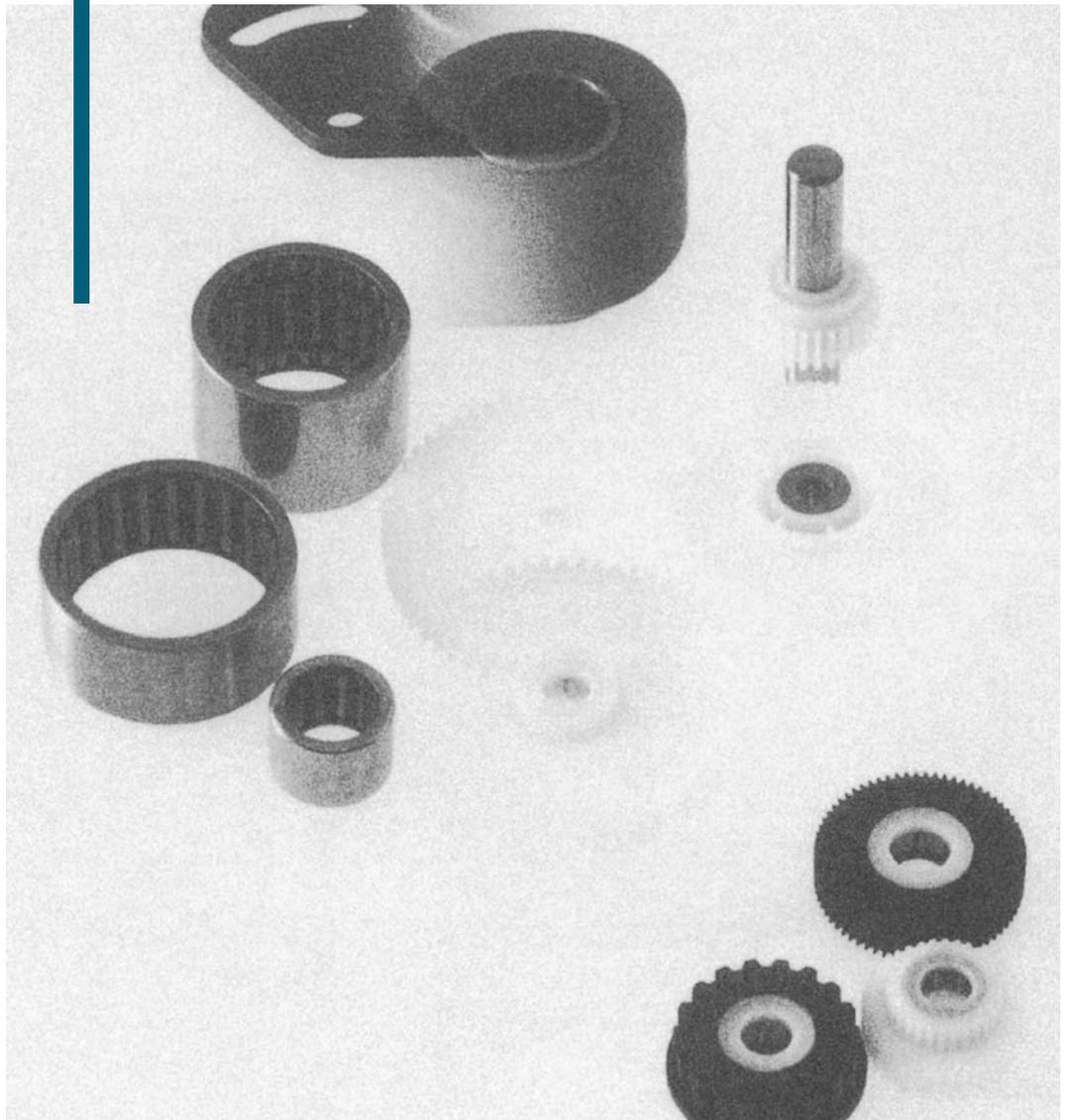


# One-way Clutches Tension Pulleys, Bottom Roller Bearings



## 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 begins to turn in the counterclockwise direction (direction marked on the outer ring width surface) relative to the shaft, the force of spring causes the rollers to advance to the engagement positions on the outer ring cam face, thereby the wedge action taking place between the outer ring cam face and the shaft drives 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)

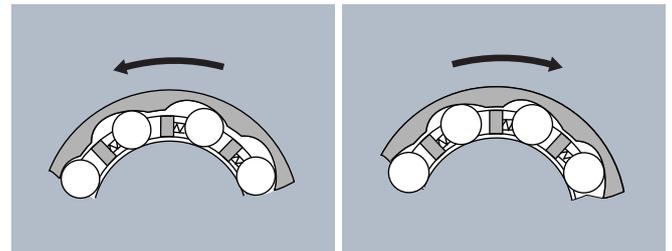


Fig. 1  
One-way clutch in engagement

Fig. 2  
One-way clutch in idling

Type	Applied shaft diameter (mm)	Composition of nominal clutch number	Remarks
<p><b>Type HF</b></p>	$\phi 6 - \phi 35$	<p><b>HF 10 12</b></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><b>In order for a oneway clutch to be able to carry a radial load and smoothly rotate, its both ends each need to be supported by a radial load carrying bearing.</b></p>
<p><b>Type HFL</b></p>	$\phi 8 - \phi 35$	<p><b>HFL 10 22</b></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 (recommended)

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

Table 2 Recommended housing wall thickness (recommended)

Housing material	Housing wall thickness
Iron-based	0.75 ( $D - F_w$ ) and over
Light metal alloy	1.5 ( $D - F_w$ ) and over

For values of  $D$  and  $F_w$ , refer to the relevant dimension table.

