Housing Freewheels FHD

for stationary multi-motor drives with roller lift-off and mechanical separating function

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Application as

- Overrunning Clutch

for multi-motor drives in which a drive is automatically disengaged when it is no longer supplying power.

Features

Housing Freewheels FHD with hydrodynamic roller lift-off are typically used in cases where an assembly can be driven from two or more motors or turbines at the same or similar high speed. They allow a continuous plant operation in the event that one of the energy sources or a drive line fails as well as energy saving in the case of partial load operation. For safe system maintenance, the Housing Freewheels FHD are equipped with a mechanical separation function to decouple the input drive from the output drive train.

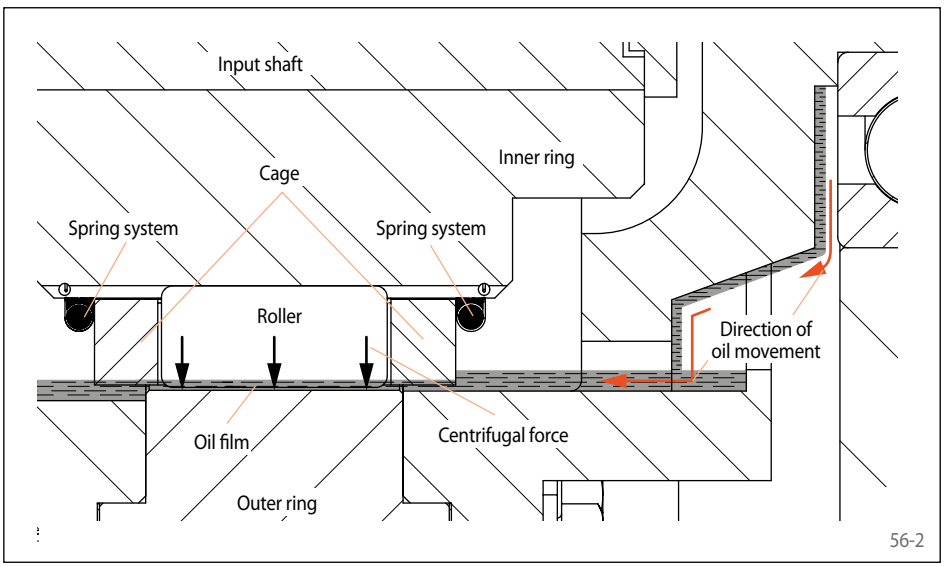
The Housing Freewheels FHD are completely enclosed freewheels for stationary arrangement with input and output shaft.

Advantages

- Nominal torques up to 24405 Nm
- Shaft diameter up to 109,5 mm
- Wear-free operation
- Low noise
- Low power dissipation
- Integrated oil filtration system
- Mechanical separating function
- Oil change without down time
- Complies OSHA "Lockout-Tagout" requirements

Hydrodynamic roller lift-off

Housing Freewheels FHD are equipped with hydrodynamic roller lift-off. The hydrodynamic roller lift-off is the ideal solution for overrunning clutches at high speeds, not only in freewheeling operation, but also in the driving operation, as can occur, for example, in multi-motor drives. In the case of hydrodynamic roller lift-off, the lifting force is generated by an oil film applied during freewheeling operation by centrifugal force exerted on the outer ring race. This provides for practically wear-free freewheeling operation. The speed differential between the inner and outer rings is the decisive factor affecting the lift-off function. If the speed differential decreases, the lift-off force also decreases. Before achieving synchronous running, the clamping rollers guided in a cage are positioned with the aid of the central spring system against the outer ring race and are then ready to lock. This guarantees immediate torque transfer once the synchronous speed has been reached.



