

Installation and Operating Instructions for Internal Freewheels FDN, FDE and FD

E 08.681 e



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Important

Please read these instructions carefully before installing and operating the product. Your particular attention is drawn to the notes on safety.

These installation and operating instructions are valid on condition that the product meets the selection criteria for its proper use. Selection and design of the product is not the subject of these installation and operating instructions.

Disregarding or misinterpreting these installation and operating instructions invalidates any product liability or warranty; the same applies if the product is taken apart or changed.

These installation and operating instructions should be kept in a safe place and should accompany the product if it is passed on to others – either on its own or as part of a machine – to make it accessible to the user.

Safety Notice

- Installation and operation of this product should only be carried out by skilled personnel.
- Repairs may only be carried out by the manufacturer or accredited agents.
- If a malfunction is indicated, the product or the machine into which it is installed, should be stopped immediately and either we or an accredited agent should be informed.
- Switch off the power supply before commencing work on electrical components.
- Rotating machine elements must be protected by the purchaser to prevent accidental contact.
- Supplies abroad are subject to the safety laws prevailing in those countries.

1. General introduction

Internal Freewheels FD, FDN and FDE are machine elements with particular characteristics:

- In one direction of rotation there is no contact between the inner and outer ring; the freewheel is in freewheeling operation.
- In the other direction of rotation there is contact between the inner and outer ring; in this direction it is possible to transmit high torque.

Internal Freewheels FD, FDN and FDE are used as:

- Backstops
- Overrunning Clutches
- Indexing Freewheels



Caution!

As Freewheels can be used as safety components, it is important to observe these installation and operating instructions carefully.

2. Applications of Freewheels

2.1 Application as Backstop

Freewheels are used as backstops if reverse rotation of the operating direction is to be prevented. In many machines and installations, for technical safety or functional reasons, it is necessary to ensure that you are working in just one specified direction of rotation. This is why there are legal stipulations requiring a mechanical safety device for the operation of, e.g. conveyor systems.

The normal operating mode of a backstop is freewheeling operation; the locking (torque transmission) is performed at zero speed. The immediate engagement of the clamping elements ensures the required high operating safety.

2.2 Application as Overrunning Clutch

The overrunning clutch engages machines or machine parts and automatically interrupts their contact as soon as the driven part of the overrunning clutch is turned faster than the driving part. In many cases, this can replace a more expensive externally actuated clutch.

With overrunning clutches the engagement take place in the driving operation (torque transmission), while in freewheeling operation the torque transmission between the inner and outer ring is interrupted. In driving operation the speeds of the inner and outer ring are equal, while in freewheeling operation they are different.

2.3 Application as Indexing Freewheel

The indexing freewheel transmits a back-and-forth motion into a stepped rotation (indexed feed). The indexing freewheel works precisely and quietly and enables an infinitely adjustable setting of the feed.

