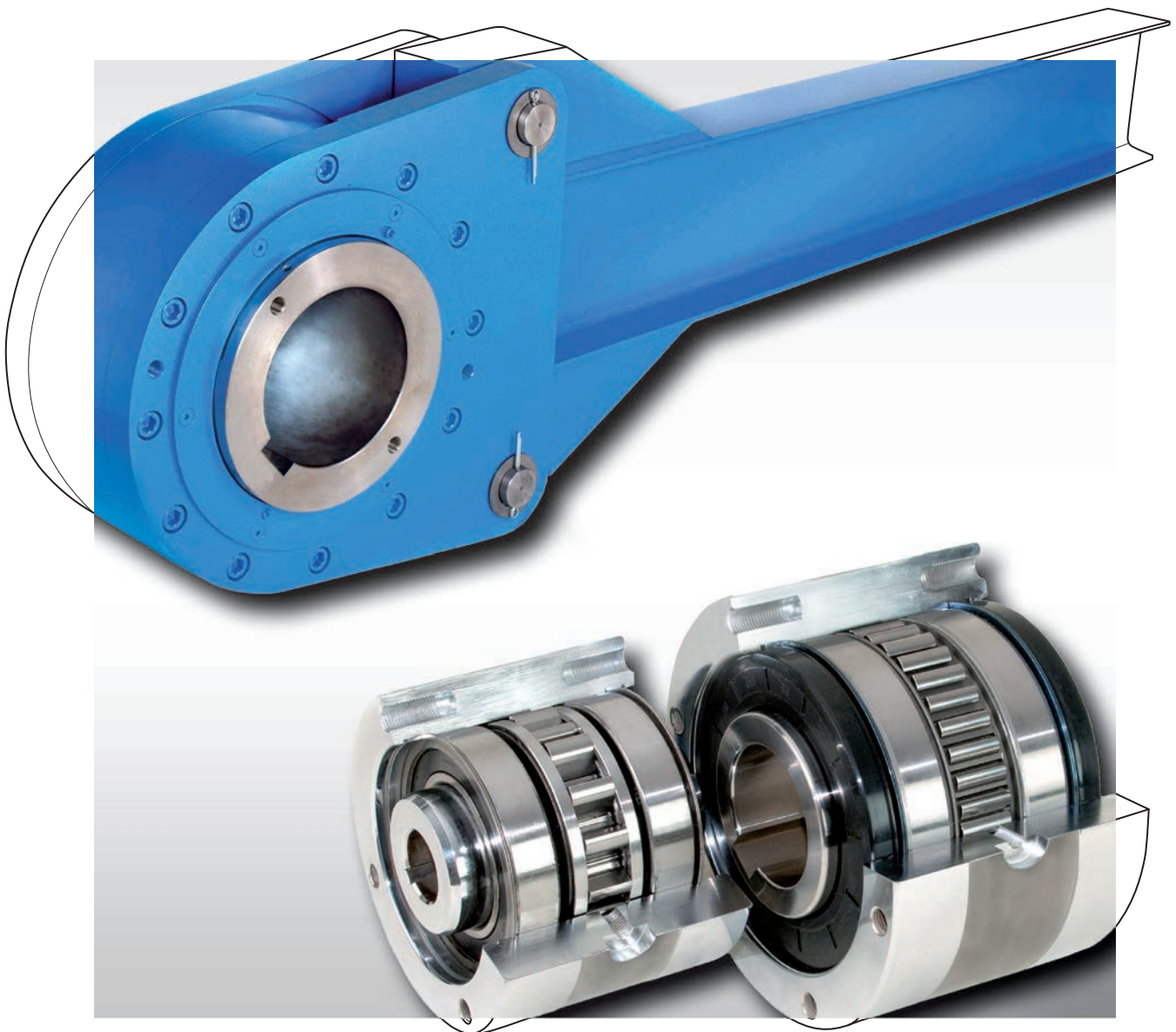


# Freewheel Clutches

Backstops • Overrunning Clutches • Indexing Freewheels



North American Edition 2020/2021



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	Backstops	Used as Overrunning Clutch	Indexing Freewheel	With bearing support	Maximum torque lb-ft	Maximum bore inch	
for bolting to the face							
FRS and FRSG with sprags	●	●	●	●	55 000	7.000	10
FRX and FRZ with sprag lift-off X or lift-off Z	●	●		●	30 000	5.438	12
with torque arm							
FRXF with sprag lift-off X, sealed grease lubricated ball bearings	●			●	29 000	4.500	14
with torque arm and clamping collar or mounting flange							
RFB with sprags and grease lubricated ball bearings	●			●	900	6.000	16
with gear coupling							
FR ... CA with sprags		●		●	55 000	7.000	18
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	Backstops	Used as Overrunning Clutch	Indexing Freewheel	With bearing support	Maximum torque lb-ft	Maximum bore inch	
with torque arm							
FRHD with sprags	●			●	2 400 000	21.000	22
FRHM with sprags	●			●	56 000	7.000	24
Internal Freewheels							Page
	Backstops	Used as Overrunning Clutch	Indexing Freewheel	With bearing support	Maximum torque lb-ft	Maximum bore inch	
for press fit on the outer ring							
FZ with sprags, bearing supported	●	●	●	●	619	1.575	26
FZ ... 2RS with sprags, bearing supported and sealed	●	●	●	●	619	1.575	28
FZ ... P2RS with sprags, bearing supported and sealed	●	●	●	●	619	1.575	28
FZ ... P with sprags, bearing supported	●	●	●	●	619	1.575	29
for keyway connection on the outer ring							
FZ ... PP with sprags, bearing supported	●	●	●	●	619	1.575	29
RC 200 with sprags	●				1 240	2.209	30
RC 500 with sprags	●				1 250	2.0457	31
specifically designed as an interchange backstop for shaft mounted reducers							
RCD with sprags	●				NA	NA	32
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RINGSPANN GmbH has been in business for over 75 years and is a world leader in Power Transmission and Workholding Technology. RINGSPANN CORPORATION, as a wholly owned subsidiary of RINGSPANN GmbH, designs, manufactures and assembles sprag and roller clutches mainly for the North American market. With innovative German engineering and American ingenuity, RINGSPANN CORPORATION offers the winning combination of quality products for your needs.

Products contained in this catalog represent RINGSPANN CORPORATION's standard free-wheel clutches. Located in a 20,000 sq. ft. manufacturing facility, RINGSPANN CORPORATION can readily design new or modify existing products to suit your application.

## The RINGSPANN CORPORATION service advantage:

- Detailed application support backed by over 75 years of experience.
- Direct sales and service from the manufacturer
- 24 hour emergency service
- North American industry leader for
  - Price
  - Delivery
  - Customer service
  - Quality

## The RINGSPANN CORPORATION design advantage:

- American design and manufacture
- Patented sprag cage designs for increased torque and maximum life
- Maximum torque in a minimum space
- Sprag Lift off "X" and "Z" for infinite, maintenance free life
- Individual springs on every sprag to provide added security against failures





Freewheels 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 opposite direction of rotation there is contact between the inner and outer ring; in this direction it is possible to transmit torque.

For example the outer ring of the freewheel shown in figure 4-1 can freewheel clockwise while the inner ring is stationary. If, however, the outer ring is turned in the opposite direction, there is contact between the inner and outer ring and the inner ring is driven (driving operation).

Freewheels are used as:

- ▶ Backstops
- ▶ Overrunning Clutches
- ▶ Indexing Freewheels

Freewheels can fulfill these functions completely automatically in the most diverse machines. No mechanical or hydraulic operating equipment is required, such as externally actuated clutches or brakes.

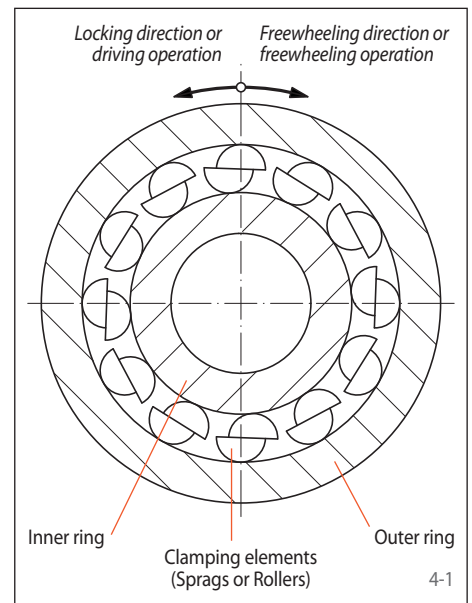
Freewheels consist of an inner and an outer ring between which clamping elements are arranged. Clamping elements can be sprags or rollers. We differentiate as follows:

- Freewheels with bearing support and
- Freewheels without bearing support.

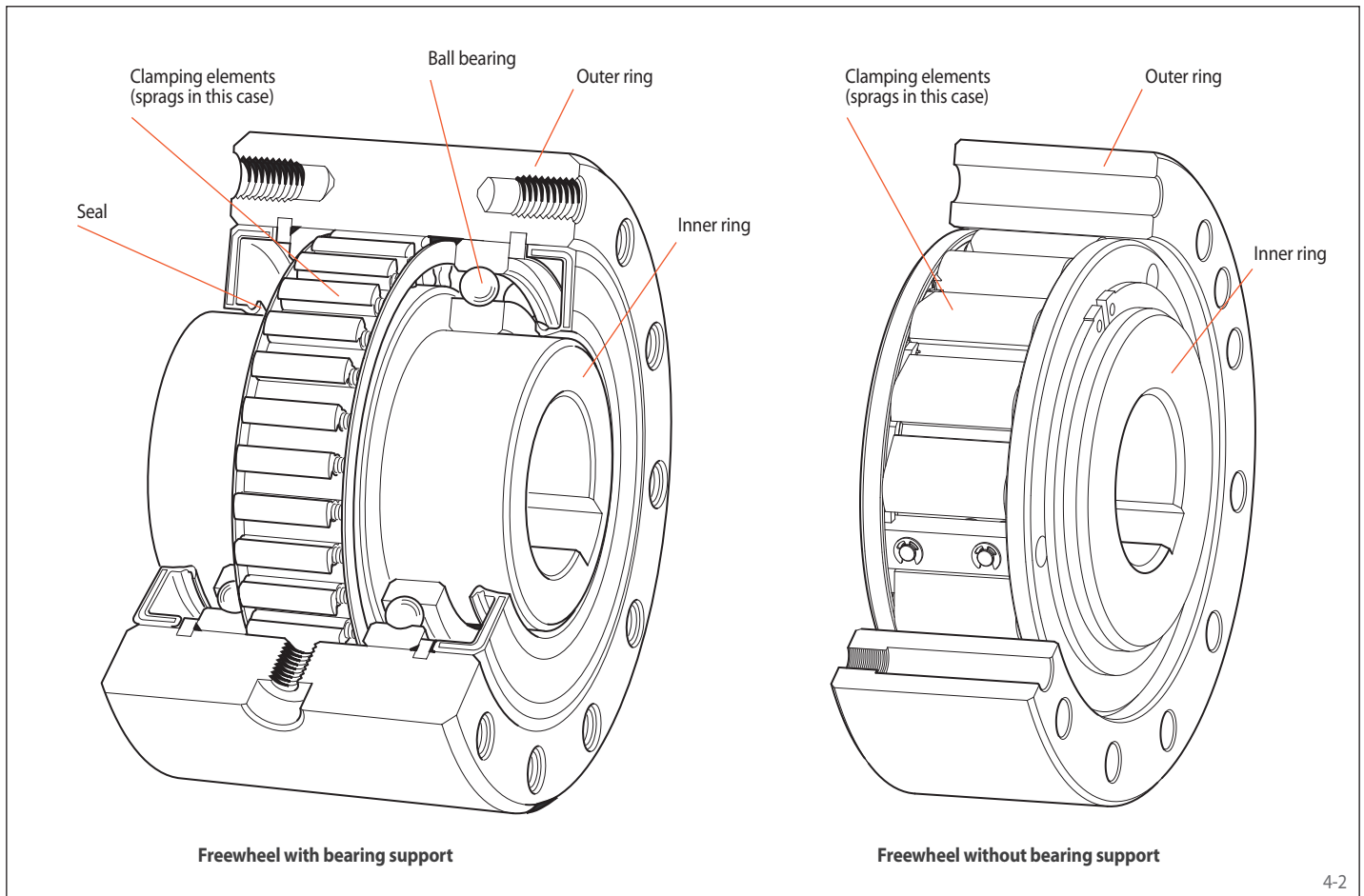
For a freewheel to function, concentric alignment of the inner and outer ring is required. In the case of freewheels without bearing support, concentric alignment must be provided by the customer.

RINGSPANN freewheels are an indispensable design element in the machine building industry. Many designs are only economical if freewheels are used. The freewheel as an automatic driving element is preferred to conventional solutions because it offers the following significant advantages:

- safe
- efficient
- high degree of automation



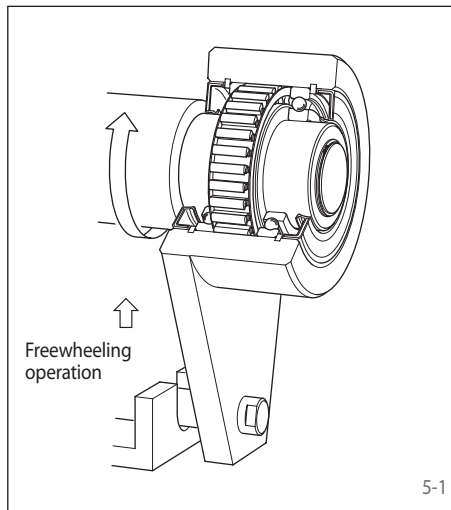
With more than 50 years experience in the development, production and sales of freewheels, RINGSPANN offers the most comprehensive range of freewheels. A global network of subsidiaries and sales agencies ensures the best possible personal on-site service. Assembly and production facilities in various countries provide fast, reliable delivery.



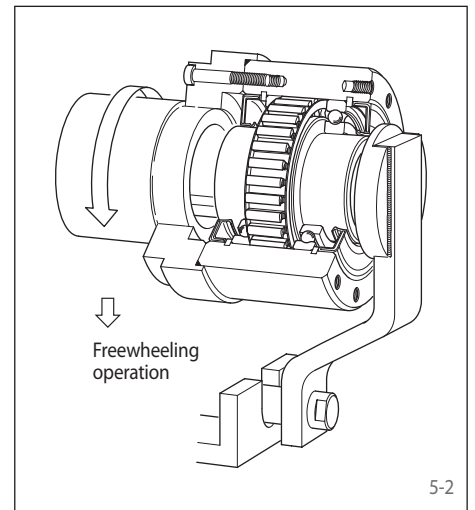
## Backstop

Freewheels are used as backstops if reverse rotation of the operating equipment needs to be prevented. In many machines and installations, for technical safety or functional reasons, it is necessary to ensure that the operating equipment is in just one specific direction of rotation. Backstops are used where legal stipulations require a mechanical safety device be installed for the operation of 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.



In general, backstops are used where the inner ring freewheels and the stationary held outer ring prevents reverse rotation (figure 5-1).



The more complicated designed backstops where the outer ring freewheels and the stationary held inner ring prevents reverse rotation are rarely used today (figure 5-2).

## 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 takes 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.

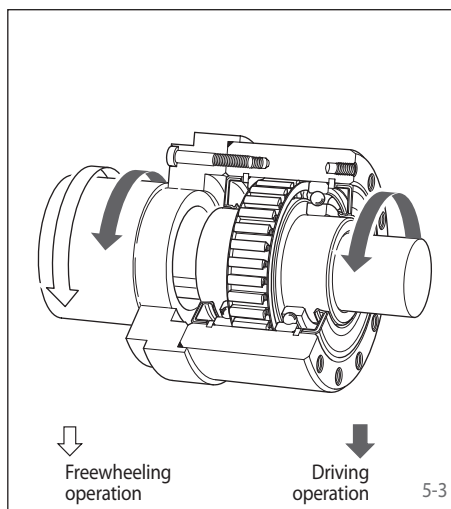


Figure 5-3 shows an overrunning clutch where in driving operation the power flow is transferred from the inner ring to the outer ring and in freewheeling operation the outer ring overruns the inner ring at a higher speed.

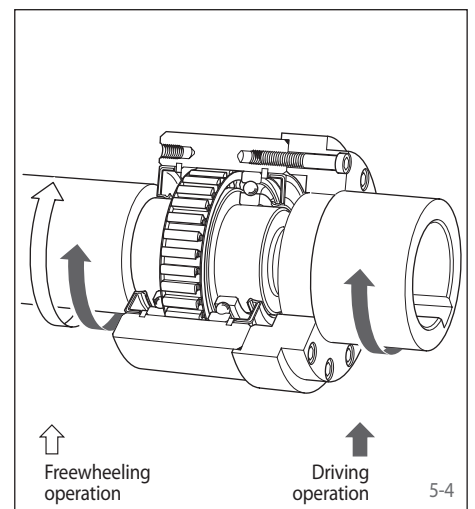


Figure 5-4 shows an overrunning clutch where in driving operation the power flow is transferred from the outer ring to the inner ring and in freewheeling operation the inner ring overruns the outer ring at a higher speed.

## Indexing Freewheel

The indexing freewheel transmits a back and forth motion into a stepped rotation (indexed feed). The RINGSPANN indexing freewheel enables an infinitely adjustable setting of the feed, for precise and quiet operation.

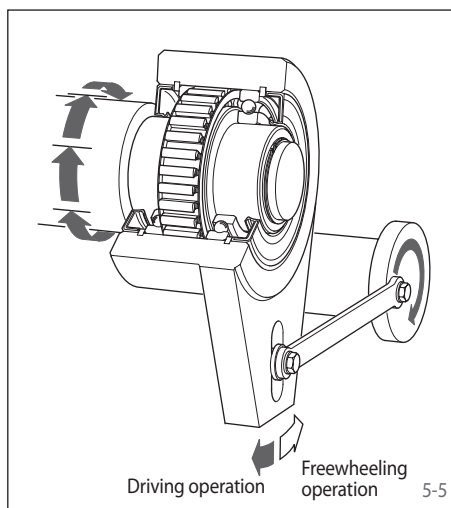


Figure 5-5 shows an indexing freewheel where the outer ring makes the back and forth motion and the inner ring carries out the indexed feed.

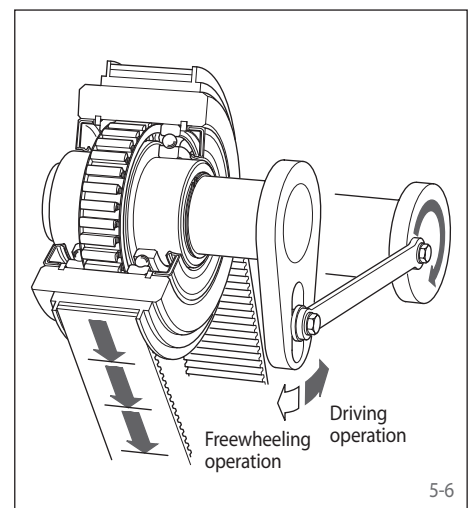
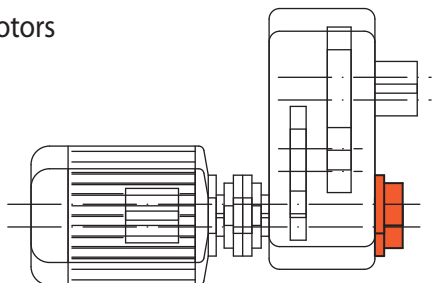


Figure 5-6 shows an indexing freewheel where the inner ring makes the back and forth motion and the outer ring carries out the indexed feed.

# Applications for Freewheels

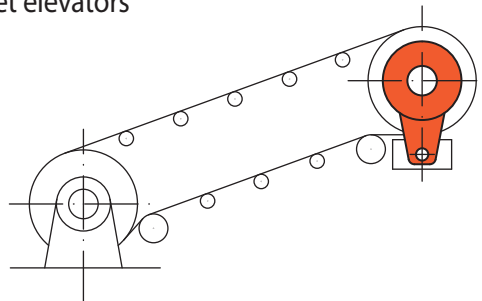
## Areas of application for Backstops

Gear units  
Electric motors  
Gear motors



The backstop prevents reverse rotation of the drive of a conveyor installation if the power fails or the motor is turned off.

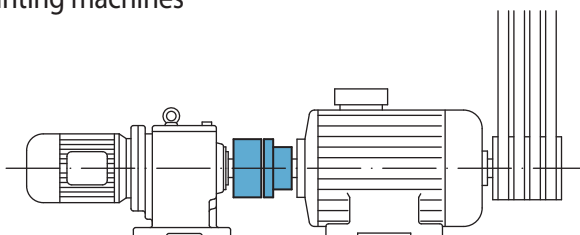
Inclined conveyors  
Elevators  
Bucket elevators



The backstop prevents reverse rotation of the conveyor load if the power fails or the motor is turned off.

