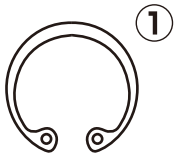
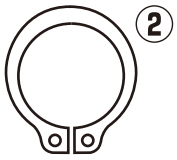
2. RETAINING RINGS

1) Types of Retaining Rings (Characteristics and Instructions for Use)

(1) Thrust Direction Mounting Types (Groove required to be machined)

① Basic Internal Ring　　② Basic External Ring

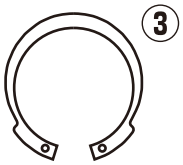


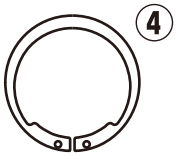


Characteristics

- Eccentric retaining rings for general use.
- Ring-shaped retainers to be set in the groove machined on the shaft or in the hole so that the retained part such as bearing may not drop out in the thrust direction that is parallel with the shaft.
- Generally, these retaining rings are fit in or on as compressed or spread using special pliers. 1) Types of Retaining Rings (Characteristics and Instructions for Use) (The permanent amount of deformation will be reduced by setting them using tapered jigs.)

③ Inverted Internal Ring　　④ Inverted External Ring

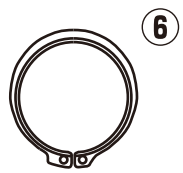




Characteristics

- The interference with the retained part is eased since the Inverted Internal (External) Ring has a smaller clearance diameter inside (outside) than the Basic Internal (External) Ring.
- The thrust load is approximately reduced to the order of two third due to smaller area of contact with the groove than the Basic Ring.

⑤ Beveled Internal Ring　　⑥ Beveled External Ring



Characteristics

- The inverted retaining rings can reduce looseness and unsteadiness resulting from the accuracy of machining to the groove position and variation of their retained parts.
- See page 11, “(3) Beveled Ring” for details.

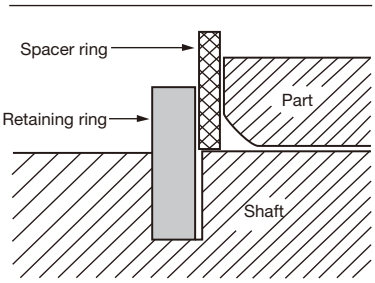
Instructions for Use

❶ Do not reuse these retaining rings.

❷ In setting the retaining ring in the hole (on the shaft), for the Basic Internal (External) Ring, do not compress (spread) the ring more than 1% of the hole (shaft) diameter.
If the ring is compressed (spread) more than 1% of the hole (shaft) diameter, a large deformation will be produced to prevent return of the ring to the groove of retained parts causing a danger of falling off of the ring from looseness.
However, for the Beveled Ring, the amount of compression (spread) is up to the applied hole (shaft) diameter.

❸ When fitting the retaining ring on or into retained parts, there is a danger that it may drop out of a jig and spring out causing injury. Take enough care to prevent the ring from falling off the jig.

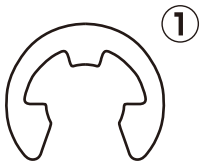
❹ When using the external retaining ring on a rotating shaft, the ring may drop off since it will spread as the shaft is rotated at a high speed.
Be sure to verify the conditions by using the actual machine.



❺ When retained parts have large corner radii or chamfers, the supporting point of load applied to the retaining ring will vary resulting in a danger that the ring may fall off the groove.
In this case, fit an angular plain washer-like insert having enough rigidity in between the parts and the ring to prevent deformation.

(2) Radial Direction Mounting Type (Groove required to be machined)

① E-Ring



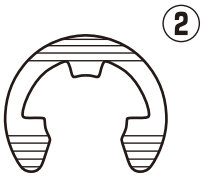
Characteristics

- With the groove machined on the retained shaft, the E Ring can be fit on in the radial direction that is perpendicular to the shaft.

Notes

- Our specification of the groove diameter is set differently from the JIS standard.

② Bowed E-Ring



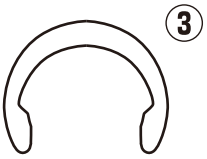
Characteristics

- Can prevent looseness in the thrust direction.

Notes

- The retaining ring may be crushed out to prevent removal of looseness if undue load is applied since the portion acting as a spring is short.
- There will be reverse warps (flips) or settling if undue load is applied.
- The bowed ring may be hard to be fit with the fitting load larger from the following reasons: The retained part is scraped during fitting depending on the material (hardness) of the part. And the ring is fit on as the portion acting as a spring is being compressed.

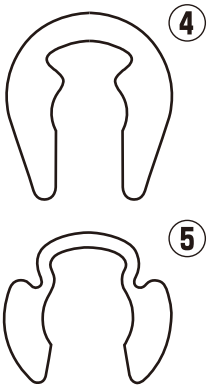
③ C-Ring



Characteristics

The C Ring has smaller outside diameters and can be applied where space is limited.
(This ring is effective where the outside diameter is restricted.)

④ U-Ring　　⑤ K-Ring



Characteristics

- The U- and K-rings have higher thrust loads than the E-rings since they have a large area of contact with the groove.
- These snap rings can be removed using a screwdriver or other tool.

Instructions for Use

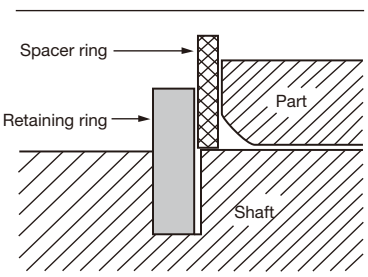
❶ Ensure that the Ring is set in the groove. Do not use any retaining ring that has been deformed by incorrect fitting. There is a danger that the ring being not gripped in the groove may fall off.

