RINGSPANN®
Power Transmission

Backstops

88

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Issue 09/04 - we reserve the right to make technical modifications.

1

Freewheel Function and Application as Backstop

Freewheel Function

Freewheels are machine elements with particular characteristics:

- In the one direction of rotation no driving contact between inner and outer ring; the freewheel is freewheeling.
- In the other direction of rotation driving contact between inner and outer ring; in this direction it is possible to transmit a high torque.

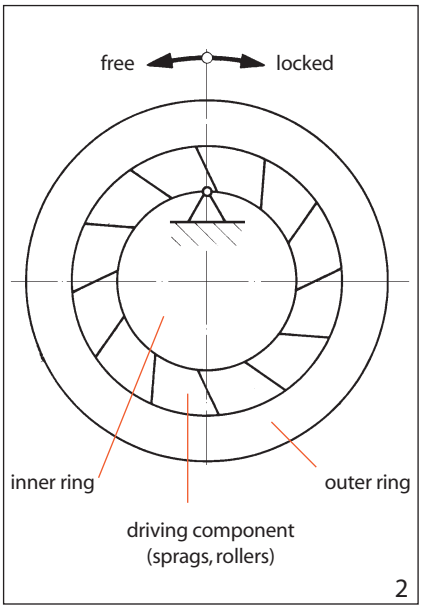
The charasteristics allow freewheels to fulfill various functions completely automatically in the most diverse machines. No mechanical or hydraulic operating equipment is needed, as is the case with couplings or brakes for example. Freewheels are used as:

- Indexing freewheels
- Overrunning clutches
- Backstops

RINGSPANN Freewheels are an essential design element in the machine and automotive industry as well as aviation technology. The freewheel as an automatic driving element is preferred to conventional solutions because of its decisive advantages offered in respect of

- Operating safety
- Economics
- Higher degree of automatisation.

By no means do these advantages create higher costs - on the contrary, the application of freewheels leads to reduced costs compared with solutions using separately controlled clutches or brakes as there are no control costs. For some designs the application of freewheels would be the one and only economical solution e.g. automatic transmission gears with hydrodynamic torque converters.



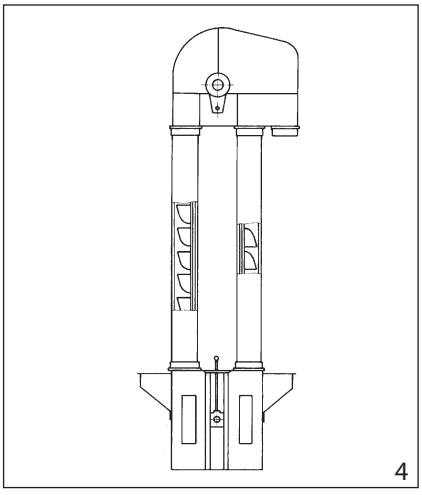
2

Application as Backstop

RINGSPANN Freewheels are used as backstops in order to prevent rotational movement against the operating direction of rotation because for safety or functional reasons many machines and installations should only operate in one - predetermined - direction of rotation. For example, there are regulations regarding the operation of conveyor installations which demand the fitting of a mechanical safety device. In fluid flow drives reverse running under pressure from the flow medium must be prevented at all cost so that a rotary pump, for example, is not driven as a turbine. In that case the speeds and centrifugal forces would overload and cause damage to both pump and driving motor. In this case and other application areas for RINGSPANN backstops described on page 4, the automatic locking of the backstop is guaranteed because of their function as automatic clutches.

When the normal operating condition is freewheeling; torque transmission (stopping) is at zero speed. The immediate shock-free response ensures the neccessary operating safety.