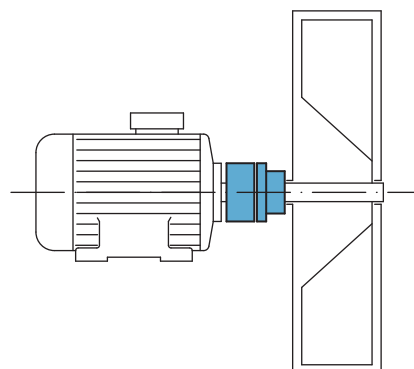
## Areas of application for Overrunning Clutches

Textile machines  
Printing machines



During normal operation of textile or printing machines, the overrunning clutch separates the auxiliary drive which is used as a starter from the main drive.

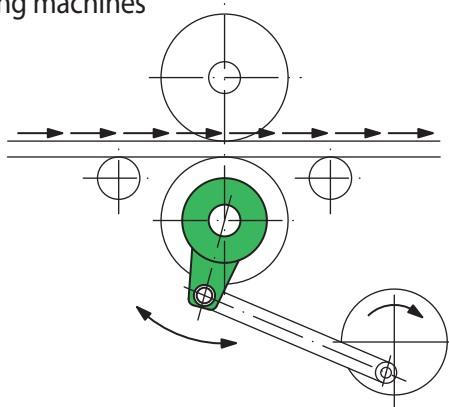
Fans



If fans are turned off, the overrunning clutch prevents the flywheel mass from rotating the drive.

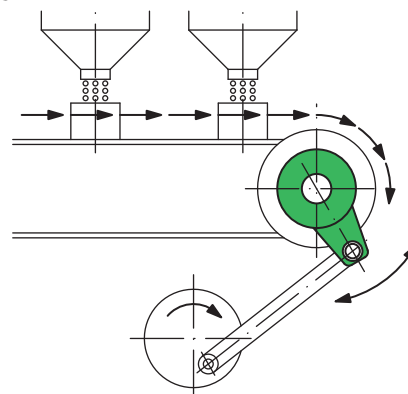
## Areas of application for Indexing Freewheels

Textile machines  
Printing machines



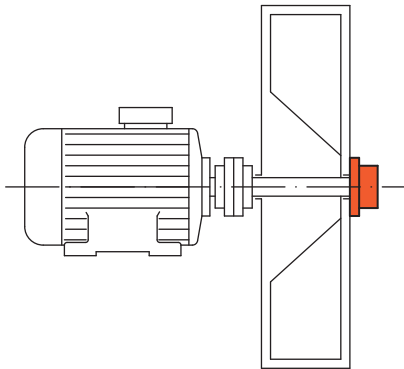
The indexing freewheel generates an indexed feed in textile and printing machines.

Packaging machines  
Filling plants



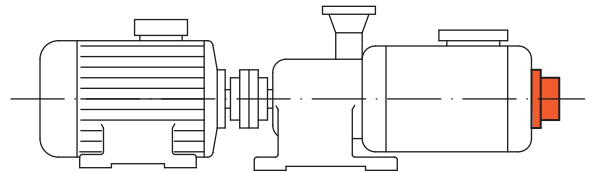
The indexing freewheel is used in packaging machines and filling plants for an indexed feed.

Fans



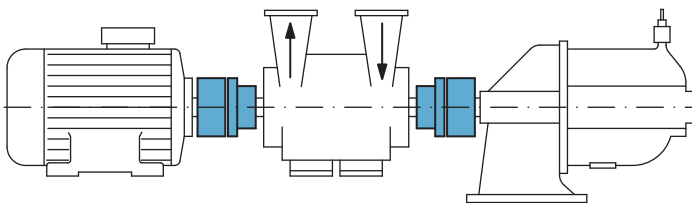
The backstop prevents the motor from reverse rotation under the back pressure when it is turned off.

Pumps  
Compressors



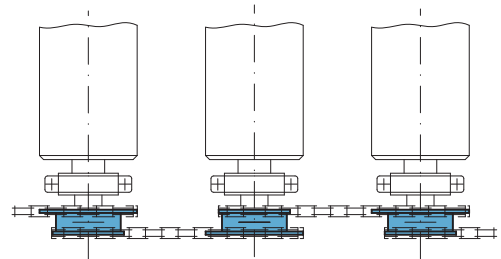
The backstop prevents the motor from reverse rotation under the back pressure when it is turned off.

Pumps  
Generators



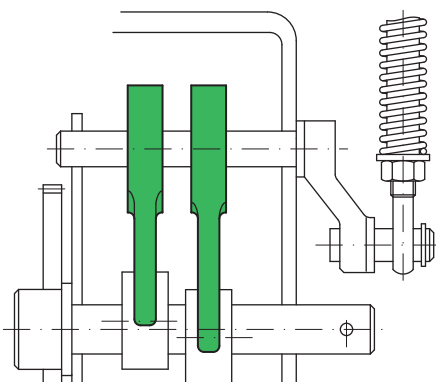
In multimotor drives the overrunning clutch disengages the inactive or lower speed drive.

Roller conveyor



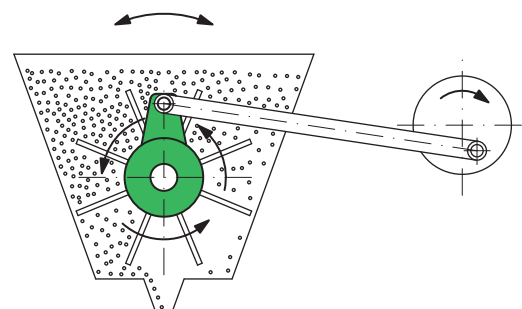
The overrunning clutch ensures that the conveyed material can be pushed or pulled faster over the rollers than the speed of the drive.

High voltage switches



In high voltage switches for tensioning a spring, the indexing freewheel is used in the place of a reduction gear.

Seed spreader



The indexing freewheel replaces a reduction gear in seed spreader.

		Standard type	Type with sprag lift-off X	Type with sprag lift-off Z
		For universal use	To extend service life using sprag lift-off for high speed rotating inner ring	To extend service life using sprag lift-off for high speed rotating outer ring
Use as	Backstop	Up to medium speeds during freewheeling operation (inner or outer ring freewheels)	Up to very high speeds during freewheeling operation (inner ring freewheels)	Up to very high speeds during freewheeling operation (outer ring freewheels)
	Overrunning Clutch	Up to medium speeds during freewheeling operation (inner or outer ring overruns)	Up to very high speeds during freewheeling operation (inner ring overruns)	Up to very high speeds during freewheeling operation (outer ring overruns)
		Up to very high speeds in driving operation (outer or inner ring drives)	Low speeds in driving operation (outer ring drives)	Low speeds in driving operation (inner ring drives)
Indexing Freewheel	Up to a medium total number of actuations			

In addition to the standard type, RINGSPANN has developed other types to extend service life

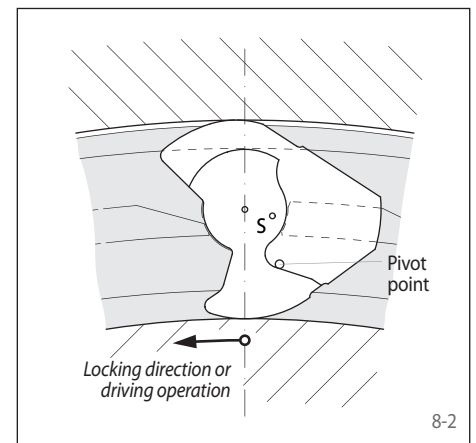
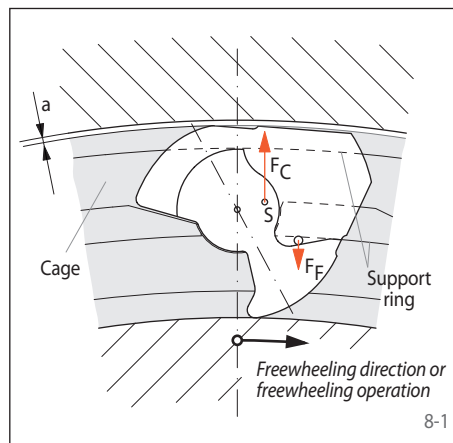
for freewheels with sprags. The table above lists the recommended application conditions for

these types.

## Type with sprag lift-off X

The sprag lift-off X is used for backstops and overrunning clutches, provided that in freewheeling operation the inner ring is rotating at high speed and with overrunning clutches that the driving operation is at a low speed. In freewheeling operation, the centrifugal force  $F_C$  causes the sprag to lift off from the sprag track of the outer ring. In this operating state, the freewheel operates wear-free with unlimited service life.

Figure 8-1 shows a freewheel with sprag lift-off X in freewheeling operation. The sprags, which are supported in a cage connected to the inner ring, rotate with the inner ring. The centrifugal force  $F_C$  that is applied in the center of gravity  $S$  of the sprag turns the sprag counterclockwise and rests against the support ring of the cage. This results in the gap "a" between the sprag



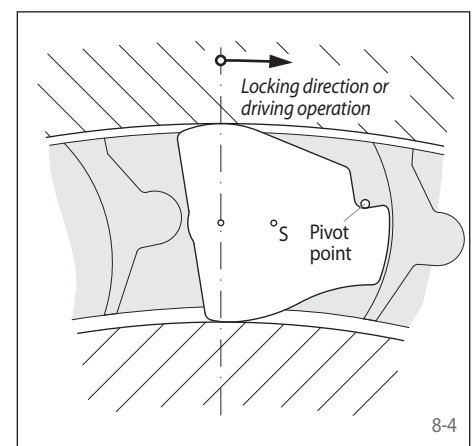
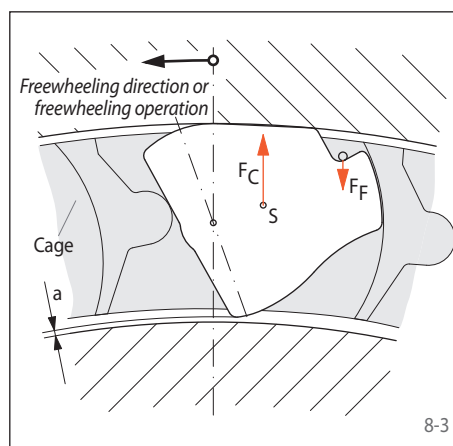
and the sprag track of the outer ring; the freewheel works without contact. If the inner ring speed decreases to such an extent that the effect of the centrifugal force on the sprag is less than that of the spring force  $F_F$ , the sprag again

rests on the outer track and the freewheel is ready to lock (figure 8-2). If used as an overrunning clutch, the driving speed must not exceed 40% of the lift-off speed.

## Type with sprag lift-off Z

The sprag lift-off Z is used for backstops and overrunning clutches, provided that in freewheeling operation the outer ring is rotating at high speed, and with overrunning clutches that the driving operation is at a low speed. In freewheeling operation, the centrifugal force  $F_C$  causes the sprag to lift off from the sprag track of the inner ring. In this operating state, the freewheel operates wear-free with unlimited service life.

Figure 8-3 shows a freewheel with sprag lift-off Z in freewheeling operation. The sprags rotate with the outer ring. The centrifugal force  $F_C$  that is applied in the centre of gravity  $S$  of the sprag turns the sprag counterclockwise and rests against the outer ring. This results in the gap "a" between the sprag and the sprag track of the



inner ring; the freewheel works without contact. If the outer ring speed decreases to such an extent that the effect of the centrifugal force on the sprag is less than that of the spring force  $F_F$

, the sprag again rests on the inner track and the freewheel is ready to lock (figure 8-4). If used as an overrunning clutch, the driving speed must not exceed 40% of the lift-off speed.



## Selection torque for Backstops

Bringing a loaded inclined conveyor, an elevator or a pump to a standstill is a highly dynamic process that incurs high peak torques. These peak torques are critical in the selection of the backstop. The determination of peak torques in the case of locking is more accurate by using a rotational vibration analysis of the entire system. This requires a knowledge of rotational masses, the rotational rigidity and the excitation moments that occur in 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 backstop should be determined as follows:

$$M_A = 1.75 \cdot M_L \text{ [lb-ft]}$$

Often you only have the figures for the motor nominal output  $P_0$  [hp] available. Then:

$$M_A = F \cdot 5250 \cdot P_0 / n_{SP} \text{ [lb-ft]}$$

In these equations:

$$M_A = \text{Selection torque of the backstop [lb-ft]}$$

$$M_L = \text{Static backdriving torque of the load referring to the backstop shaft [lb-ft]}$$

$$P_0 = \text{Nominal power of motor [hp]}$$

$$n_{SP} = \text{Speed of backstop shaft [rpm]}$$

$$F = \text{Selection factor (refer to table)}$$

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

$$M_N \geq M_A$$

$$M_N = \text{Nominal torque of the backstop in accordance with the table values [lb-ft]}$$

It must be noted that, with a direct motor start in the locking direction of a backstop, very high peak torques can occur which in turn can destroy the backstop.

Approximate values for F:

Type of installation	F
Conveyor belts, angle up to 6°	0.88
Conveyor belts, angle up to 8°	1.07
Conveyor belts, angle up to 10°	1.21
Conveyor belts, angle up to 12°	1.29
Conveyor belts, angle up to 15°	1.39
Screw pumps	1.51
Ball mills, drying drums	1.26
Bucket conveyors, elevators	1.48
Hammer mills	1.51
Fans, Ventilators	0.49

## Selection torque for Overrunning Clutches

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 pull-over torque. The conditions for internal combustion engines are similar. Even in normal operation, their degree of irregularity, peak torques can occur that are considerably greater than the nominal torque.

The prior determination of the maximum occurring torque is carried out more accurately 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:

$$M_A = \text{Selection torque of the freewheel}$$

$$K = \text{Operating factor (refer to table)}$$

$$M_L = \text{Load torque for constant rotating freewheel:}$$

$$= 5250 \cdot P_0 / n_{FR}$$

$$P_0 = \text{Nominal power of motor [hp]}$$

$$n_{FR} = \text{Speed of the freewheel in driving operation [rpm]}$$

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

$$M_N \geq M_A$$

$$M_N = \text{Nominal torque of the freewheel in accordance with the table values [lb-ft]},$$

Approximate values for operating factor „K“:

Type of driver	K
Electric motors with low start up impact (e.g. DC motors, asynchronous motors with slip rings or soft start couplings), steam turbines, gas turbines	0.8 to 2.5
Electric motors with considerable start up impact (e.g. synchronous or asynchronous motors with direct start)	1.25 to 2.5
Piston engines with more than two cylinders, water turbines, hydraulic motors	1.25 to 3.15
Piston engines with one or two cylinders	1.6 to 3.15

The operating factor K depends on the properties of the driver and the machine. The general rules of mechanical engineering apply here. We know from practice that applications are known where the operating factor K can also assume values of up to 20, e.g. with a direct start-up of asynchronous electric motors in connection with elastic couplings.

## Selection torque for Indexing Freewheels

The selection torque for indexing freewheels is, among other things, dependent upon how the back and forth motion is generated (crank

operation, hydraulic cylinders, pneumatic cylinders etc.). It cannot be specified in a simple equation. When stating the maximum torque to

be transmitted, we are happy to advise you regarding the selection torque.

# Complete Freewheels FRS and FRSG

for bolting to the face  
with sprags



## Application as

- ▶ Backstop
- ▶ Overrunning Clutch
- ▶ Indexing Freewheel

## Features

Complete Freewheels FRS and FRSG are sealed sprag freewheels with ball bearings and ready for installation.

The freewheels FRS are supplied oil-filled.

The freewheels FRSG are supplied grease filled.

Maximum torques up to 55 000 lb-ft.

Bores up to 7 inch. Standard bores in inch dimension are available from stock. Metric bores on request.

## Application example

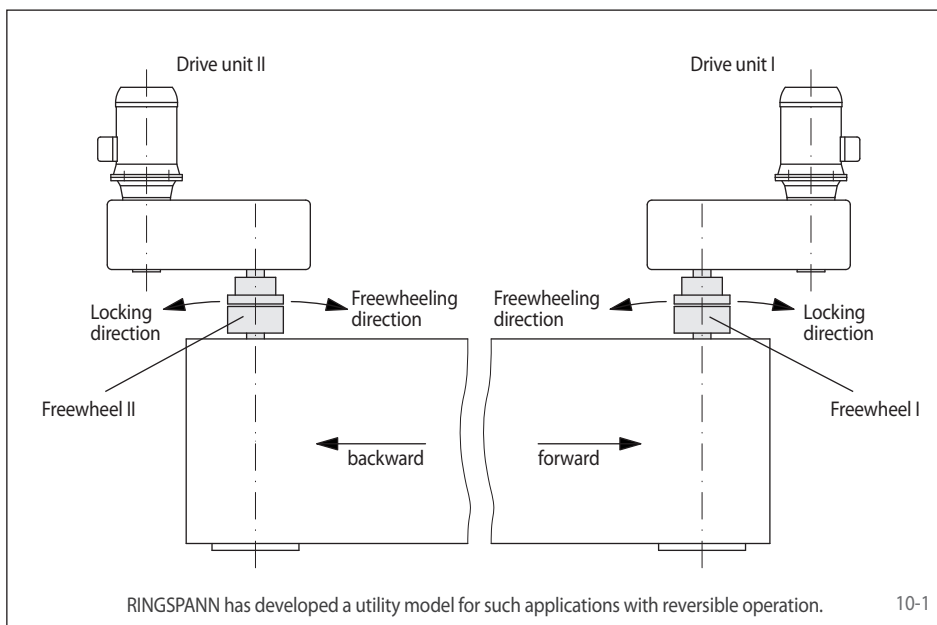
Complete Freewheels FRS 600 in both drive units of a transport system with a conveyor belt that moves both forward and backward (reversible operation). In order to ensure that the conveyor belt is moved under tension, forward movement is driven by drive unit I, reverse movement by drive unit II. The freewheels automatically disengage the respective non working drive, eliminating the need for expensive external clutches or brakes.

For forward movement, drive unit II is started in freewheeling direction of freewheel II; freewheel II is in freewheeling operation and disengages drive unit II from the conveyor belt. Afterwards drive unit I is started in the locking direction of the freewheel I; freewheel I is in driving operation and the conveyor belt is moved forward by drive unit I. The speed of drive unit I is lower than that of drive unit II. Thus freewheel II remains in freewheeling operation and drive unit II is not improperly engaged.

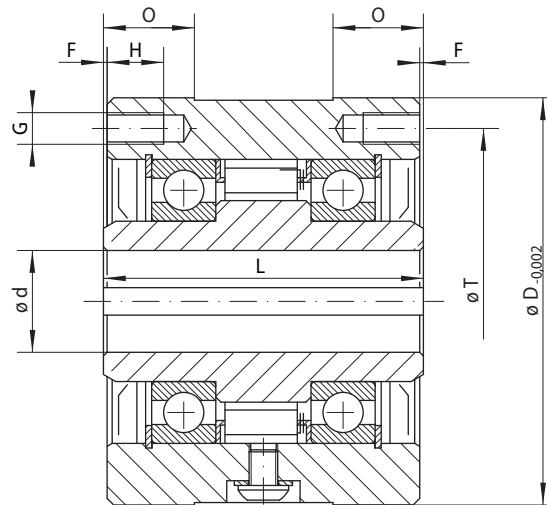
For reverse movement, the drive units are started in reverse order and direction of rotation at the corresponding speeds.

The mentioned application for a reversing conveyor requires speed control for both of the drives.

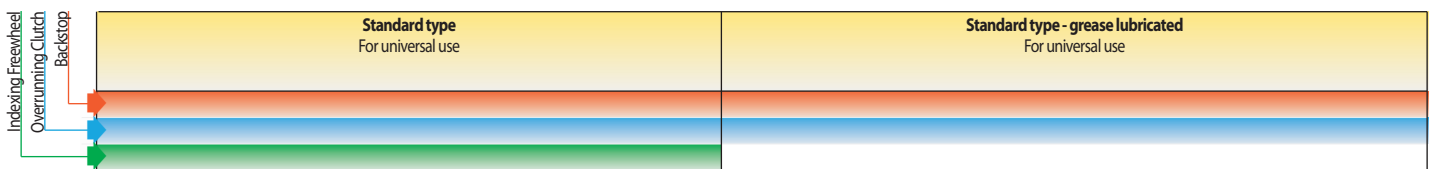
Conveyors operating in the same direction can use clutches in conjunction with the two drives.



for bolting to the face  
with sprags



11-1



Freewheel Size	Maximum torque M <sub>M</sub> lb-ft	Nominal torque M <sub>N</sub> lb-ft	Max. speed		Freewheel Size	Maximum torque M <sub>M</sub> lb-ft	Nominal torque M <sub>N</sub> lb-ft	Max. speed	
			inner ring freewheels/ overruns rpm	outer ring freewheels/ overruns rpm				inner ring freewheels/ overruns rpm	outer ring freewheels/ overruns rpm
FRS 300	420	210	2500	2600	FRSG 300	420	210	3600	3600
FRS 400	670	335	1900	2100	FRSG 400	670	335	3600	3600
FRS 500	1600	800	1400	1900	FRSG 500	1600	800	3600	3600
FRS 550	3050	1525	1175	1600	FRSG 550	3050	1525	3600	3600
FRS 600	3900	1950	1100	1500	FRSG 600	3900	1950	3600	3600
FRS 650	5400	2700	900	1250	FRSG 650	5400	2700	3600	3600
FRS 700	11050	5525	790	1150	FRSG 700	11050	5525	1800	1800
FRS 750	18700	9350	790	1150	FRSG 750	18700	9350	1800	1800
FRS 775	17000	8500	750	1050	FRSG 775	17000	8500	1800	1800
FRS 800	22200	11100	700	950	FRSG 800	22200	11100	1800	1800
FRS 900	33600	16800	700	950	FRSG 900	33600	16800	1200	1200
FRS 1000	55000	27500	630	800	FRSG 1000	55000	27500	1200	1200

See page 9 for determination of selection torque.

