Freewheel Clutches

Backstops • Overrunning Clutches • Indexing Freewheels

# Freewheel Technology Introduction

<table>
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<td>FRX with sprag lift-off X, sealed grease lubricated ball bearings</td>
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</tr>
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<td></td>
<td>56000</td>
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</tr>
<tr>
<td>FA with sprags and grease lubrication</td>
<td></td>
<td></td>
<td></td>
<td>3690</td>
<td>3.150</td>
</tr>
<tr>
<td>RFB with sprags and grease lubricated ball bearings</td>
<td></td>
<td></td>
<td></td>
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</tr>
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## Complete Freewheels

### For bolting to the face

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<td></td>
<td></td>
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### With torque arm

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<td></td>
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### With shaft coupling

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## Accessories for Complete Freewheels FR . . .

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<tbody>
<tr>
<td>Torque Arms TA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End Covers</td>
<td></td>
<td></td>
<td></td>
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## Internal Freewheels

### For press fit on the outer ring

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<th>Maximum bore inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZ with sprags, bearing supported</td>
<td></td>
<td></td>
<td></td>
<td>480</td>
<td>1.575</td>
</tr>
<tr>
<td>ZZ . . . 2RS with sprags, bearing supported and sealed</td>
<td></td>
<td></td>
<td></td>
<td>480</td>
<td>1.575</td>
</tr>
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<td>ZZ . . . P2RS with sprags, bearing supported and sealed</td>
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### For keyway connection on the outer ring

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<td></td>
<td></td>
<td></td>
<td>480</td>
<td>1.575</td>
</tr>
<tr>
<td>RC with sprags</td>
<td></td>
<td></td>
<td></td>
<td>1240</td>
<td>2.200</td>
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</table>

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<tbody>
<tr>
<td>RCD with sprags</td>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

## Interchange Charts

### For Marland, Formsprag, Morse*/EPT and Renold with RINGSPANN Freewheels

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

### Questionnaires

<table>
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</table>

**Issue 02/2019 • Technical details subject to change without notice.**

*Morse*® is a registered trademark of Borg Warner.
RINGSPANN GmbH has been in business for over 70 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 70 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.
Applications of Freewheels

**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.

**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.

**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.
Applications for Freewheels

> Gear units
  Electric motors
  Gear motors

> Inclined conveyors
  Elevators
  Bucket elevators

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

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

Fans

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.

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

Packaging machines
Filling plants

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

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

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

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.
Types to extend service life

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 $F_S$, 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 $F_S$, 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.
Determination of Selection Torque

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:
- \( M_A \) = Selection torque of the backstop [lb-ft]
- \( M_L \) = Static backdriving torque of the load referring to the backstop shaft [lb-ft]
- \( P_0 \) = Nominal power of motor [hp]
- \( n_{SP} \) = Speed of backstop shaft [rpm]
- \( F \) = 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 \( F \):

<table>
<thead>
<tr>
<th>Type of installation</th>
<th>( F )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyor belts, angle up to 6°</td>
<td>0.88</td>
</tr>
<tr>
<td>Conveyor belts, angle up to 8°</td>
<td>1.07</td>
</tr>
<tr>
<td>Conveyor belts, angle up to 10°</td>
<td>1.21</td>
</tr>
<tr>
<td>Conveyor belts, angle up to 12°</td>
<td>1.29</td>
</tr>
<tr>
<td>Conveyor belts, angle up to 15°</td>
<td>1.39</td>
</tr>
<tr>
<td>Screw pumps</td>
<td>1.51</td>
</tr>
<tr>
<td>Ball mills, drying drums</td>
<td>1.26</td>
</tr>
<tr>
<td>Bucket conveyors, elevators</td>
<td>1.48</td>
</tr>
<tr>
<td>Hammer mills</td>
<td>1.51</td>
</tr>
<tr>
<td>Fans, Ventilators</td>
<td>0.49</td>
</tr>
</tbody>
</table>

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:
- \( M_A \) = Selection torque of the freewheel in accordance with the catalog tables [lb-ft],
- \( K \) = Operating factor (refer to table),
- \( M_L \) = Load torque for constant rotating freewheel:
  \[ M_L = 5250 \cdot P_0/n_{FRE} \]
- \( P_0 \) = Nominal power of motor [hp]
- \( n_{FRE} \) = 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 „“:

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

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.
**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.
Complete Freewheels FRS and FRSG for bolting to the face with sprags

See page 9 for determination of selection torque.