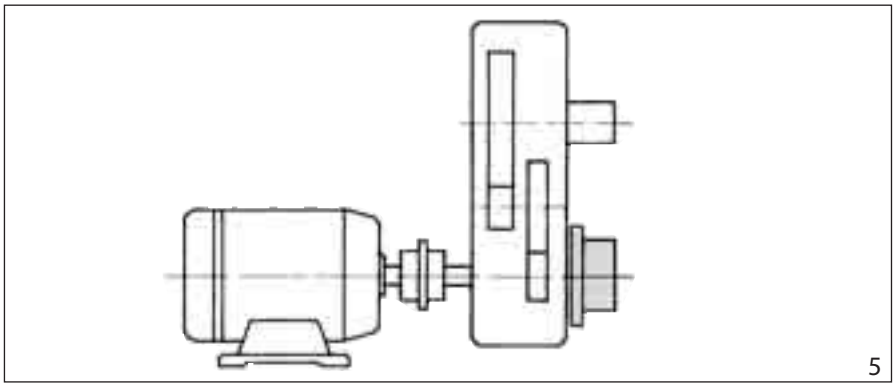

3


4

Areas of Application

Gear Reducers
Electric Motors
Geared Motors

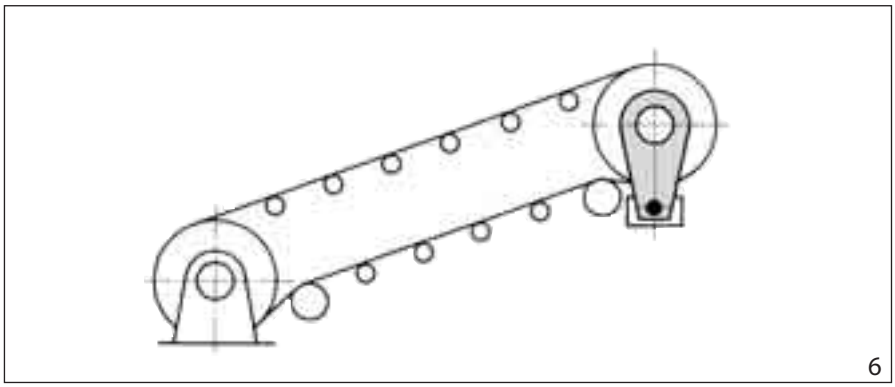
In drives on conveyor systems the backstop prevents the system from running back when shut off.



5

Inclined Conveyors
Elevators

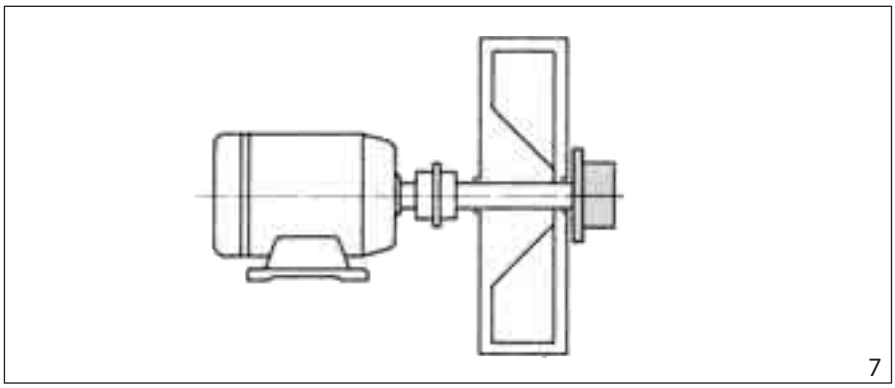
The backstop prevents the material being conveyed from running back in the event of current failure or when the motor is shut off.



6

Pumps
Blowers
Fans

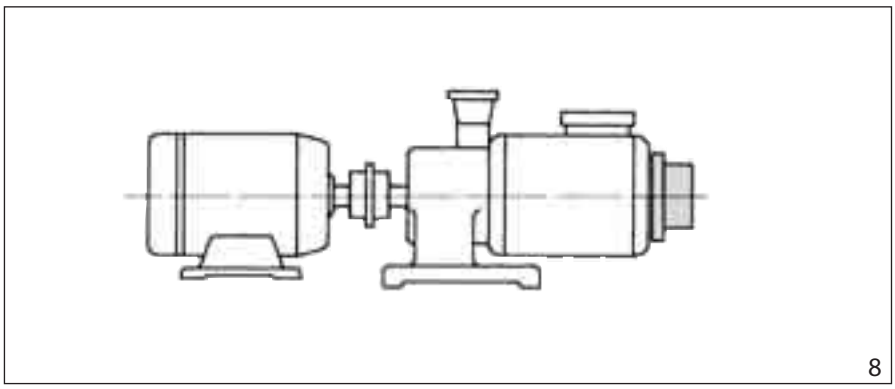
The backstop prevents these turning back when reverse pressure is exerted by the load.