Freewheel Size	Bore d								max. inch	D inch	F inch	G Thread	L inch	H inch	O inch	T inch	Z*	Weight lbs
	Standard bores inch																	
FR ... 300	0.500	0.650	0.750						0.750	3.000	0.063	0.250-28	2.500	0.375	0.750	2.625	4	3.5
FR ... 400	0.500	0.625	0.750	0.875	1.000	1.125			1.125	3.500	0.032	0.312-24	2.750	0.500	0.750	2.875	4	6.0
FR ... 500	0.875	1.000	1.125	1.250	1.312				1.312	4.250	0.063	0.312-24	3.500	0.625	1.000	3.625	4	10.0
FR ... 550	1.250	1.312	1.500	1.625					1.625	4.750	0.063	0.312-24	3.250	0.540	0.750	4.250	6	12.0
FR ... 600	1.250	1.375	1.438	1.500	1.625	1.688	1.750	1.938	2.000	5.375	0.063	0.312-24	3.750	0.625	1.000	4.750	6	19.0
FR ... 650	1.938	2.000	2.250	2.438	2.500				2.500	6.500	0.063	0.375-24	3.500	0.750	1.000	5.750	8	24.0
FR ... 700	1.938	2.000	2.250	2.438	2.500	2.750	2.938		2.938	7.125	0.063	0.375-24	5.000	0.750	1.000	6.250	8**	42.0
FR ... 750	2.438	2.500	2.938	3.000	3.250	3.438			3.438	8.750	0.063	0.500-20	6.000	0.875	1.250	7.000	8**	83.0
FR ... 775	2.750	2.938	3.000	3.250	3.438	3.500	3.750		3.750	9.750	0.063	0.500-20	6.000	0.875	1.250	8.500	8	96.0
FR ... 800	3.000	3.250	3.438	3.500	3.750	3.937	4.000	4.250	4.500	10.000	0.063	0.500-20	6.000	0.875	1.250	8.937	8	102.0
FR ... 900	4.000	4.438	4.500	4.938	5.000	5.438			5.438	12.000	0.063	0.625-18	6.375	1.000	1.375	9.750	10	156.0
FR ... 1000	5.750	5.938	6.000	6.750	6.875	7.000			7.000	15.000	0.063	0.625-18	6.625	1.000	1.375	11.750	12	250.0

\* Z = Number of tapped holes G on pitch circle T.

\*\* Six holes are equally spaced 60° apart with two additional holes located 30° from the six equally spaced holes and 180° apart.

Keyway dimensions upon request by customers.

## Mounting

The customer attachment part is centered on the external diameter D and then bolted on to the face.

The recommended tolerance of the shaft is + 0 / - 0.001 inch and the tolerance of the pilot diameter D of the attachment part is - 0 / + 0.002 inch.

## Labyrinth Seals

Labyrinth seals are available to provide additional protection for harsh environments.

# Complete Freewheels FRX and FRZ

for bolting to the face  
with sprag lift-off X or lift-off Z



## Application as

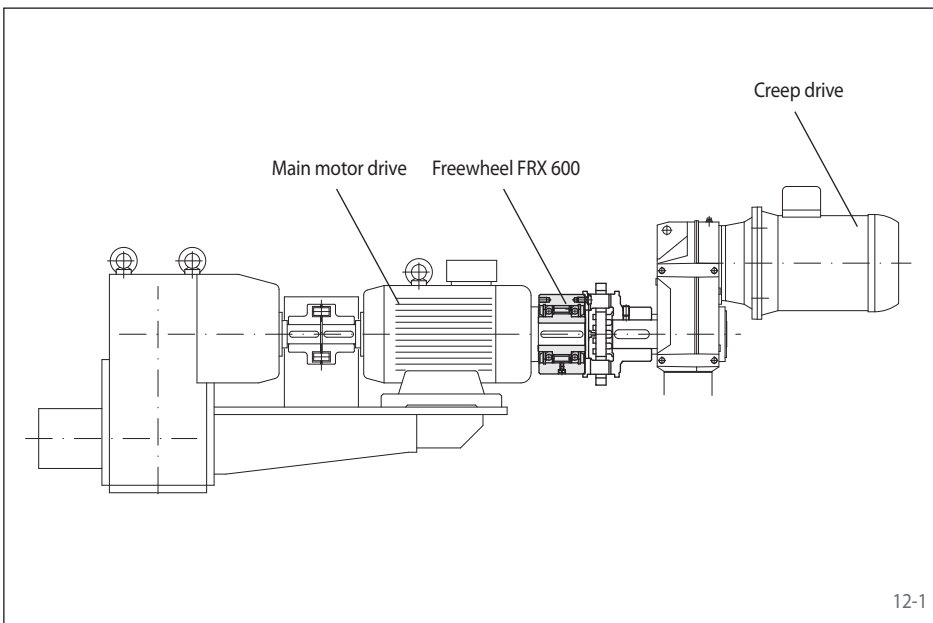
- ▶ Backstop
- ▶ Overrunning Clutch

## Features

Complete Freewheels FRX and FRZ are sealed sprag freewheels with ball bearings and sprag lift-off X or sprag lift-off Z.

Maximum torques up to 30000 lb-ft.

Bores up to 5.438 inch. Standard bores in inch dimension are available from stock. Metric bores on request.

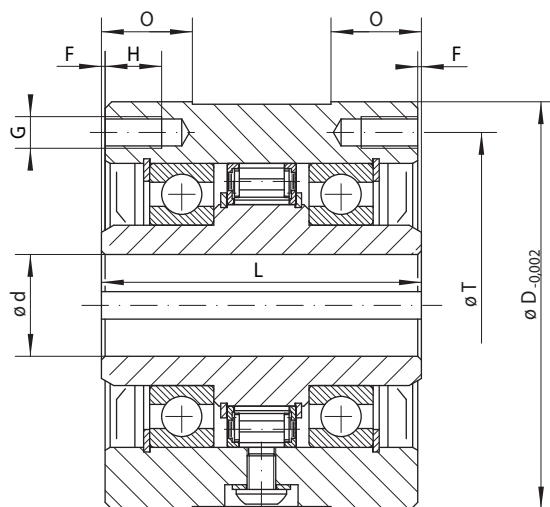


## Application example

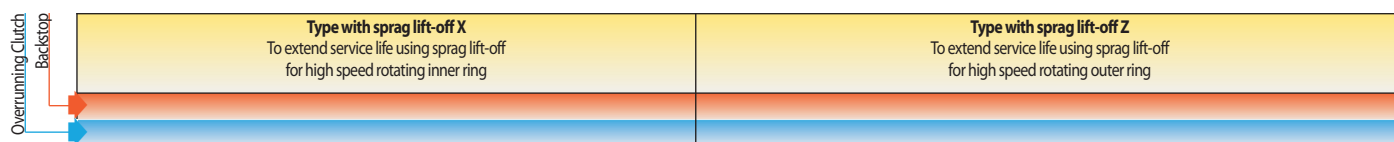
Complete Freewheel FRX 600 as an overrunning clutch in the drive unit of a conveyor belt system with additional creep drive. The freewheel with shaft coupling is installed between the main motor and the creep drive. When the creep drive operates, the freewheel is in driving operation and drives the belt at low speed. During normal operation (freewheeling operation), the main motor drives and the inner ring overruns and the creep drive is automatically disengaged. With this high speed, sprag lift-off X is used; the sprags work in freewheeling operation without contact and are wear-free.



for bolting to the face  
with sprag lift-off X or lift-off Z



13-1



Freewheel Size	Maximum torque $M_M$ lb-ft	Nominal torque $M_N$ lb-ft	Sprag lift-off at inner ring speed rpm	Max. speed		Freewheel Size	Max. torque $M_M$ lb-ft	Nominal torque $M_N$ lb-ft	Sprag lift-off at outer ring speed rpm	Max. speed	
				inner ring freewheels/overruns rpm	outer ring drives rpm					outer ring freewheels/overruns rpm	inner ring drives rpm
FRX 400	250	125	860	4000	340	FRZ 400	560	280	800	2600	320
FRX 500	850	425	750	4000	300	FRZ 500	1070	535	1400	2050	560
FRX 550	1500	750	700	4000	280	FRZ 550	2760	1380	1550	1800	620
FRX 600	2000	1000	670	4000	265	FRZ 600	3530	1765	1450	1650	580
FRX 650	3500	1750	610	3100	240	FRZ 650	5000	2500	1300	1400	520
FRX 700	8100	4050	350	2600	140	FRZ 700	10500	5250	1160	1200	465
FRX 750	14600	7300	320	2400	125	FRZ 750	17500	8750	1160	1200	465
FRX 775	14800	7400	320	2100	125	FRZ 775	15000	6500	950	1050	380
FRX 800	29000	14500	250	1800	100	FRZ 800	17400	8700	880	975	350
FRX 900	30000	15000	250	650	100	FRZ 900	26000	13000	720	925	288

See page 9 for determination of selection torque.

Freewheel Size	Bore d						max. inch	D inch	F inch	G Thread	L inch	H inch	O inch	T inch	Z**	Weight lbs		
	Standard bores inch																	
FR ... 400	0.500	0.625	0.750	0.875	1.000*	1.125*	1.125	3.500	0.032	0.312-24	2.750	0.500	0.750	2.875	4	6.0		
FR ... 500	0.875	1.000	1.125	1.250	1.312		1.312	4.250	0.063	0.312-24	3.500	0.625	1.000	3.625	4	10.0		
FR ... 550	1.250	1.312	1.500	1.625			1.625	4.750	0.063	0.312-24	3.250	0.540	0.750	4.250	6	12.0		
FR ... 600	1.250	1.375	1.438	1.500	1.625	1.688	1.750	1.938	2.000	5.375	0.063	0.312-24	3.750	0.625	1.000	4.750	6	19.0
FR ... 650	1.938	2.000	2.250	2.438	2.500		2.500	6.500	0.063	0.375-24	3.500	0.750	1.000	5.750	8	24.0		
FR ... 700	1.938	2.000	2.250	2.438	2.500	2.750	2.938		2.938	7.125	0.063	0.375-24	5.000	0.750	1.000	6.250	8***	42.0
FR ... 750	2.438	2.500	2.938	3.000	3.250	3.438			3.438	8.750	0.063	0.500-20	6.000	0.875	1.250	7.000	8***	83.0
FR ... 775	2.750	2.938	3.000	3.250	3.438	3.500	3.750		3.750	9.750	0.063	0.500-20	6.000	0.875	1.250	8.500	8	96.0
FR ... 800	3.000	3.250	3.438	3.500	3.750	3.937	4.000	4.250	4.500	10.000	0.063	0.500-20	6.000	0.875	1.250	8.937	8	102.0
FR ... 900	4.000	4.438	4.500	4.938	5.000	5.438			5.438	12.000	0.063	0.625-18	6.375	1.000	1.375	9.750	10	156.0

\* Not available for FRX. Max bore 0.875 inch.

\*\* Z = Number of tapped holes G on pitch circle T.

\*\*\* Six holes are equally spaced 60° apart with two additional holes located 30° from the six equally spaced holes and 180° apart.

Keyway dimensions upon request by customers.

## Mounting

The customer attachment part is centered on the external diameter D and then bolted on to the face.

The recommended tolerance of the shaft is + 0 / - 0.001 inch and the tolerance of the pilot diameter D of the attachment part is - 0 / + 0.002 inch.

## Labyrinth Seals

Labyrinth seals are available to provide additional protection for harsh environments.

# Complete Freewheels FRXF

with torque arm  
with sprag lift-off X and sealed grease lubricated ball bearings



## Application as

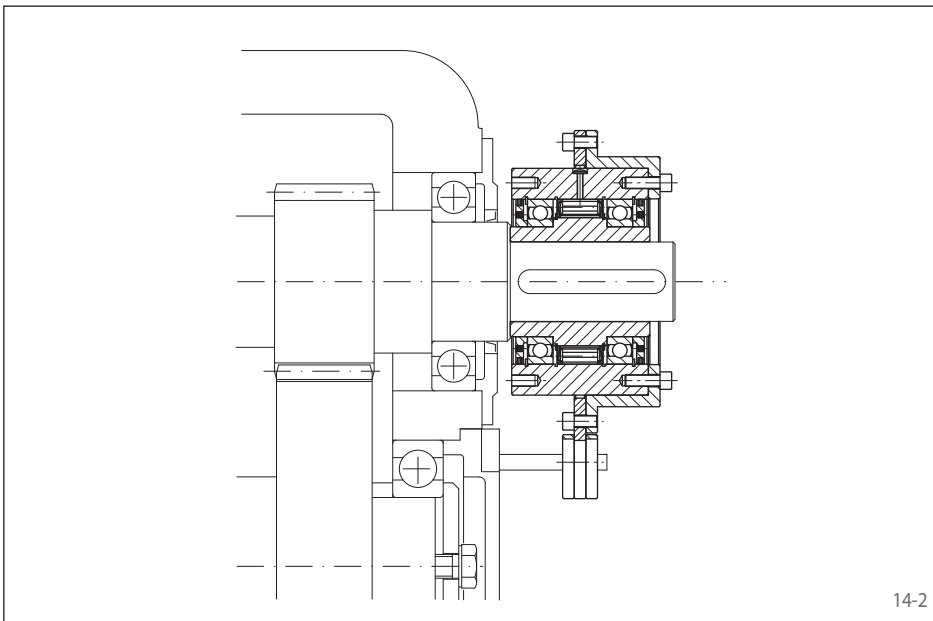
▶ Backstop

## Features

Complete Freewheels FRXF are freewheels with sprag lift-off X, labyrinth seals, and sealed grease lubricated ball bearings. All units are supplied complete with torque arms. FRXF backstops are maintenance free and lubricated for life prior to shipping.

Maximum torques up to 29000 lb-ft.

Bores up to 4.5 inch. Standard bores are available from stock.



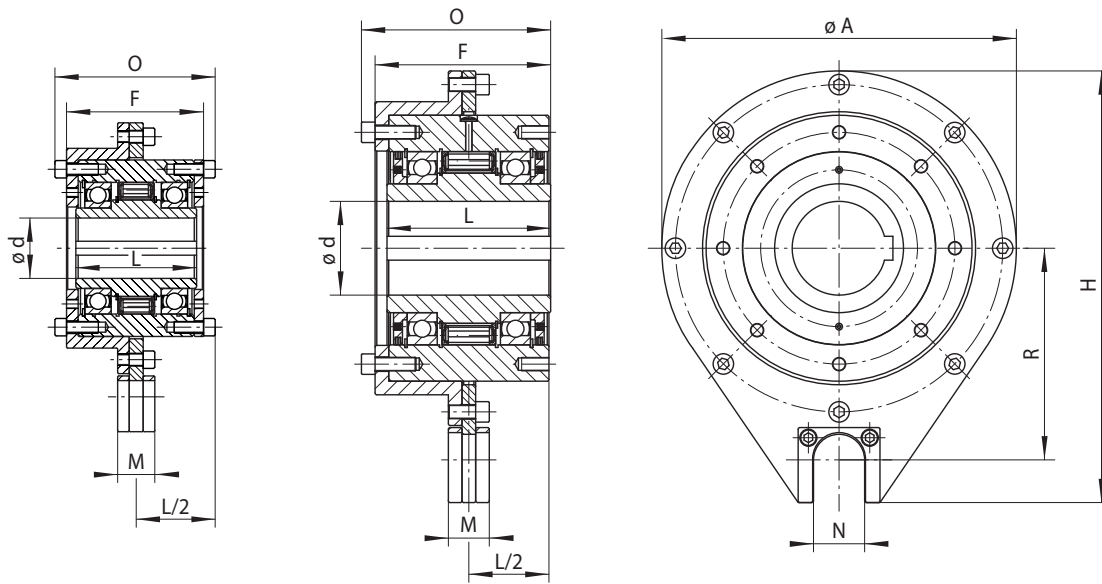
## Application example

Complete Freewheel FRXF as backstop, arranged at the end of a high speed shaft of the gearbox. The back driving torque is restrained by the clutch torque arm and the gearbox torque arm pin.

With this high shaft speed under normal operation (freewheeling operation), sprag lift-off X is used; the sprags work in freewheeling operation without contact and are wear-free.

# Complete Freewheels FRXF

with torque arm  
with sprag lift-off X and sealed grease lubricated ball bearings



Size FRXF 550

Size FRXF 700 to FRXF 800

15-1

Backstop	<b>Type with sprag lift-off X</b> To extend service life using sprag lift-off for high speed rotating inner ring	<b>Dimensions</b>

Freewheel Size	Maximum torque M <sub>M</sub> lb-ft	Nominal torque M <sub>N</sub> lb-ft	Sprag lift-off at inner ring speed rpm*	Maximum speed inner ring overruns rpm	Bore d										A	F	H	L	M	N	O	R	Torque arm Size	Weight lbs
					Standard bores inch																			
FRXF 550	1 500	750	700	4 000	1.250	1.312	1.500	1.625	2.500	2.750	2.938	2.938	6.750	3.750	8.313	3.25	1.00	0.813	4.380	4.00	#10	20		
FRXF 700	8 100	4 050	350	3 600	1.938	2.000	2.250	2.438	2.500	2.750	2.938	2.938	9.375	5.250	11.813	5.00	1.25	1.250	5.625	6.00	#20	60		
FRXF 775	14 800	7 300	320	2 100	2.750	2.938	3.000	3.250	3.438	3.500	3.750	3.750	13.000	6.375	15.825	6.00	1.50	1.875	6.875	7.76	#60	150		
FRXF 800	29 000	14 500	250	1 800	4.500							4.500	13.000	6.375	15.825	6.00	1.50	1.875	6.875	7.76	#60	160		

See page 9 for determination of selection torque.  
\* Maximum recommended operating speed.  
Keyway dimensions upon request by customers.

## Mounting

The back driving torque is restrained by the clutch torque arm and the gearbox torque arm pin. It must have clearance of 1/4 inch to 1/2 inch in both radial and axial directions.

Complete Freewheels FRXF are furnished to size for a slip fit on the shaft.

Non lift off clutch varieties are available when operating below sprag lift off speeds.

## Lubrication

The freewheels FRXF 700 and larger are supplied with labyrinth seals, sealed grease lubrication ball bearings and required no additional lubrication.

# Complete Freewheels RFB

with torque arm and clamping collar or mounting flange  
with sprags and grease lubricated ball bearings



16-1

## Application as

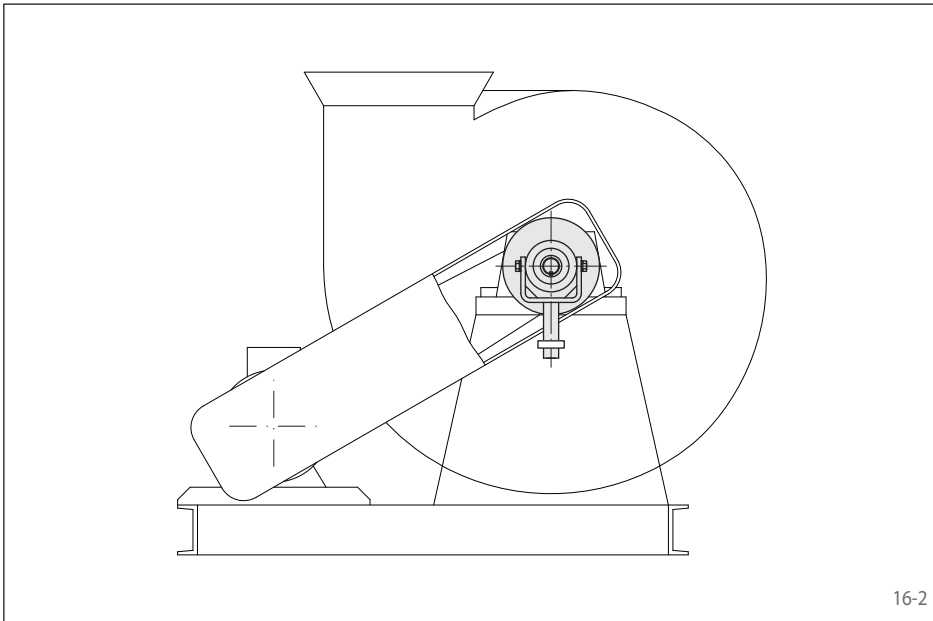
▶ Backstop

## Features

Complete Freewheels RFB are sprag freewheels with sealed grease lubricated ball bearings that require no maintenance. They are supplied with a clamping collar or a flange for direct mounting to standard bushings.

