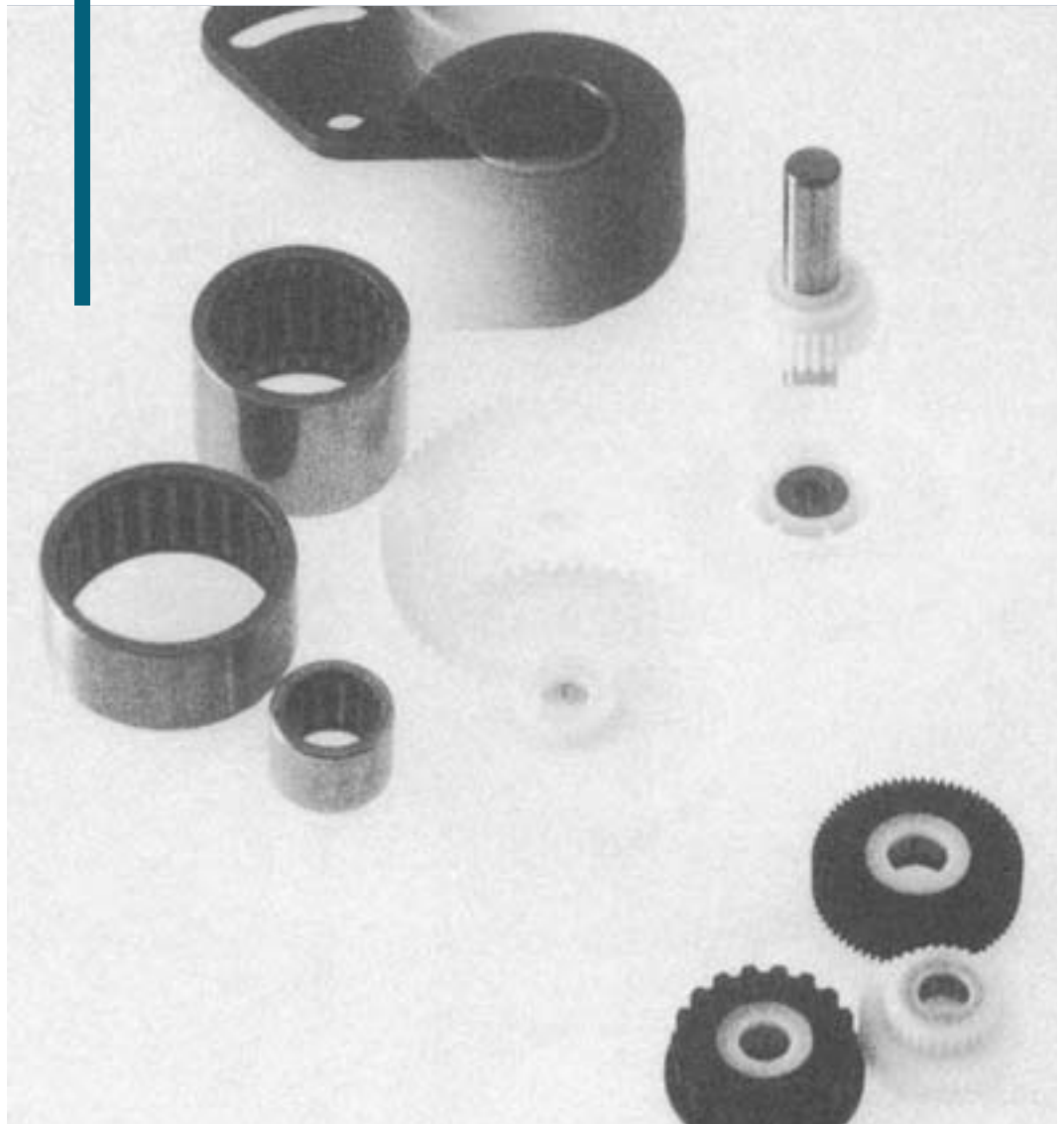


One-way Clutches Tension Pulleys, Bottom Roller Bearings



One-way Clutches

This is a compact and roller type one-way clutch which formed a cam face on its outer ring. (Available shaft diameter range: 6 to 35 mm) When the outer ring is going to rotate counterclockwise against shaft rotation (arrow → direction on outer ring widthway surface), the rollers advance to the position of engagement with the outer ring cam face by spring action and drive the shaft by acting as a wedge between the outer ring cam face and the shaft. (See Fig. 1) When the outer ring rotates clockwise against the shaft, the shaft rotates counterclockwise relative to the outer ring and, as the result, the rollers get away from the outer ring cam face and simultaneously the outer ring idles against the shaft. (See Fig. 2)