7

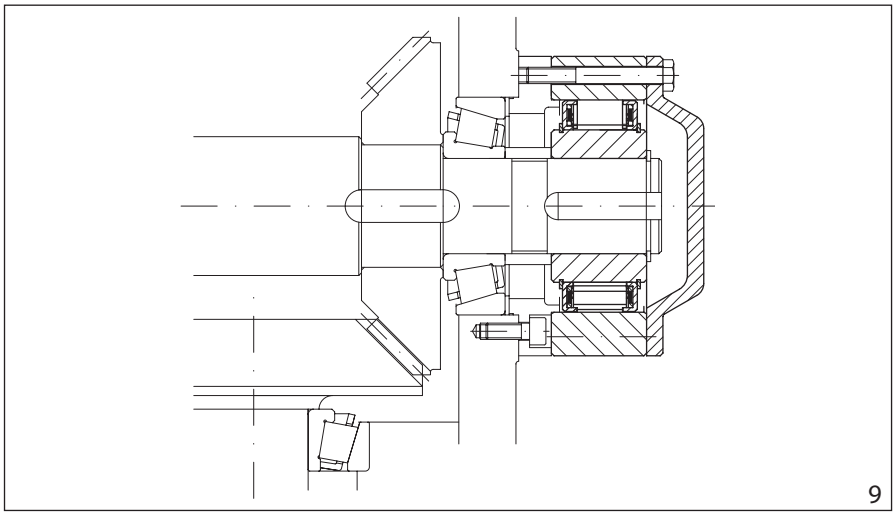
Pumps
Compressors

The backstop prevents these from starting up in the wrong direction of rotation.



8

Types of Backstops

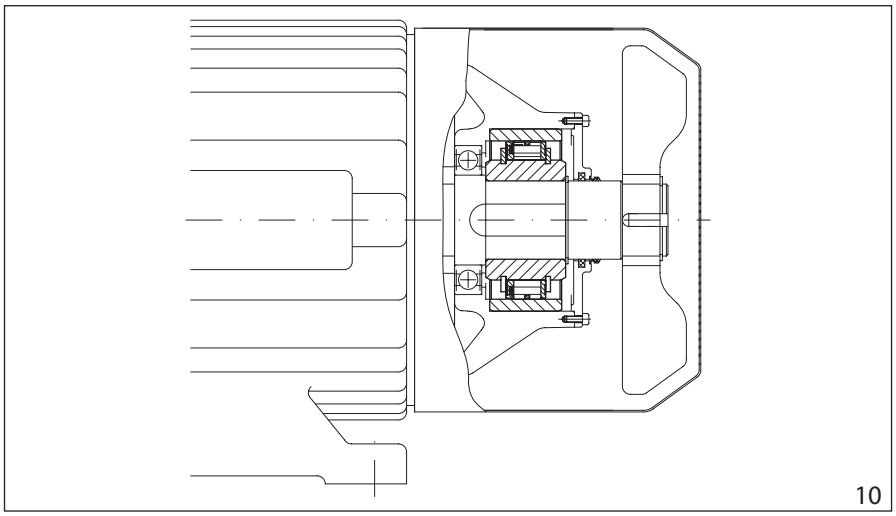


9

Internal Backstops - bolted on without Bearings

Backstops as an integral part for fitting to gear reducers, pumps etc. These backstops are not fitted with bearings and must therefore be mounted so that their bolted on outer rings are concentric with their inner rings. The series incorporating centrifugal lift-off sprags do not require any special lubrication, they are maintenance free.

Pages 10 to 15

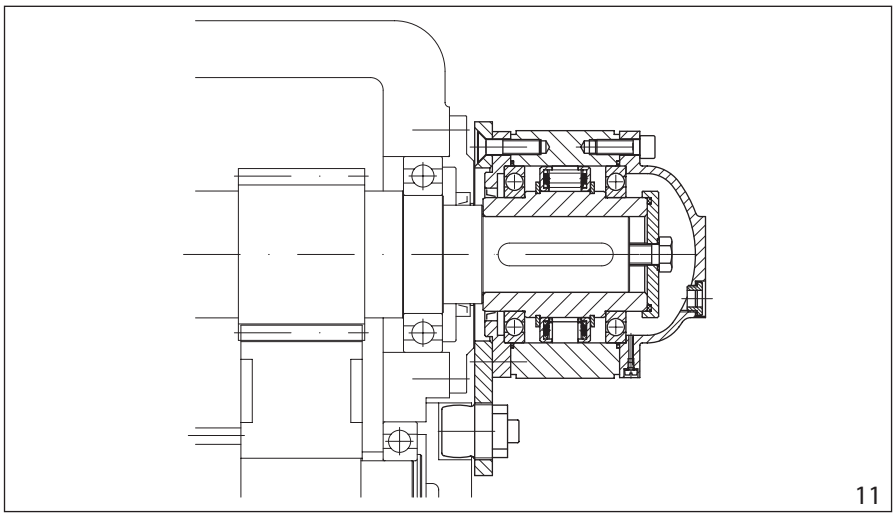


10

Internal Backstops - pressed in without Bearings

Backstops as an integral part for fitting to electric motors, gear reducers, pumps etc. These backstops are not fitted with bearings and must therefore be mounted so that their outer rings which are pressed in the housing are concentric with their inner rings. The series incorporating centrifugal lift-off sprags do not require any special lubrication, they are maintenance free.