3. Design

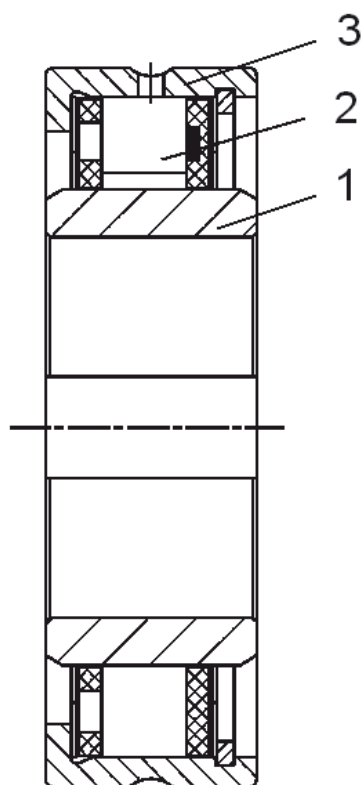


Fig. [1] FDN

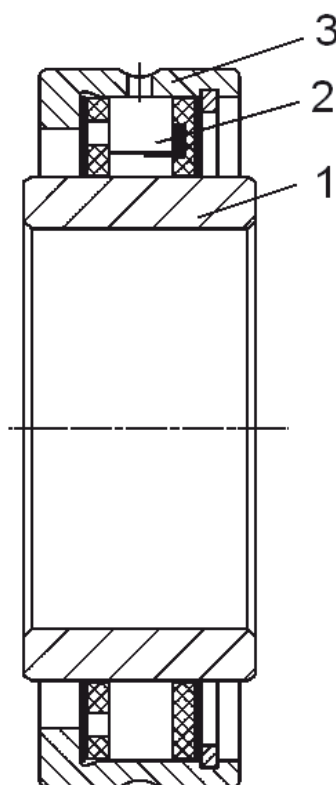


Fig. [2] FDE

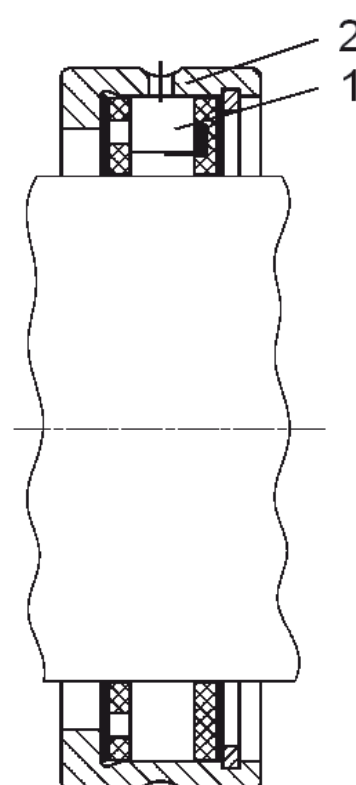


Fig. [3] FD

The Internal Freewheels FDN are designed as shown in Fig. [1]. The essential functional components are the inner ring (1), the sprags (2), the outer ring (3) and the lubricant.

The Internal Freewheels FDE have an identical construction (see Fig. [2]). The essential functional components are the inner ring (1), the sprags (2), the outer ring (3) and the lubricant.

The Internal Freewheels FD (see Fig. [3]) have an identical construction, but are supplied without inner ring. The essential functional components are the inner ring (1), the outer ring (2) and the lubricant. As an inner clamp track is used a customer's part. The properties of the track must comply with our specifications in Catalog 84.

The freewheels are particularly suitable for installation in enclosures with oil lubrication and sealing.

4. Types

Internal Freewheels FDN, FDE and FD are available in 3 different types.
For the types without own bearing, the concentric alignment of inner and outer ring must be provided by the customer

4.1 Standard type

This type is designed for universal use. This type has no own bearing, so the concentric alignment of the inner and outer ring must be provided by the customer.
It is identified by the suffix „CFH“ at the end of the product designation.

Example: FDN, FDE and/or FD ... CFH

4.2. Standard type with bearing

In this standard type with bearing every second sprag is replaced by a cylindrical roller, this freewheel can therefore absorb radial forces.
It is identified by the suffix „CFR“ at the end of the product designation.

Example: FDN, FDE and/or FD ... CFR

4.3 Type with P-grinding

This type has an outstanding suitability as an indexing freewheel. This type has no own bearing, so the concentric alignment of the inner and outer ring must be provided by the customer.
It is identified by the suffix „CFP“ at the end of the product designation.

Example: FDN, FDE and/or FD ... CFP



Please note!

Further information especially on design, function and selection, permissible torques or permissible speeds of these freewheels is provided in Catalog 84 "Freewheels". Please contact us if you need assistance.

5. General instructions



Caution!

Reliable torque transmission between the freewheel is guaranteed only if the maximum permissible speed in driving operation of the freewheel is not exceeded.

Operation at speeds in excess of the speeds permitted for the different operating modes can result in damage and overheating of the freewheel!



Caution!

The maximum permissible freewheel torque must not be exceeded due to torque peaks in specific applications.

The maximum freewheel torque should be calculated according to catalog 84. Please contact us if you need assistance.

Freewheel damage resulting by excessive torque peaks impair component function and can result in excessive overheating of the freewheel!



Danger to life and limb!

When freewheels are used as backstops, it is essential to ensure that they can be released only when the machine or system is standing still and load-free.

Release of the freewheel under load conditions results in uncontrolled reverse movement of the system.



Caution!

Internal Freewheels FDN, FDE and FD have partially no own bearing, so the concentric alignment of the inner and outer ring must be provided by the customer.

The permissible eccentricity of 0.06 mm must be complied with!

**Caution!**

Torsion vibrations (amplitudes and frequencies which result in engagement and release of the freewheel in rapid succession) must be avoided.

Torsion vibrations can result in overheating and the impairment of freewheel function!

6. Condition at delivery

The freewheels are delivered ready to install. They are packed in anti-corrosion paper.

7. Technical requirements for safe operation

In order to transmit the torques in the table of Catalog 84 („Freewheels“), the outer ring must be pressed in a housing with the minimum outside diameter in this Catalog. The housing is made of steel or grey cast iron in the minimum quality GG-20.

The tolerance of the housing bore must be ISO P6.

**Caution!**

The tolerance of the housing bore to ISO P6 must be complied with mandatory.

Risk of loss function!

7.1 Serie FDN

The inner ring of the freewheel may not with interference fit, but only with tight fit on the shaft to be installed. The bore in the inner ring normally has a tolerance of ISO H7. The tolerance of the shaft must be in this case ISO h6 or j6.