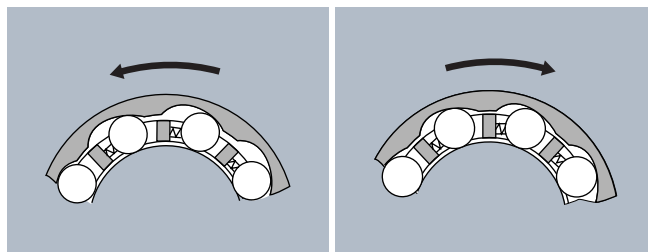
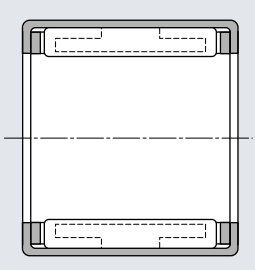
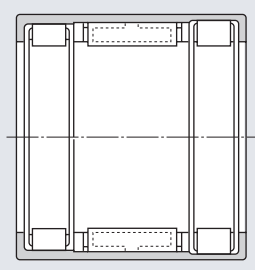


Fig. 1
One-way clutch in engagement

Fig. 2
One-way clutch in idling

| Type | Applied shaft diameter (mm) | Composition of nominal clutch number | Remarks |
|--|-----------------------------|--|---|
| <p>Type HF</p>  | $\phi 6 \sim \phi 35$ | <p>HF 10 12</p> <p>Width Bore diameter Type code</p> | <p>One-way clutch HF composed of an outer ring drawn from a thin steel plate by precision drawing has the clutching function only.</p> <p>This one-way clutch must be provided with a bearing at its both sides to support radial load acting thereon and to ensure smooth rotating motion.</p> |
| <p>Type HFL</p>  | $\phi 8 \sim \phi 35$ | <p>HFL 10 22</p> <p>Width Bore diameter Type code</p> | <p>One-way clutch HFL has an outer ring drawn from thin steel plate by precision drawing, a clutching function, and an integral needle roller and cage assembly capable of supporting radial load at its both ends respectively. Thus, this HFL can function as clutch and, in addition, support radial load.</p> |

Both of Type HF and HFL use a polyamide resin cage and press the needle rollers to a wedge, which is formed between the outer ring cam face and the shaft, by action of a plate spring supported with the cage.

Clutch fit

Table 1 shows the one-way clutch fits on shaft and in housing. Both of Type HF and HFL are only press-fitted in a housing, needing no axial fixing by use of a snap ring, etc.

However, due to the outer ring drawn from thin steel by precision drawing, the performance of the both is directly affected by the dimensional and profile deviations of the shaft/housing. To avoid such an inverse affect, shaft and housing accuracy must be controlled with good care. Any housing is required to have the wall thickness of a

specified value or more. Table 2 shows the recommended value.

Table 1 Clutch fits

| Type | Shaft | Housing | |
|------|---------|-------------|-------------------|
| | | Iron series | Light metal alloy |
| HF | h5 (h6) | N6 (N7) | R6 (R7) |
| HFL | | | |

Table 2 Recommended housing wall thickness

| Housing material | Housing wall thickness |
|-------------------|-----------------------------|
| Steel, cast iron | 0.75 ($D - F_w$) and over |
| Light metal alloy | 1.5 ($D - F_w$) and over |

Shaft and housing requirements

Table 3 shows the shaft and housing requirements.

