

Installation and Operating Instructions for Integrated Freewheels FXRV and FXRT

E 08.755e



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IMPORTANT

Please read these instructions carefully before installing and operating the product. Your particular attention is drawn to the notes on safety.

These installation and operating instructions are valid on condition that the product meets the selection criteria for its proper use. Selection and design of the product is not the subject of these installation and operating instructions.

Disregarding or misinterpreting these installation and operating instructions invalidates any product liability or warranty by RINGSPANN; the same applies if the product is taken apart or changed.

These installation and operating instructions should be kept in a safe place and should accompany the product if it is passed on to others -either on its own or as part of a machine- to make it accessible to the user.

SAFETY NOTICE

- Installation and operation of this product should only be carried out by skilled personnel.
- Repairs may only be carried out by the manufacturer or accredited RINGSPANN agents.
- If a malfunction is indicated, the product or the machine into which it is installed, should be stopped immediately and either RINGSPANN or an accredited RINGSPANN agent should be informed.
- Switch off the power supply before commencing work on electrical components.
- Rotating machine elements must be protected by the purchaser to prevent accidental contact.
- Supplies abroad are subject to the safety laws prevailing in those countries.

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1. General introduction

Integrated Freewheels FXRV and FXRT with release device 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 other direction of rotation there is contact between the inner and outer ring; in this direction it is possible to transmit high torque.

Integrated Freewheels FXRV and FXRT are used as:

- Backstops



Caution!

As Freewheels can be used as safety components, it is important to observe these installation and operating instructions carefully.

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2. Applications of Freewheels

Freewheels are used as backstops if reverse rotation of the operating direction is to be prevented. In many machines and installations, for technical safety or functional reasons, it is necessary to ensure that you are working in just one specified direction of rotation. This is why there are legal stipulations requiring a mechanical safety device for the operation of, e.g. 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.

With the use of backstops with torque limit for conveyors with multiple motor drives in excess of the adjusted torque M_R (see Catalog 84) of the torque limiter slips briefly, until gradually further backstops come to engage. In addition, the dynamic torque peaks of the blocking process are reduced.

In Integrated Freewheels FXRT the slide torque of the torque can be controlled by a sensitive release device to reduce to zero, so that the blocking effect is repealed (see Section 8).



Danger to life and limb!

The pressure bolts of the compression springs are protected by a locking wire to prevent loosening and loss.
If the locking wire is missed or damaged it is strictly forbidden to use the backstop .

3. Design

3.1 Design Integrated Freewheel FXRV

The Integrated Freewheels FXRV are designed as shown in Fig. [1]. The essential functional components are the inner ring (1), the outer ring (2), the sprag cage (3), the housing (4), the locking plate (6), the friction pads (7), the backstops flange (8) and the pressure springs (5).