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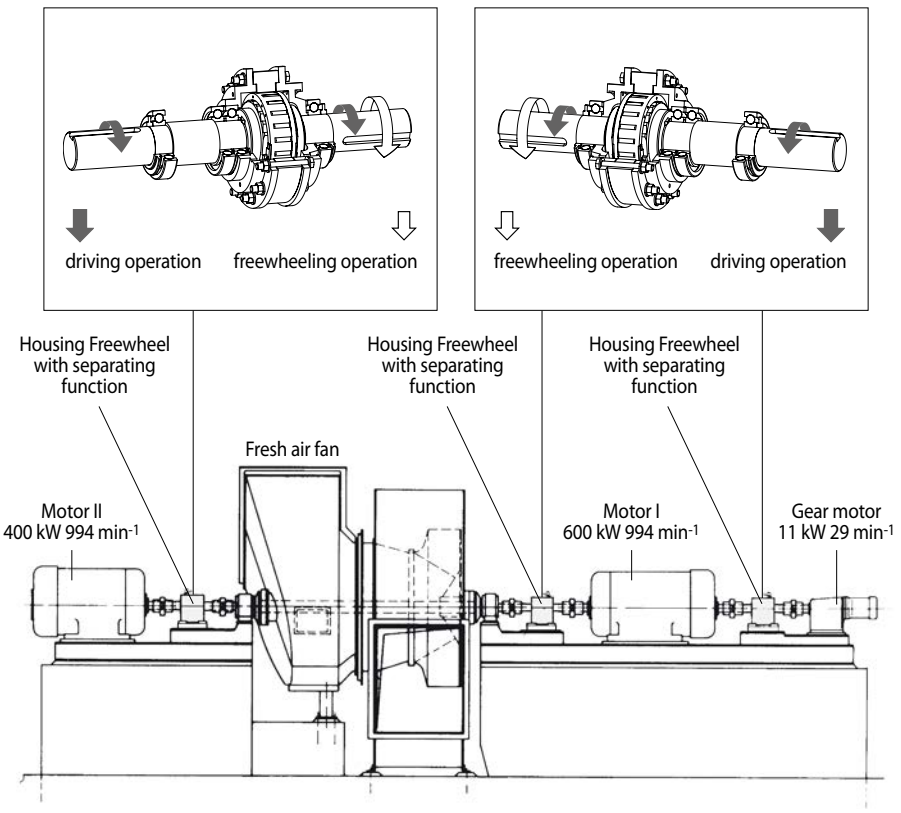
Housing Freewheels FHD

for stationary multi-motor drives with roller lift-off and mechanical separating function



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Areas of application

Housing Freewheels as automatic clutches in multi-motor drives fulfil here an important function. They disengage a drive automatically as soon as it no longer provides power to the working machine. The Housing Freewheels do not require any external operating equipment.

Typical applications for multi-motor drives are:

- Generators
- Pumps
- Ventilators
- Fans
- Uninterrupted power supply

Application example

Three Housing Freewheels in the multi-motor drive of a fresh air fan. The fan is driven by one or two electric motors. An additional auxiliary drive serves to slowly turn the fan for the purposes of inspection work or for an even cooling down after shut down. The Housing Freewheels automatically engage the respective working electric motor to the fan.

Mechanical separating function

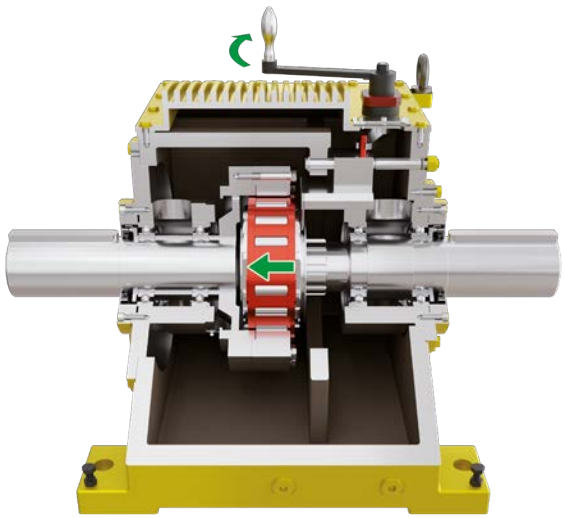
When the hand lever is actuated, the inner ring with the sprag roller freewheel (figures 57-2 and 57-3) moves out of engagement with the outer ring. This mechanically separates the input drive from the output drive train. This separation can be seen through a view port.

Re-coupling of the input drive and output drive train is done by resetting the hand lever.

The respective position of the hand lever can be secured with a padlock. This fulfils the requirements for a Lockout-Tagout system.

