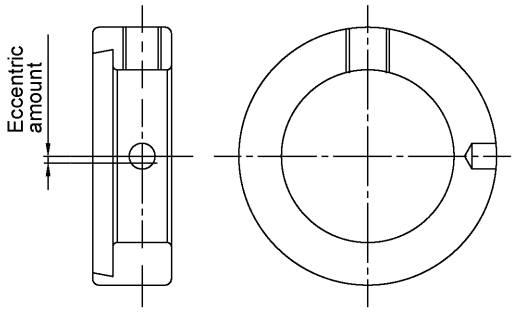
Photo 7.3

Attachment: Principle of eccentric locking collar securing system

This is the method for securing the bearing to the shaft by providing inside or outside eccentric convex or concave-shaped parts on the inner ring end and providing wedges on the circumference using corresponding eccentric locking collars.



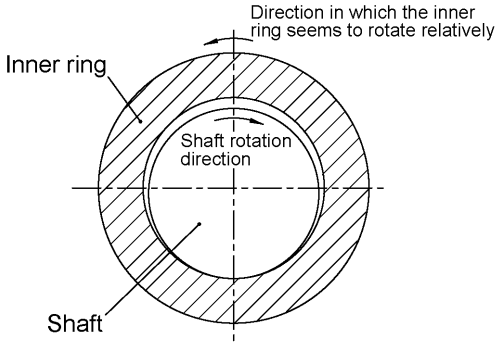
Inner ring



Eccentric locking collar

The press-fitting of the inner ring and shaft is mostly performed by a running fit in general for convenience in handling. In this case, there is a gap between the inner ring and shaft (eccentric locking collar) and the rotation of shaft (eccentric locking collar) does not match with the rotation of inner ring.

Because of differences in circumferential length between the shaft and inner ring, the inner ring is misaligned by the circumferential difference amount every rotation of shaft, and relative to each other, it will look as if the inner ring is rotating in the opposite direction to the shaft rotation direction. In other words, because the eccentric locking collar is secured to the shaft, it will look as if it is tightening to the inner ring in the rotation direction.



Schematic diagram

The force to make the inner ring seem to rotate in the opposite direction to the shaft rotation direction becomes larger in proportion to the radial loads acting on. By these loads, wedges are formed on the eccentric part, which provides excellent securing force.

If tightening the eccentric locking collar in the opposite direction to the shaft rotation direction by way of experiment, the eccentric locking collar is loosened once and then tightened.

Therefore, when mounting the eccentric locking collar, it is only necessary to tighten it in the shaft rotation direction.

If using the bearing repeatedly in normal and reverse rotation directions, the above phenomenon may occur; therefore, when mounting the eccentric locking collar, after tightening it in the shaft rotation direction, it is necessary to insert a jig such as a chisel into the eccentric locking collar drilled hole and tighten it additionally using a plastic hammer.

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