Pages 16 to 18



11

External Backstops with Bearings and Torque Arm

Enclosed backstops with bearings and lubrication for external mounting to gears, belt conveyors, elevators, fans etc. The backdriving torque is secured via a torque arm. When the arm is released it is possible to rotate the shaft in either direction.

Pages 19 to 23

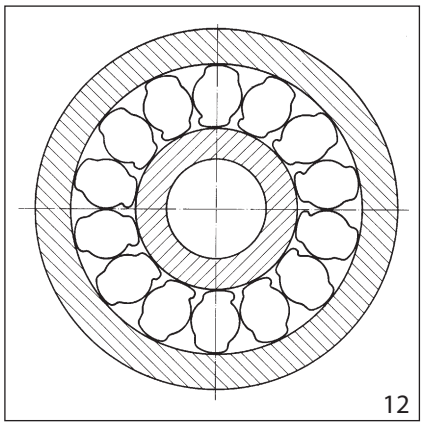
Backstops with sprags or rollers

two different designs of freewheels

Freewheels with sprag design

The sprag freewheel has outer and inner rings with cylindrical races. Arranged in between are the individually sprung sprags. The drive mode is free from slip. Due to varying sprag shapes several types are possible and can be supplied for:

- high torques
- high indexing accuracy
- noncontact overrunning operation



12

Operating Principle of Sprag Freewheels

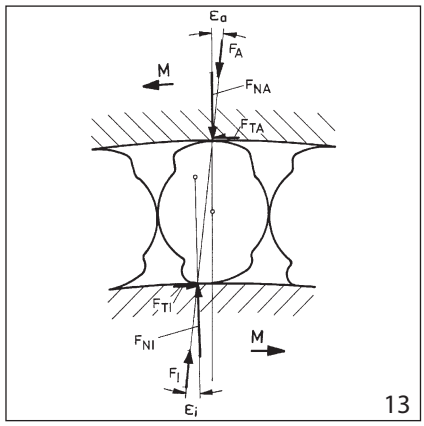
For the arrangement as shown in ill. 12, with the inner race stationary, the outer race can be turned freely in the clockwise direction. Turning the outer race in the anticlockwise direction, again with the inner race stationary, produces a self-locking effect with the sprags trapped, without slip, between the inner and outer races. In this direction it is possible to transmit a high torque. The forces F_I and F_A created in the inner and outer races along the load application line connecting the two points of contact are in equilibrium. The forces F_I and F_A can be resolved into the normal forces F_{NI} and F_{NA} and the tangential forces F_{TI} and F_{TA}. The load application line and the normal force F_{NI} form the clamping angle ε_i. To achieve self-locking the tangent of the clamping angle must be smaller than the coefficient of friction μ.

$$\tan \varepsilon_i = \frac{F_{TI}}{F_{NI}} \leqq \mu$$

Based on the following formula:

$M = R_I \cdot F_{TI} = R_I \cdot F_{NI} \cdot \tan \varepsilon_i$

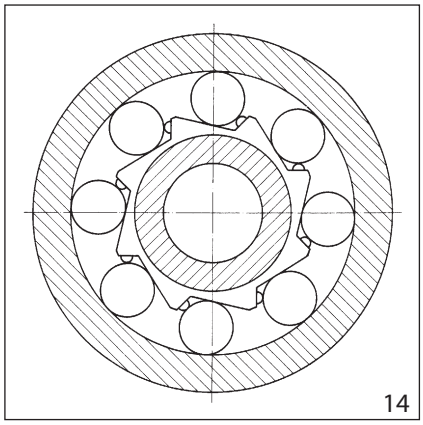
the locking of the sprags adjusts automatically to the existing torque M.



13

Freewheels with roller design

The ramp freewheel is equipped with roller ramps on either the inner or the outer ring, the other ring having a cylindrical race. The individually sprung rollers are arranged in between. The drive mode operates free from slip.

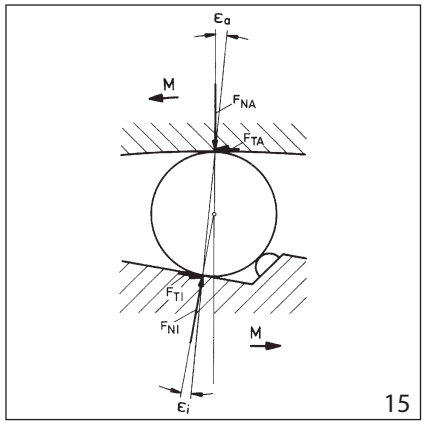


14

Operating Principle of roller Freewheels

RINGSPANN ramp freewheels are built with an inner star or outer star. Ill. 14 shows such a freewheel with an inner star. With the built-in version shown here, the outer ring can be rotated freely in a clockwise direction. Turning the outer ring in the opposite direction produces the clamping effect. The rollers are trapped without slip between the outer ring and inner star.