Table 3 Shaft and housing requirements (recommended)

| Characteristics | Shaft | | Housing | |
|--------------------------------------|-----------|----------|-----------|----------|
| | Type HF | Type HFL | Type HF | Type HFL |
| Roundness (max) | IT3 (IT4) | | IT4 (IT5) | |
| Cylindricity (max) | IT3 (IT4) | | IT4 (IT5) | |
| Surface roughness | 0.2a | | 1.6a | |
| Surface hardness | HRC58~64 | | — | |
| Effective hardened layer depth (min) | 0.4mm | | — | |

Lubrication

Oil lubrication is optimum for these one-way clutches, but generally grease lubrication is mostly applied to this type of one-way clutch. NTN one-way clutches are filled up with a suitable grease. These clutches need no further grease replenishment, but subject to general applications.

In replenishing, good care must be exercised of too much grease filling. Too much filling could cause interference with smooth clutching.

Allowable operating temperature

For Type HF and HFL ··· Oil lubrication : -10 to 120°C
Grease lubrication : -10 to 70°C

However, consult with NTN for application under temperature exceeding the said temperature range.

How to mount

It is convenient to use a press-fitting mandrel as illustrated in Fig. 3 for assembling and mounting these one-way clutches. In that case, press-fit the outer ring, with its stamped mark side kept in contact with the mandrel shoulder.

In assembling, be careful to prevent the outer ring from twisting. Avoid to hammer directly the outer ring and, in press-fitting, bring a proper jig in contact with the outer ring side face without fail. Furthermore, when press-fitting in an housing with shoulder, good care must be exercised to prevent the bearing side face from coming into contact with the housing shoulder and to thereby avoid deformation of the bearing.

Also, shaft can be easily assembled by turning it in clutch idling direction. Where impossible to do so, provide the shaft end with a tapered (chamfered) guide to facilitate assembling-in.

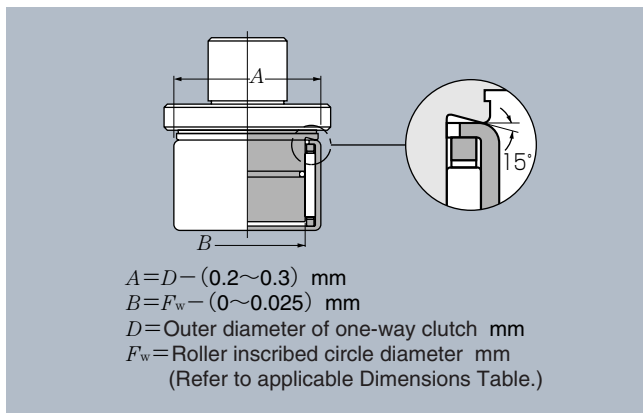


Fig. 3

Precautions in selecting

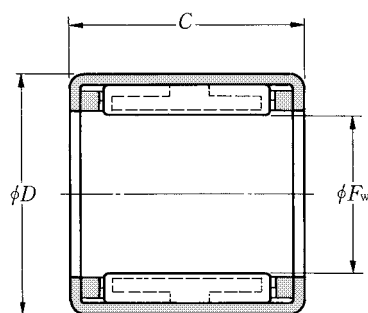
NTN makes it a rule to conduct functional verification tests on its manufactured one-way clutches under various test conditions. However, be noted that the clutch lifetime could reduce depending on the following factors; application to high load torque, high oscillation cycle and fine oscillation, etc., large radial load acting on one-way clutch unit, and use of a shaft with lower hardness.

Furthermore, lock failure could occur in the cases of fast idling speed, frequent use in idling, and application incurring vibration.

When using these one-way clutches under the special conditions stated above, feel free to contact NTN for further instructions.

When it is forecast that clutching function failure of one-way clutch(ex. clutch slip in engaging) could result in serious damage to person or equipment, appropriate safety devices must be provided separately.

