

Housing Freewheels FH

for stationary multi-motor drives
with roller lift-off



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Application as

▶ Overrunning Clutch

at high speeds, which are the same or similar in freewheeling operation and in driving operation.

Features

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

Advantages

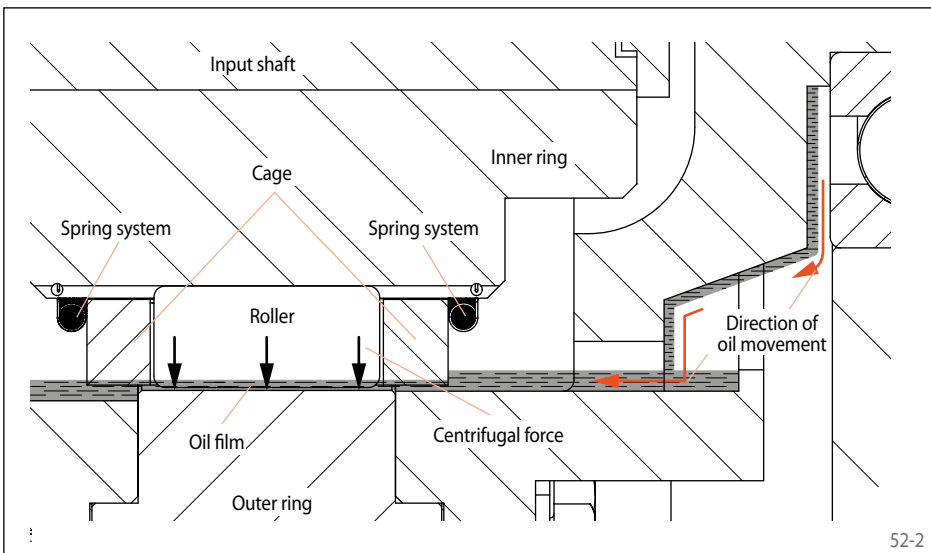
- Nominal torques up to 81 350 Nm
- Shaft diameter up to 178 mm
- Wear-free operation
- Low noise
- Low power dissipation
- Integrated oil filtration system
- Integrated locking brake
- Oil change without down time

Hydrodynamic roller lift-off

Housing Freewheels FH are equipped with hydrodynamic roller lift-off. The hydrodynamic roller lift-off is the ideal solution for over-

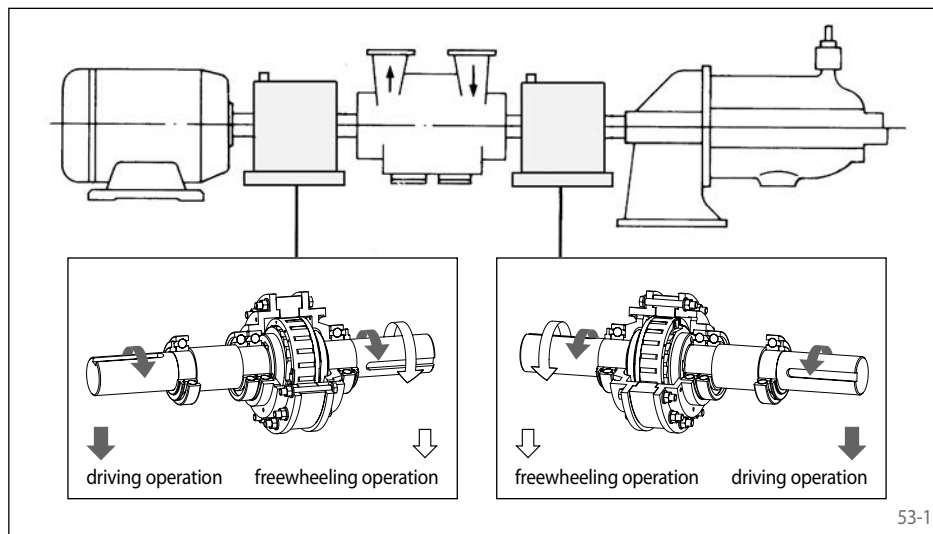
running clutches at high speeds, not only in freewheeling operation, but also in the driving operation, as can occur, for example, in mul-

ti-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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for stationary multi-motor drives with roller lift-off

