Housing Freewheels FHHS

for stationary multi-motor drives with roller lift-off and hydrodynamic bearings

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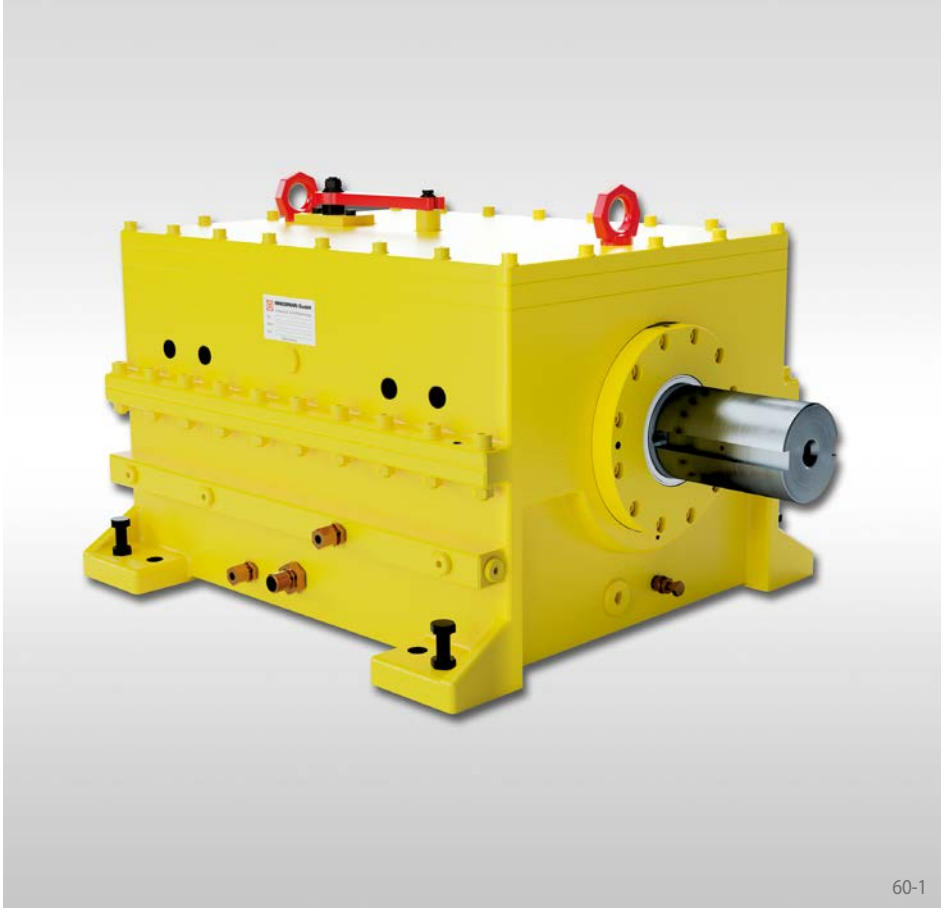
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Application as

- Overrunning Clutch

at very high speeds, which can be same or similar in freewheeling operation and driving operations.

Features

Housing Freewheels FHHS 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.