**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.

The recommended tolerance of the shaft is +0.005 / -0.001 inch and the tolerance of the pilot diameter D of the attachment part is -0 / +0.002 inch.

Mounting

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

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 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.

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.

Features

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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.
**Complete Freewheels FRX and FRZ**

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

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**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

![Diagram of freewheel sizes FRXF 550 and FRXF 700 to FRXF 800](image)

**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.

---

### Dimensions

<table>
<thead>
<tr>
<th>Size</th>
<th>Bore (d)</th>
<th>(F)</th>
<th>(H)</th>
<th>(L)</th>
<th>(M)</th>
<th>(N)</th>
<th>(O)</th>
<th>Torque arm size</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>FRXF 550</td>
<td>1.500</td>
<td>4.050</td>
<td>3.100</td>
<td>2.500</td>
<td>3.438</td>
<td>3.500</td>
<td>4.500</td>
<td>0.400</td>
<td>4.380</td>
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<td>4.500</td>
<td>13.000</td>
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<td>8.375</td>
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</table>

See page 9 for determination of selection torque.

*Maximum recommended operating speed.

Keyway dimensions upon request by customers.

---

### Backstop Freewheel

<table>
<thead>
<tr>
<th>Size</th>
<th>Maximum torque (M_u)</th>
<th>Nominal torque (M_t)</th>
<th>Sprag lift-off at inner ring speed (N_{rpm})*</th>
<th>Maximum speed inner ring oversruns (N_{rpm})</th>
<th>Standard/bore</th>
<th>Weight</th>
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<tbody>
<tr>
<td>FRXF 550</td>
<td>1.500</td>
<td>750</td>
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<td>1.500</td>
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<td>8.100</td>
<td>4.050</td>
<td>1.038</td>
<td>2.000</td>
<td>2.438</td>
<td>1.250</td>
</tr>
<tr>
<td>FRXF 775</td>
<td>14.800</td>
<td>7.300</td>
<td>1.312</td>
<td>2.500</td>
<td>2.750</td>
<td>1.00</td>
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<tr>
<td>FRXF 800</td>
<td>29.000</td>
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<td>1.500</td>
<td>3.250</td>
<td>3.438</td>
<td>1.00</td>
</tr>
</tbody>
</table>

---

* Maximum recommended operating speed.
Complete Freewheel 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
Complete Freewheels FRHD with torque arm are sealed sprag freewheels with ball bearings. They are supplied oil-filled and ready for installation. The freewheels 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.

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.
Complete Freewheel FRHD
with torque arm
with sprags

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

with torque arm
with sprags

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.

Features
Complete Freewheels 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 freewheels FRHM are arranged on through shafts or shaft ends.

Maximum torques up to 56,000 lb-ft.

Bores up to 7 inch.

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.
### Complete Freewheel FRHM

**with torque arm**

**with sprags**

---

#### Standard type

For universal use

#### Dimensions

<table>
<thead>
<tr>
<th>Freewheel Size</th>
<th>Maximum torque $M_{a}$</th>
<th>Nominal torque $M_{t}$</th>
<th>Maximum speed inner ring freewheels</th>
<th>Bore $d$ max.</th>
<th>A inch</th>
<th>C inch</th>
<th>D inch</th>
<th>E inch</th>
<th>H inch</th>
<th>J* inch</th>
<th>L* inch</th>
<th>N inch</th>
<th>O inch</th>
<th>Q inch</th>
<th>R* inch</th>
<th>Weight lbs</th>
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<tbody>
<tr>
<td>FRHM 700-7</td>
<td>7 500</td>
<td>3 750</td>
<td>620</td>
<td>3.44</td>
<td>8.00</td>
<td>4.38</td>
<td>5.25</td>
<td>0.50</td>
<td>21.00</td>
<td>3.56</td>
<td>6.00</td>
<td>1.25</td>
<td>6.63</td>
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<td>7 500</td>
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<td>9.75</td>
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<td>0.50</td>
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<td>8.13</td>
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<td>4.38</td>
<td>7.00</td>
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<td>10.50</td>
<td>4.75</td>
<td>7.00</td>
<td>0.50</td>
<td>25.50</td>
<td>3.56</td>
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<td>1.25</td>
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<td>400</td>
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<td>9.13</td>
<td>25.00</td>
<td>23.00</td>
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</tr>
</tbody>
</table>

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.

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Morse® is a registered trademark of Borg Warner.

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19-1
Application as

- Backstop
- Indexing Freewheel

For application as backstop in installations with low speeds in freewheeling operation. For application as indexing freewheel in installations with low to medium total number of actuations.