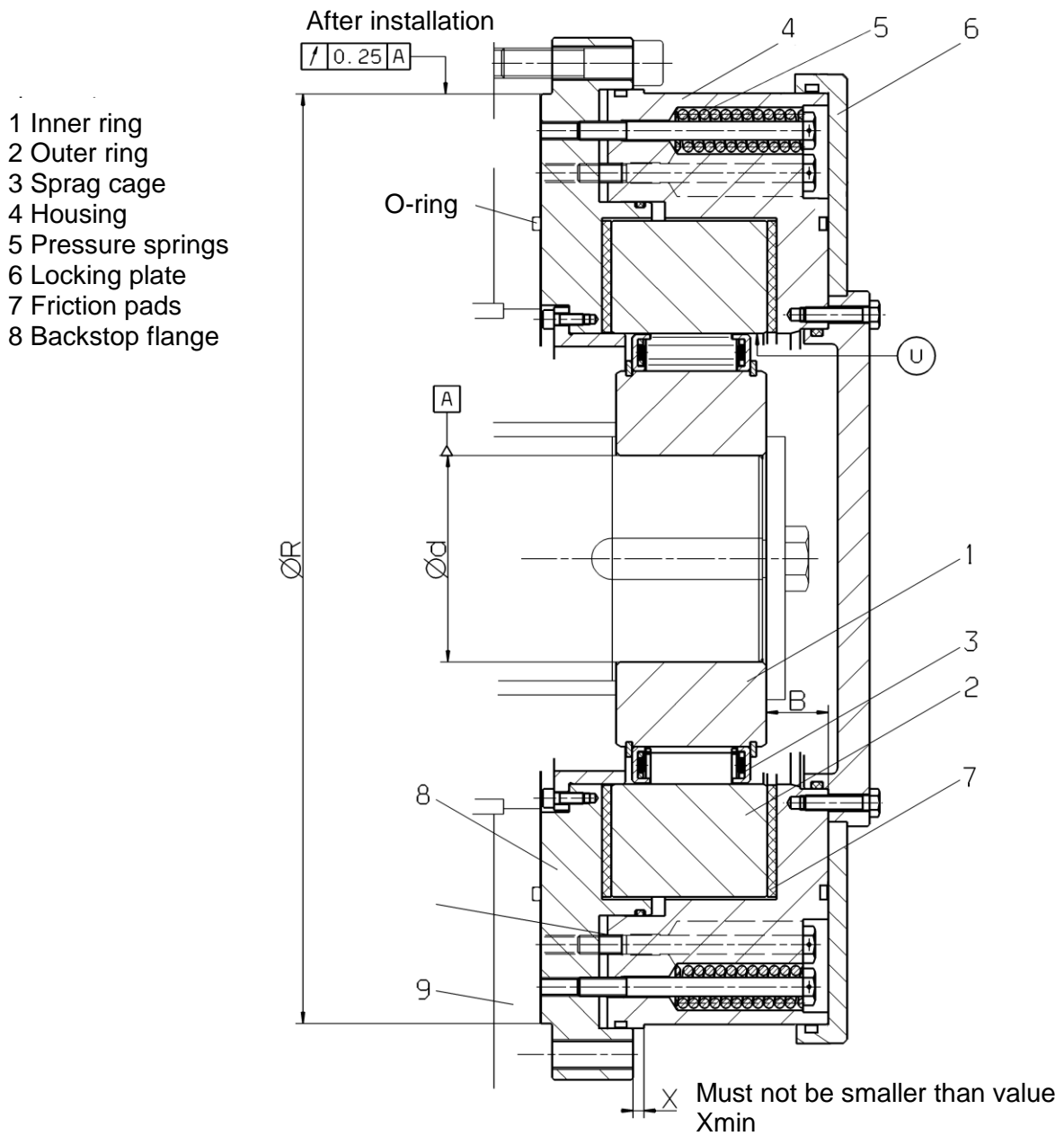


Fig. [1]

3.2 Design Integrated Freewheel FXRT

The Integrated Freewheels FXRT are designed as shown in Fig. [2]. The essential functional components are the inner ring (1), the outer ring (2), the sprag cage (3), the housing (4), the hexagonal screws (5), the locking plate (6), the friction pads (7), the backstops flange (8), the gearbox flange (9), the plate springs (10), the pressure springs (11), the locking taps (12) and the fixing screws (13).