Maximum torques up to 900 lb-ft.

Bores up to 6 inch with clamping collar.



16-2

## Application example

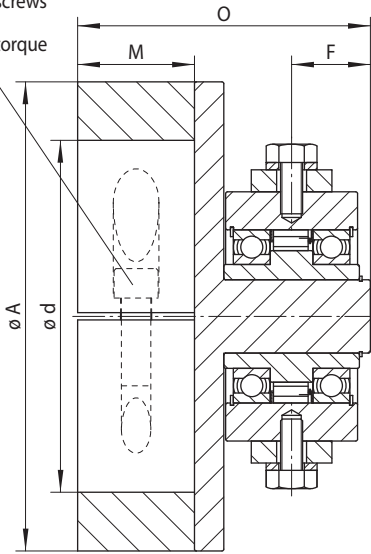
Complete Freewheel RFB as a backstop on a radial fan. The backstop prevents reverse rotation of the fan shaft from air flow or from incorrectly polarized drive motor.



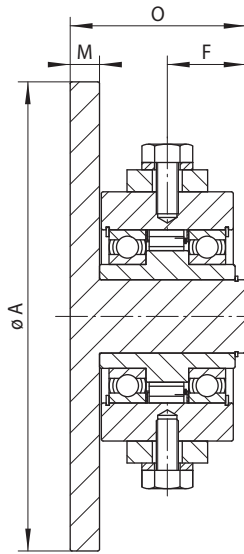
# Complete Freewheels RFB

with torque arm and clamping collar or mounting flange  
with sprags and grease lubricated ball bearings

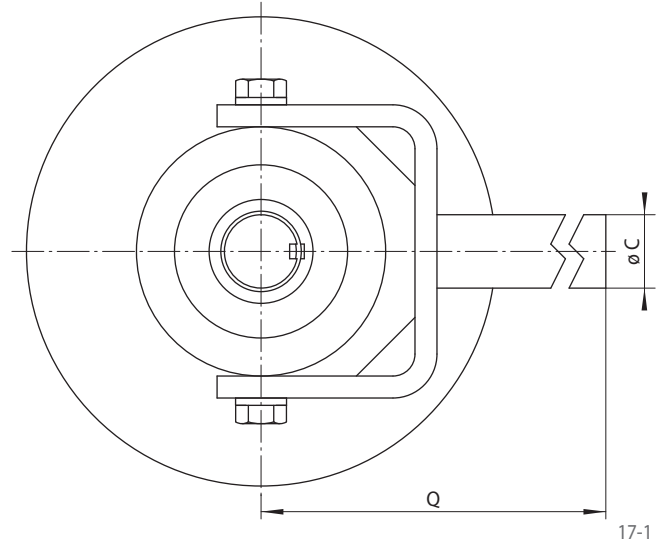
Tightening screws  
2 x 1/2"-20  
Tightening torque  
125 lb-ft



Size RFB 350 and 450 Type C  
with clamping collar



Size RFB 450 Type QD and  
Taper Lock with mounting flange



Backstop	Standard type For universal use				Dimensions							

Freewheel Size	Type	Maximum torque $M_M$ lb-ft	Nominal torque $M_N$ lb-ft	Maximum speed inner ring freewheels rpm	Bore d		A	C*	F	M	O	Q	Connection/Bushing Type
					min. inch	max. inch							
RFB 350	C	700	350	1800	1	3.94	6	1.25	1.34	2.0	5	16.63	Shaft end mounted
RFB 450	C	900	450	1800	4	6.00	8	1.25	1.34	2.0	5	16.63	Shaft end mounted
RFB 450	QD	900	450	1800	-	-	8	1.25	1.34	0.5	3	16.63	E F J
RFB 450	Taper Lock	900	450	1800	-	-	8	1.25	1.34	0.5	3	16.63	3020 30525 2535 4030

See page 9 for determination of selection torque.

\* A 3/4 inch diameter arm extension is available upon request.

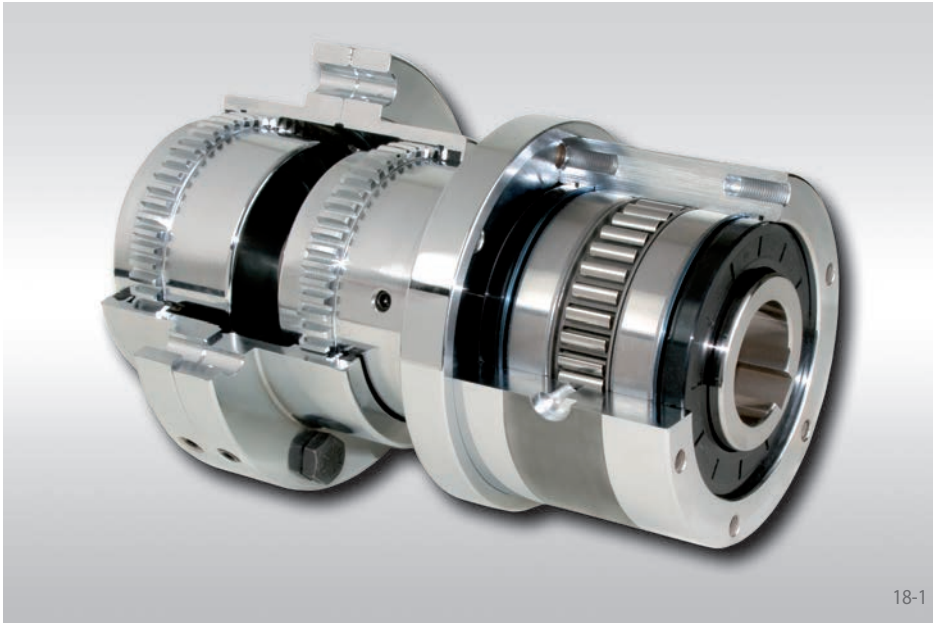
## Mounting

Backstops RFB are mounted with either a clamping collar to shaft end or a mounting flange that can be connected directly to a QD or Taper Lock bushing.

Additional shaft accessories may be required for RFB-TL designs, contact RINGSPANN.

# Complete Freewheels FR ... CA

with gear coupling  
with sprags



18-1

## Application as

- Overrunning Clutch

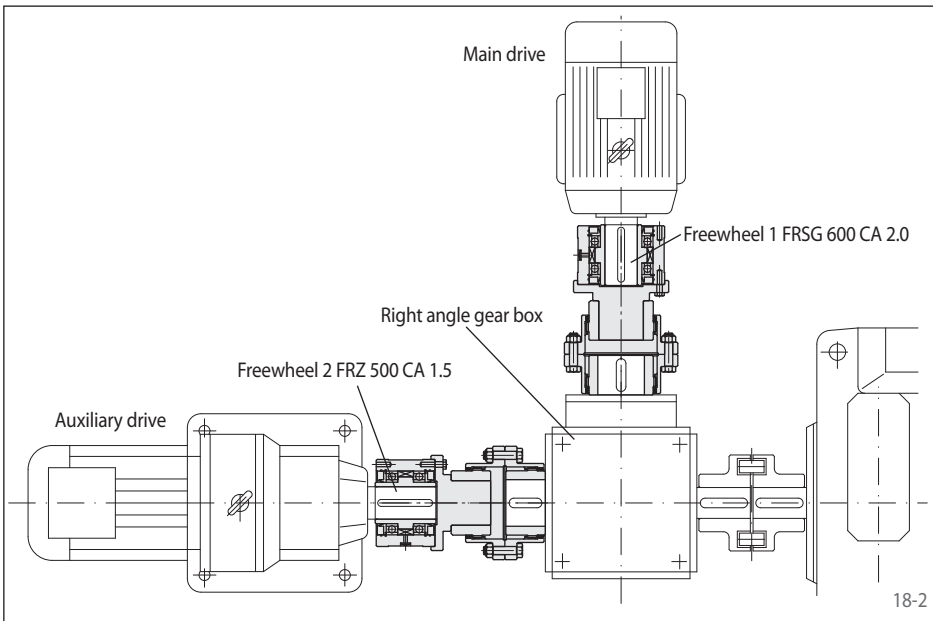
## Features

Complete Freewheel FR ... CA incorporate a freewheel FR ... and a gear coupling. Freewheels are supplied oil or grease lubricated.

Maximum torques up to 55 000 lb-ft.

Bores up to 7 inch.

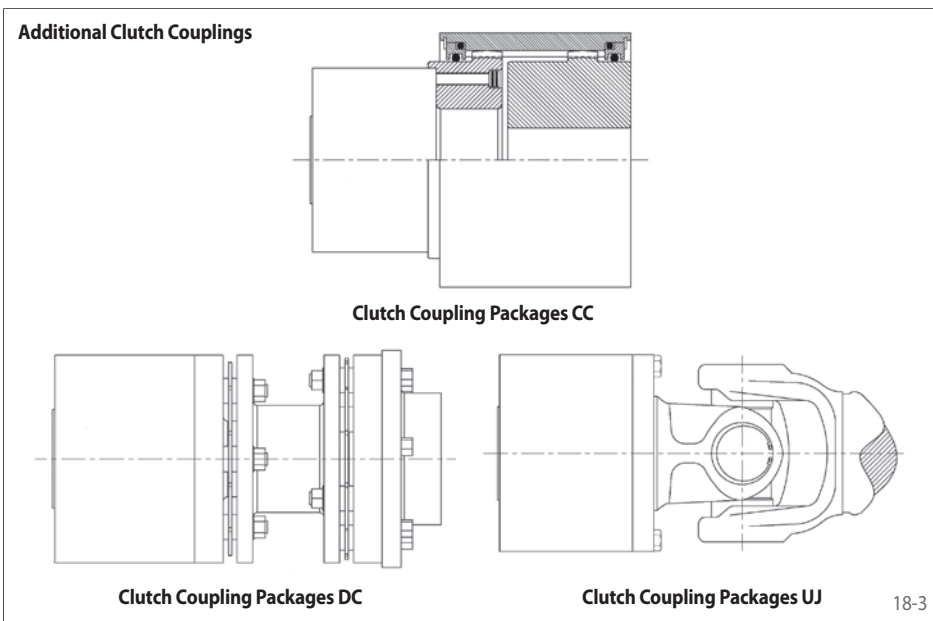
Complete Freewheels FR ... CA allow for removal of the assembly without moving the connected equipment. The clutch should always be mounted on the low temperature shaft of the application.



18-2

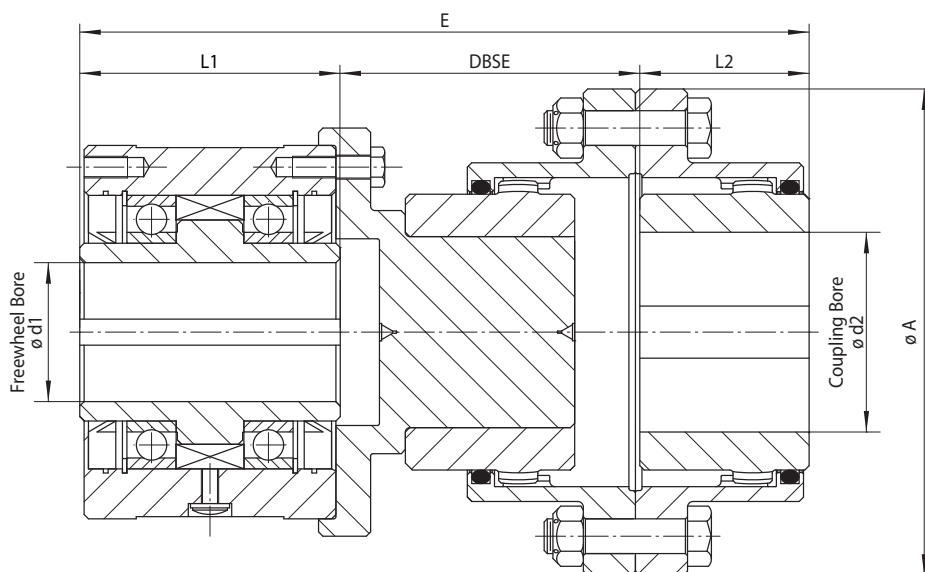
## Application Example

Two Complete Freewheels FR ... CA with gear coupling as overrunning clutches in the drive unit of a tube mill with additional auxiliary drive. A freewheel FRSG 600 CA 2.0 (Freewheel 1) is arranged between the main drive and the right angle gear box. A freewheel FRZ 500 CA 1.5 (Freewheel 2) with sprag lift-off Z (page 20) is positioned between the auxiliary drive and the right angle gear box. If the auxiliary drive is operating, Freewheel 2 works in the driving operation and the Freewheel 1 overruns at a low speed (freewheel operation). When driving via the main drive, the unit is driven thru Freewheel 1 (driving operation) Freewheel 2 overruns and automatically disengages the auxiliary drive (freewheeling operation). With the high speed, the type with sprag lift-off Z is used. There is no contact of the sprags during freewheeling and therefore no wear.



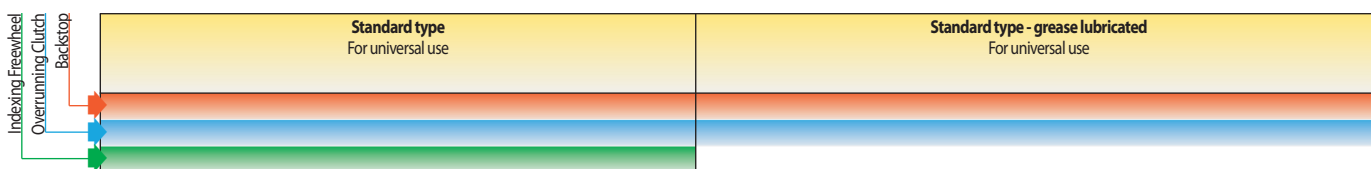
18-3

with gear coupling  
with sprags



Freewheel FR ... CA

19-1



Freewheel Size	Coupling Size	Maximum torque M <sub>M</sub> lb-ft	Nominal torque M <sub>N</sub> lb-ft	Max. speed		Freewheel Size	Maximum torque M <sub>M</sub> lb-ft	Nominal torque M <sub>N</sub> lb-ft	Max. speed	
				inner ring freewheels/ overruns rpm	outer ring freewheels/ overruns rpm				inner ring freewheels/ overruns rpm	outer ring freewheels/ overruns rpm
FRS 300 CA	F 1.0	420	210	2500	2600	FRSG 300 CA	420	210	3600	3600
FRS 400 CA	F 1.0	670	335	1900	2100	FRSG 400 CA	670	335	3600	3600
FRS 500 CA	F 1.5	1600	800	1400	1900	FRSG 500 CA	1600	800	3600	3600
FRS 550 CA	F 2.0	3050	1525	1175	1600	FRSG 550 CA	3050	1525	3600	3600
FRS 600 CA	F 2.0	3900	1950	1100	1500	FRSG 600 CA	3900	1950	3600	3600
FRS 650 CA	F 2.5	5400	2700	900	1250	FRSG 650 CA	5400	2700	3600	3600
FRS 700 CA	F 3.0	11050	5525	790	1150	FRSG 700 CA	11050	5525	1800	1800
FRS 750 CA	F 3.5	18700	9350	790	1150	FRSG 750 CA	18700	9350	1800	1800
FRS 775 CA	F 4.0	17000	8500	750	1050	FRSG 775 CA	17000	8500	1800	1800
FRS 800 CA	F 4.0	22200	11100	700	950	FRSG 800 CA	22200	11100	1800	1800
FRS 900 CA	F 4.5	33600	16800	700	950	FRSG 900 CA	33600	16800	1200	1200
FRS 1000 CA	F 5.0	55000	27500	630	800	FRSG 1000 CA	55000	27500	1200	1200

See page 9 for determination of selection torque.

Freewheel Size	Bore max.		A	DBSE	E	L1	L2	Weight*
	Freewheel d1 inch	Coupling d2 inch						
FR ... 300 CA	0.750	1.750	4.560	3.500	7.688	2.500	1.688	15
FR ... 400 CA	1.125	1.750	4.560	3.750	8.188	2.750	1.688	18
FR ... 500 CA	1.312	2.313	6.000	4.188	9.625	3.500	1.938	32
FR ... 550 CA	1.625	2.875	7.000	5.000	10.688	3.250	2.438	46
FR ... 600 CA	2.000	2.875	7.000	4.313	10.500	3.750	2.438	55
FR ... 650 CA	2.500	3.750	8.375	5.125	11.656	3.500	3.031	91
FR ... 700 CA	2.938	4.375	9.438	6.875	15.469	5.000	3.594	137
FR ... 750 CA	3.438	5.000	11.000	8.750	18.938	6.000	4.188	235
FR ... 775 CA	3.750	5.875	12.500	9.500	20.250	6.000	4.750	321
FR ... 800 CA	4.500	5.875	12.500	7.688	18.438	6.000	4.750	343
FR ... 900 CA	5.438	6.500	13.625	9.125	20.813	6.375	5.313	487
FR ... 1000 CA	7.000	7.125	15.500	10.125	22.781	6.625	6.031	740

\* Note weights are based on solid coupling hubs. Weights will vary with required bores. • Keyway dimensions upon request by customers.

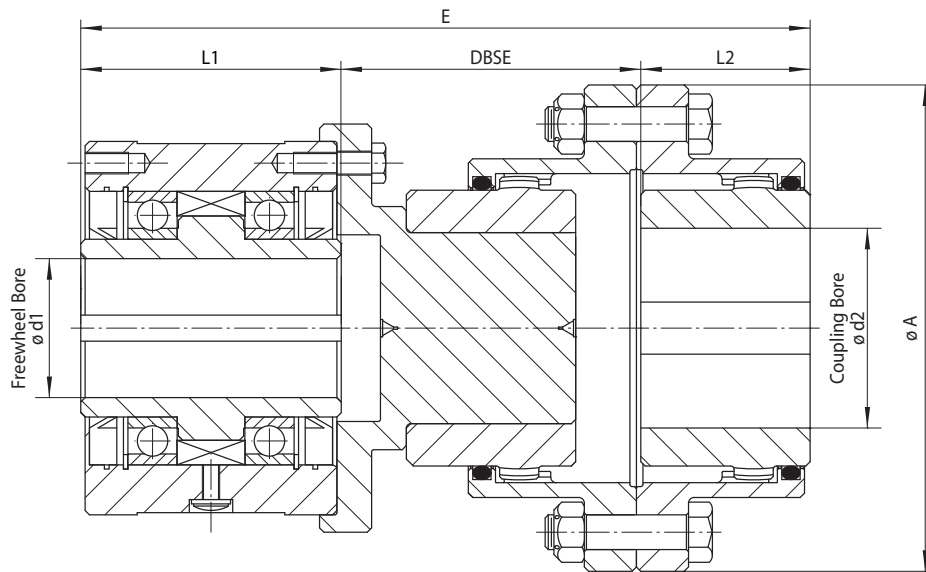
## Mounting

The gear coupling and stub adapter with fasteners are supplied loose. Depending on the desired freewheeling direction, the gear coupling can be mounted on either the drive or driven shaft.

## Labyrinth Seals

Labyrinth seals are available to provide additional protection for harsh environments.

with gear coupling  
with sprag lift-off ...