Features

Complete Freewheels FA with torque arm are sprag freewheels with sleeve bearings. They are grease-lubricated and require no maintenance.

Maximum torques up to 3690 lb-ft.

Bores up to 3.15 inch.

Application example

Two Complete Freewheels FA 57 in the roller feed of a sheet metal processing machine. The indexing freewheel arranged on the left is driven via a bell crank with an adjustable lift. This enables an infinite setting of the feed. The backstop arranged on the right prevents the indexing rollers from running backwards while the indexing freewheel carries out its back stroke. Often, an additional small brake is provided in order to prevent the accelerated sheet metal strip from advancing.
Complete Freewheels FA
with torque arm
with sprags and grease lubrication

<table>
<thead>
<tr>
<th>Freewheel Size</th>
<th>Type</th>
<th>Maximum torque $M_{tu}$</th>
<th>Nominal torque $M_{nu}$</th>
<th>Max. speed inner ring freewheels</th>
<th>Bore d max.</th>
<th>C inch</th>
<th>D inch</th>
<th>E inch</th>
<th>H inch</th>
<th>L inch</th>
<th>N inch</th>
<th>Weight lbs</th>
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<tr>
<td>FA 37</td>
<td>SF</td>
<td>340</td>
<td>170</td>
<td>250</td>
<td>0.984</td>
<td>1.378</td>
<td>2.992</td>
<td>0.472</td>
<td>3.543</td>
<td>1.378</td>
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<td>FA 57</td>
<td>SF</td>
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<td>465</td>
<td>170</td>
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<td>1.969</td>
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<td>1180</td>
<td>130</td>
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<td>0.827</td>
<td>12.2</td>
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<td>FA 107</td>
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<td>1845</td>
<td>90</td>
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<td>3.150</td>
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<td>0.787</td>
<td>7.087</td>
<td>2.559</td>
<td>0.886</td>
<td>18.8</td>
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</table>

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

Mounting
When used as a backstop, the backdriving torque is supported by the torque arm. The torque arm must not be clamped into position. It must have 0.002 to 0.008 inch play in the axial and radial directions.

When used as an indexing freewheel, the torque arm serves as the indexing lever arm.

The torque arm is not heat treated enabling the customer alter the torque arm to suit his application.

The recommended tolerance of the shaft is $+0 / -0.001$ inch.
Complete Freewheels RFB

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

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.

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

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

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.

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 FR SG 600 CA 2.0 (Freewheel 1) is arranged between the main drive and the right angle gear box. A freewheel FR Z 500 CA 1.5 (Freewheel 2) with sprag lift-off Z (page 26) 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.

Additional Clutch Couplings

- Clutch Coupling Packages CC
- Clutch Coupling Packages DC
- Clutch Coupling Packages UJ
Complete Freewheels FRS … CA and FRSG … CA
with gear coupling
with sprags

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.
Complete Freewheels FRX … CA and FRZ … CA
with gear coupling
with sprag lift-off …

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

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

See page 9 for determination of selection torque.

---

<table>
<thead>
<tr>
<th>Freewheel Size</th>
<th>Coupling Size</th>
<th>Maximum torque Mu lb-ft</th>
<th>Nominal torque Mu lb-ft</th>
<th>Sprag lift-off at inner ring speed rpm</th>
<th>Max. speed inner ring freewheels/overruns rpm</th>
<th>Max. speed outer ring drives rpm</th>
<th>Nominal torque Mu lb-ft</th>
<th>Sprag lift-off at outer ring speed rpm</th>
<th>Max. speed outer ring drives rpm</th>
<th>Sprag lift-off at outer ring speed rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRX 400 CA</td>
<td>F 1.0</td>
<td>250</td>
<td>125</td>
<td>860</td>
<td>4000</td>
<td>340</td>
<td>FRZ 400 CA</td>
<td>500</td>
<td>280</td>
<td>800</td>
</tr>
<tr>
<td>FRX 500 CA</td>
<td>F 1.0</td>
<td>850</td>
<td>425</td>
<td>750</td>
<td>4000</td>
<td>300</td>
<td>FRZ 500 CA</td>
<td>1070</td>
<td>535</td>
<td>1400</td>
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<tr>
<td>FRX 550 CA</td>
<td>F 2.0</td>
<td>1500</td>
<td>750</td>
<td>700</td>
<td>4000</td>
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<td>FRZ 550 CA</td>
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<td>1380</td>
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<td>2000</td>
<td>1000</td>
<td>670</td>
<td>4000</td>
<td>265</td>
<td>FRZ 600 CA</td>
<td>3530</td>
<td>1765</td>
<td>1450</td>
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<tr>
<td>FRX 650 CA</td>
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<td>1750</td>
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<td>3100</td>
<td>240</td>
<td>FRZ 650 CA</td>
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<table>
<thead>
<tr>
<th>Freewheel Size</th>
<th>Bore max.</th>
<th>A</th>
<th>DBSE</th>
<th>E</th>
<th>L1</th>
<th>L2</th>
<th>Weight*</th>
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<td>8.188</td>
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<td>FR ... 500 CA</td>
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<td>2.313</td>
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<td>4.188</td>
<td>9.625</td>
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<td>7.000</td>
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</tr>
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<td>FR ... 900 CA</td>
<td>5.438</td>
<td>6.500</td>
<td>13.625</td>
<td>9.325</td>
<td>20.813</td>
<td>6.375</td>
<td>5.313</td>
</tr>
</tbody>
</table>