In respect of the ratio of forces, the same logic applies as for sprag freewheels.



15

Backstops with sprags
for long service life

Series with RIDUVIT®-Sprags

RINGSPANN sprags are manufactured from chromium steel, as used for ball and roller bearings. The high pressure resistance, elasticity and resilience of this material is nesessary for the sprags during the locked stage. During freewheeling, however, everything depends on maximum resistance to wear at the contact points sprags/inner ring.

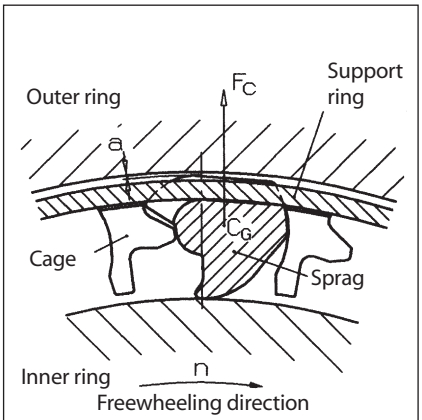
All these requirements are fulfilled to maximum effect by a chromium steel sprag with RIDUVIT coating. The RIDUVIT coating gives the sprag a hard metal type wear resistance. The technology applied here is based on the most recent findings of tribological research. RIDUVIT sprags in backstops increase the operating life many times over.

Series with Centrifugal Lift-Off X

The centrifugal lift-off X is used in backstops when the inner ring of the freewheel (shaft) rotates at high speed during overrunning (freewheeling). Here the centrifugal force F_C causes the sprag to lift off the outer race during freewheeling. In this operating mode the freewheel runs without wear, i.e. with limitless life.

Ill. 16 shows a RINGSPANN freewheel with centrifugal lift-off X in freewheeling mode. The sprags and support ring rotate with the inner ring. The centrifugal force F_C has turned the sprag anticlockwise causing it to locate on the support ring. That has created the gap a between sprag and outer race. The freewheel is thus operating without any friction.

When the speed of the inner ring has dropped sufficiently to reduce the effect of the centrifugal force to less than the spring force, the sprag locates once more on the outer ring and the freewheel is ready to lock, (Ill. 17). These backstops may also be operated below the lift-off speed. In that case either an oil bath or an oil supply between sprag cage and outer race should be provided. Even so, the life under such operating conditions is limited if no hydrodynamic assistance of the sprags can be achieved. Please refer to us regarding life expectancy when operating below the lift-off speed by using the questionnaire on page 27.



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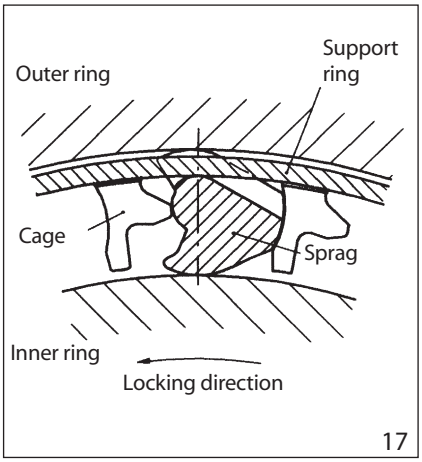


17

Calculation of Transmissible Torque

Transmissible Torque

The calculation of the transmissible torque assumes an accurate knowledge of the geometrical relation between the outline of the sprag and the freewheel races. With a sprag freewheel with cylindrical inner and outer races, the formula for the inner clamping angle is as follows (see ill. 18):

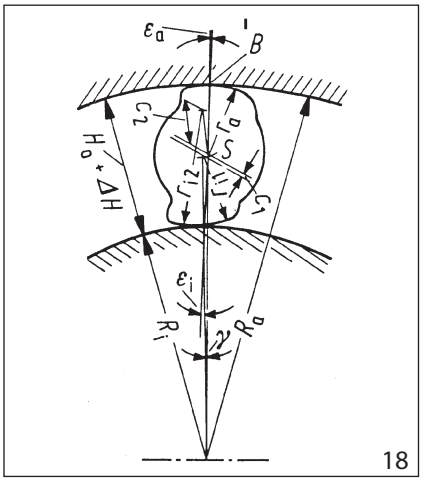
$$\tan \varepsilon_i = \frac{Ra}{Ra - Ri} \sqrt{\frac{c^2 - (Ri + ri - Ra + ra)^2}{(Ri + ri)(Ra - ra)}}$$