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

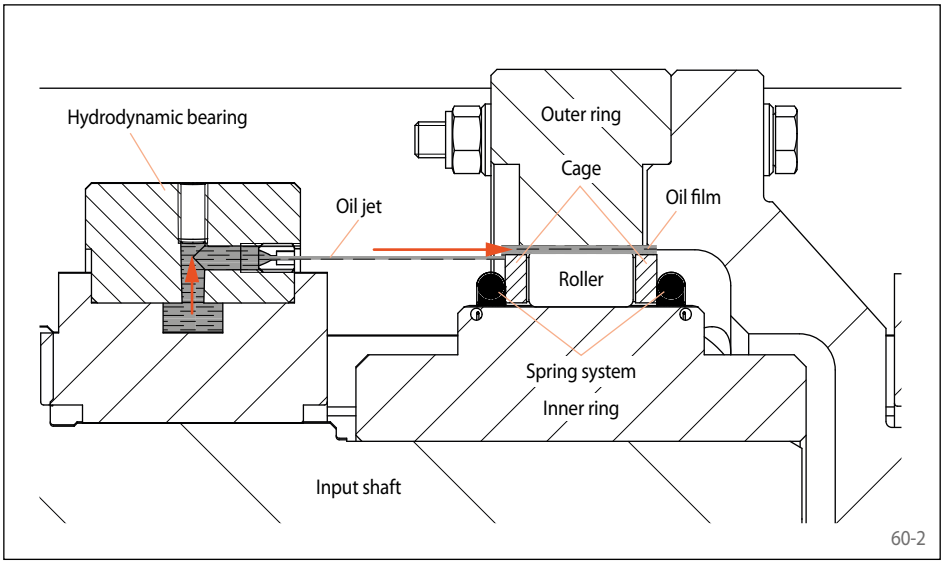
Thanks to the hydrodynamic bearing, the freewheel can be operated at speeds of up to 12,000 rpm.

Advantages

- Nominal torques up to 24 405 Nm
- Shaft diameter up to 141,28 mm
- Wear-free high-speed operation
- Integrated locking brake

Hydrodynamic roller lift-off

Housing Freewheels FHHS 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 jet, which is directed through several axial oil jets in the hydrodynamic bearings. 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 FHHS

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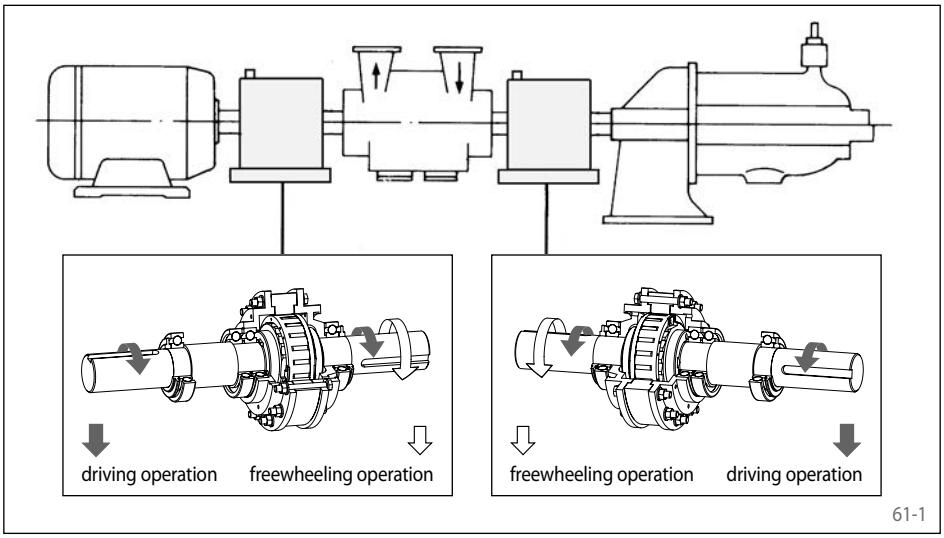
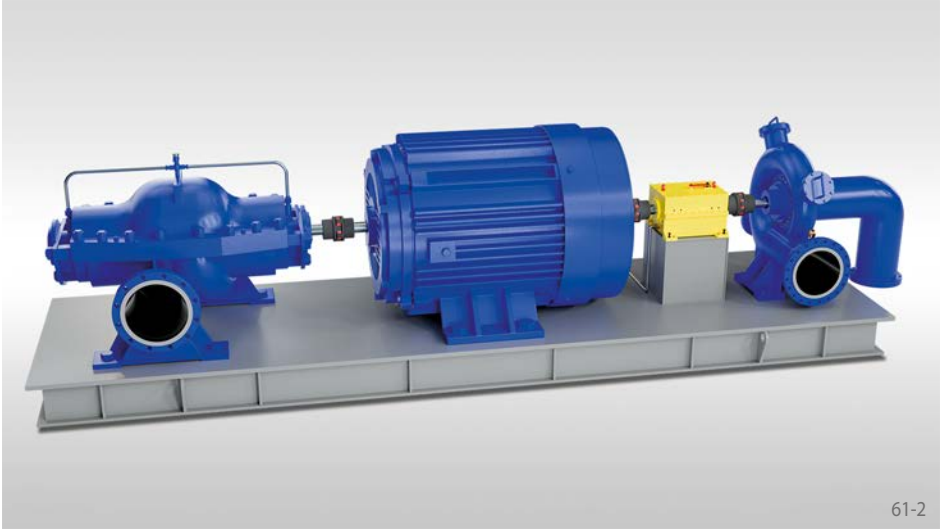