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

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.
Application as

- Backstop
- Overrunning Clutch
- Indexing Freewheel

Features

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

The freewheel is assembled into the customer housing, allowing a compact, space-saving solution.

Maximum torques up to 480 lb-ft/650 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:

<table>
<thead>
<tr>
<th>Series</th>
<th>Torque transmission on outer ring by keyway</th>
<th>Torque transmission on inner ring by keyway</th>
<th>2RS-seals</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZ</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>29</td>
</tr>
<tr>
<td>ZZ … 2RS</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>30</td>
</tr>
<tr>
<td>ZZ … P2RS</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>30</td>
</tr>
<tr>
<td>ZZ … P</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>31</td>
</tr>
<tr>
<td>ZZ … PP</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>31</td>
</tr>
</tbody>
</table>

The Internal Freewheels ZZ of the sizes ZZ 6201 to ZZ 6207 have the same dimensions as the respective ball bearings of series 62.

The series ZZ … 2RS and ZZ … P2RS have 2RS seals.

Application example

Two Internal Freewheels ZZ 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 off set by 180° are arranged on the gearbox shaft. By means of torque 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 torque arms can execute lifts of differing amounts.
## Internal Freewheels ZZ

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

### Mounting

The torque is transmitted on the inner ring and outer ring by press fit. In order to transmit the torques specified in the table, the outer ring must be installed in a housing with an external diameter K. The housing should be 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.

### Standard type

For universal use.

### Dimensions

<table>
<thead>
<tr>
<th>Freewheel Size</th>
<th>Maximum torque</th>
<th>Nominal torque</th>
<th>Maximum speed</th>
<th>Load rating of bearing support</th>
<th>Bore d</th>
<th>B</th>
<th>D</th>
<th>K</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb-ft</td>
<td>MN</td>
<td>rpm</td>
<td>dynamic C</td>
<td>inch</td>
<td>mm</td>
<td>inch</td>
<td>mm</td>
<td>lbs</td>
</tr>
<tr>
<td>ZZ 8</td>
<td>3.8</td>
<td>5.0</td>
<td>1.9</td>
<td>2.5</td>
<td>15000</td>
<td>1720</td>
<td>720</td>
<td>194</td>
<td>860</td>
</tr>
<tr>
<td>ZZ 6201</td>
<td>13.8</td>
<td>18.6</td>
<td>6.9</td>
<td>9.3</td>
<td>10000</td>
<td>1370</td>
<td>6100</td>
<td>810</td>
<td>2700</td>
</tr>
<tr>
<td>ZZ 6202</td>
<td>38.6</td>
<td>52.0</td>
<td>19.3</td>
<td>26.0†</td>
<td>9400</td>
<td>1350</td>
<td>6000</td>
<td>830</td>
<td>3700</td>
</tr>
<tr>
<td>ZZ 6203</td>
<td>50.4</td>
<td>68.0</td>
<td>25.2</td>
<td>34.0‡</td>
<td>8200</td>
<td>1650</td>
<td>7350</td>
<td>1025</td>
<td>4550</td>
</tr>
<tr>
<td>ZZ 6204</td>
<td>96.2</td>
<td>130.0</td>
<td>48.1</td>
<td>65.0†</td>
<td>6800</td>
<td>2250</td>
<td>10000</td>
<td>1415</td>
<td>6300</td>
</tr>
<tr>
<td>ZZ 6205</td>
<td>118.6</td>
<td>160.0</td>
<td>59.3</td>
<td>80.0†</td>
<td>5600</td>
<td>2475</td>
<td>11000</td>
<td>1575</td>
<td>7000</td>
</tr>
<tr>
<td>ZZ 6206</td>
<td>251.8</td>
<td>340.0</td>
<td>125.9</td>
<td>170.0</td>
<td>4000</td>
<td>3375</td>
<td>15000</td>
<td>2250</td>
<td>10000</td>
</tr>
<tr>
<td>ZZ 6207</td>
<td>295.2</td>
<td>350.0</td>
<td>129.6</td>
<td>175.0</td>
<td>3600</td>
<td>2810</td>
<td>12500</td>
<td>1620</td>
<td>7200</td>
</tr>
<tr>
<td>ZZ 6208</td>
<td>481.4</td>
<td>650.0</td>
<td>240.7</td>
<td>332.5</td>
<td>3000</td>
<td>3485</td>
<td>15500</td>
<td>2755</td>
<td>12500</td>
</tr>
</tbody>
</table>