Freewheel FR ... CA

20-1



Type with sprag lift-off X	Type with sprag lift-off Z
To extend service life using sprag lift-off for high speed rotating inner ring	To extend service life using sprag lift-off for high speed rotating outer ring

Freewheel Size	Coupling Size	Maximum torque $M_M$ lb-ft	Nominal torque $M_N$ lb-ft	Sprag lift-off at inner ring speed rpm	Max. speed		Freewheel Size	Max. torque $M_M$ lb-ft	Nominal torque $M_N$ lb-ft	Sprag lift-off at outer ring speed rpm	Max. speed	
					inner ring freewheels/ overruns rpm	outer ring drives rpm					outer ring freewheels/ overruns rpm	inner ring drives rpm
FRX 400 CA	F 1.0	250	125	860	4000	340	FRZ 400 CA	560	280	800	2600	320
FRX 500 CA	F 1.5	850	425	750	4000	300	FRZ 500 CA	1070	535	1400	2050	560
FRX 550 CA	F 2.0	1500	750	700	4000	280	FRZ 550 CA	2760	1380	1550	1800	620
FRX 600 CA	F 2.0	2000	1000	670	4000	265	FRZ 600 CA	3530	1765	1450	1650	580
FRX 650 CA	F 2.5	3500	1750	610	3100	240	FRZ 650 CA	5000	2500	1300	1400	520
FRX 700 CA	F 3.0	8100	4050	350	2600	140	FRZ 700 CA	10500	5250	1160	1200	465
FRX 750 CA	F 3.5	14600	7300	320	2400	125	FRZ 750 CA	17500	8750	1160	1200	465
FRX 775 CA	F 4.0	14800	7400	320	2100	125	FRZ 775 CA	15000	6500	950	1050	380
FRX 800 CA	F 4.0	29000	14500	250	1800	100	FRZ 800 CA	17400	8700	880	975	350
FRX 900 CA	F 4.5	30000	15000	250	650	100	FRZ 900 CA	26000	13000	720	925	288

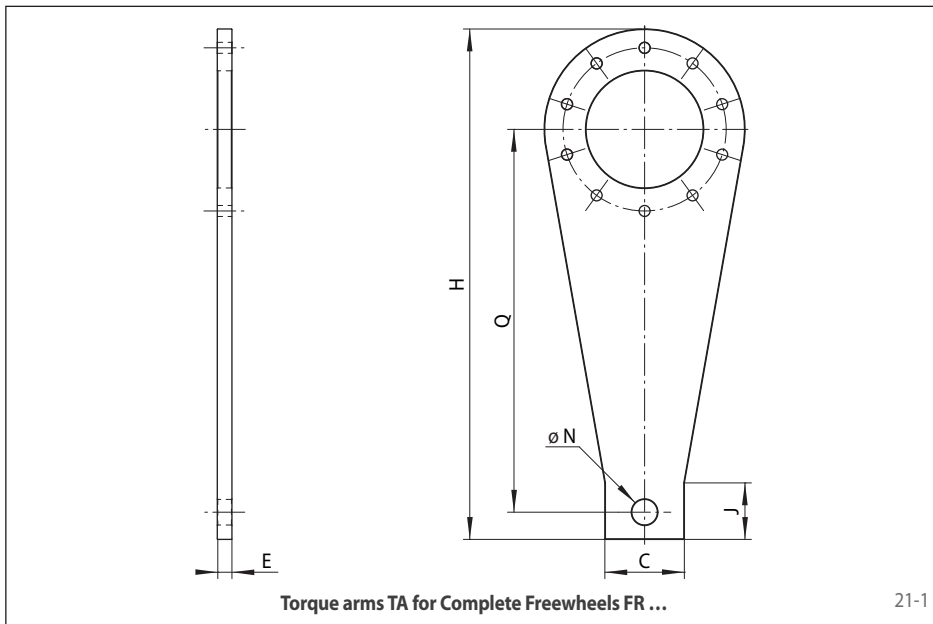
See page 9 for determination of selection torque.

Freewheel Size	Bore max.		A inch	DBSE inch	E inch	L1 inch	L2 inch	Weight* lbs
	Freewheel d1 inch	Coupling d2 inch						
FR ... 400 CA	1.125	1.750	4.560	3.750	8.188	2.750	1.688	18
FR ... 500 CA	1.312	2.313	6.000	4.188	9.625	3.500	1.938	32
FR ... 550 CA	1.625	2.875	7.000	5.000	10.688	3.250	2.438	46
FR ... 600 CA	2.000	2.875	7.000	4.313	10.500	3.750	2.438	55
FR ... 650 CA	2.500	3.750	8.375	5.125	11.656	3.500	3.031	91
FR ... 700 CA	2.938	4.375	9.438	6.875	15.469	5.000	3.594	137
FR ... 750 CA	3.438	5.000	11.000	8.750	18.938	6.000	4.188	235
FR ... 775 CA	3.750	5.875	12.500	9.500	20.250	6.000	4.750	321
FR ... 800 CA	4.500	5.875	12.500	7.688	18.438	6.000	4.750	343
FR ... 900 CA	5.438	6.500	13.625	9.125	20.813	6.375	5.313	487

\* Note weights are based on solid coupling hubs. Weights will vary with required bores. • Keyway dimensions upon request by customers.



## Torque Arms TA and End Covers



### Torque Arms TA

Torque Arms TA are offered as an accessory for Freewheels FRS, FRSG and FRX when used as a backstop.

The torque arms are supplied pre-drilled and ready for installation.

### Installation

The torque arm must not be rigidly anchored but must be restrained by either a non-threaded pin or an angle iron bracket.

When a pin is used the diameter of the pin must be 1/32 of an inch smaller than the pin hole diameter N of the torque arm.

Torque Arm	C	E	H	J	N	Q	Weight
	inch	inch	inch	inch	inch	inch	lbs
TA 300	2.00	0.375	8.375	1.000	0.53125	6.250	2
TA 400	2.00	0.375	8.625	1.000	0.53125	6.250	3
TA 500	2.00	0.375	9.000	1.125	0.53125	6.250	3
TA 550	2.25	0.375	10.125	1.375	0.78125	7.000	4
TA 600	2.50	0.375	11.500	1.500	0.78125	8.000	5
TA 650	3.00	0.375	13.625	1.750	0.78125	9.500	6
TA 700	3.00	0.500	15.000	2.000	1.31250	10.500	7
TA 750	3.75	0.500	18.375	2.375	1.28125	12.875	9
TA 775	4.00	0.500	20.000	2.500	1.53125	13.500	14
TA 800	4.00	0.500	21.000	2.750	1.53125	14.625	16
TA 900	4.75	0.875	30.500	3.375	1.53125	22.875	17
TA 1000	5.25	0.875	32.000	3.375	1.78125	23.000	51

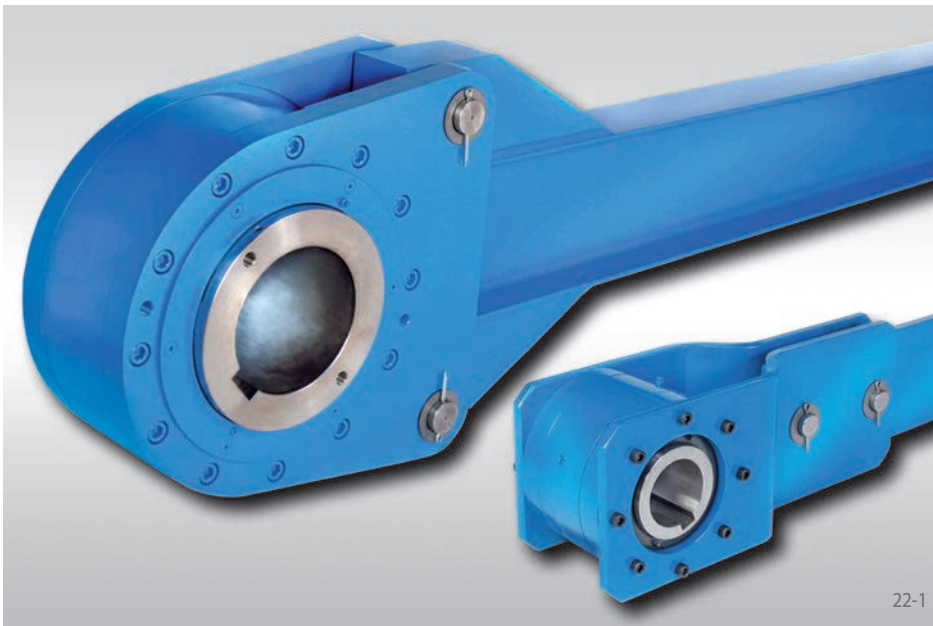


### End Covers

End covers are available to protect operating personnel from coming in contact with the rotating shaft for all Complete Freewheels FR ... . Contact factory for availability.

# Low Speed Backstops FRHD

with torque arm  
with sprags



## Application as

### Backstop

for installations with low speeds. The freewheels are designed for the use in inclined conveyor-belts, elevators or pumps. Taconite seals protect the freewheels from contamination with dust or dirt.

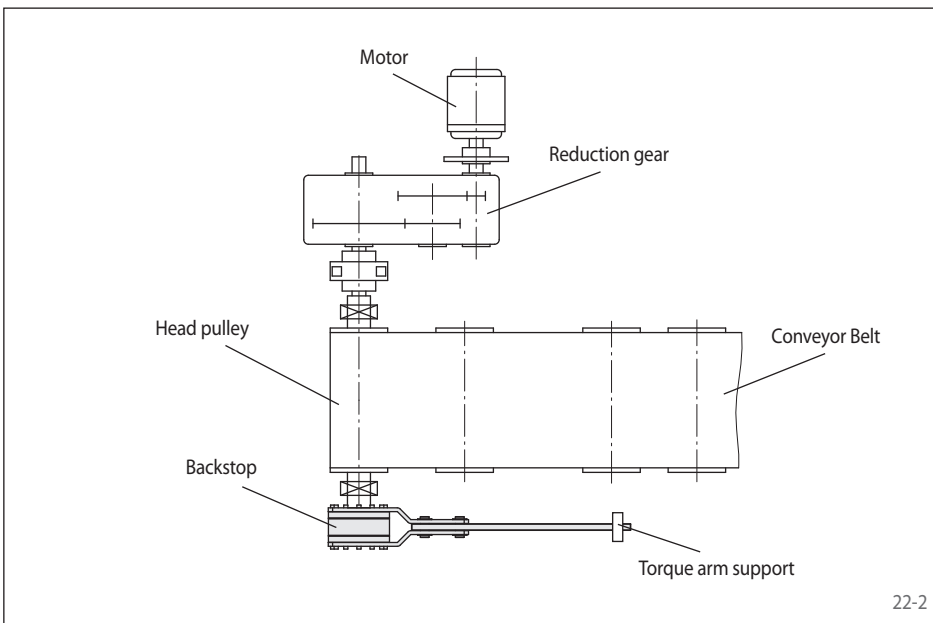
## Features

Low Speed Backstops FRHD with torque arm are sealed sprag freewheels with ball bearings. They are supplied oil-filled and ready for installation.

The Low Speed Backstops are arranged on through shafts or shaft ends.

Maximum torques up to 2 400 000 lb-ft.

Bores up to 21 inch.



## Application example

Backstop FRHD 900 on the head pulley shaft of an inclined conveyor belt system. The torque arm is bolted to the freewheel. The back driving torque is restrained by the torque arm on the base plate. When the conveyor belt is without any load, the drum shaft can be turned in both directions during maintenance by removing the torque arm pins.

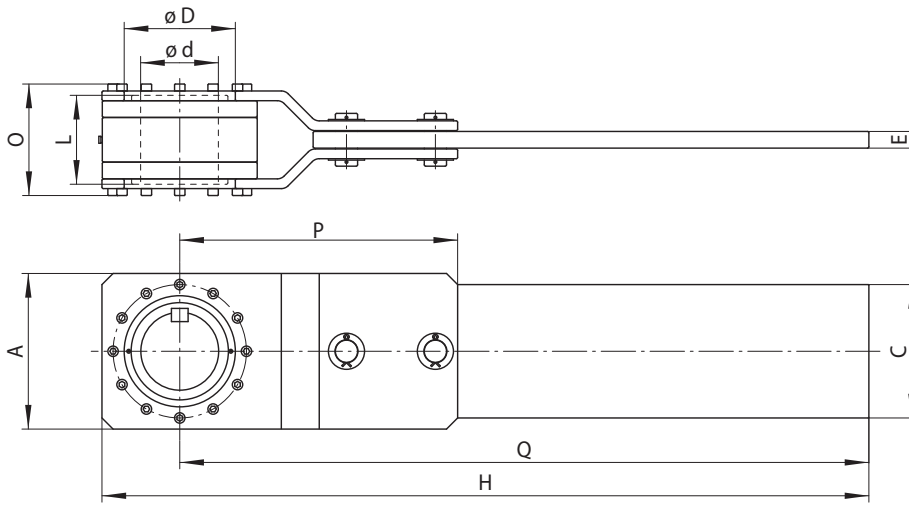


## Mounting

The backdriving torque is restrained by the torque arm. The torque arm must not be clamped into position. It must have 0.5 inch play in the axial and in the radial direction.

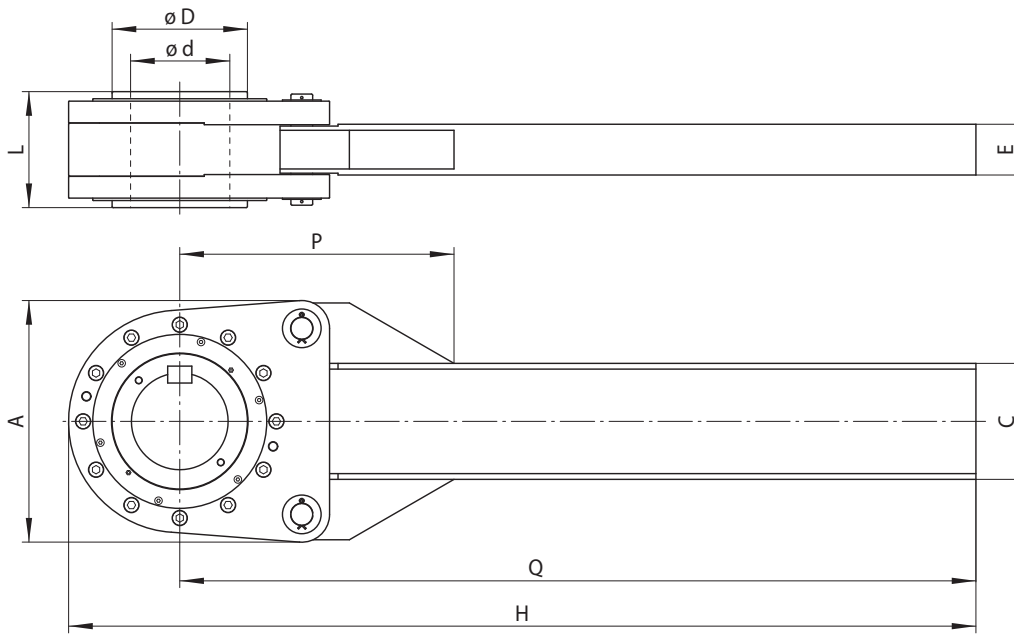
# Low Speed Backstops FRHD

with torque arm  
with sprags



Size FRHD 700 to FRHD 950 and FRHD 1 050

23-1



Size FRHD 1000 and FRHD 1 100 to FRHD 1 900

23-2

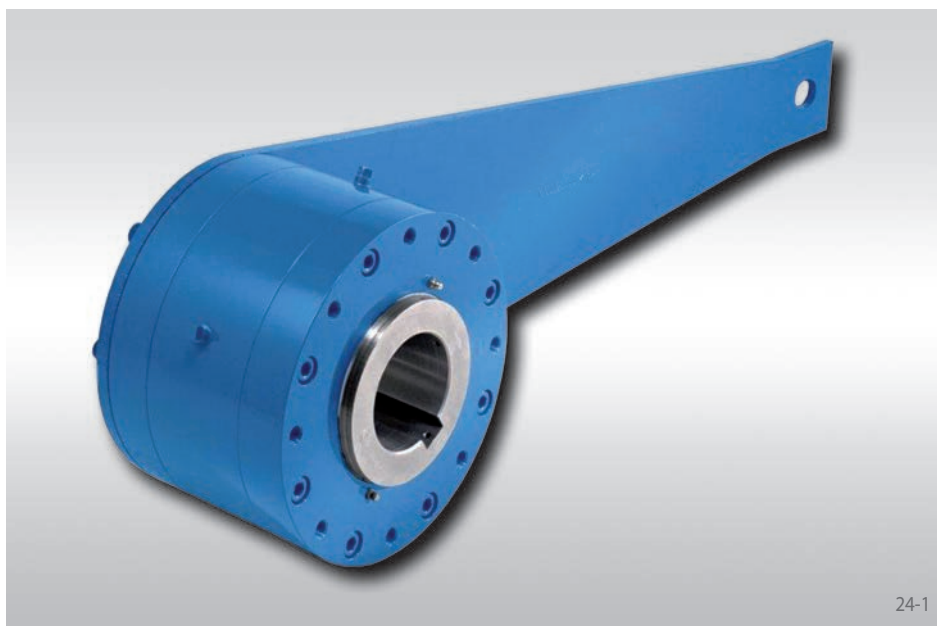
Backstop	Standard type	Dimensions													
	For universal use														

Freewheel Size	Maximum torque $M_M$ lb-ft	Nominal torque $M_N$ lb-ft	Maximum speed inner ring freewheels rpm	Bore d max. inch	A inch	C inch	D inch	E inch	H inch	L inch	O inch	P inch	Q inch	Weight lbs
FRHD 700	7 500	3 750	620	3.44	8.00	6.00	5.25	0.50	36.00	6.00	6.75	16.38	32.00	135
FRHD 775	15 000	7 500	540	3.75	9.75	8.00	6.00	1.00	42.88	7.50	9.00	20.38	38.00	310
FRHD 800	24 000	12 000	460	4.50	10.50	10.00	7.00	1.00	43.25	8.00	9.50	22.13	38.00	360
FRHD 900	37 000	18 500	400	5.44	12.00	10.00	8.00	1.50	54.00	7.63	9.38	22.75	48.00	480
FRHD 950	46 000	23 000	360	7.00	14.00	12.00	10.00	1.50	69.00	8.00	10.00	25.00	62.00	530
FRHD 1000	56 000	28 000	360	7.00	17.00	8.00	9.00	4.13	80.38	8.75	-	23.13	72.00	550
FRHD 1050	90 000	45 000	360	7.00	14.00	12.00	10.00	1.50	79.00	10.50	12.50	29.00	72.00	600
FRHD 1100	90 000	45 000	360	7.00	17.00	8.00	9.00	4.13	80.38	10.00	-	23.13	72.00	795
FRHD 1200	185 000	92 500	250	9.00	23.00	10.00	12.00	4.94	89.00	11.00	-	28.00	78.00	1300
FRHD 1300	220 000	110 000	220	10.00	25.00	12.00	14.00	5.25	95.00	12.00	-	30.00	82.88	1674
FRHD 1400	280 000	140 000	200	12.00	30.00	18.00	16.00	6.25	107.00	13.00	-	36.00	94.00	2200
FRHD 1450	380 000	190 000	200	12.00	30.00	18.00	16.00	6.25	107.00	15.00	-	36.00	94.00	2500
FRHD 1500	580 000	290 000	200	12.00	31.00	18.00	15.13	6.25	107.00	17.62	-	36.00	94.00	2440
FRHD 1600	746 000	373 000	140	14.00	32.50	20.00	17.63	6.25	124.00	19.25	-	30.44	108.00	3400
FRHD 1700	1 250 000	625 000	120	18.00	42.50	24.50	23.00	7.88	140.00	20.00	-	48.00	120.00	7000
FRHD 1800	1 800 000	900 000	100	21.00	52.00	30.00	26.50	10.50	170.00	23.00	-	54.00	144.00	12 000
FRHD 1900	2 400 000	1 200 000	60	21.00	52.00	30.00	27.00	10.50	216.00	27.00	-	54.00	192.00	14 000

See page 9 for determination of selection torque. • Keyway dimensions upon request by customers.

# Low Speed Backstops FRHM

with torque arm  
with sprags



24-1

## Application as

### ▶ Backstop

for installations with low speeds. The freewheels are designed for the use in inclined conveyor-belts, elevators or pumps. Taconite seals protect the freewheels from contamination with dust or dirt.

## Features

Low Speed Backstops FRHM with torque arm are sealed sprag freewheels with ball bearings. They are designed for interchanging the Morse® CB units, supplied oil-filled and ready for installation.

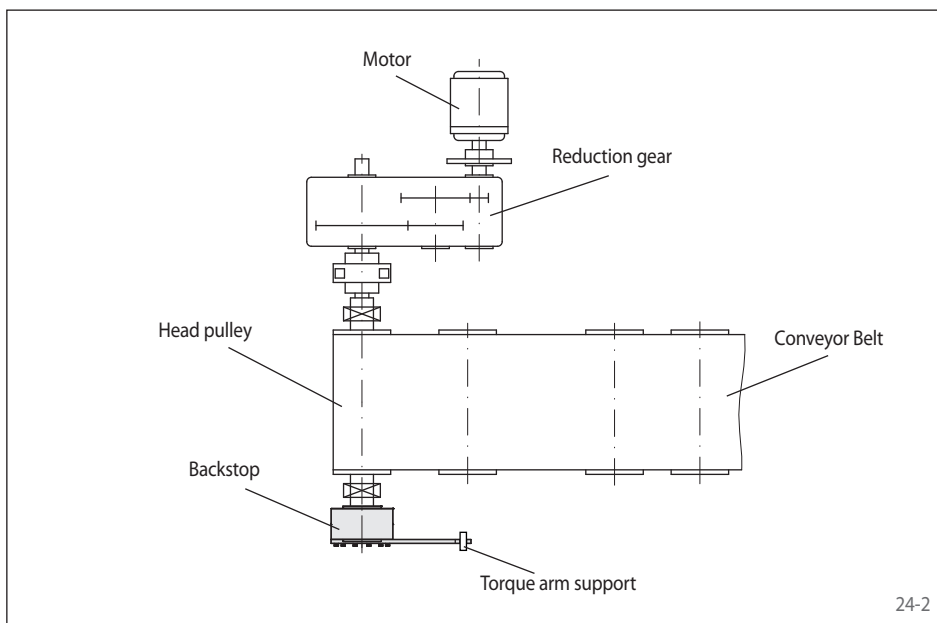
The Low Speed Backstops FRHM are arranged on through shafts or shaft ends.

Maximum torques up to 56 000 lb-ft.

Bores up to 7 inch.

## Application example

Backstop FRHM 900-12 on the head pulley shaft of an inclined conveyor. The back driving torque is restricted by the torque arm on the base plate.