Type HF



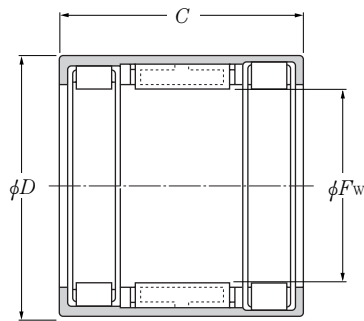
Type HF

F_w 6~35mm

| Boundary dimensions | | | Torque capacity M_d | | Bearing numbers | Mass kg (approx.) | Part number by radial load | |
|---------------------|-----------|-----------------------|-----------------------|-------|-----------------|-------------------------|---|----------|
| F_w | mm D | C 0 -0.25 | N·m | kgf·m | | | (approx.) needle roller bearing oil retaining bearing | |
| 6 | 10 | 12 | 1.76 | 0.18 | HF0612 | 0.003 | HK0609T2 | B-S6-22 |
| 8 | 12 | 12 | 3.15 | 0.32 | HF0812 | 0.0035 | HK0810 | B-S8-25 |
| 10 | 14 | 12 | 5.30 | 0.54 | HF1012 | 0.004 | HK1010 | B-S10-21 |
| 12 | 18 | 16 | 12.2 | 1.24 | HF1216 | 0.0116 | HK1212 | B-S12-32 |
| 14 | 20 | 16 | 17.3 | 1.76 | HF1416 | 0.013 | HK1412 | B-S14-13 |
| 16 | 22 | 16 | 20.5 | 2.09 | HF1616 | 0.014 | HK1612 | B-S16-13 |
| 18 | 24 | 16 | 24.1 | 2.46 | HF1816 | 0.0155 | HK1812 | B-S18-8 |
| 20 | 26 | 16 | 28.5 | 2.91 | HF2016 | 0.017 | HK2012 | B-S20-19 |
| 25 | 32 | 20 | 66 | 6.73 | HF2520 | 0.0309 | HK2512 | B-S25-11 |
| 30 | 37 | 20 | 90 | 9.18 | HF3020 | 0.036 | HK3012 | B-S30-19 |
| 35 | 42 | 20 | 121 | 12.3 | HF3520 | 0.040 | HK3512 | B-S35-7 |

Remarks: Type HF is subject to delivery of INA product instead.
Type HFL is the imported product from INA, Germany.

Type HFL



Type HFL

d 8~35mm

| Shaft dia. mm <i>d</i> | Boundary dimensions | | | Basic load ratings | | | | Bearing numbers | Torque capacity | | Mass kg (approx.) |
|------------------------------|----------------------|----------------|--------------|--------------------------------------|--------------------------------------|--|--|-----------------|-----------------|-------|-------------------------|
| | <i>F_w</i> | mm <i>D</i> | $C_{0-0.25}$ | dynamic N <i>C_r</i> | static N <i>C_{or}</i> | dynamic kgf <i>C_r</i> | static kgf <i>C_{or}</i> | | N·mm | kgf·m | |
| 8 | 8 | 12 | 22 | 4 050 | 413 | 4 150 | 423 | HFL0822 | 3.15 | 0.32 | 0.0063 |
| 10 | 10 | 14 | 22 | 4 300 | 438 | 4 650 | 474 | HFL1022 | 5.30 | 0.54 | 0.0074 |
| 12 | 12 | 18 | 26 | 6 300 | 642 | 6 500 | 663 | HFL1226 | 12.2 | 1.24 | 0.018 |
| 14 | 14 | 20 | 26 | 7 100 | 724 | 7 700 | 785 | HFL1426 | 17.3 | 1.76 | 0.020 |
| 16 | 16 | 22 | 26 | 7 300 | 744 | 8 400 | 857 | HFL1626 | 20.5 | 2.09 | 0.022 |
| 18 | 18 | 24 | 26 | 8 300 | 846 | 10 300 | 1 050 | HFL1826 | 24.1 | 2.46 | 0.024 |
| 20 | 20 | 26 | 26 | 8 200 | 836 | 10 400 | 1 060 | HFL2026 | 28.5 | 2.91 | 0.027 |
| 25 | 25 | 32 | 30 | 10 900 | 1 110 | 14 100 | 1 440 | HFL2530 | 66.0 | 6.73 | 0.044 |
| 30 | 30 | 37 | 30 | 12 600 | 1 280 | 17 600 | 1 790 | HFL3030 | 90.0 | 9.18 | 0.051 |
| 35 | 35 | 42 | 30 | 13 000 | 1 330 | 19 300 | 1 970 | HFL3530 | 121 | 12.3 | 0.058 |