See page 9 for determination of selection torque.
Internal Freewheels ZZ … 2RS and ZZ … P2RS

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

Mounting

Series ZZ … 2RS:
The torque is transmitted on the inner ring and outer ring by press fit.

Series ZZ … 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 installed in a housing with an external diameter K. The housing should be 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 the factory 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 +140°F. Please contact the factory if the temperature is different than the given values.

Lubrication

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

See page 9 for determination of selection torque.

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

* Only one RS seal on the ball bearing side. Locking from this side the freewheeling direction of the inner ring is clockwise free.

Mounting

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

Series ZZ … 2RS:
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 installed in a housing with an external diameter K. The housing should be 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 the factory 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 +140°F. Please contact the factory if the temperature is different than the given values.

Lubrication

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

See page 9 for determination of selection torque.

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

* Only one RS seal on the ball bearing side. Locking from this side the freewheeling direction of the inner ring is clockwise free.
Internal Freewheels ZZ ... P and ZZ ... PP

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

Mounting

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

Series ZZ ... 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 installed in a hou-
sing with an external diameter K. The housing
should be made of steel or grey cast iron in mi-
nimum quality GG-20. When using other hou-
sing materials or smaller external diameters, we
urge you to contact the factory regarding the
transmissible torque.

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 +40°F to +140°F. Please contact the
factory if the temperature is different than the
given values.

Lubrication

The freewheels are supplied grease-filled.

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.

<table>
<thead>
<tr>
<th>Freewheel</th>
<th>Maximum torque $M_u$</th>
<th>Nominal torque $M_u$</th>
<th>Maximum speed</th>
<th>Load rating of bearing support</th>
<th>Bore $d$</th>
<th>B</th>
<th>D</th>
<th>K</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZZ 6201 P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>ZZ 6203 P</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ZZ 6204 P</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZ 6205 P</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZ 6206 P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZZ 6207 P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
### Application as

- Backstop
- Overrunning Clutch

### Features

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

---

**Standard type**

For universal use

**Dimensions**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RC 205</td>
<td>220</td>
<td>110</td>
<td>2.0482</td>
<td>2.0463</td>
<td>1.00</td>
<td>0.929/0.930</td>
<td>3/8 x 7/16</td>
<td></td>
<td>205</td>
</tr>
<tr>
<td>RC 206</td>
<td>390</td>
<td>195</td>
<td>2.4422</td>
<td>2.4403</td>
<td>1.125</td>
<td>1.289/1.290</td>
<td>1/4 x 1/8</td>
<td></td>
<td>206</td>
</tr>
<tr>
<td>RC 207</td>
<td>650</td>
<td>325</td>
<td>2.8360</td>
<td>2.8341</td>
<td>1.125</td>
<td>1.656/1.657</td>
<td>1/4 x 1/8</td>
<td></td>
<td>207</td>
</tr>
<tr>
<td>RC 208</td>
<td>900</td>
<td>450</td>
<td>3.1510</td>
<td>3.1491</td>
<td>1.250</td>
<td>1.840/1.841</td>
<td>3/8 x 7/16</td>
<td></td>
<td>208</td>
</tr>
<tr>
<td>RC 210</td>
<td>1 240</td>
<td>620</td>
<td>3.5447</td>
<td>3.5248</td>
<td>1.250</td>
<td>2.208/2.209</td>
<td>7/8 x 7/16</td>
<td></td>
<td>210</td>
</tr>
</tbody>
</table>

See page 9 for determination of selection torque.
Internal Freewheels RCD

Specifically designed as an interchange backstop for shaft mounted reducers with sprags.