Areas of application

Housing Freewheels as automatic freewheels in multiple drives fulfil here an important function. They disengage a drive automatically as soon as it no longer provides power to the working machine.

Typical applications are at locations such as

- Refineries
- Chemical Plants
- Fertilizer plants
- Hydrocarbon processing
- Locations that speeds exceed ball type bearings



Application example

The pump system is started by a motor. After start-up, the Hydraulic Power Recovery Turbine (HPRT) takes over the drive power and drives the pump via the freewheel. The motor can then be switched off. This makes efficient use of the hydraulic energy available in the system, reduces energy consumption and results in significant cost savings.

The system is particularly suitable for industrial applications with continuous pump operation, as it optimises plant operation.

Selection torque for Housing Freewheels FHHS

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]

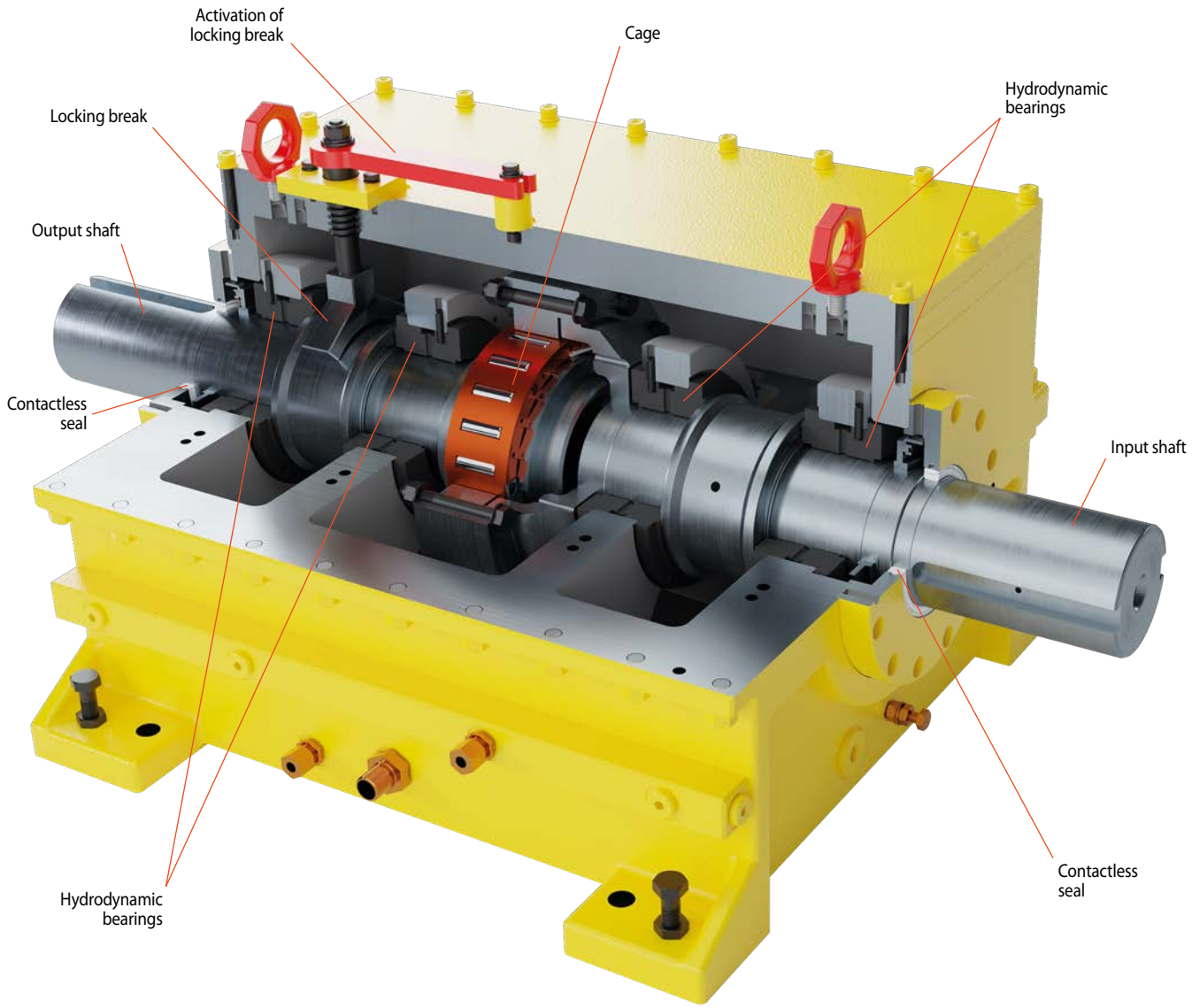
n_{FR} = Speed of the freewheel in driving operation [min^{-1}]