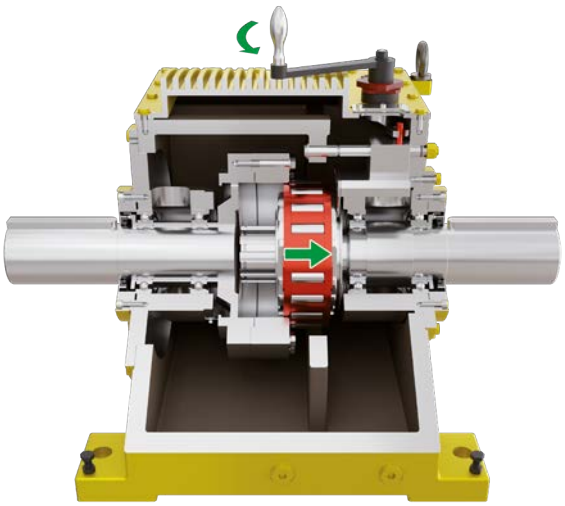
Lockout-Tagout system

The Lockout-Tagout system serves the purpose of occupational safety. It allows all energies from equipment that may be dangerous to people to be isolated, locked out and tagged. This allows drive components to be serviced without interrupting production in accordance with OSHA 29 CFR 1910.147.



Freewheel engaged (ready for use)

57-2



Freewheel mechanically separated

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Housing Freewheels FHD

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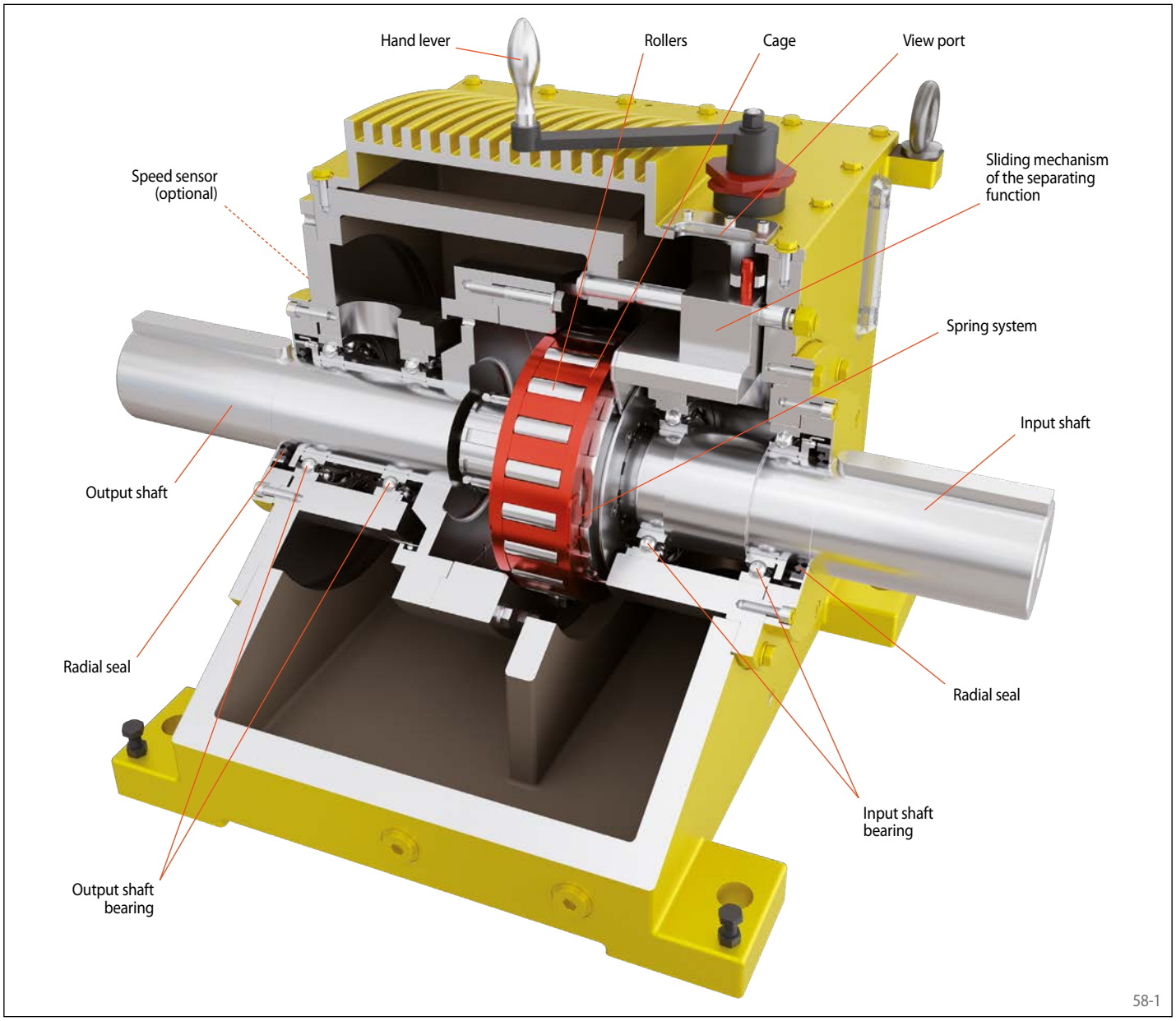
for stationary multi-motor drives
with roller lift-off and mechanical separating function