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.

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.

### Internal Backstops for Shaft Mount Gearbox.

<table>
<thead>
<tr>
<th>Freewheel size</th>
<th>Freewheel Diameter</th>
<th>Outer Keyway</th>
<th>Width</th>
<th>Shaft Diameter</th>
<th>Inner Ring Bore Diameter</th>
<th>Inner Ring Ker</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCD 3</td>
<td>1.849/1.848</td>
<td>1/2 x 1/8</td>
<td>1.184</td>
<td>0.875</td>
<td>0.738/0.7378</td>
<td>NA</td>
<td>0.5</td>
</tr>
<tr>
<td>RCD 4</td>
<td>2.393/2.385</td>
<td>1/2 x 1/8</td>
<td>1.184</td>
<td>0.875</td>
<td>0.889/0.8881</td>
<td>NA</td>
<td>1.1</td>
</tr>
<tr>
<td>RCD 5</td>
<td>3.149/3.148</td>
<td>1/2 x 1/8</td>
<td>1.438</td>
<td>1.215/1.214</td>
<td>1.501/1.5015</td>
<td>NA</td>
<td>2.3</td>
</tr>
<tr>
<td>RCD 6</td>
<td>3.936/3.935</td>
<td>1/2 x 1/8</td>
<td>1.563</td>
<td>1.501/1.5015</td>
<td>1.501/1.5015</td>
<td>NA</td>
<td>2.7</td>
</tr>
<tr>
<td>RCD 7</td>
<td>4.499/4.498</td>
<td>1/2 x 1/8</td>
<td>1.563</td>
<td>1.7510/1.7515</td>
<td>1.7510/1.7515</td>
<td>NA</td>
<td>3.6</td>
</tr>
<tr>
<td>RCD 8</td>
<td>4.499/4.498</td>
<td>1/2 x 1/8</td>
<td>1.563</td>
<td>1.7510/1.7515</td>
<td>1.7510/1.7515 (2@180)</td>
<td>2/180</td>
<td>5.2</td>
</tr>
<tr>
<td>RCD 9</td>
<td>4.499/4.498</td>
<td>1/2 x 1/8</td>
<td>1.563</td>
<td>1.7510/1.7515</td>
<td>1.7510/1.7515 (2@180)</td>
<td>2/180</td>
<td>5.2</td>
</tr>
<tr>
<td>RCD 10</td>
<td>4.499/4.498</td>
<td>1/2 x 1/8</td>
<td>1.563</td>
<td>1.7510/1.7515</td>
<td>1.7510/1.7515 (2@180)</td>
<td>2/180</td>
<td>5.2</td>
</tr>
<tr>
<td>RCD 11</td>
<td>4.499/4.498</td>
<td>1/2 x 1/8</td>
<td>1.563</td>
<td>1.7510/1.7515</td>
<td>1.7510/1.7515 (2@180)</td>
<td>2/180</td>
<td>5.2</td>
</tr>
<tr>
<td>RCD 12</td>
<td>4.499/4.498</td>
<td>1/2 x 1/8</td>
<td>1.563</td>
<td>1.7510/1.7515</td>
<td>1.7510/1.7515 (2@180)</td>
<td>2/180</td>
<td>5.2</td>
</tr>
<tr>
<td>RCD 13</td>
<td>4.499/4.498</td>
<td>1/2 x 1/8</td>
<td>1.563</td>
<td>1.7510/1.7515</td>
<td>1.7510/1.7515 (2@180)</td>
<td>2/180</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Internal Backstops for Shaft Mount Gearbox.

RCD 3 to RCD 5 ride directly on reducer shaft (no inner ring).