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 FHHS 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.


Activation of locking break
Cage
Hydrodynamic bearings
Locking break
Output shaft
Contactless seal
Input shaft
Hydrodynamic bearings
Contactless seal

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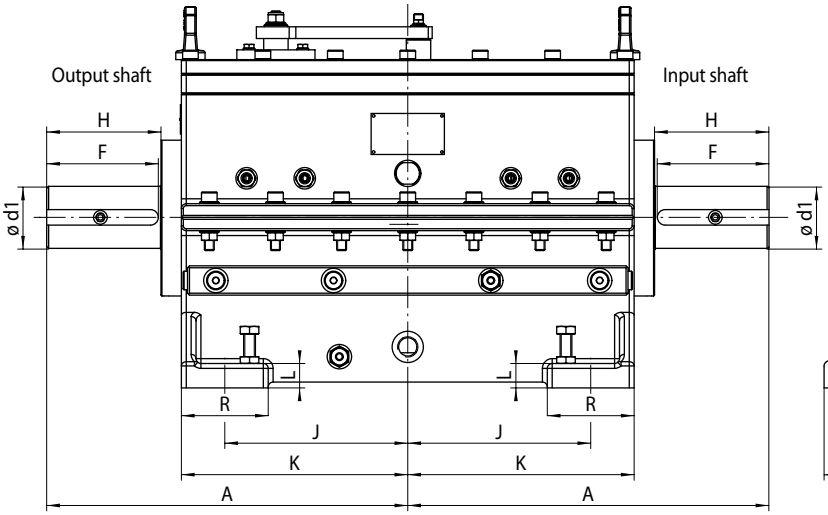