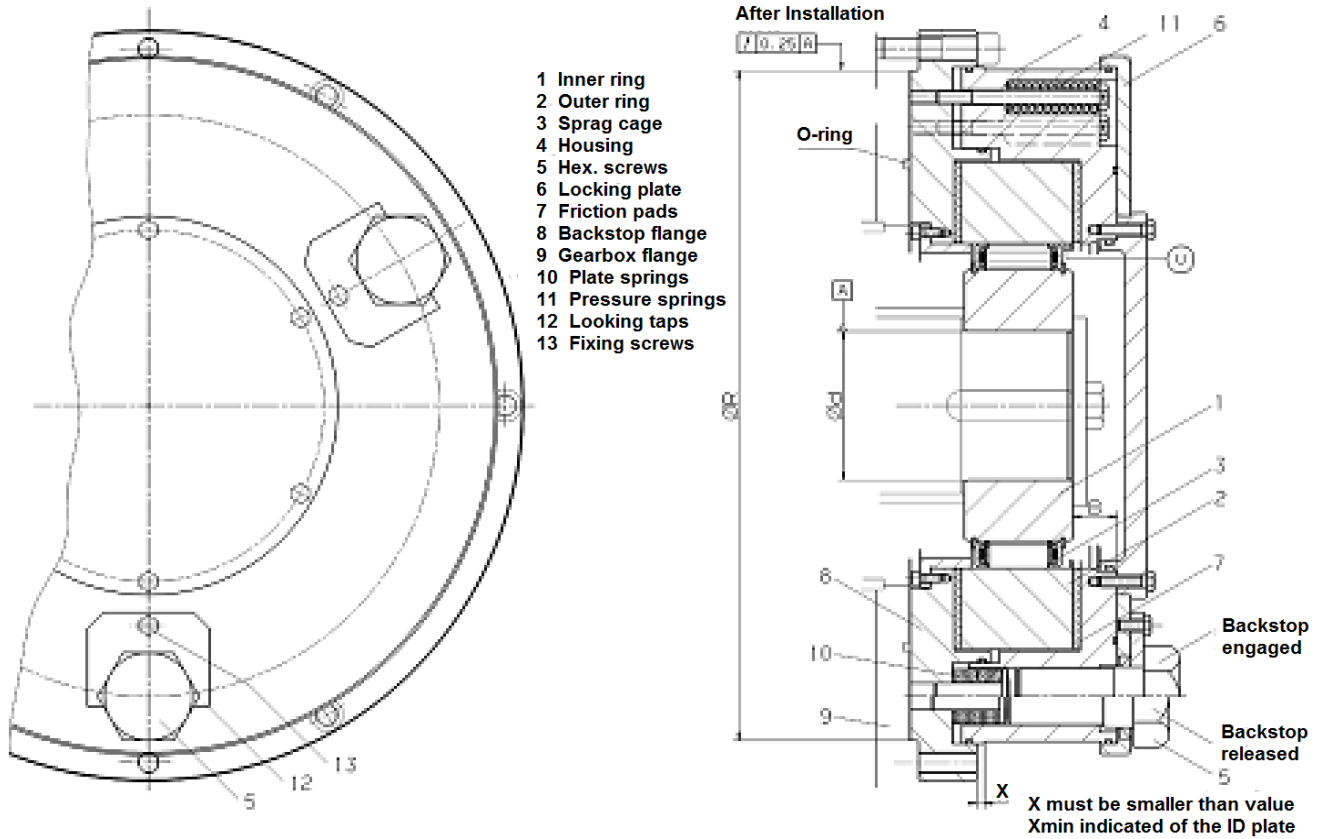


Fig. [2]

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4. Types

Type with sprag lift-off X

This type is designed for extended service life using sprag lift-off at high speed rotating inner ring.

It is identified by the suffix "X" at the end of the product designation.



Please note !

Further information especially on design, function and selection, permissible torques or permissible speeds of these freewheels is provided in RINGSPANN Catalog 84 "Freewheels". Please contact RINGSPANN GmbH if you need assistance.

5. General instructions



Caution!

The maximum permissible freewheel torque must not be exceeded due to torque peaks in specific applications.

The maximum freewheel torque should be calculated according to RINGSPANN Catalog 84. Please contact RINGSPANN if you need assistance.

Freewheel damage resulting by excessive torque peaks impair component function and can result in excessive overheating of the freewheel!



Caution!

Torsion vibrations (amplitudes and frequencies which result in engagement and release of the freewheel in rapid succession) must be avoided.

Torsion vibrations can result in overheating and the impairment of freewheel function!



Caution!