Includes Keys.
## Interchange Chart

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

<table>
<thead>
<tr>
<th>RINGSPANN®</th>
<th>Marland</th>
<th>Formsprag</th>
<th>Morse®/EPT</th>
<th>Renold</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clutch</td>
<td>RINGSPANN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRS 300</td>
<td>RMS-12N</td>
<td>FSO-/HPI-/HSB-300</td>
<td>MG-/MI-300A</td>
<td>SO/SX300</td>
</tr>
<tr>
<td>FRS 400</td>
<td>RMS-14</td>
<td>FSO-/HPI-/HSB-400</td>
<td>MG-/MI-400A</td>
<td>SO/SX400</td>
</tr>
<tr>
<td>FRS 500</td>
<td>RMS-21</td>
<td>FSO-/HPI-/HSB-500</td>
<td>MG-/MI-300A</td>
<td>SO/SX500</td>
</tr>
<tr>
<td>FRS 550</td>
<td>RMS-26</td>
<td>FSO-/HPI-/HSB-550</td>
<td>MG-/MI-300A</td>
<td>SO/SX550</td>
</tr>
<tr>
<td>FRS 600</td>
<td>RMS-32</td>
<td>FSO-/HPI-/HSB-600</td>
<td>MG-/MI-600A</td>
<td>SO/SX600</td>
</tr>
<tr>
<td>FRS 700</td>
<td>RMS-40</td>
<td>FSO-/HPI-/HSB-650</td>
<td>MG-/MI-700A</td>
<td>SO/SX700</td>
</tr>
<tr>
<td>FRS 750</td>
<td>RMS-47</td>
<td>FSO-/HPI-/HSB-700</td>
<td>MG-/MI-700A</td>
<td>SO/SX750</td>
</tr>
<tr>
<td>FRS 800</td>
<td>RMS-55</td>
<td>HPI-/FS-/HSB-750</td>
<td>MG-/MI-800</td>
<td>SO/SX800</td>
</tr>
<tr>
<td>FRS 900</td>
<td>RMS-72</td>
<td>HPI-/FS-/HSB-800</td>
<td>MG-/MI-900A</td>
<td>SO/SX900</td>
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<tr>
<td>FRS 1 000</td>
<td>RMS-72</td>
<td>HPI-/FS-/HSB-1027</td>
<td>MG-/MI-1000A</td>
<td>SO/SX1027</td>
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<td>FRSG 300</td>
<td>RMS-12 FG</td>
<td>MO-300*</td>
<td>SO/SX300</td>
<td></td>
</tr>
<tr>
<td>FRSG 400</td>
<td>RMS-14 FG</td>
<td>MO-400*</td>
<td>SO/SX400</td>
<td></td>
</tr>
<tr>
<td>FRSG 500</td>
<td>RMS-21 FG</td>
<td>MO-500A*</td>
<td>SO/SX500</td>
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<tr>
<td>FRSG 550</td>
<td>RMS-26 FG</td>
<td>MO-600A*</td>
<td>SO/SX600</td>
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<td>FRSG 600</td>
<td>RMS-32 FG</td>
<td>MO-600A*</td>
<td>SO/SX600</td>
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</tr>
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<td>FRSG 700</td>
<td>RMS-40 FG</td>
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*Grease filled with labyrinth seals • Interchange is dependent on the maximum required bore of the RINGSPANN FRHM. See Page 19. • Morse is a registered trademark of Borg Warner.
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<th>Formsprag</th>
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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

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<tbody>
<tr>
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<td>Phone:</td>
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<tr>
<td>Name:</td>
<td>Fax:</td>
</tr>
<tr>
<td>Department:</td>
<td>E-mail:</td>
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</tbody>
</table>

1. Where will the Backstop be used?
   1.1 Type of machine:
   - In the case of conveyor belts:
     - Angle of the steepest segment °
     - Multiple-drive?  Yes  No
   - If yes, number of drives
   1.2 Backstop location:
     - on the gearbox
     - on the motor
     - elsewhere:
   1.3 Arrangement:
     - on a shaft end
     - Diameter: inch
     - Length: inch
     - on a through shaft
     - Diameter: inch
     - on a pulley
     - on a sprocket
     - elsewhere:
   1.4 If possible, please include specification,
       data sheet, sketch or drawing with connection dimensions.

2. Operating data
   2.1 Speed at the backstop location (backstop shaft) nBP = rpm
   - 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.
   2.2 Nominal power of motor P0 = hp
   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)?
     - Yes  No
   2.4 Maximum backdriving torque Mmax = lb-ft
   2.5 Lifting capacity of the conveyor system PL = hp
   2.6 Number of daily stops: ______________
   2.7 Daily operating time: ______________ hours

3. Installation conditions
   3.1 Open, outside
   - Open, in a closed room
   - In the machine housing
     - Lubrication by means of oil bath or oil mist in the machine housing
     - Connection to the central lubrication system is possible
   - Name of lubricant:
   - Kinematic viscosity:
     - cst  °F  °C
   3.2 Should the backstop be releasable?
     - No  Yes, in an emergency
   - Yes, frequently
   3.3 Ambient temperature on the backstop:
     - from °F to °F
   3.4 Other (e.g. accessibility, dust susceptibility and other environmental influences that could be of significance):