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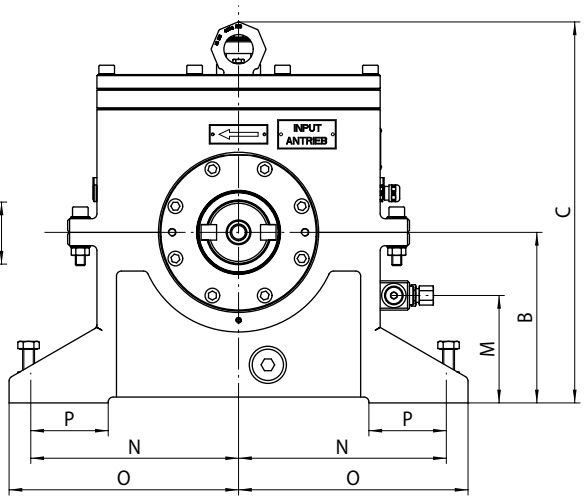

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Overrunning Clutch

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	F	H	J	K	L	M	N	O	P	R	Weight
inch			lb-ft	min^{-1}	min^{-1}	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	lbs
inch	FHHS 1000	R	1000	12000	12000	1 3/4	12 7/16	5 3/4	14 3/16	3 3/4	3 3/4	6 3/8	7 11/16	1	3 3/8	6 3/8	7 1/4	2 1/8	3	273
inch	FHHS 2000	R	2000	10000	10000	2 1/2	14 9/16	6 7/8	15 1/4	4 1/2	4 5/8	7 3/8	9 1/8	1	4 5/16	8 3/8	9 1/4	3 1/8	3 1/2	420
inch	FHHS 4000	R	4000	8000	8000	3 5/16	17	7 3/4	16 1/8	5 1/4	5 1/4	7 3/4	10 15/16	1	4 5/16	9	10 1/2	1 7/8	4	692
inch	FHHS 8000	R	8000	7000	7000	4 5/16	21 5/8	8 5/8	18	5 15/16	6 15/16	11 1/2	13 11/16	1	4 3/16	10 3/4	11 3/4	2 5/16	4	1159
inch	FHHS 12000	R	12000	6000	6000	4 13/16	24 1/16	9 3/16	20 1/2	6 1/4	7 3/4	12 3/4	15 3/8	1	4 3/4	12	13	2 1/8	4	1539
inch	FHHS 18000	R	18000	5000	5000	5 9/16	26 5/16	11	22 11/16	8 9/16	8 5/8	14	16 11/16	1	5 11/16	13 3/4	15	3 13/16	4 15/16	2063
metric			Nm	min^{-1}	min^{-1}	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
metric	FHHS 1000	R	1356	12000	12000	44,45	316,34	146,000	360,0	95,5	95,95	162,00	195,25	25	85	162,00	184,25	53,75	76,0	124
metric	FHHS 2000	R	2712	10000	10000	63,50	369,70	174,625	388,0	114,3	117,00	187,33	231,78	25	110	212,73	234,95	79,28	88,9	191
metric	FHHS 4000	R	5423	8000	8000	84,14	431,75	196,850	410,0	133,3	133,45	196,85	277,50	25	110	228,60	266,70	46,90	102,0	314
metric	FHHS 8000	R	10847	7000	7000	109,54	549,45	219,750	456,5	150,4	176,65	292,10	347,50	25	107	273,00	298,50	59,50	102,0	526
metric	FHHS 12000	R	16270	6000	6000	122,24	611,90	234,000	521,0	158,0	196,10	323,90	390,50	25	120	304,80	330,20	54,60	102,0	698
metric	FHHS 18000	R	24405	5000	5000	141,28	668,40	279,400	576,0	217,0	219,60	355,60	423,50	25	145	348,50	381,00	97,50	125,0	936

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

Locking brake

During freewheeling operation, the stationary input shaft of the Housing Freewheel is effected by a drag torque from the freewheeling output shaft. By manually activation of the in the housing freewheel integrated locking brake the driving parts are prevented from being carried along.

Mounting

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

The freewheel clutch oil inlet can be configured for either side.

Example for ordering

Prior to ordering, please complete the questionnaire on page 121 by specifying the direction of rotation in driving operation when viewed in direction X, so that we can check the special requirements.