Operation of freewheels with centrifugal sprag lift-off below the lift-off speed results in sprag wear. Occasional start and stop operations during operation below lift-off speed for periods of less than 20 second are permitted.

Excessive sprag wear can result in overheating and the impairment of free-wheel function!

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Danger to life and limb!

It is strictly forbidden to load the conveyor over the maximum specified capacity. Otherwise the backstop will slip.



Danger to life and limb!

A damaged backstop is not able to hold the required torque.

6. Condition at delivery

The Integrated Freewheels FXRV and FXRT be supplied with adjusted slipping torque M_R of the torque limiter. They are ready to install and packed in anti-corrosion paper.

7. Technical requirements for safe operation

The bore in the inner ring normally has a tolerance of ISO H7. The tolerance of the shaft must be in this case ISO h6 or j6..

The key must have back play and may have only minimal width oversize, as otherwise the inner ring may be deformed.

The centering depth of the customer attachment part must be at least $C + 0,2$ mm. The tolerance of the pilot diameter of the attachment part must be ISO H7. (see RINGSPANN Catalog 84).

When freewheeling with speed above the lift-off speed, the freewheels operate in maintenance free mode and do not require any lubrication. Protection against corrosion should be provided..

The backstop normally shares the gearbox lubrication because the backstop is not sealed against the inner area of the gearbox. If an internal seal prevents the gearbox lubricant from reaching the backstop then squirt oil without friction-reducing additives into the sprag cage area.

8. Installation



Caution!


It is absolutely necessary to pay attention on these fits in order to limit the stresses in shaft and hub as well as on the keyway surface. Non-observance will cause undue expansion as well as cracking of the inner race and an accurate operation of the backstop will be impossible.

The direction of machine or system rotation must be determined prior to freewheel installation!

The direction of the arrow at the face of the sprag cage (3) corresponds to the freewheeling direction of the inner ring.

Please pay attention to the direction of the arrows on the gearbox housing.


The key should be have a tapped hole in the end for ease of fitting and removal.

	<p>Caution!</p> <p>The drive may not start against the freewheeling direction of rotation, as this could destroy the freewheel!</p>
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The temperature of the inner ring with sprag cage when assembling should not be lower than the temperature of the shaft.

Warm up if necessary the inner ring with the sprag cage. The maximum temperature may not exceed thereby 100 °C.

The torque limiter FXRV, consisting of the components 2, 4, 5, 6, 7, 8, 10 and 11 (see Figure [1]) or the torque limiter FXRT, consisting of the components 2, 4, 5, 6, 7, 8, 10, 11, 12 and 13 (see Figure [2]), is directly bolted on the gear flange (9). For the seal of the gear to the outside provides an O-ring or sealant.

	<p>Caution!</p> <p>If using sealing compound between fastening surface and face of the outer ring ensure that it is applied sparingly and evenly Surplus sealing that none is allowed to enter the sprag cage (3).</p>
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The fastening screws must comply with a material quality of 8.8 or 10.9 and you have a torque according to the following table using torque-tightened wrench.

Table: Torque for fastening screws:

Freewheel size	Screw size	Tightening torque	
		Quality 8.8	Quality 10.9
FXR.. 85- 40 MX	M 12	84 Nm	123 Nm
FXR.. 100- 50 MX	M 12	84 Nm	123 Nm
FXR.. 120- 50 MX	M 16	200 Nm	300 Nm
FXR.. 140- 50 MX	M 16	200 Nm	300 Nm
FXR.. 170- 63 MX	M 16	200 Nm	300 Nm
FXR.. 200- 63 MX	M 16	200 Nm	300 Nm
FXR.. 240- 63 LX	M 20	415 Nm	590 Nm
FXR.. 260- 63 LX	M 20	415 Nm	590 Nm
FXR.. 290- 70 LX	M 24	700 Nm	1000 Nm
FXR.. 310- 96 LX	M 24	700 Nm	1000 Nm

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Caution!

Non-observance the material quality and the tightening torque of the screws will cause damage since torque transmission is impossible, required holding load is not guaranteed.