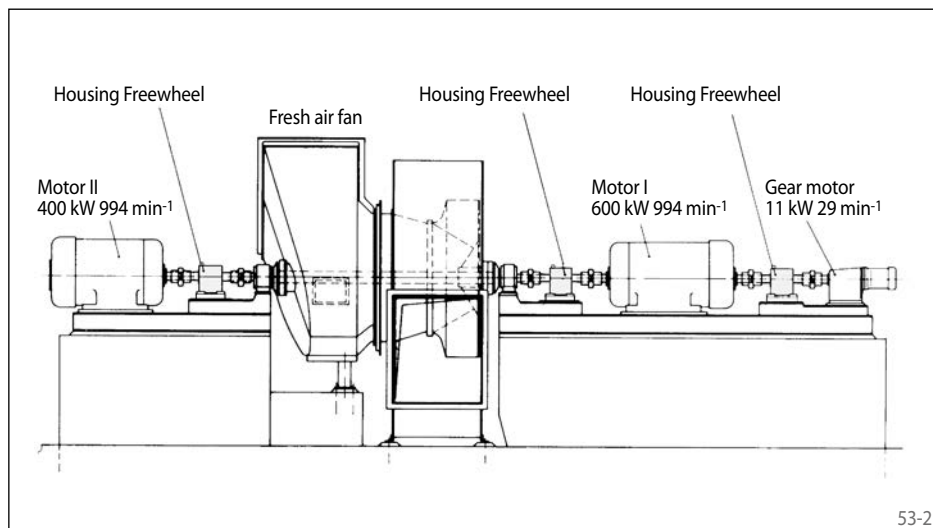


Areas of application

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.

Selection torque for Housing Freewheels FH

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:

$$M_N \geq M_A$$

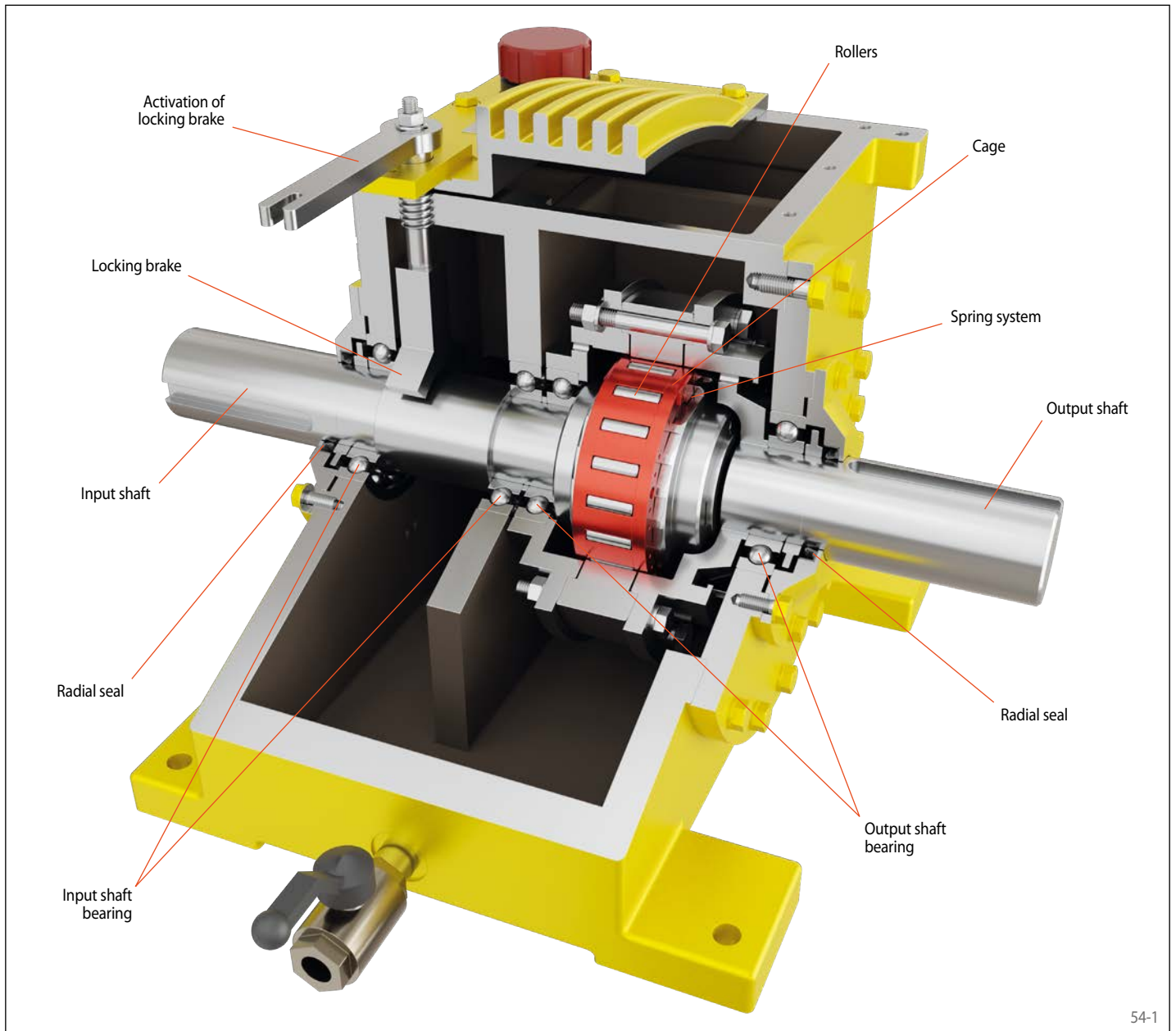
M_N = Nominal torque of the Housing Freewheel FH in accordance with the table values [Nm]