24-2

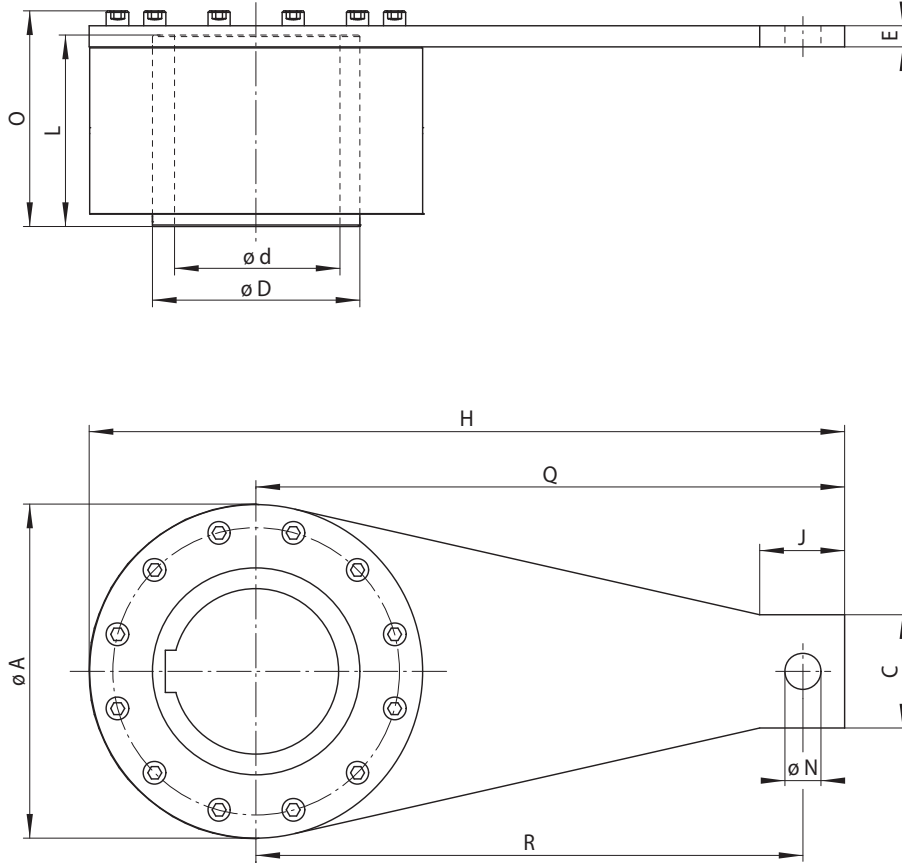
## Mounting

The back driving torque is restrained by the torque arm. The torque arm must not be clamped into position. It must have 0.5 inch play in the axial and in the radial direction.

FRHM backstops are supplied for a clearance fit. Set screws on the inner ring are provided for axial retention, shaft collars are not required.

# Low Speed Backstops FRHM

with torque arm  
with sprags



25-1

Backstop	Standard type	Dimensions														
	For universal use															

Freewheel Size	Maximum torque $M_M$	Nominal torque $M_N$	Maximum speed inner ring freewheels rpm	Bore d	A	C	D	E	H	J*	L*	N	O	Q	R*	Weight
	lb-ft	lb-ft		max. inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch	inch
FRHM 700-7	7500	3750	620	3.44	8.00	4.38	5.25	0.50	21.00	3.56	6.00	1.25	6.63	17.00	15.25	105
FRHM 775-7	15000	7500	540	3.75	9.75	4.38	6.00	0.50	21.88	3.56	7.50	1.25	8.13	17.00	15.25	160
FRHM 800-7	24000	12000	460	4.50	10.50	4.38	7.00	0.50	22.25	3.56	8.00	1.25	8.63	17.00	15.25	190
FRHM 800-12	24000	12000	460	4.50	10.50	4.75	7.00	0.50	25.50	3.56	8.00	1.25	8.63	20.25	18.63	200
FRHM 900-12	37000	18500	400	5.44	12.00	4.75	8.00	0.50	26.25	3.56	7.63	1.25	8.38	20.25	18.63	210
FRHM 900-19	37000	18500	400	5.44	12.00	4.75	8.00	0.88	30.63	3.56	7.63	1.50	8.75	24.63	22.88	220
FRHM 1000-19	56000	28000	360	7.00	16.50	4.75	9.00	0.88	32.89	3.56	8.75	1.50	9.13	24.63	22.88	270
FRHM 1000-30	56000	28000	360	7.00	16.50	5.25	9.00	0.88	33.25	3.56	8.75	1.75	9.13	25.00	23.00	275

See page 9 for determination of selection torque.

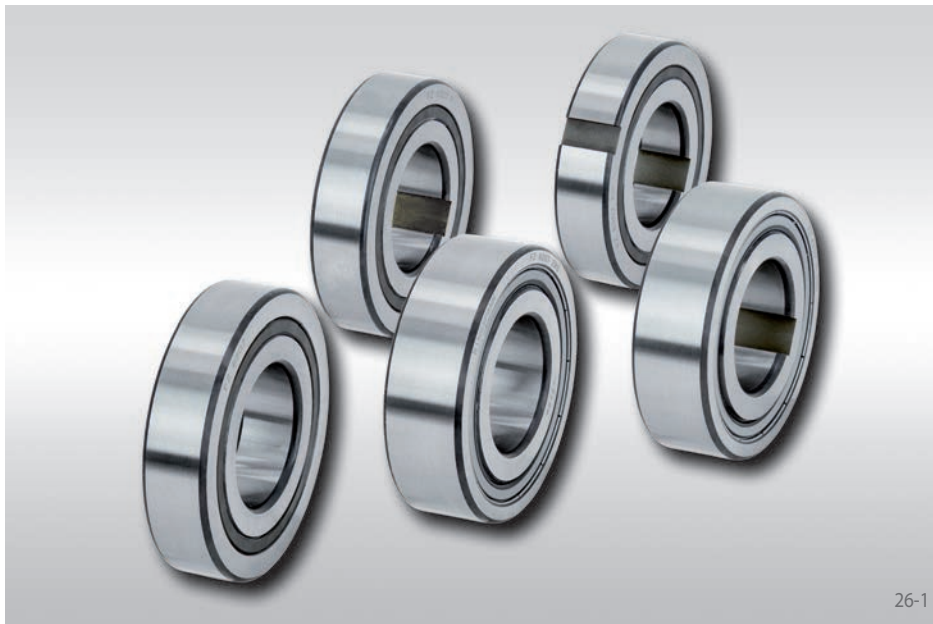
Keyway dimensions upon request by customers.

\* Shaft length L and stirrup position J or pin position R should be considered. These dimensions may vary from the Morse® Series CB.



# Internal Freewheels FZ ...

with ball bearing properties



26-1

## Application as

- ▶ Backstop
- ▶ Overrunning Clutch
- ▶ Indexing Freewheel

## Features

Internal Freewheels FZ ... are sprag freewheels with bearing support and ball bearing properties. The freewheels are supplied grease-filled for normal operating conditions.

The freewheel is built into the customer housing. This makes compact, space-saving fitting solutions possible.

Maximum torques up to 619 lb-ft/840 Nm. The torque is transmitted on the inner ring and/or on the outer ring by press fit or keyway connection.

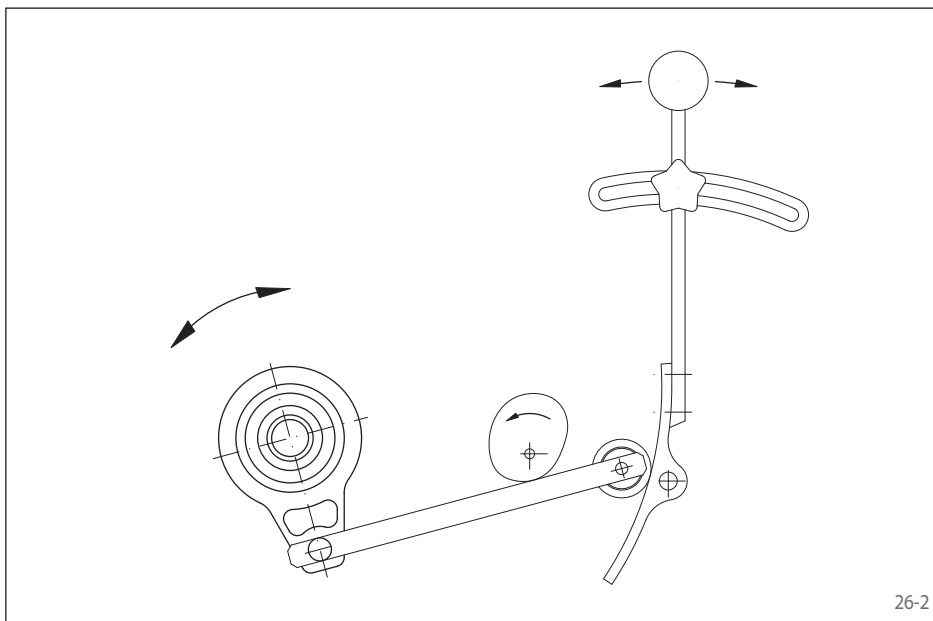
Bores up to 1.575 inch/40 mm.

The following series are available:

Series	Torque transmission on				2RS-seals	Page
	outer ring		inner ring			
	by keyway	by press fit	by keyway	by press fit		
FZ		●		●		27
FZ ... 2RS		●		●	●	28
FZ ... P2RS		●	●	●	●	28
FZ ... P		●	●	●		29
FZ ... PP	●		●			29

Internal Freewheels FZ 6201 to FZ 6207, FZ 6201 P to FZ 6207 P and FZ 6202 PP to FZ 6207 PP have the same dimensions as the respective ball bearings of series 62. The freewheel sizes FZ 6208, FZ 6208 P and FZ 6208 PP as well as the series FZ ... 2RS and FZ ... P2RS have a different width B.

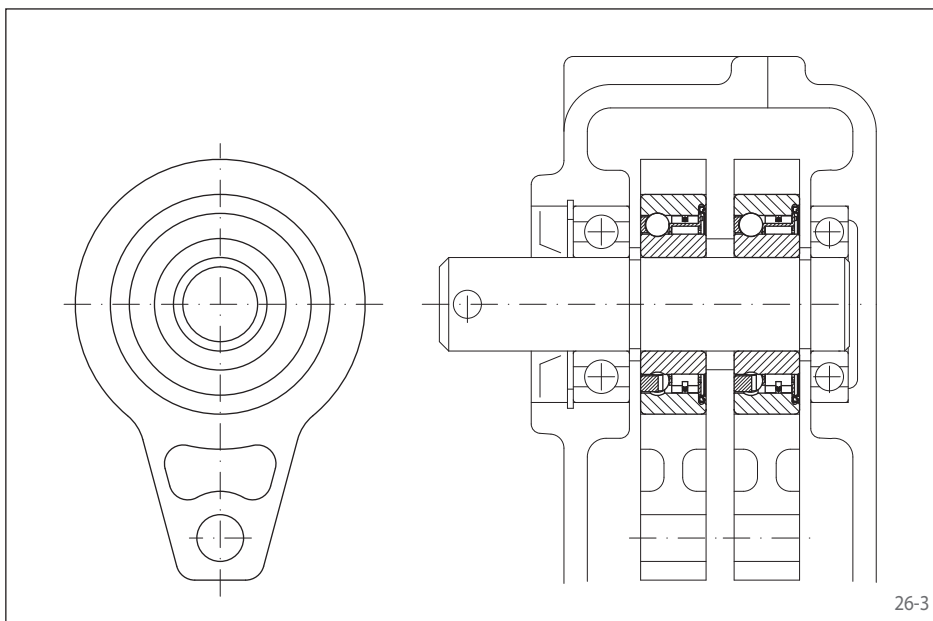
The series FZ ... 2RS and FZ ... P2RS have 2RS seals.



26-2

## Application example

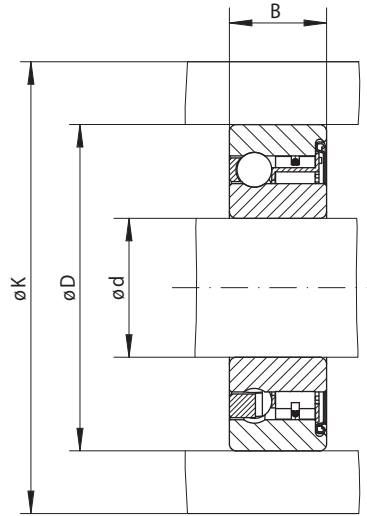
Two Internal Freewheels FZ 6206 as indexing freewheels in the drive of the metering roller of a seed spreader. The freewheels are built in an infinitely variable oil bath gearbox. Two cam disks that are set off by 180° are arranged on the gearbox shaft. By means of lever arms, these drive the outer rings of the two adjacent Internal Freewheels, which then gradually turn the metering shaft. The infinite speed settings of the gearbox's drive shaft are executed by means of the respective pivoting of the roller support plate, so that the lever arms can execute lifts of differing amounts.



26-3

# Internal Freewheels FZ

for press fit on the outer ring  
with sprags, bearing supported



27-1

Indexing Freewheel Overrunning Clutch Backstop	Standard type For universal use	Dimensions

Freewheel Size	Maximum torque $M_M$		Nominal torque $M_N$		Maximum speed rpm	Load rating of bearing support				Bore d		B		D		K		Weight	
	lb-ft	Nm	lb-ft	Nm		dynamic $C$	N	static $C_0$	N	inch	mm	inch	mm	inch	mm	inch	mm	lbs	kg
FZ 6201	13.28	18	6.64	9	10000	1155	5140	532	2370	0.472	12	0.394	10	1.260	32	1.535	39	0.09	0.04
FZ 6202	30.98	42	15.49	21	9400	1160	5160	542	2410	0.591	15	0.433	11	1.378	35	1.654	42	0.14	0.06
FZ 6203	47.20	64	23.60	32	8200	1270	5650	643	2860	0.669	17	0.472	12	1.575	40	2.008	51	0.18	0.08
FZ 6204	129.80	176	64.90	88	6800	1549	6890	942	4190	0.787	20	0.551	14	1.850	47	2.283	58	0.26	0.12
FZ 6205	147.50	200	73.75	100	5600	1625	7230	1048	4660	0.984	25	0.591	15	2.047	52	2.480	63	0.33	0.15
FZ 6206	339.24	460	169.62	230	4000	1737	7730	1272	5660	1.181	30	0.630	16	2.441	62	2.874	73	0.55	0.25
FZ 6207	486.72	660	243.36	330	3600	1836	8170	1490	6630	1.378	35	0.669	17	2.835	72	3.346	85	0.66	0.30
FZ 6208	619.46	840	309.73	420	3000	2012	8950	1796	7990	1.575	40	0.866	22*	3.150	80	3.710	94	1.10	0.50

See page 9 for determination of selection torque.

\* The width of freewheel size FZ 6208 is different to the corresponding ball bearing 6208

## Mounting

The torque is transmitted on the inner and outer ring by press fit. In order to transmit the torques specified in the table, the outer ring must be accommodated in a housing with an external diameter K. The housing is made of steel or grey cast iron in minimum quality GG-20. When using other housing materials or smaller external diameters, we urge you to contact us regarding the transmissible torque.

The tolerance of the housing bore D must be ISO N6 and the tolerance of the shaft must be ISO n6.

The permissible operating temperature of the freewheel is -40°F to +175°F.

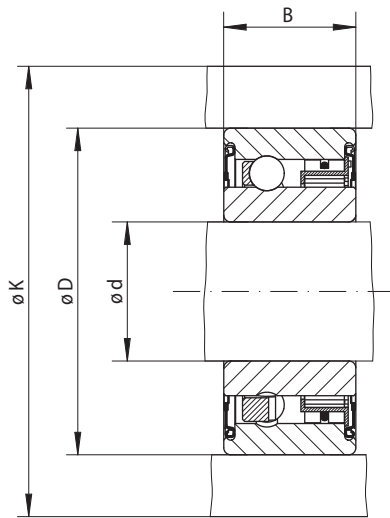
## Lubrication

The freewheels are supplied grease-filled for normal operating conditions.

However, the freewheels can also be connected to the customer's oil lubrication system; this is particularly recommended in the case of higher speeds.

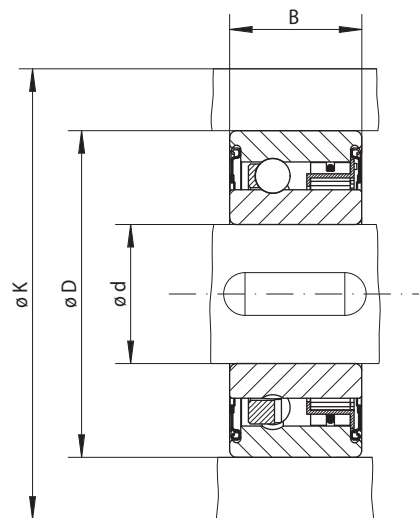
# Internal Freewheels FZ ... 2RS and FZ ... P2RS

for press fit on the outer ring  
with sprags, bearing supported and sealed



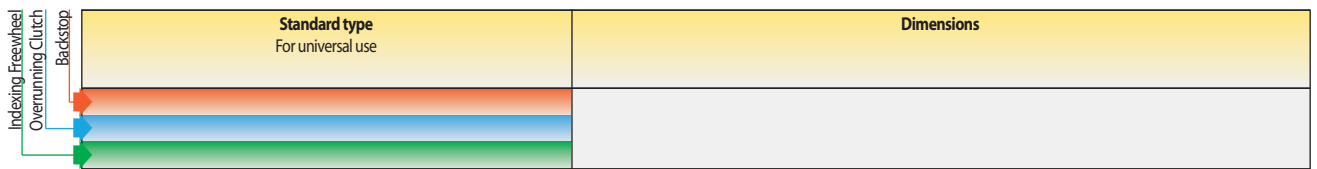
FZ ... 2RS

28-1



FZ ... P2RS

28-2



Freewheel Size		Maximum torque $M_M$		Nominal torque $M_N$		Maximum speed	Load rating of bearing support				Bore d		B*		D		K		Weight	
Series FZ ... 2RS	Series FZ ... P2RS	lb-ft	Nm	lb-ft	Nm	rpm	dynamic C		static $C_0$		inch	mm	inch	mm	inch	mm	inch	mm	lbs	kg
FZ 6201 2RS	FZ 6201 P2RS	13.28	18	6.64	9	10000	1155	5140	532	2370	0.472	12	0.551	14	1.260	32	1.540	39	0.110	0.05
FZ 6202 2RS	FZ 6202 P2RS	30.98	42	15.49	21	8400	1160	5160	542	2410	0.591	15	0.630	16	1.378	35	1.654	42	0.154	0.07
FZ 6203 2RS	FZ 6203 P2RS	47.20	64	23.60	32	7350	1270	5650	643	2860	0.669	17	0.669	17	1.575	40	2.008	51	0.198	0.09
FZ 6204 2RS	FZ 6204 P2RS	129.80	176	64.90	88	6000	1549	6890	942	4190	0.787	20	0.748	19	1.850	47	2.283	58	0.330	0.15
FZ 6205 2RS	FZ 6205 P2RS	147.50	200	73.75	100	5200	1625	7230	1048	4660	0.984	25	0.787	20	2.047	52	2.480	63	0.396	0.18
FZ 6206 2RS	FZ 6206 P2RS	339.24	460	169.62	230	4200	1737	7730	1272	5660	1.181	30	0.827	21	2.441	62	2.874	73	0.594	0.27
FZ 6207 2RS	FZ 6207 P2RS	486.72	660	243.36	330	3600	1836	8170	1490	6630	1.378	35	0.866	22	2.835	72	3.346	85	0.881	0.40
FZ 6208 2RS	FZ 6208 P2RS	619.46	840	309.73	420	3000	2012	8950	1796	7990	1.575	40	1.063	27	3.150	80	3.710	94	1.322	0.60

See page 9 for determination of selection torque.

Keyway according to DIN 6885, page 3 • Tolerance of keyway width JS10.

\* The width of freewheel size from FZ 6201 2RS to FZ 6208 2RS and FZ 6201 P2RS to FZ 6208 P2RS is different to the corresponding ball bearings of series 62.

## Mounting

Series FZ ... 2RS:

The torque is transmitted on the inner and outer ring by press fit. I

Series FZ ... P2RS:

The torque is transmitted on the inner ring by keyway connection and on the outer ring by press fit.

In order to transmit the torques specified in the table, the outer ring must be accommodated in a housing with an external diameter K. The housing is made of steel or grey cast iron in minimum quality GG-20. When using other housing materials or smaller external diameters, we urge you to contact us regarding the transmissible torque.