All sprags in the sprag cage (3) must be turned against the spring force in lift-off position and be fixed in this position with the help of elastic ring or with a tensioning belt.

The inner ring (1) with sprag cage (3) is to be mounted as an assembly (do not disassemble!) on- to the shaft with key.

Check for correct handling of sprag cage i. e. the assembly can be mounted to suit either clock- wise or anti-clockwise shaft rotation. The arrow on the sprag cage shows the freewheeling direc- tion of the inner ring.

In order to ease the assembly of the inner ring on the shaft, coat the shaft and keyway lightly with anti-oxidant paste.



Caution!

Make sure that the elastic band or tensioning belt is removed when the sprags have entered the outer race..

When mounting the inner ring onto the shaft, pressure should only be exerted on the face of the inner ring; never apply force to the sprag cage or use a hammer!



Please note!

We recommends to assembly to use a assembly ring.
Closer information in addition finds you under Section 11 „Assembly ring”.

Lock the inner ring (1) axially onto the shaft with an end retaining plate, circlip or similar. Attend also the dimension given in the catalog.



Caution!

An incorrect position of the inner ring leads to malfunction and lead to a reduction of the maximum transmissible torque.

Check for correct axial position of the inner ring (1) within the torque limiter cavity by measurement of dimension „B“ (Fig. [1] and [2]). This should be within a tolerance of ± 1 mm of the values “dimension B” given in the following table. Adjust as necessary with spacer sleeves.

Freewheel size	dimension B
FXR.. 85- 40 MX	35.0 mm
FXR.. 100- 50 MX	30.0 mm
FXR.. 120- 50 MX	30.0 mm
FXR.. 140- 50 MX	30.0 mm
FXR.. 170- 63 MX	33.0 mm
FXR.. 200- 63 MX	33.0 mm
FXR.. 240- 63 LX	28.0 mm
FXR.. 260- 63 LX	23.0 mm
FXR.. 290- 70 LX	33.0 mm
FXR.. 310- 96 LX	57.0 mm

The run-out between the inner and the outer ring raceway shall be not more than 0.5 mm.

Check the run-out between the rotating inner ring and the bore of the outer ring by fastening a dial gauge indicator to the inner ring and located the sensor of the dial gauge indicator against raceway of the outer ring (point U in Fig. [1] and [2]).

Slowly turn the shaft 360° and determine the maximum run-out whilst ensuring that the bearing play is included in the run-out.

That leaves itself maximum run-out alternative by measuring the distance between the inner- (1) and outer ring (2) to determine. The measurement is all 90° at the extent with a internal measuring device e.g. "Intertest". The largest difference of the results of measurement lying in a line results in the run-out.



Caution!

In case the allowed run-out of 0.5 mm is exceeded the required torque can not be transmitted.

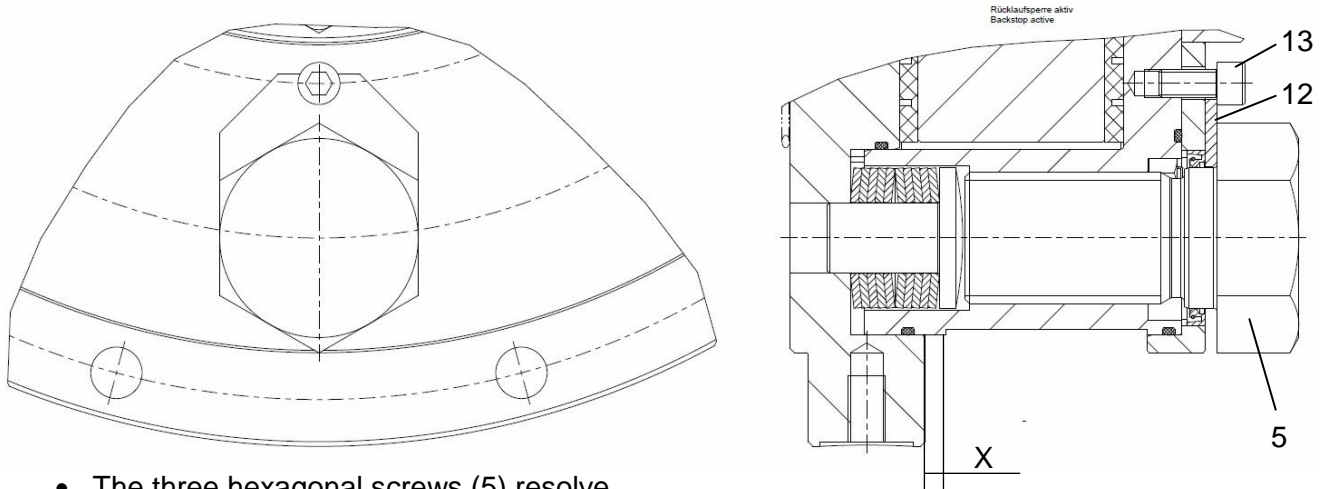
Possible causes of unacceptably high run-out:

	Causes
8.A	Dirt or uneven thickness of sealing compound between the mounting faces by backstop flange (8) and gearbox flange (9).
8.B	The mounting face on the gearbox is not perpendicular to the axis of the transmission shaft
8.C	If intermediate adapter plate is fitted between gear box and torque limiter mounting faces are not parallel or the mounting spigots on the two faces are not true to each other.
8.D	The roller bearings have too much clearance.
8.F	The shaft has too high run-out due to manufacturing failures

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9. Release device at Integrated Freewheel FXRT

9.1 Releasing the Integrated Freewheel FXRT due a blocked Conveyor Belt (see Fig. [2])



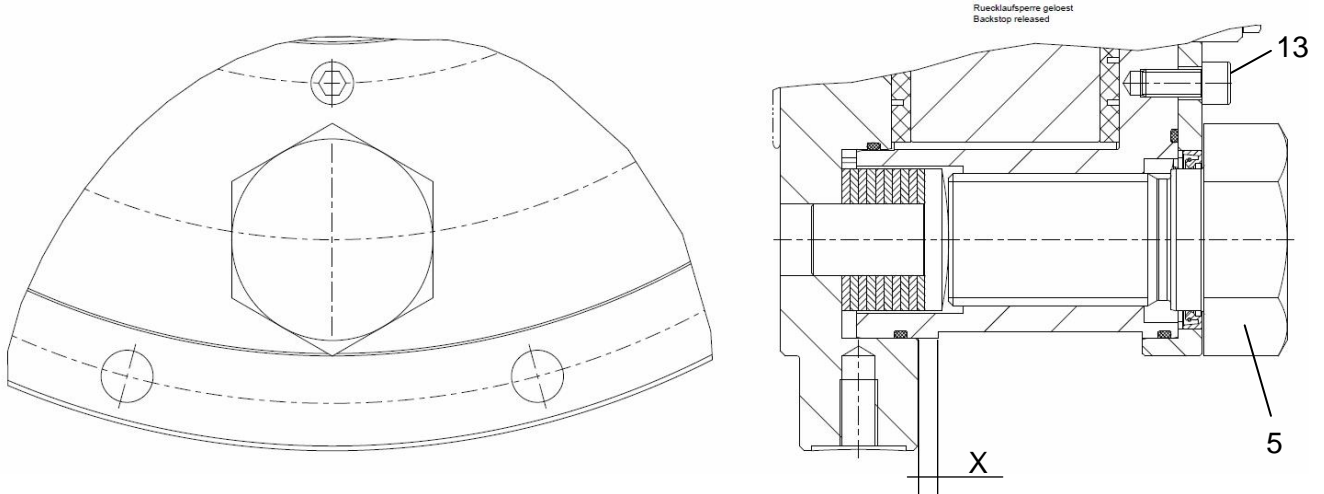
- The three hexagonal screws (5) resolve.
- Loosen the three hex head screws (13) and remove the three locking tabs (12).
- Turn the three hexagonal screws (5) clockwise until resistance is felt. Do not fully tighten!
- Turn the three hexagonal screws (5) on after the other by 60° at a time, until the Conveyor Belts begin to move.
- When the Conveyor Belt starts to run back, release the hexagonal screws (5) to stop the Conveyor Belt.