4. Estimated requirements
   - Pieces
   - Pieces/month
   - Pieces/year

5. Enclosures
   - Specifications
   - Data sheet
   - Sketch/drawing
**Questionnaire for selecting RINGSPANN Overrunning Clutches**

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<tr>
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<td>Fax:</td>
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<tr>
<td>Department:</td>
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<td>E-mail:</td>
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1. **Where will the Overrunning Clutch be used?**

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

2. **Operating data**

   2.1 In driving operation the drive of the overrunning clutch will be carried out by:
   - Asynchronous motor
   - direct startup
   - A-Δ-start-up
   - Other electric motor
   - Type: ______________________
   - Combustion engine
   - Type: ______________________
   - Number of cylinders: ____
   - Turbine
   - Other (please explain in more detail):
   
   2.2 To be transmitted in driving operation:
   - Power: __________ hp or
   - Torque: __________ lb-ft

   2.3 Maximum torque __________ lb-ft (Important for drives that develop their maximum torque below their nominal speed.)
   2.4 Speed
   - 1. in driving operation: from _____ rpm to _____ rpm
   - 2. in freewheeling operation: (when overrunning clutch is disengaged)
     - Primary part (driver) from _____ rpm to _____ rpm
     - Secondary part (driven machine) from _____ rpm to _____ rpm

   2.5 Should the overrunning clutch be combined with a shaft coupling?
   - with an elastic coupling
   - with a torsionally stiff coupling

   2.6 If, upon start up, larger masses are to be accelerated:
   - Moment of inertia: \( J = _____ \) lb-ft\(^2\)
   - Speed of mass: \( n = _____ \) rpm

   2.7 Torque fluctuations/torsional vibrations during driving operation generate the following torque limits
   - Minimum torque \( M_{\text{min}} = _____ \) lb-ft
   - Maximum torque \( M_{\text{max}} = _____ \) lb-ft
   - Min-/Max.-torque is not known

   2.8 Daily operating time: _____ hours (hr)
   - thereof _____ (hr) driving operation
   - _____ (hr) freewheeling operation

3. **Installation conditions**

   3.1
   - Open, outside
   - Open, in a closed room
   - in the machine housing
   - Connection to the central lubrication system is possible
   - Name of lubricant: ______________________
   - Kinematic viscosity: _____ cst _____ °F _____ °C

   3.2 Ambient temperature on the freewheel:
   - from _____ °F to _____ °F

   3.3 Other (e.g. accessibility, dust susceptibility and other environmental influences that could be of significance):

4. **Estimated requirements**

   - Pieces (one-off)
   - Pieces/month
   - Pieces/year

5. **Enclosures**

   - Specifications
   - Data sheet
   - Sketch/drawing
Questionnaire for selecting
RINGSPANN Indexing Freewheels

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1. Where will the Indexing Freewheel be used?

1.1 Type of machine, machine group or installation, in which the indexing freewheel will be used:

1.2 Arrangement of the indexing freewheel (if possible, please include specification, data sheet, sketch or drawing with connection dimensions).

2. Operating data

2.1 Index angle of the indexing freewheel:
   from ° to °

2.2 Number of actuations (indexes) per minute:
   from _____ /min to _____ /min

2.3 The back and forth movement is made by:
   - [ ] freewheel outer ring
   - [ ] freewheel inner ring
   - [ ] other (please explain in more detail):

2.4 The back and forth movement is generated by:
   - bell crank
   - hydraulic cylinder
   - pneumatic cylinder
   - cam disk or plate
   - other (please explain in more detail):

2.5 Proposed shaft dimensions:
   - Diameter _____ inch
   - Length _____ inch

2.6 Normal torque:
   - M = _____ lb-ft
   - Maximum torque:
     - Mmax = _____ lb-ft (including peaks)

2.7 Daily operating time:
   _____ hours

3. Installation conditions

3.1 [ ] Open, outside
   - [ ] Open, in a closed room
   - [ ] in the machine housing
     - [ ] Lubrication by means of oil bath or oil mist in the machine housing
     - [ ] Connection to the central lubrication system is possible

3.2 Ambient temperature on freewheel:
   from _____ °F to _____ °F

3.3 Other (e.g. accessibility, dust susceptibility and other environmental influences that could be of significance):

   Name of lubricant:

   Kinematic viscosity:
   _____ cst _____ °F  _____ °C

4. Estimated requirement

   _____ Pieces  _____ Pieces/month  _____ Pieces/year

5. Enclosures
   - [ ] Specifications
   - [ ] Data sheet
   - [ ] Sketch/drawing