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 FH

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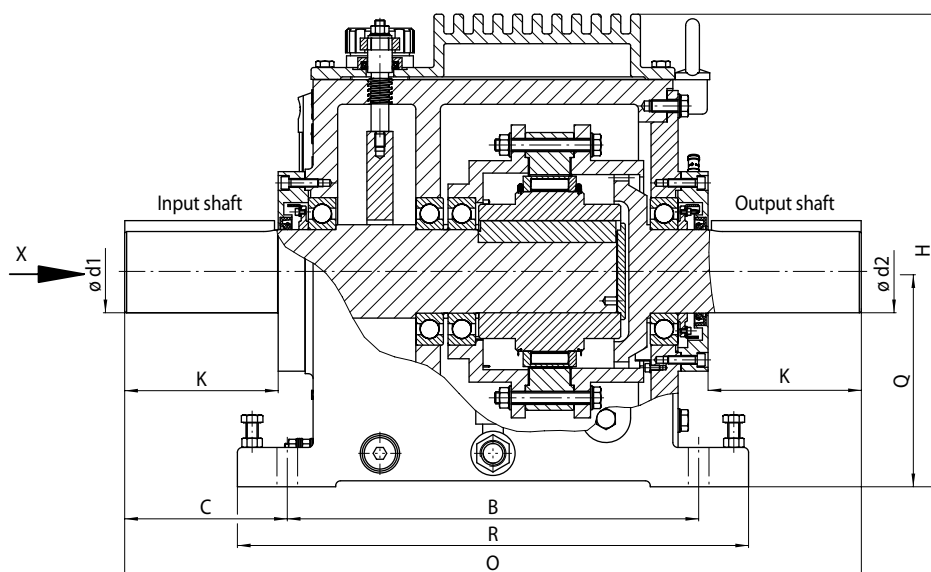


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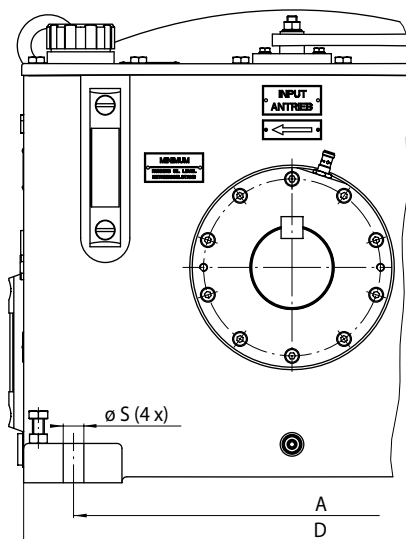
Housing Freewheels FH