Selection torque for Housing Freewheels FHD

In many cases where overrunning clutches are being used, dynamic processes occur that cause high peak torques. In the case of overrunning clutches, the torques that occur during start up must be observed. The peak torques when starting up can, in the case of asynchronous motors - especially when accelerating large masses and when using elastic couplings - significantly exceed the torque calculated from the motor pullover torque. The conditions for internal combustion engines are similar. Even in normal operation, on account of their degree of irregularity, peak torques can occur that are way in excess of the nominal torque.

The prior determination of the maximum occurring torque is carried out most safely by using a rotational vibration analysis of the entire system. This, however, requires a knowledge of the rotating masses, the rotational rigidity and all of the excitation moments that occur on the system. In many cases, a vibrational calculation is too time consuming or you may not have all the necessary data in the configuration phase available. In this case, the selection torque M_A of the overrunning clutch should be determined as follows:

$M_A = K \cdot M_L$

In this equation:

M_A = Selection torque of the freewheel

K = Operating factor

M_L = Load torque for constant rotating freewheel:
$= 9550 \cdot P_0 / n_{FR}$

P_0 = Nominal power of motor [kW]

n_{FR} = Speed of the freewheel in driving operation [min^{-1}]

After calculating M_A the freewheel size must be selected in accordance with the catalogue tables in such a way that in all cases this applies:

$M_N \geq M_A$

M_N = Nominal torque of the Housing Freewheel FHD in accordance with the table values [Nm]

The operating factor K depends on the properties of the driver and the machine. The general rules of mechanical engineering apply here. We recommend using an operating factor K of at least 1.5. We will be pleased to check your selection.

Housing Freewheels FHD

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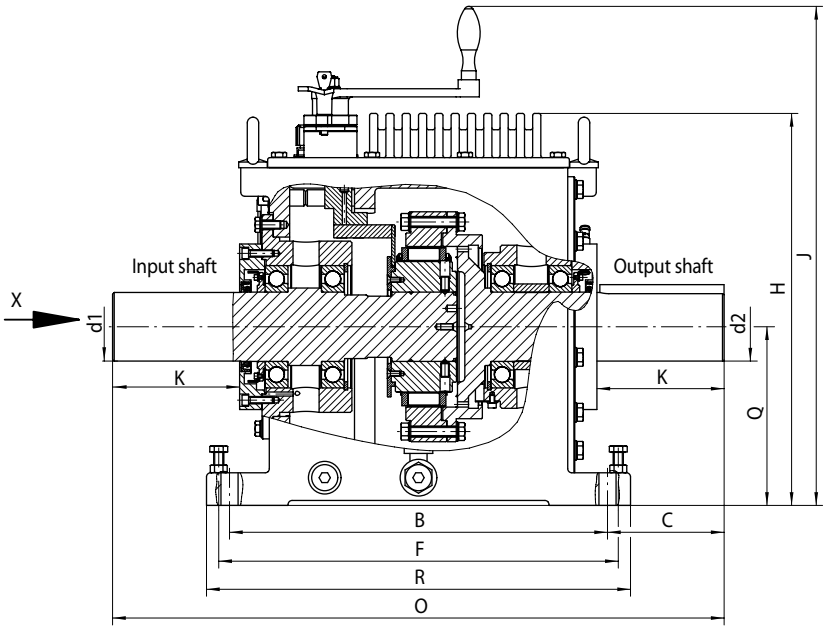