❷ Do not reuse these retaining rings.

❸ When selecting the retaining ring, check both the shaft diameter and the groove diameter before use.

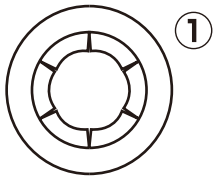
❹ When using the retaining ring on a rotating shaft, the ring may drop off since it will spread due to centrifugal force.
Be sure to verify the conditions by using the actual machine.

❺ When retained parts have large corner radii or chamfers, the supporting point of load applied to the retaining ring will vary resulting in a danger that the ring may fall off the groove.
In this case, fit an angular plain washer-like insert having enough rigidity in between the parts and the ring to prevent deformation.



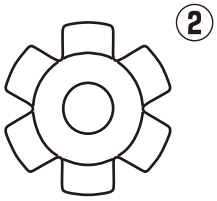
(3) Thrust Direction Mounting Types (Groove not required to be machined)

① Self-locking External Nut　② Self-locking Internal Nut



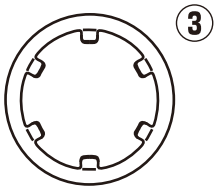
Characteristics

- By fitting the Self-locking Nut on the shaft in the thrust direction that is parallel with the shaft, its prongs bite into the retained part so as to prevent dropping off.
- There is no need of machining a groove and the Nut can be freely positioned and fixed.
- The product is structured so that its prongs bite into the shaft.



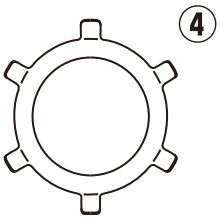
- These self-locking nuts have larger thrust loads than the Circular and P-Type Push-on Nuts.

③ Circular External Nut　④ Circular Internal Nut



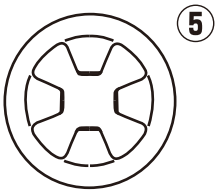
Characteristics

- The Circular Nut has lower fitting force and is profiled to be less prone to damage the shaft than the Self-locking Nut.
- The circular nuts have smaller outside diameters than the self-locking nuts.
- These nuts have smaller thrust loads than the self-locking nuts.



⑤ Circular Push-on Nut

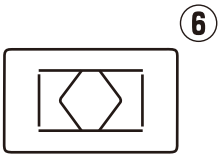
Characteristics



- The thrust load is between that of the Self-locking Nut and that of the Circular External Nut.
- There is no need of taking care of misalignment during fitting since the Nut has longer prongs than the Circular External Nut.
- External product only.

⑥ P-Type Push-on Nut

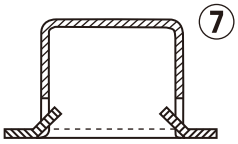
Characteristics



- The spring action is given by curving the whole nut on an arched line.
  The retained part can be fastened with the Nut pushed in (without looseness).
- External product only.

⑦ Cap Nut F-Type

Characteristics

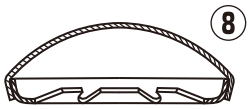


- The Nut avoids snag issues (scratches and injury) on the axial end face by protecting the end face of the retained shaft.
- Used for decoration.

⑧ Cap Nut D-Type

Characteristics

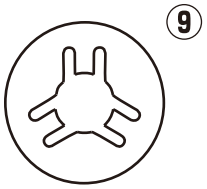
- The Nut avoids snag issues (scratches and injury) on the axial end face by protecting the end face of the retained shaft.
- Used for decoration.
- Combined product of the Self-locking Nut and the Cap Nut.



⑨ Flat Push Nut

Characteristics

- Unlike the Self-locking and Circular External Nuts, this nut does not distinguish the front side from the backside according to the orientation of the prongs which facilitates automation.
- Stack supplied as standard.
- The thrust load is between that of the Self-locking Nut and that of the Circular External Nut.
- The guide is attached to prevent misalignment during fitting.
- External product only.



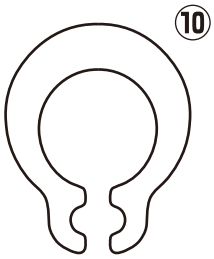
⑩ Grip Ring

Characteristics

- External product only.
- The shaft is fixed by the gripping force of the Ring.

Notes

- When fitting the Ring on the shaft, excessive spread causes increased permanent deformation and reduced thrust load.
- The thrust load is varied according to the specifications of the retained shaft that include the degree of surface roughness and the surface hardness (heat treatment and plating) because of use of the friction force between the Ring and the retained shaft.



Instructions for Use

1. If the retained part is rigid in hardness or applied with such surface treatment as produces a hard coating (nickel plating, chrome plating), there is no difference in hardness between the retaining ring and the retained part. Then the prongs will not bite into the retained part causing the thrust load to be reduced. (Except for the Grip Ring)
2. The purpose is to prevent dropping off of retained parts. And the parts are not pressurized (no force to continuously push on them). However, for the P-Type Push-on Nut, force to push on the retained part will be produced.
3. For repairing and maintenance of the retained part, the product cannot be reused since it is removed as deformed (destroyed) from the part.
4. When fitting the product on the retained part, install it with care to prevent the fitting jig from being caught. Otherwise, the retained part may not be allowed to be fixed due to deformed prongs. (Except for the Grip Ring) Be sure to verify the conditions by using the actual machine.
5. When fitting the product on the retained part, do not install it obliquely. The thrust load (drop off force) may be reduced as compared to the case where the product is correctly installed.
6. Never insert your finger(s) into any of the external products. The product will not slip off from your finger(s) and this is very dangerous.