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55-2

Overrunning
Clutch

Type hydrodynamic roller lift-off

Dimensions

	Freewheel Size	Type	Nominal torque	Max. speed		Shaft d1 and d2	A	B	C	D	H	K	O	Q	R	S	Weight
			M _N	Output shaft overruns	Input shaft drives												
inch			lb-ft	min ⁻¹	min ⁻¹	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	lbs
	FH 1000	R	1 000	5 600	5 600	1 3/4	12 3/4	12 3/4	3 7/16	16 1/4	12 7/8	3 7/8	19 5/8	5 3/4	14 1/2	11/16	231
	FH 2000	R	2 000	4 200	4 200	2 5/16	16 3/4	14 3/4	4 1/4	18 3/4	15	4 5/8	23 1/4	6 7/8	16 1/2	11/16	355
	FH 4000	R	4 000	3 600	3 600	2 3/4	18	15 1/2	5 1/16	20	17 1/8	5 3/8	25 5/8	7 3/4	17 1/2	11/16	496
	FH 8000	R	8 000	3 000	3 000	3 5/16	17 1/2	18 1/4	5 5/8	21 1/2	18 15/16	6 1/8	29 1/2	8 5/8	20 1/2	13/16	716
	FH 12000	R	12 000	2 500	2 500	3 7/8	18 1/4	21 1/2	6 5/16	22 3/4	20 15/16	6 15/16	34 1/8	9 5/8	23 3/4	1 1/16	926
	FH 18000	R	18 000	2 300	2 300	4 5/16	20 1/2	23 1/4	7 5/16	26	20 5/8	7 11/16	37 7/8	11 1/4	25 3/4	1 5/16	1 402
	FH 30000	R	30 000	2 000	2 000	5 1/16	25 1/2	26 1/4	7 7/8	31	26 1/2	8 5/8	42	12 3/4	29 1/2	1 5/16	2 178
	FH 42000	R	42 000	1 700	1 700	5 7/8	29	28 3/4	8 1/2	35	32 1/2	9 1/8	45 3/4	14 1/2	31 3/4	1 5/16	2 822
	FH 60000	R	60 000	1 400	1 400	7	32	30 1/2	9 1/2	38	35	10 5/8	49 1/2	16	33 1/2	1 5/16	3 655
metric			Nm	min ⁻¹	min ⁻¹	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
	FH 1000	R	1 356	5 600	5 600	44,45	323,85	323,85	87,31	412,75	327,00	98,43	498,48	146,05	368,30	17,50	105
	FH 2000	R	2 712	4 200	4 200	58,74	425,45	374,65	107,95	480,00	381,00	117,48	590,55	174,63	419,10	17,50	161
	FH 4000	R	5 423	3 600	3 600	69,85	457,20	393,70	128,59	508,00	435,00	136,53	650,88	196,85	444,50	17,50	225
	FH 8000	R	10 847	3 000	3 000	84,14	444,50	463,55	142,87	546,00	481,00	155,58	749,30	219,08	520,00	21,00	325
	FH 12000	R	16 270	2 500	2 500	98,43	463,55	546,10	160,35	578,00	532,00	177,00	866,80	244,48	603,00	27,00	425
	FH 18000	R	24 405	2 300	2 300	109,54	520,70	590,55	185,74	660,00	600,00	195,26	962,00	285,75	654,00	33,00	636
	FH 30000	R	40 675	2 000	2 000	128,59	647,70	666,75	200,03	787,00	672,00	220,00	1 066,80	323,85	749,00	33,00	988
	FH 42000	R	56 944	1 700	1 700	149,23	736,60	730,25	215,88	889,00	825,00	232,00	1 162,00	368,30	806,00	33,00	1 280
	FH 60000	R	81 349	1 400	1 400	177,80	812,80	774,70	241,30	965,00	890,00	270,00	1 257,30	406,40	850,00	33,00	1 658

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.

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 121 by specifying the direction of rotation in driving operation when viewed in direction X so that we can check the selection.