When calculating the transmissible torque it is also necessary to take into consideration the elastic deformations of the freewheel rings. These deformations are created by the large radial forces which the sprags exert on the rings during the locking process. This requires the solving of differential equations which describe the relation between pressures and deformations in the rings. The distribution of hertzian surface pressure on the contact points between sprags and races is represented by Fourier's series and inserted in the differential equation as a boundary condition. Subject to continuously increasing forces the geometric values, deformations and pressures are calculated and compared with the permitted limit values by using an iteration method. The following limits must be observed:

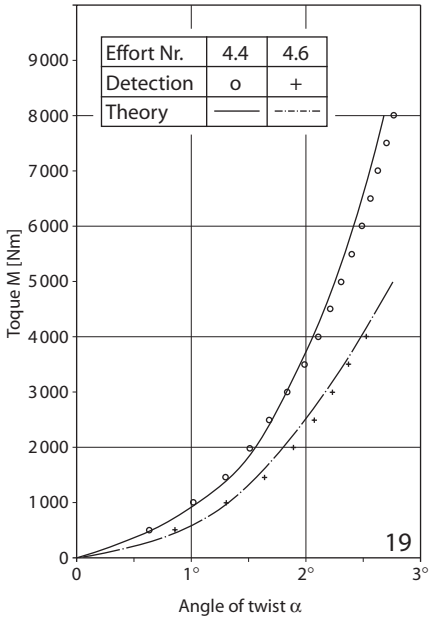
- hertzian pressure on the contact points
- limit of clamping angle
- tangential stress in the rings
- limit of gripping angle

Also considered in the calculation is the effect of eccentric races. The calculation also provides the torsion characteristic of the freewheel (see ill. 19) which is particularly relevant for the dynamic calculations of the whole installation.

The nominal torques M_N in the table contain a safety factor of 2. The transmissible torques calculated according to the above method are therefore twice as high than the values shown in the catalogue tables.



18



19

Selection of Backstop Size

Selection of Backstop Sizes

Stopping a loaded inclined conveyor belt, an elevator or, for example a pump, is a highly dynamic process during which high peak torques M_{max} occurs. These peak torques determine the size of the backstop. The most reliable method to predict the torque occurring during a locking action is with an exact vibration calculation of the whole system. But this does assume that the factors regarding rotational inertia and spring stiffness etc. of the various elements of the system are known. In many cases, however, a vibration calculation is too involved. Alternatively, the experience based method to determine the selection torque M_A could be used, as follows:

$$M_A = 1{,}75 \cdot M_L \text{ [Nm]} \quad (1)$$

Often only the nominal motor power P_0 [kW] is known. In that case the calculation is as follows:

$$M_A = 1{,}75 \cdot 9550 \cdot \eta^2 \cdot P_0/n_{sp} \text{ [Nm]} \quad (2)$$

In these equations:

M_A = Selection torque of backstop [Nm]

M_L = $9550 \cdot \eta \cdot P_L/n_{sp}$ [Nm] (3)

= Statistic backdriving torque of load relative to the shaft of the backstop [Nm]

P_L = Elevating power of the conveyor installation under full load [kW]

= Conveyor lift [m] multiplied by load conveyed per second [kN/s]

P_0 = Nominal Power of motor [kW]

n_{sp} = Revolutions per minute of backstop shaft [min^{-1}]

η = Efficiency of installation

$$= \frac{\text{Elevating power}}{\text{Elevating power} + \text{Power loss}}$$

After calculating M_A the backstop size is selected according to the catalogue table so that always the following applies:

$$M_N \geqq M_A \quad (4)$$

M_N = Nominal torque of backstop according to the tables [Nm]

The above method of selection does not apply to backstops of the series FXRV and FXRT; which should be selected according to the instructions on page 13.

If you are unsure, please contact RINGSPANN, giving precise details of the installation and the operating conditions or preferably fill in the questionnaire on page 27. We shall be pleased to advise you regarding the selection of the right size of backstop.

Approximate values for η:

Type of Installation	η	η^2
Conveyor belts, gradient up to 6°	0,71	0,50
Conveyor belts, gradient up to 8°	0,78	0,61
Conveyor belts, gradient up to 10°	0,83	0,69
Conveyor belts, gradient up to 12°	0,86	0,74
Conveyor belts, gradient up to 15°	0,89	0,79
Screw pumps	0,93	0,87
Ball mills, drying drums	0,85	0,72
Bucket conveyors, elevators	0,92	0,85
Hammer mills	0,93	0,87

Internal Backstops FXM - bolted on
for high torques und high speeds
with sprags and centrifugal lift-off X