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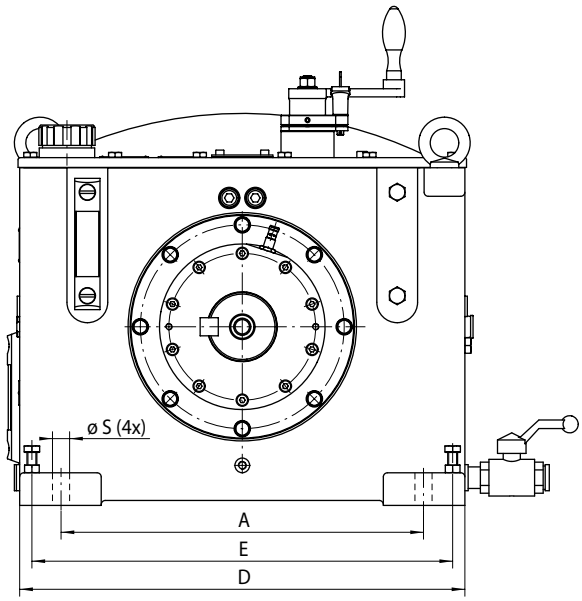

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Overrunning Clutch

Type hydrodynamic roller lift-off	Dimensions

	Freewheel Size	Type	Nominal torque M_N	Max. speed Output shaft overruns	Max. speed Input shaft drives	Shaft d1 and d2	A	B	C	D	E	F	H	J	K	O	Q	R	S	Weight
inch			lb-ft	min^{-1}	min^{-1}	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	lbs
inch	FHD 1000	R	1000	5600	5600	1 3/4	12 3/4	12 3/4	3 7/16	16 1/4	15 1/10	13 3/10	12 7/8	17 48/67	3 7/8	19 5/8	5 3/4	14 1/2	11/16	231
inch	FHD 2000	R	2000	4200	4200	2 5/16	16 3/4	14 3/4	4 1/4	18 3/4	12 3/5	14 3/4	15	20	4 5/8	23 1/4	6 7/8	16 1/2	11/16	355
inch	FHD 4000	R	4000	3600	3600	2 3/4	18	15 1/2	5 1/16	20	14 2/5	16	17 1/8	21 35/38	5 3/8	25 5/8	7 3/4	17 1/2	11/16	496
inch	FHD 8000	R	8000	3000	3000	3 5/16	17 1/2	18 1/4	5 5/8	21 1/2	20 3/10	19 3/10	18 15/16	23 7/12	6 1/8	29 1/2	8 5/8	20 1/2	13/16	716
inch	FHD 12000	R	12000	2500	2500	3 7/8	18 1/4	21 1/2	6 5/16	22 3/4	15 1/3	22 1/6	20 15/16	25 13/30	6 15/16	34 1/8	9 5/8	23 3/4	1 1/16	926
inch	FHD 18000	R	18000	2300	2300	4 5/16	20 1/2	23 1/4	7 5/16	26	24 2/5	24 8/47	20 5/8	27 21/23	7 11/16	37 7/8	11 1/4	25 3/4	1 5/16	1402
metric			Nm	min^{-1}	min^{-1}	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
metric	FHD 1000	R	1356	5600	5600	44,45	323,85	323,85	87,31	412,75	382,75	338,30	327,00	450,00	98,43	498,48	146,05	368,30	17,50	105
metric	FHD 2000	R	2712	4200	4200	58,74	425,45	374,65	107,95	480,00	320,00	374,65	381,00	508,00	117,48	590,55	174,63	419,10	17,50	161
metric	FHD 4000	R	5423	3600	3600	69,85	457,20	393,70	128,59	508,00	344,80	404,50	435,00	556,80	136,53	650,88	196,85	444,50	17,50	225
metric	FHD 8000	R	10847	3000	3000	84,14	444,50	463,55	142,87	546,00	516,00	490,00	481,00	599,00	155,58	749,30	219,08	520,00	21,00	325
metric	FHD 12000	R	16270	2500	2500	98,43	463,55	546,10	160,35	578,00	390,00	563,00	532,00	646,00	177,00	866,80	244,48	603,00	27,00	425
metric	FHD 18000	R	24405	2300	2300	109,54	520,70	590,55	185,74	660,00	620,00	614,00	600,00	709,00	195,26	962,00	285,75	654,00	33,00	636

The maximum transmissible torque is 2 times the specified nominal torque. See page 14 for determination of selection torque.
Keyway according to USAS B17.1-1967

Mounting

The Housing Freewheel must be mounted in such a way that shaft d1 is the input shaft and shaft d2 the output shaft.

We recommend the use of torsionally stiff shaft couplings generating only low reactive forces. On indication of the reactive forces that occur we are well prepared to check the usable life of the bearings installed.

Example for ordering

Prior to ordering, please complete the questionnaire on page 113 by specifying the direction of rotation in driving operation when viewed in direction X so that we can check the selection.