Please note!

The speed of the lock shaft may, if the torque was previously reduced to zero, max. 6 revolutions per minute. The time of the backward movement must not exceed 5 minutes. We believe that such transactions do not occur more often than twice a year. For different requirements, please consult us.
The torque limiter is **NOT** a brake for the Conveyor!

9.2 Integrated Freewheel FXRT make operational again



Before the operation can begin again, the Freewheel must again be made operational:

- Turn the three hexagonal screws (5) one by one approx. 60° counter-clockwise until they are completely loose.
- Fast the three locking tabs (12) with the hexagonal screws (13) back to their position
- By tightening the three hexagonal screws (5) the locking tabs (12) again secure.
- Check dimension X (see Fig. [2]). Dimension X must not be smaller than the value Xmin indicated on the ID plate.

	RINGSPANN GmbH D- 61348 Bad Homburg
	Typ: <input type="text" value="FXRT Mdyn Nm"/>
	Sechnr.: <input type="text" value="4867....."/>
	Serie: <input type="text" value="Xmin=...mm"/>



Danger to life and limb!

If dimension X is too small, the machine may not be started again! Friction torque may be excessively reduced due to friction pad wear. In this case, safe and proper function of the Backstop with Torque Limiter cannot be guaranteed. Please contact RINGSPANN if dimension X is too small.

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10. Maintenance interval

The Integrated Freewheels FXRV und FXRT with Torque Limiter are maintenance-free as there is no wear during the normal operation gives. Experience has shown that the units should give many years of trouble free service, as long as the initial fitting procedure is correctly followed, and the units are run within acceptable limits of run-out with clean protective lubricant. The inner ring with the cage is supported by the bearings within the gear box, and so the function is dependent upon the satisfactory condition of the bearings

If maintenance rules are required, then the following periodic checks are suggested:

10.1 Monthly check

- Make a simple check for excessive noise or temperature when the unit is in operation.
- Check the constant temperature between shaft and bearings.

Differences in temperature or internal unusual noise indicates a problem.

10.2 Examination after 12 months

Check for wear of friction pads by measurement of the distance „X“ (see Fig. [1] and [2]) from the face of the backstop flange (8) and the groove of housing (4). Dimension X must be not smaller than the value Xmin indicated on the ID plate.



Danger to life and limb!

If dimension X is too small, the machine may not be started again! Friction torque may be excessively reduced due to friction pad wear. In this case, safe and proper function of the Backstop with Torque Limiter cannot be guaranteed. Please contact RINGSPANN if dimension X is too small.

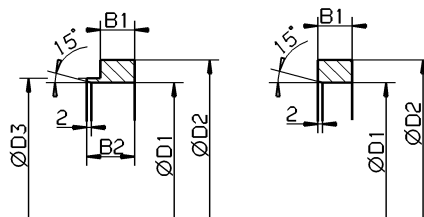
10.3 Possible causes of errors:

	Symptom	Cause
10.3.1	Excessive noise and heat	<p>Cause of the frictional contact within the unit between the rotating cage and the stationary outer ring.</p> <p>Remove the cover and check lubricant for dirt and debris. Check the run-out between the rotating inner ring (1) and the bore of the outer ring (2). Remove inner ring with cage and examine for signs of rubbing contact on cage side and outside diameter of cage side pieces.. Check the bore of outer ring and the sprags for signs of frictional contact and wear from friction contact..</p> <p>Remedy:</p> <p>(A) Check the installation. Replace the inner ring (1) and / or the freewheel cage (3).</p> <p>(B) If the outer ring is worn or damaged, send the torque limiter to RINGSPANN.</p>
10.3.2	<p>Burned friction pads</p> <p>Wear mark „X“ fallen below (see Section 9.2)</p>	<p>Powered reversal of the unit in either engaged or disengaged condition respectively driving the unit in backstop direction can cause excessive heat and wear, followed by destruction of the pads and of the internal spigot register of the outer race. The consequence is severe damage to the sprag cage and to the bore of the outer ring, and the outer diameter of the inner ring..</p> <p>In normal operation the torque limiter shares the torque by slipping a few degrees of angle. Therefore only little or no consequential measured wear on the friction pads will be generated.</p> <p>Solution:</p> <p>Please contact RINGSPANN.</p>

11. Use of the assembly ring:

11.1 Purpose

To facilitate assembly, a assembly ring is used. These keeps the sprags in the assembly required lift-off position. The assembly rings are available delivered by RINGSPANN.

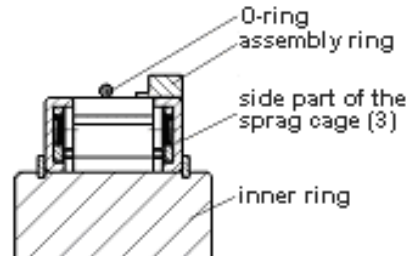


Freewheel size	D1 _{-0,1} [mm]	D2 [mm]	D3 [mm]	B1 [mm]	B2 [mm]
FXR.. 85-40 MX	124.4	144	128.4	8	26.5
FXR.. 140-50 MX	179.4	199	183.4	8	17.0
FXR.. 170-63 MX	209.4	229	–	16	–
FXR.. 200-63 MX	239.4	259	–	16	–
FXR.. 240-63 LX	309.0	329	313.0	15	21.0
FXR.. 290-70 LX	358.8	390	369.4	8	28.0
FXR.. 310-96 LX	378.8	410	389.4	5	30.0

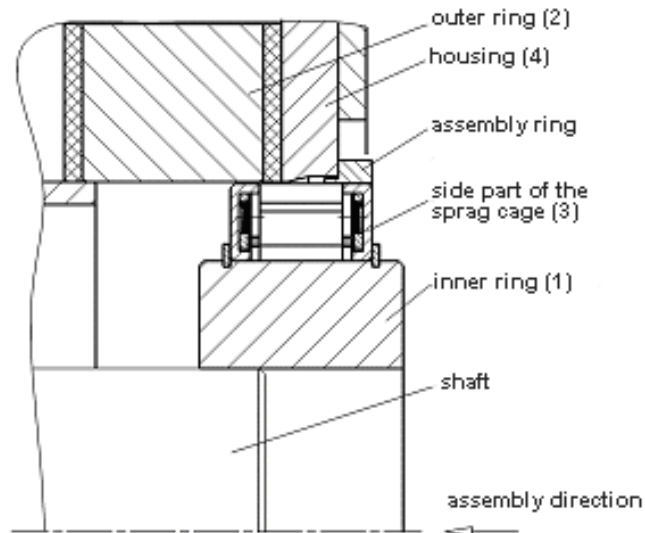
Assembly rings and/or their dimensions for sizes, which are not specified in the table, can be requested with RINGSPANN.

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11.2 Use of the assembly ring



After all sprags were swivelled with the help of a elastic ring or with a tensioning belt in lift-off position, the assembly ring becomes so far onto the sprag cage (3) pushed, until it is concise with the cage side part.



If the elastic ring and/or the tensioning belt is removed, all sprags are fixed by the assembly ring in the lift-off position. When pushing the inner ring (1) with the sprag cage (3) onto the shaft, the assembly ring rests against the housing of the torque limiter and becomes forced away from the sprag cage (3) constantly.

The assembly ring must lie against the housing (4), until it is forced away completely from the sprag cage. Only like that, it is ensured that all sprags into the outer ring (2) is correctly inserted.