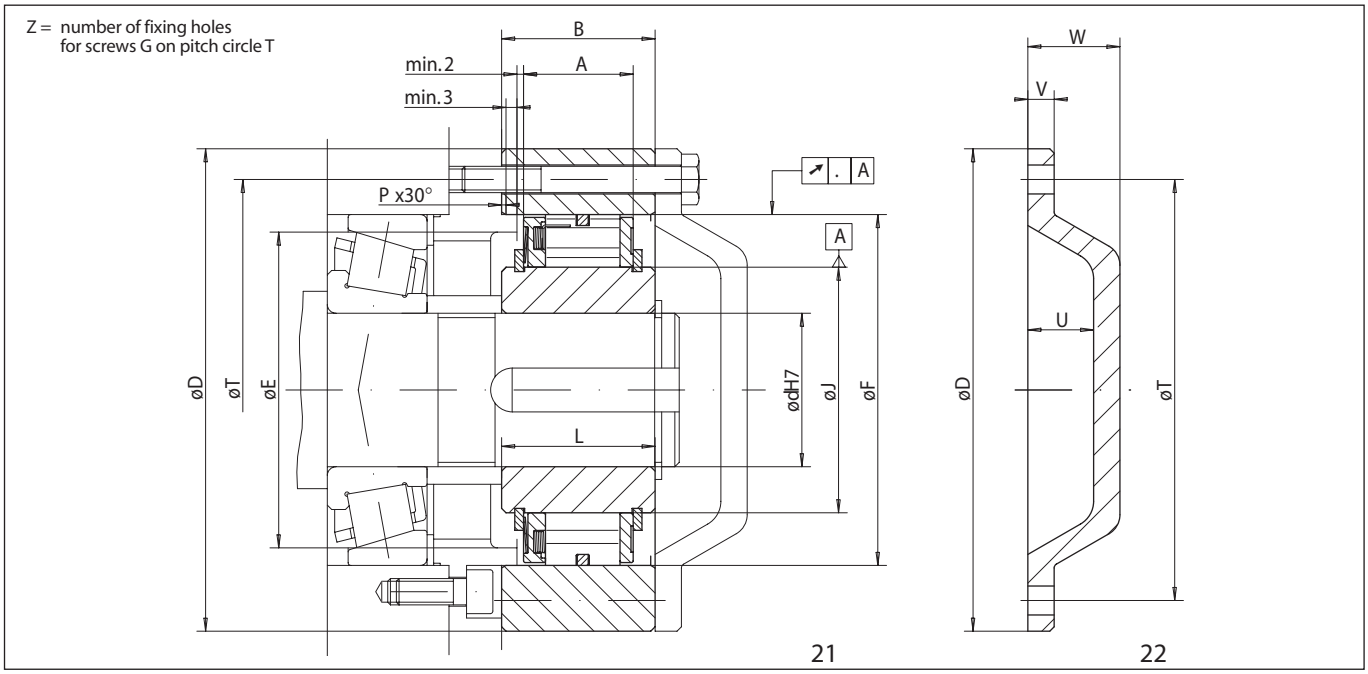
Type	Art. no.	Theo. nominal torque	Nominal torques M_N at existing run out T.I.R.						Lift-off speed	Max. speed
		⌖ 0 A	⌖ 0,1 A	⌖ 0,2 A	⌖ 0,3 A	⌖ 0,4 A	⌖ 0,5 A	⌖ 0,8 A		
		Nm	Nm	Nm	Nm	Nm	Nm	Nm	min^{-1}	min^{-1}
FXM 31 - 17 DX	4867.031.200	100	100	95	–	–	–	–	890	5 000
FXM 38 - 17 DX	4867.038.200	150	140	130	–	–	–	–	860	5 000
FXM 46 - 25 DX	4867.046.200	390	380	350	–	–	–	–	820	5 000
FXM 51 - 25 DX	4867.051.200	480	470	420	–	–	–	–	750	5 000
FXM 56 - 25 DX	4867.056.200	580	570	490	–	–	–	–	730	5 000
FXM 61 - 19 DX	4867.061.200	420	410	370	–	–	–	–	750	5 000
FXM 66 - 25 DX	4867.066.200	800	780	700	–	–	–	–	700	5 000
FXM 76 - 25 DX	4867.076.200	1 050	1 040	890	–	–	–	–	670	5 000
FXM 86 - 25 DX	4867.086.200	1 350	1 300	1 030	–	–	–	–	630	5 000
FXM 101 - 25 DX	4867.101.200	1 700	1 600	1 400	–	–	–	–	610	5 000
FXM 85 - 40 SX	4867.085.501	1 900	1 900	1 800	1 800	1 700	1 600	–	430	6 000
FXM 100 - 40 SX	4867.100.501	2 700	2 600	2 500	2 400	2 200	2 000	–	400	4 500
FXM 120 - 50 SX	4867.120.501	6 500	6 300	5 800	4 800	4 400	3 600	–	320	4 000
FXM 140 - 50 SX	4867.140.502	8 700	8 500	7 900	6 700	5 500	5 400	–	320	3 000
FXM 170 - 63 SX	4867.170.502	20 000	19 000	16 000	14 000	13 000	12 000	–	250	2 700
FXM 200 - 63 SX	4867.200.501	26 000	23 000	20 500	17 500	15 500	14 000	–	240	2 100
FXM 240 - 63 UX	4867.240.501	31 000	30 500	30 000	29 000	26 000	24 000	19 500	220	3 000
FXM 240 - 96 UX	4867.240.502	52 050	51 000	49 000	47 500	46 000	44 000	35 000	220	2 500
FXM 260 - 63 UX	4867.260.501	38 500	38 000	37 000	36 500	33 000	29 000	25 000	210	2 500
FXM 290 - 70 UX	4867.290.501	59 500	59 000	56 000	50 000	47 000	45 000	37 000	200	2 500
FXM 290 - 96 UX	4867.290.502	91 000	90 000	82 500	77 500	70 000	62 500	55 000	200	2 500
FXM 310 - 70 UX	4867.310.500	69 000	68 000	64 500	60 000	55 000	49 000	43 000	195	2 500
FXM 310 - 96 UX	4867.310.501	107 000	105 000	99 000	85 500	81 000	74 000	68 000	195	2 100
FXM 320 - 70 UX	4867.320.500	76 500	73 000	67 000	62 000	56 500	49 500	43 000	195	2 000
FXM 360 - 100 UX	4867.360.500	149 000	139 500	128 000	119 500	103 500	90 000	80 500	180	1 800
FXM 410 - 100 UX	4867.410.500	193 000	179 500	167 000	154 500	137 000	121 500	111 500	170	1 500
FXM 2.410 - 100 UX	4867.410.100	364 000	350 000	315 000	296 500	277 500	266 000	223 500	210	1 500