## Lubrication

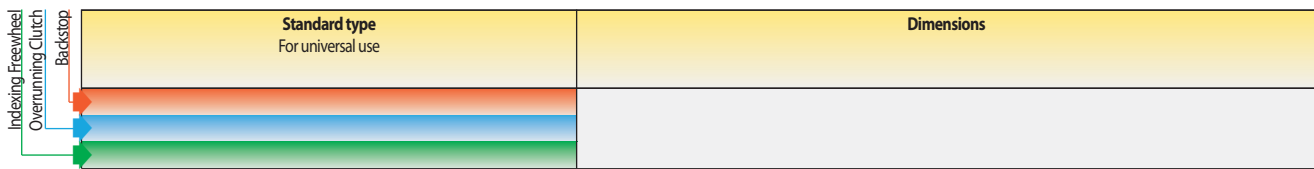
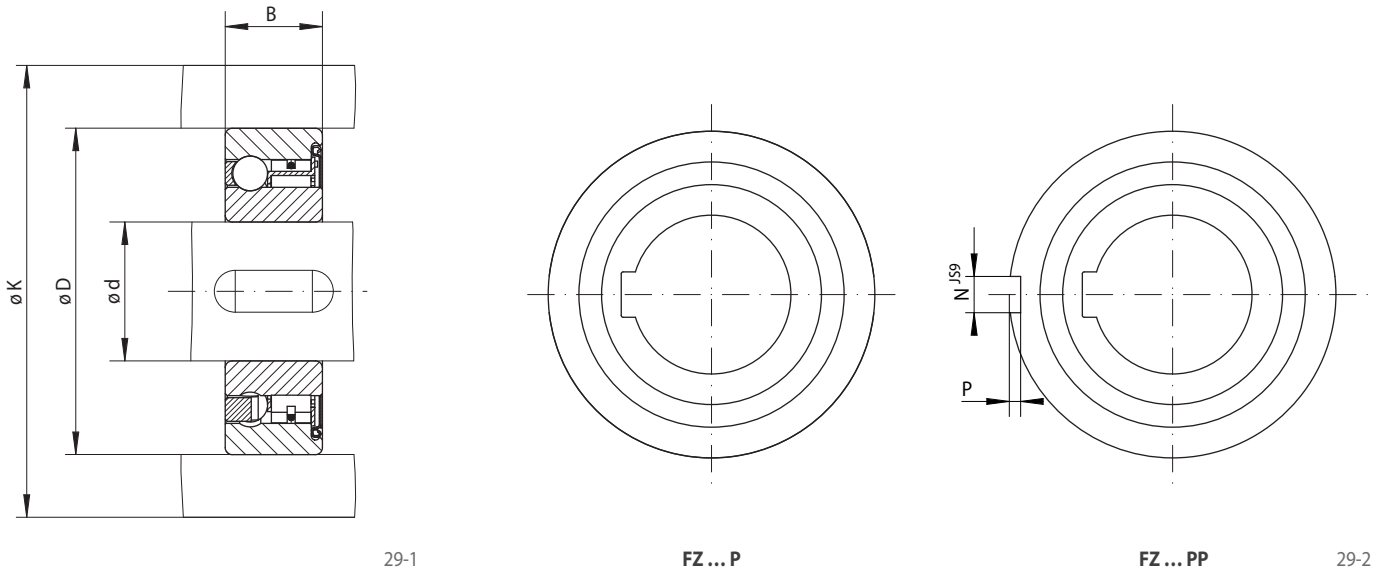
The freewheels are supplied grease-filled and with 2 RS seals.

The tolerance of the housing bore D must be ISO N6 and the tolerance of the shaft must be ISO k6.

The permissible operating temperature of the freewheel is -4 °F to +175 °F. Please contact the factory if the temperature is different than the given values.

# Internal Freewheels FZ ... P and FZ ... PP

for press fit or for keyway connection on the outer ring  
with sprags, bearing supported



Freewheel Size		Maximum torque $M_M$		Nominal torque $M_N$		Maximum speed rpm	Load rating of bearing support				Bore d		B		D		K		N		P		Weight	
Series FZ ... P	Series FZ ... PP	lb-ft	Nm	lb-ft	Nm		dynamic $C$	N	static $C_0$	lb-ft	N	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lbs
FZ 6201 P		13.28	18	6.64	9	10000	1155	5140	532	2370	0.472	12*	0.394	10	1.260	32	1.535	39					0.09	0.04
FZ 6202 P	FZ 6202 PP	30.98	42	15.49	21	8400	1160	5160	542	2410	0.591	15*	0.433	11	1.378	35	1.654	42	0.08	2	0.02	0.6	0.13	0.06
FZ 6203 P	FZ 6203 PP	47.20	64	23.60	32	7350	1270	5650	643	2860	0.669	17*	0.472	12	1.575	40	2.008	51	0.08	2	0.04	1.0	0.15	0.07
FZ 6204 P	FZ 6204 PP	129.80	176	64.90	88	6000	1549	6890	942	4190	0.787	20*	0.551	14	1.850	47	2.283	58	0.12	3	0.06	1.5	0.24	0.11
FZ 6205 P	FZ 6205 PP	147.50	200	73.75	100	5200	1625	7230	1048	4660	0.984	25*	0.591	15	2.047	52	2.480	63	0.24	6	0.08	2.0	0.30	0.14
FZ 6206 P	FZ 6206 PP	339.24	460	169.62	230	4200	1737	7730	1272	5660	1.181	30*	0.630	16	2.441	62	2.874	73	0.24	6	0.08	2.0	0.46	0.21
FZ 6207 P	FZ 6207 PP	486.72	660	243.36	330	3600	1836	8170	1490	6630	1.378	35*	0.669	17	2.835	72	3.346	85	0.31	8	0.10	2.5	0.66	0.30
FZ 6208 P	FZ 6208 PP	619.46	840	309.73	420	3000	2012	8950	1796	7990	1.575	40	0.866	22**	3.150	80	3.710	94	0.39	10	0.12	3.0	1.10	0.50

See page 9 for determination of selection torque.  
Keyway according to DIN 6885, page 1 • Tolerance of keyway width JS10.  
\* Keyway according to DIN 6885, page 3 • Tolerance of keyway width JS10.  
\*\* The width of freewheel size FZ 6208 P and FZ 6208 PP is different to the corresponding ball bearing 6208.

## Mounting

Series FZ ... P:

The torque is transmitted on the inner ring by keyway connection and on the outer ring by press fit.

Series FZ ... PP:

The torque is transmitted on the inner and on the outer ring by keyway connection.

In order to transmit the torques specified in the table, the outer ring must be accommodated in a housing with an external diameter K. The housing is made of steel or grey cast iron in minimum quality GG-20. When using other housing materials or smaller external diameters, we urge you to contact us regarding the transmissible torque.

## Lubrication

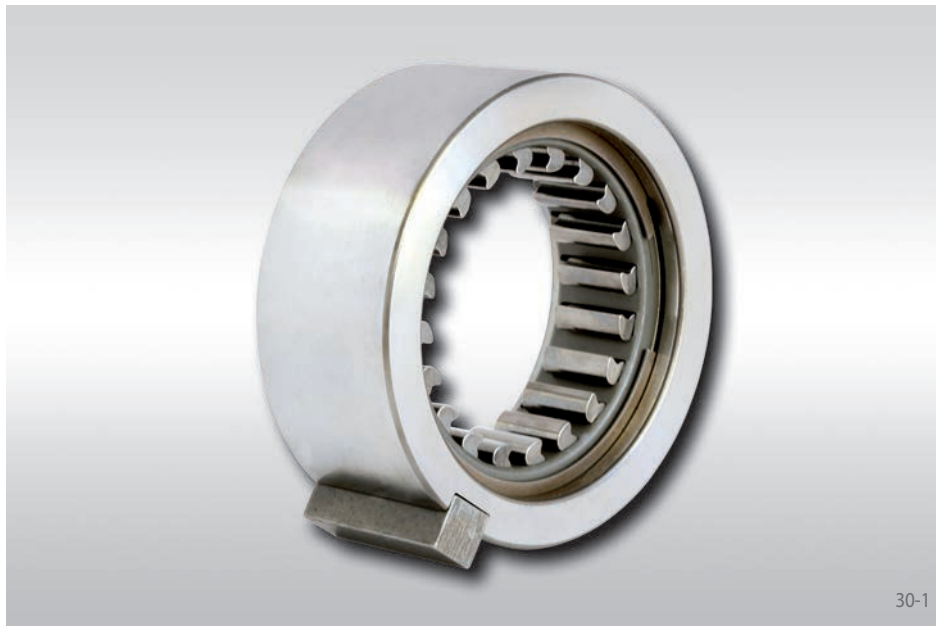
The freewheels are supplied grease-filled.

The tolerance of the housing bore D must be ISO H6 and the tolerance of the shaft must be ISO h6.

The permissible operating temperature of the freewheel is -40 °F to +175 °F. Please contact the factory if the temperature is different than the given values.

# Internal Freewheels RC 200

for keyway connection on the outer ring with sprags



## Application as

▶ Backstop

## Features

Internal Freewheels RC 200 are sprag free-wheels without inner ring or bearing support. The customer's hardened and ground shaft is used as the inner ring.

Maximum torques up to 1 240 lb-ft.

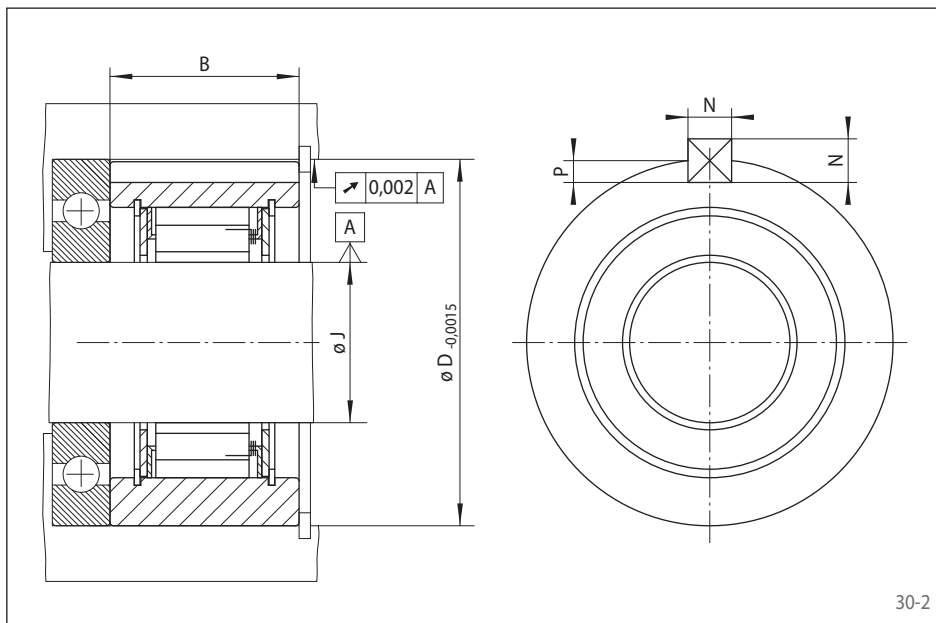
The freewheel is incorporated into the customer's housing, allowing for a compact, space saving solution.

## Mounting

Internal Freewheels RC 200 require bearing support and a shaft hardened to HRC 58-62 with a 0.060 inch case depth after grinding to a 16 micro finish. Concentric alignment of the shaft and housing bore is required.

## Lubrication

Internal Freewheels RC 200 require either grease or oil lubrication. Lubrications containing molybdenum disulphide must not be used.



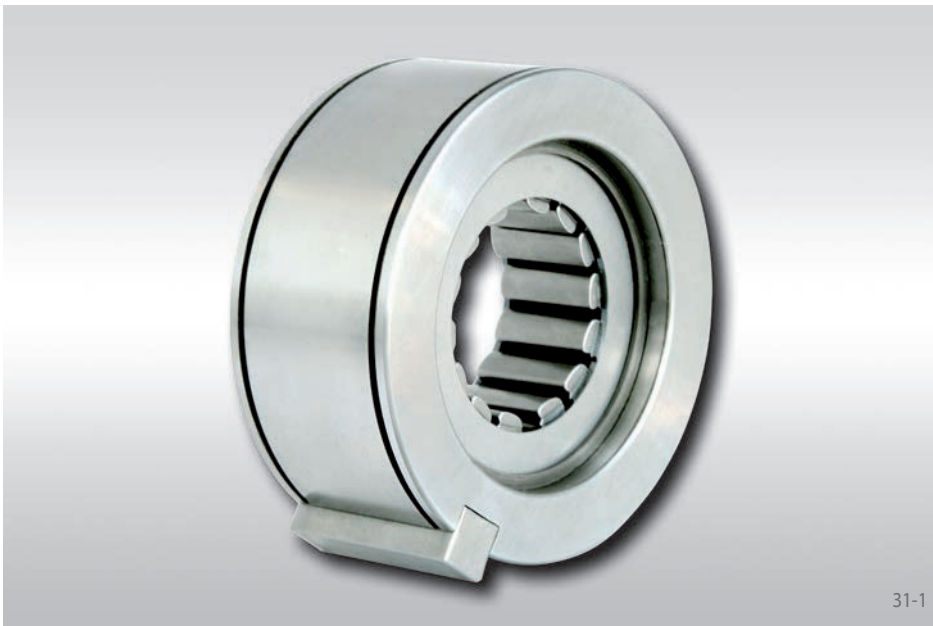
Freewheel Size	Standard type For universal use		Dimensions						
	Maximum torque $M_M$ lb-ft	Nominal torque $M_N$ lb-ft	Housing Bore Diameter $D$ inch	Freewheel Diameter $D$ inch	B inch	Shaft Diameter $J$ inch	Keyway $N \times P$ inch	Use with bearing	Weight lbs
RC 205	220	110	2.0482	2.0463	1.000	0.929/0.930	$\frac{3}{16} \times \frac{3}{32}$	205	0.75
RC 206	390	195	2.4422	2.4403	1.125	1.289/1.290	$\frac{1}{4} \times \frac{1}{8}$	206	1.00
RC 207	650	325	2.8360	2.8341	1.125	1.656/1.657	$\frac{1}{4} \times \frac{1}{8}$	207	1.25
RC 208	900	450	3.1510	3.1491	1.250	1.840/1.841	$\frac{3}{8} \times \frac{3}{16}$	208	1.75
RC 210	1 240	620	3.5447	3.5248	1.250	2.208/2.209	$\frac{3}{8} \times \frac{3}{16}$	210	2.00

See page 9 for determination of selection torque.



# Internal Freewheels RC 500

for keyway connection on the outer ring with sprags



## Application as

- ▶ Backstop

## Features

Internal Freewheels RC 500 are shaft mounted and are intended to be used with an adjacent bearing to provide proper concentricity and adequate radial support.

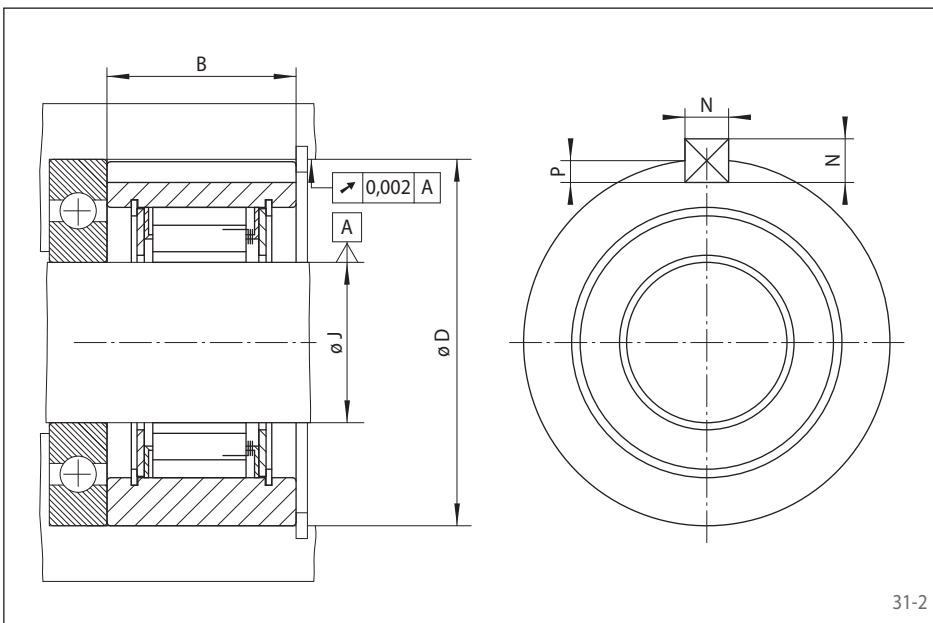
Nominal torques up to 1 250 lb-ft.

## Mounting

Internal Freewheels RC 500 require bearing support and a shaft hardened to HRC 58-62 with a 0.060 inch case depth after grinding to a 1.6 Rz micro finish. In addition, eccentricity between the shaft and housing bore should not exceed 0.003 inch T.I.R. with a taper on the shaft not to exceed 0.0002 inch per inch of shaft.

## Lubrication

Internal Freewheels RC 500 require lubrication and may be either oil or grease lubricated. Lubrication containing extreme pressure additives must not be used.

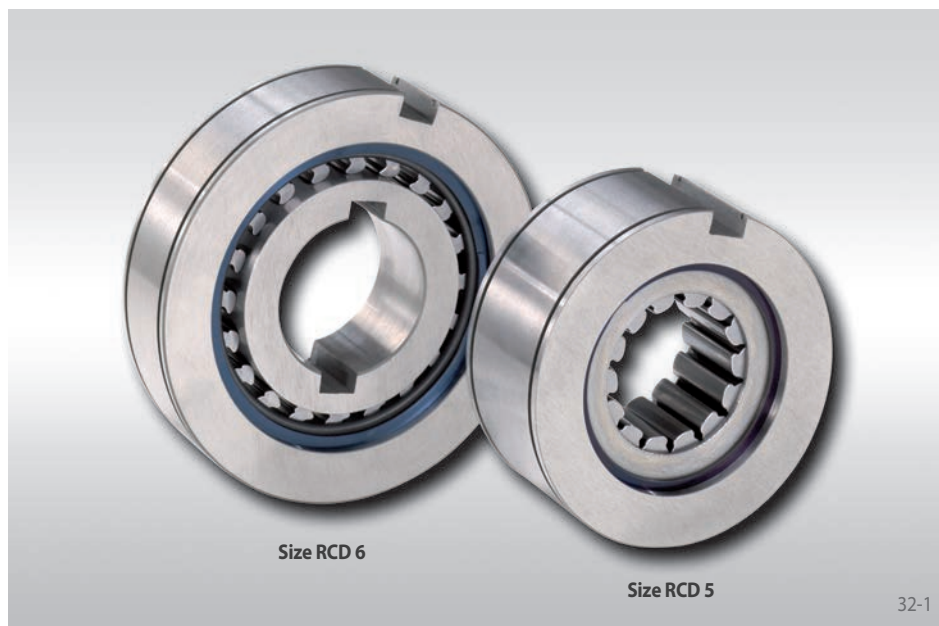


Freewheel Size	Standard type		Dimensions						
	For universal use								
RC 507	160	2.440	2.4395 / 2.4385	1.125	0.9706 / 0.9696	1/4 x 1/8	6206	1.0	
RC 509	250	2.834	2.8332 / 2.8322	1.250	1.1335 / 1.1325	1/4 x 1/8	6207	1.4	
RC 510	250	3.149	3.1485 / 3.1470	1.375	1.2965 / 1.2955	3/8 x 3/16	3L10, 6208	2.0	
RC 511	525	3.150	3.1490 / 3.1480	1.625	1.3776 / 1.3770	3/8 x 3/16	3L10, 6208	2.2	
RC 512	650	3.543	3.5420 / 3.5410	1.625	1.5410 / 1.5400	3/8 x 3/16	3L11, 6210	2.9	
RC 513	1 250	4.751	4.7500 / 4.7490	1.750	2.0457 / 2.0447	1/2 x 1/4	XLS-3.25	6.1	

Freewheel Size	Nominal torque M <sub>N</sub> lb-ft	Housing Bore Diameter D inch	Freewheel Diameter D inch	Width inch	Shaft Diameter J inch	Keyway N x P inch	Bearing w/Same OD	Weight lbs
RC 507	160	2.440	2.4395 / 2.4385	1.125	0.9706 / 0.9696	1/4 x 1/8	6206	1.0
RC 509	250	2.834	2.8332 / 2.8322	1.250	1.1335 / 1.1325	1/4 x 1/8	6207	1.4
RC 510	250	3.149	3.1485 / 3.1470	1.375	1.2965 / 1.2955	3/8 x 3/16	3L10, 6208	2.0
RC 511	525	3.150	3.1490 / 3.1480	1.625	1.3776 / 1.3770	3/8 x 3/16	3L10, 6208	2.2
RC 512	650	3.543	3.5420 / 3.5410	1.625	1.5410 / 1.5400	3/8 x 3/16	3L11, 6210	2.9
RC 513	1 250	4.751	4.7500 / 4.7490	1.750	2.0457 / 2.0447	1/2 x 1/4	XLS-3.25	6.1

See page 9 catalog "Freewheel Clutches" for determination of selection torque.

specifically designed as an interchange backstop for shaft mounted reducers with sprags



## Application as

▶ Backstop

## Features

Internal Freewheels RCD are sprag freewheels without bearing support. They are specifically designed as interchange backstops for shaft mounted reducers.