The key must have back play and may have only minimal width oversize, as otherwise the inner ring may be deformed.

7.2 Serie FDE

The torque is transmitted to the inner ring by a interference fit. The tolerance of the customer shaft must be ISO p6.

7.3 Serie FD

As an inner clamp track is used a customer's part. The properties of the track must comply with our specifications in Catalog 84.

8. Installation

Carefully clean the housing bore for the outer ring and the surface of the shaft for the inner ring.

The direction of machine or system rotation must be determined prior to freewheel installation.

Mark this direction with an arrow on the shaft to which the inner ring of the freewheel is to be mounted.

Ensure that the freewheeling direction of the freewheel matches the direction marked on the shaft.



Caution!

When a freewheel is used as a backstop, the drive must not be started in the direction opposite the freewheeling direction of the freewheel, as otherwise the freewheel may be destroyed!

Installation of the freewheel into the housing bore must be made by pressure on the front-side of the outer ring.

The assembly of the freewheel inner ring or the customer shaft in the outer part is facilitated by slight rotation of the inner ring or the customer shaft in the freewheeling direction.

Secure the inner ring of the freewheel by Serie FDN axial on the shaft.



Caution!

The communicable or specified torque for the standard type and type with P-grinding are only guaranteed if the permissible eccentricity between the shaft and outer ring raceway from 0,06 mm is be complied with.

Compliance with the allowable eccentricity must be guaranteed by the customer-defined storage and centering the freewheeling parts.

Make sure that the axial position of the outer ring with the freewheel cage after assembling will be such that in no case to be bracing retaining rings.

9. Inspection prior to commissioning

It is an oil lubrication with the oil quality in accordance with the oil selection table in Section 11 "Lubricants" to use.

We recommend an oil level up to the mid-shaft for horizontal mounting of the freewheel.



Caution!

The permissible operating temperature is -40°C to + 80°C.

10. Maintenance



Caution!

The first oil change must be performed after 20 hours of operation!

During the first oil change, all particles accumulated during the “running in” procedure should be removed from the freewheel. That is why this oil change is required to ensure the service life of the freewheel.

Subsequent oil changes must be performed after every 2,000 operating hours, at a minimum



Information!

If oil is changed at longer intervals, we recommend using the synthetic lubricant MOBIL SHC 626.

If this lubricant is used, it must be changed after every 4,000 operating hours.

When speed differences between the inner ring and outer ring of less than 100 min^{-1} longer oil change intervals are allowed after consultation.



Caution!

If seal problems occur (leakage) during operation, the machine or system must be shut down immediately. Determine the cause of the leak and replace the freewheel if necessary!

11. Lubricants

Please follow the instructions in Section 9 before commissioning. We recommend the following grades of oil for lubrication or oil changes:

Oil table			
Ambient temperature	For ambient temperatures from 0° to 50° C	For ambient temperatures from - 15° to + 15° C	For ambient temperatures from - 40° to 0° C
Kinematic viscosity at 40° C, ISO-VG	46/68 [mm ² /s]	32 [mm ² /s]	10 [mm ² /s]
AGIP	OSO 46/68	OSO 32	OSO 10
ARAL	VITAM GF 46/68	VITAM GF 32	VITAM GF 10
BP	ENERGOL HLP 46/68	ENERGOL HLP 32	AERO HYDRAULIC 1
CASTROL	VARIO HDX	VARIO HDX	ALPHASYNTH 15
CHEVRON	EP HYDRAULIC OIL 46/68	EP HYDRAULIC OIL 32	HYJET IV
DEA	ASTRON HLP 46	ASTRON HLP 32	ASTRON HLP 10
ELF	ELFOLNA 46	ELFOLNA 32	ELF AVIATION HYDRAULIC OIL 20
ESSO	NUTO H 46/68	NUTO H 32	UNIVIS J 13
KLÜBER	LAMORA HLP 46/68	LAMORA HLP 32	Klüberoil 4 UH1-15
MOBIL	D.T.E. 25/26	D.T.E. 24	AERO HF A
SHELL	TELLUS OIL 46/68	TELLUS OIL 32	TELLUS OIL 10
Other manufacturers	Gearbox- or hydraulic oils without solid lubricants ISO-VG 46/68	Gearbox- or hydraulic oils without solid lubricants ISO-VG 32; Automatic transmission fluids [ATF]	Gearbox- or hydraulic oils without solid lubricants ISO-VG 10; Note setting point! Aviation hydraulic oils ISO-VG 10

Please contact us if temperatures exceed + 50 °C or fall below – 40 °C.



Caution!

Oils that contain friction-reducing additives like molybdenum disulfide or the like, may only be used with our authorisation.