### 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.

For selection of an appropriate lubricant, contact NTN Engineering for technical assistance.

## Allowable operating temperature

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

When intending to use the oneway clutch at the upper or lower limit for its allowable operating temperature range, contact NTN Engineering for technical assistance.

## 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 a 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.

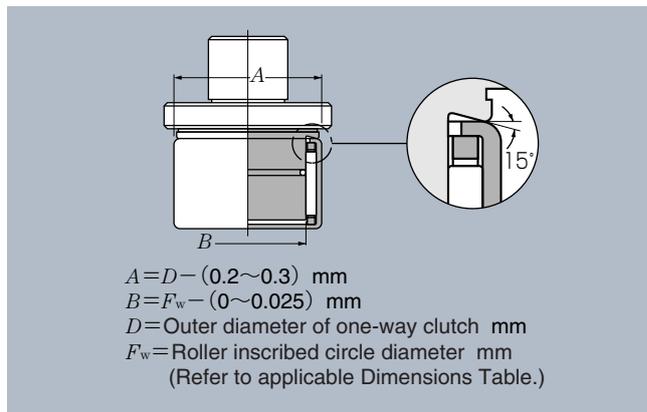


Fig. 3

## Precautions in selecting

NTN is verifying the functions of its oneway clutch products under various test conditions. However, if an NTN oneway clutch is used under a higher load torque, in high oscillation cycles and fine oscillation mode, or when a greater radial load acts on the oneway clutch, or if the hardness of the mating shaft is low, the life of oneway clutch can become shorter.

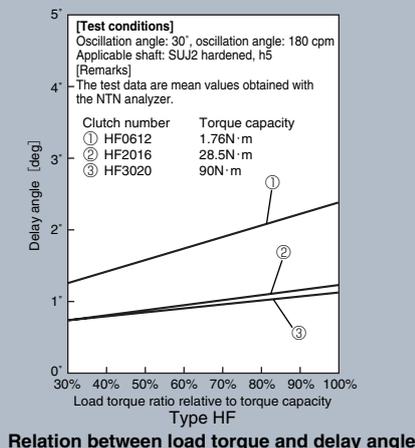
Furthermore, lock failure could occur in the cases of fast idling speed, frequent use in idling, and application incurring vibration.

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

**If loss of the clutching function of oneway clutch (slipping occurs during engagement motion) can impose severe damage to personnel or equipment, a positive safety device needs to be separately provided for the machine.**

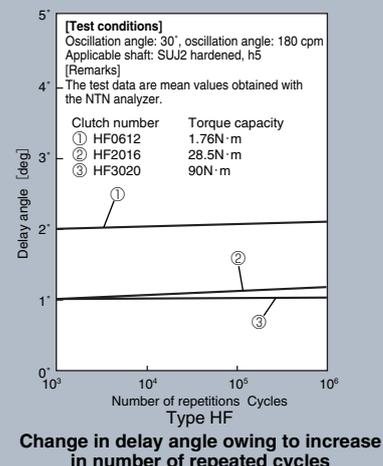
### Delay angle

“Delay angle” means the difference ( $\theta_i - \theta_o$ ) between the angle of rotation of the input shaft ( $\theta_i$ ) and the angle of rotation of the output shaft ( $\theta_o$ ). The delay angle of NTN oneway clutch can vary depending on the oneway clutch designation and the magnitude of torque the oneway clutch carries. The chart in the right graphically illustrates the trend in relation between load torque and delay angle (data measured with an NTN analyzer).

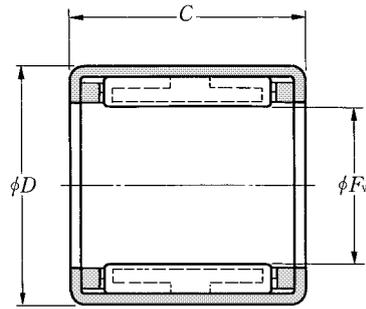


### Life

NTN has verified that even if a torque as high as the torque capacity of NTN oneway clutch products is exerted, and when the number of engagement cycles exceeds  $10^6$ , change in the delay angle on NTN oneway clutches is small (data obtained from the NTN analyzer).



Type HF



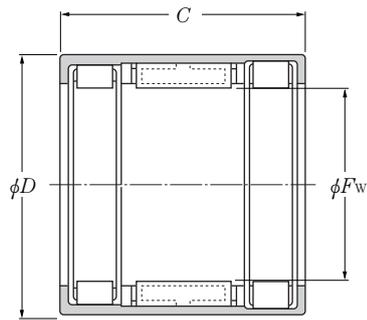
Type HF

$F_w$  6~35mm

Boundary dimensions			Torque capacity $M_d$		Bearing numbers	Mass kg (approx.)	Part number by radial load (approx.)	
$F_w$	mm $D$	$C$ 0 -0.25	N·m	kgf·m			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 $d$	Boundary dimensions			Basic load ratings				Bearing numbers	Torque capacity		Mass kg (approx.)
	$F_w$	mm $D$	$C$ $0$ $-0.25$	dynamic N $C_r$	static N $C_{or}$	dynamic kgf $C_r$	static kgf $C_{or}$		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