The freewheel is incorporated into the customer's housing, allowing for a compact, space saving solution.

Freewheel size	Freewheel Diameter	Outer Keyway	Width	Shaft Diameter	Inner Ring Bore Diameter	Inner Ring Kw	Weight
	inch	inch	inch	inch	inch	inch	lbs
RCD 3	1.849/1.848	1/4 x 1/8	0.875	0.7383/0.7378	NA	NA	0.5
RCD 4	2.4395/2.4385	1/4 x 1/8	1.188	0.8891/0.8881	NA	NA	1.1
RCD 5	3.149/3.148	3/8 x 3/16	1.438	1.215/1.214	NA	NA	2.3
RCD 6	3.936/3.935	3/8 x 3/16	1.063	NA	1.5010/1.5015	3/8 x 3/16 (2@180)	2.6
RCD 7	3.936/3.935	3/8 x 3/16	1.063	NA	1.5010/1.5015	3/8 x 3/16 (2@180)	2.7
RCD 8	4.499/4.498	3/8 x 3/16	1.063	NA	1.7510/1.7515	3/8 x 3/16 (2@180)	3.6
RCD 9	4.499/4.498	3/8 x 3/16	1.063	NA	1.7510/1.7515	3/8 x 3/16 (2@180)	3.6
RCD 10	4.499/4.498	3/8 x 3/16	1.563	NA	1.7510/1.7515	3/8 x 3/16 (2@180)	5.2
RCD 12	4.499/4.498	3/8 x 3/16	1.563	NA	1.7510/1.7515	3/8 x 3/16 (2@180)	5.2
RCD 13	4.625/4.624	1/2 x 1/4	1.937	NA	1.9375/1.9385	7/16 x 7/32	6.5

Internal Backstops for Shaft Mount Gearbox.  
RCD 3 to RCD 5 ride directly on reducer shaft (no inner ring).  
Includes Keys.

## Mounting

Internal Freewheels RCD are used to interchange backstops installed by the gearbox manufacturer. Installation instructions and recommendations by the gearbox manufacturer should be followed for the safe operation and longevity of the backstop.

## Lubrication

Oil lubrication as specified by the gearbox manufacturer should be used. Lubrications containing molybdenum disulphide must not be used.

# Interchange Chart

for Marland, Formsprag, Morse®/EPT and Renold with RINGSPANN Freewheels

RINGSPANN®	Marland		Formsprag	Morse®/EPT	Renold
	Clutch	RINGSPANN			
FRS 300	RMS-12N		FSO-/HPI-/HSB-300	MG-/MI-300A	SO/SX300
FRS 400	RMS-14	RMS-14/RMS-18	FSO-/HPI-/HSB-400	MG-/MI-400A	SO/SX400
FRS 500	RMS-21	RMS-21	FSO-/HPI-/HSB-500	MG-/MI-500A	SO/SX500
FRS 550	RMS-26	RMS-26	FSO-/HPI-/HSB 550		
FRS 600	RMS-32	RMS-32	FSO-/HPI-/HSB-600	MG-/MI-600A	SO/SX600
FRS 650	RMS-40	RMS-40	FSO-/HPI-/HSB-650		
FRS 700	RMS-47	RMS-47	FSO-/HPI-/HSB-700	MG-/MI-700A	SO/SX700
FRS 750	RMS-55	RMS-55	HPI-/FS-/HSB-750	MG-/MI-750	SO/SX750
FRS 800	RMS-72	RMS-72	HPI-/FS-/HSB-800	MG-/MI-800	SO/SX800
FRS 900	RMS-87	RMS-87	HPI-/FS-/HSB-900	MG-/MI-900A	SO/SX900
FRS 1 000	RMS-112	RMS-112	HPI-/FS-/HSB-1 027	MG-/MI-1 000A	SO/SX1 027
FRSG 300	RMS-12 FG			MO-300A*	SO/SX300
FRSG 400	RMS-14 FG	RMS-14 FG/RMS-18 FG		MO-400A*	SO/SX400
FRSG 500	RMS-21 FG	RMS-21 FG		MO-500A*	SO/SX500
FRSG 550	RMS-26 FG	RMS-26 FG			
FRSG 600	RMS-32 FG	RMS-32 FG		MO-600A*	SO/SX600
FRSG 650	RMS-40 FG	RMS-40 FG			
FRSG 700	RMS-47 FG	RMS-47 FG		MO-700A*	SO/SX700
FRSG 750	RMS-55 FG	RMS-55 FG	FSO-750		
FRSG 800	RMS-72 FG	RMS-72 FG	FSO-800		SO/SX800
FRSG 900	RMS-87 FG	RMS-87 FG	FSO-900		SO/SX900
FRSG 1 000	RMS-112 FG	RMS-112 FG	FSO-1 027		SO/SX1 027
FRX 400	RMI-14	RMX-14	FRB-400		
FRX 500	RMI-21	RMX-21	FRB-500		
FRX 550	RMI-26	RMX-26			
FRX 600	RMI-32	RMX-32	FRB-600		
FRX 650	RMI-40	RMX-40	FRB-650		
FRX 700	RMI-47	RMX-47	FRB-700		
FRX 750	RMI-55	RMX-55	FRB-750		
FRX 800	RMI-72	RMX-72	FRB-800		
FRX 900	RMI-87	RMX-87	FRB-900		

\*Grease filled with labyrinth seals • Morse is a registered trademark of Borg Warner.

# Interchange Chart

for Marland, Formsprag, Morse®/EPT and GMN with RINGSPANN Freewheels

RINGSPANN®	Marland RINGSPANN	Formsprag	Morse®/EPT	GMN
FRHM 775-7			CB 7*	
FRHM 800-7			CB 7*	
FRHM 800-12			CB 12*	
FRHM 900-12			CB 12*	
FRHM 900-19			CB 19*	
FRHM 1 000-19			CB 19*	
FRHM 1 000-30			CB 30*	
FZ 6201		CSK 12		
FZ 6202		CSK 15	KK 15	
FZ 6203		CSK 17	KK 17	FK6203
FZ 6204		CSK 20	KK 20	FK 6204
FZ 6205		CSK 25	KK 25	FK 6205
FZ 6206		CSK 30	KK 30	FK 6206
FZ 6207		CSK 35	KK 35	FK 6207
FZ 6208		CSK 40	KK 40	
RC 205	R205	FS 20-5	B205A	
RC 206	R206	FS 20-6	B206A	
RC 207	R207	FS 20-7	B207A	
RC 208	R208	FS 20-8	B208A	
RC 210	R210	FS 20-10	B210A	
RC 507			B507A	
RC 509		FS 50-9A	B509A	
RC 510			B510A	
RC 511		FS 50-11A	B511A	
RC 512		FS 50-12A	B512A	
RC 513		FS 50-13	B513	

\* Interchange is dependent on the maximum required bore of the RINGSPANN FRHM. See page 24. • Morse is a registered trademark of Borg Warner.

# Interchange Chart

## FRHD Series - for Formsprag, Marland, Falk, Stephens Adamson and Morse®

Manufacturer	RINGSPANN®		Formsprag	Marland		Falk	Stephens Adamson	Morse®
Size	FRHD 700		LLH 700	BC 3MA		1045 NRTHB	HD 215	
Max. Bore (inch)	3.44		2.94	2.94		2.50	2.94	
Torque Rating (lb-ft)	3750		5000	3000		2100	3333	
Size	FRHD 775		LLH 750	BC 6MA		1075 NRT	HD 315	CB 7
Max. Bore (inch)	3.75		3.44	3.69		3.94	3.94	4
Torque Rating (lb-ft)	7500		7000	6000		10000	6666	6500
Size	FRHD 800		LLH 800	BC 12MA		1075 NRT	HD 415	CB 12
Max. Bore (inch)	4.5		4.44	4.5		3.94	4.94	5.25
Torque Rating (lb-ft)	12000		13000	12000		10000	11667	12000
Size	FRHD 900		LLH 900	BC 18MA		1085 NRT	HD 600	CB 19
Max. Bore (inch)	5.44		5.44	5.44		5.19	6	6.25
Torque Rating (lb-ft)	18500		18000	18000		16000	20833	19000
Size	FRHD 950		LLH 1027	BC 27MA		1095 NRT	HD 700	CB 30
Max. Bore (inch)	7		7	6.5		5.5	7	7.75
Torque Rating (lb-ft)	23000		27000	27000		28000	27083	30000
Size	FRHD 1000		LLH 1027	BC 27MA		1095 NRT	HD 700	CB 30
Max. Bore (inch)	7		7	6.5		5.5	7	7.75
Torque Rating (lb-ft)	28000		27000	27000		28000	27083	30000
Size	FRHD 1050	FRHD 1100	LLH 1051	BC 45MA		1105 NRT	HD 800	CB 45
Max. Bore (inch)	7	7	7	7		7.44	8	8.5
Torque Rating (lb-ft)	45000	45000	45000	45000		45000	45833	45000
Size	FRHD 1200		LLH 1250	BC 63MA		1115 NRT	HD 900	CB 65
Max. Bore (inch)	9		9	8		8.44	9	9.5
Torque Rating (lb-ft)	92500		65000	63000		75000	66667	65000
Size	FRHD 1300		LLH 1300	BC 90MA		1125 NRT	HD 1000	
Max. Bore (inch)	10		10	9		9	10	
Torque Rating (lb-ft)	110000		90000	90000		105000	92500	
Size	FRHD 1400		LLH 1375	BC 135MA		1135 NRT	HD 1200	CB 150
Max. Bore (inch)	12		11	10		10.5	12	11.5
Torque Rating (lb-ft)	140000		135000	135000		150000	145833	150000
Size	FRHD 1450		LLH 2000	BC 180MA		1145 NRT	HD 1400	CB 250
Max. Bore (inch)	12		13.25	11.75		12	14	13.5
Torque Rating (lb-ft)	190000		200000	180000		212000	208333	250000
Size	FRHD 1500		LLH 2400	BC 240MA	BC 300MA	1155 NRT	HD 1600	
Max. Bore (inch)	12		15.5	14	14	13.25	16	
Torque Rating (lb-ft)	290000		265000	240000	300000	249000	316667	
Size	FRHD 1600		LLH 3500	BC 300MA	BC 375MA	1165 NRT	HD 1600	
Max. Bore (inch)	14		20	14	18	15.5	16	
Torque Rating (lb-ft)	373000		375000	300000	375000	346000	316667	
Size	FRHD 1700		LLH 5000	BC 375MA	BC 540MA	1175 NRT	HD 1800	
Max. Bore (inch)	18		20	18	21	17.5	18	
Torque Rating (lb-ft)	625000		700000	375000	540000	519000	416666	
Size	FRHD 1800		LLH 5000	BC 720MA	BC 940MA	1185 NRT		
Max. Bore (inch)	21		20	21	21	20		
Torque Rating (lb-ft)	900000		700000	720000	940000	747000		
Size	FRHD 1900			BC 1200 MA				
Max. Bore (inch)	21			23.5				
Torque Rating (lb-ft)	1200000			1200000				

The above is a functional interchange reference, please verify dimensional interchange details. • Morse® is a registered trademark of Borg Warner



# Questionnaire for selecting RINGSPANN Backstops

Please photocopy or use the PDF-File from our website!

Company: .....	Date: .....
Address: .....	Inquiry Ref.: .....
.....	Phone: .....
Name: .....	Fax: .....
Department: .....	E-mail: .....

**1. Where will the Backstop be used?**

<p>1.1 Type of machine: _____</p> <p>In the case of conveyor belts:          Angle of the steepest segment _____°          Multiple-drive? <input type="checkbox"/> Yes <input type="checkbox"/> No          If yes, number of drives _____</p> <p>1.2 Backstop location:  <input type="checkbox"/> on the gearbox  <input type="checkbox"/> on the motor  <input type="checkbox"/> elsewhere: _____</p>	<p>1.3 Arrangement:  <input type="checkbox"/> on a shaft end          Diameter: _____ inch          Length: _____ inch  <input type="checkbox"/> on a through shaft          Diameter: _____ inch  <input type="checkbox"/> on a pulley  <input type="checkbox"/> on a sprocket  <input type="checkbox"/> elsewhere: _____</p>	<p>1.4 If possible, please include specification, data sheet, sketch or drawing with connection dimensions.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
--	--	--

**2. Operating data**

<p>2.1 Speed at the backstop location (backstop shaft) <math>n_{sp} =</math> _____ rpm</p> <p>Would it be possible to arrange the backstop on a high speed shaft? (higher speed = lower torque = smaller backstop)          If necessary please give further details on the drawing.</p>	<p>2.2 Nominal power of motor  <math>P_0 =</math> _____ hp</p> <p>2.3 Must the backstop also absorb the peak torque that occurs if the drive motor is started in the locking direction of the backstop (incorrectly poled drive motor)?          If yes, the backstop must be substantially oversized.  <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>2.4 Maximum backdriving torque  <math>M_{max} =</math> _____ lb-ft</p> <p>2.5 Lifting capacity of the conveyor system  <math>P_L =</math> _____ hp</p> <p>2.6 Number of daily stops: _____</p> <p>2.7 Daily operating time: _____ hours</p>
--	--	--

**3. Installation conditions**

<p>3.1 <input type="checkbox"/> Open, outside  <input type="checkbox"/> Open, in a closed room  <input type="checkbox"/> In the machine housing  <input type="checkbox"/> Lubrication by means of oil bath or oil mist in the machine housing  <input type="checkbox"/> Connection to the central lubrication system is possible          Name of lubricant: _____          Kinematic viscosity: _____ cst _____°F _____°C</p>	<p>3.2 Should the backstop be releasable?  <input type="checkbox"/> No <input type="checkbox"/> Yes, in an emergency  <input type="checkbox"/> Yes, frequently</p> <p>3.3 Ambient temperature on the backstop:          from _____°F to _____°F</p> <p>3.4 Other (e.g. accessibility, dust susceptibility and other environmental influences that could be of significance):          _____          _____</p>	<p>3.5 Are there any elastic elements/components located between the backstop and the installation that is to be backstopped (elastic couplings generate considerable peak torques at the moment of stopping)?  <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
--	--	--

**4. Estimated requirements**

\_\_\_\_\_ Pieces      \_\_\_\_\_ Pieces/month      \_\_\_\_\_ Pieces/year

**5. Enclosures**

Specifications       Data sheet       Sketch/drawing

# Questionnaire for selecting RINGSPANN Overrunning Clutches

Please photocopy or use the PDF-File from our website!

Company: .....	Date: .....
Address: .....	Inquiry Ref.: .....
.....	Phone: .....
Name: .....	Fax: .....
Department: .....	E-mail: .....

**1. Where will the Overrunning Clutch be used?**

<p>1.1 Type of machine, machine group or installation, in which the overrunning clutch will be used:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>1.2 Arrangement of the overrunning clutch (if possible, please include specification, data sheet, sketch or drawing with connection dimensions).</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
---	---

**2. Operating data**

<p>2.1 In driving operation the drive of the overrunning clutch will be carried out by:</p> <p><input type="checkbox"/> Asynchronous motor</p> <p style="margin-left: 20px;"><input type="checkbox"/> direct start-up</p> <p style="margin-left: 20px;"><input type="checkbox"/> <math>\lambda</math>-<math>\Delta</math>-start-up</p> <p><input type="checkbox"/> Other electric motor</p> <p style="margin-left: 20px;">Type: _____</p> <p><input type="checkbox"/> Combustion engine</p> <p style="margin-left: 20px;">Type: _____</p> <p style="margin-left: 20px;">Number of cylinders: ____</p> <p><input type="checkbox"/> Turbine</p> <p><input type="checkbox"/> Other (please explain in more detail):</p> <p>_____</p> <p>_____</p>	<p>2.3 Maximum torque _____ lb-ft (Important for drives that develop their maximum torque below their nominal speed.)</p> <p>2.4 Speed</p> <p>1. in driving operation: from _____ rpm to _____ rpm</p> <p>2. in freewheeling operation: (when overrunning clutch is disengaged)</p> <p>Primary part (driver) from _____ rpm to _____ rpm</p> <p>Secondary part (driven machine) from _____ rpm to _____ rpm</p> <p>2.5 Should the overrunning clutch be combined with a shaft coupling?</p> <p><input type="checkbox"/> with an elastic coupling</p> <p><input type="checkbox"/> with a torsionally stiff coupling</p> <p><input type="checkbox"/> _____</p>	<p>2.6 If, upon start up, larger masses are to be accelerated:</p> <p>Moment of inertia: <math>J =</math> _____ lb-ft<sup>2</sup></p> <p>Speed of mass: <math>n =</math> _____ rpm</p> <p>2.7 Torque fluctuations/torsional vibrations during driving operation generate the following torque limits</p> <p><input type="checkbox"/> Minimum torque <math>M_{min} =</math> _____ lb-ft</p> <p><input type="checkbox"/> Maximum torque <math>M_{max} =</math> _____ lb-ft</p> <p><input type="checkbox"/> Min-/Max.-torque is not known</p> <p>2.8 Daily operating time: _____ hours (hr) thereof _____ (hr) driving operation _____ (hr) freewheeling operation</p>
<p>2.2 To be transmitted in driving operation:</p> <p>Power: _____ hp or</p> <p>Torque: _____ lb-ft</p>		

<p><b>3. Installation conditions</b></p> <p>3.1 <input type="checkbox"/> Open, outside</p> <p><input type="checkbox"/> Open, in a closed room</p> <p><input type="checkbox"/> in the machine housing</p> <p style="margin-left: 20px;"><input type="checkbox"/> Lubrication by means of oil bath or oil mist in the machine housing</p> <p style="margin-left: 20px;"><input type="checkbox"/> Connection to the central lubrication system is possible</p> <p>Name of lubricant:</p> <p>_____</p> <p>Kinematic viscosity</p> <p>_____ cst    ____ °F    ____ °C</p>	<p>3.2 Ambient temperature on the freewheel: from _____ °F to _____ °F</p> <p>3.3 Other (e.g. accessibility, dust susceptibility and other environmental influences that could be of significance):</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p><b>4. Estimated requirements</b></p> <p>_____ Pieces (one-off)</p> <p>_____ Pieces/month</p> <p>_____ Pieces/year</p> <p><b>5. Enclosures</b></p> <p><input type="checkbox"/> Specifications</p> <p><input type="checkbox"/> Data sheet</p> <p><input type="checkbox"/> Sketch/drawing</p>
--	--	---

# Questionnaire for selecting RINGSPANN Indexing Freewheels

Please photocopy or use the PDF-File from our website!

Company: .....	Date: .....
Address: .....	Inquiry Ref.: .....
.....	Phone: .....
Name: .....	Fax: .....
Department: .....	E-mail: .....

**1. Where will the Indexing Freewheel be used?**

<p>1.1 Type of machine, machine group or installation, in which the indexing freewheel will be used:</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>1.2 Arrangement of the indexing freewheel (if possible, please include specification, data sheet, sketch or drawing with connection dimensions).</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
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**2. Operating data**

<p>2.1 Index angle of the indexing freewheel: from _____° to _____°</p> <p>2.2 Number of actuations (indexes) per minute: from _____/min to _____/min</p> <p>2.3 The back and forth movement is made by</p> <p><input type="checkbox"/> freewheel outer ring</p> <p><input type="checkbox"/> freewheel inner ring</p> <p><input type="checkbox"/> .....</p> <p>2.4 The back and forth movement is</p>	<p>generated by</p> <p><input type="checkbox"/> bell crank</p> <p><input type="checkbox"/> hydraulic cylinder</p> <p><input type="checkbox"/> pneumatic cylinder</p> <p><input type="checkbox"/> cam disk or plate</p> <p><input type="checkbox"/> other (please explain in more detail):</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>2.5 Proposed shaft dimensions:</p>	<p>Diameter _____ inch</p> <p>Length _____ inch</p> <p>2.6 Normal torque: M = _____ lb-ft</p> <p>Maximum torque: M<sub>max</sub> = _____ lb-ft (including peaks)</p> <p>2.7 Daily operating time: _____ hours</p>
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**3. Installation conditions**

<p>3.1 <input type="checkbox"/> Open, outside</p> <p><input type="checkbox"/> Open, in a closed room</p> <p><input type="checkbox"/> in the machine housing</p> <p><input type="checkbox"/> Lubrication by means of oil bath or oil mist in the machine housing</p> <p><input type="checkbox"/> Connection to the central lubrication system is possible</p> <p>Name of lubricant: .....</p> <p>Kinematic viscosity: .....</p> <p>_____ cst    _____ °F    _____ °C</p>	<p>3.2 Ambient temperature on freewheel: from _____ °F to _____ °F</p> <p>3.3 Other (e.g. accessibility, dust susceptibility and other environmental influences that could be of significance):</p> <p>.....</p> <p>.....</p> <p>.....</p>
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**4. Estimated requirement**

\_\_\_\_\_ Pieces      \_\_\_\_\_ Pieces/month      \_\_\_\_\_ Pieces/year

**5. Enclosures**

Specifications       Data sheet       Sketch/drawing



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