The maximum transmissible torque is twice the shown torque. Therefore, the peak torque should not exceed twice the nominal torque. The theoretical torque presumes perfect concentricity between inner and outer ring. In practice the concentricity is affected by bearing play and concentricity errors of the adjacent parts. Then the nominal torques in the table apply which take into consideration the existing T.I.R. Higher speeds on request.

Characteristics

Backstops for high performance. The large amount of permissible radial runout means that the backstop can be attached without difficulty even to shafts carried in taper roller bearings or plain bearings. Sprags with centrifugal lift-off ensure maximum life. No special lubrication is required for speeds above the lift-off speed. This backstop is therefore maintenance free. When operating below the lift-off speed please refer to us by using the questionnaire on page 27.

Internal Backstops FXM - bolted on
for high torques and high speeds
with sprags and centrifugal lift-off X



Type	Bore d standard							A	B	D	E	F	G	J	L	P	T	U	V	W	Z
	mm	mm	mm	mm	mm	mm	max. mm	mm	mm	mm	min. mm	mm		mm	mm	mm	mm	mm	mm	mm	
FXM 31 - 17 DX	20*	–	–	–	–	–	20*	17	25	85	41	55	M6	31	24	1	70	15	6	21	6
FXM 38 - 17 DX	25*	–	–	–	–	–	25*	17	25	90	48	62	M6	38	24	1	75	15	6	21	6
FXM 46 - 25 DX	25	–	–	–	–	–	30	25	35	95	56	70	M6	46	35	1	82	15	6	21	6
FXM 51 - 25 DX	25	30	35	–	–	–	36	25	35	105	62	75	M6	51	35	1	90	15	6	21	6
FXM 56 - 25 DX	35	–	–	–	–	–	40	25	35	110	66	80	M6	56	35	1	96	15	6	21	8
FXM 61 - 19 DX	30	35	40	–	–	–	45*	19	27	120	74	85	M8	61	25	1	105	15	6	21	6
FXM 66 - 25 DX	35	40	45	–	–	–	48*	25	35	132	82	90	M8	66	35	1	115	15	8	23	8
FXM 76 - 25 DX	45	55	–	–	–	–	60*	25	35	140	92	100	M8	76	35	1	125	15	8	23	8
FXM 86 - 25 DX	40	45	50	60	65	–	70*	25	40	150	102	110	M8	86	40	1	132	15	8	23	8
FXM 101 - 25 DX	55	70	–	–	–	–	80*	25	50	175	117	125	M10	101	50	1	155	20	8	28	8
FXM 85 - 40 SX	45	50	60	65	–	–	65	40	50	175	102	125	M10	85	60	1	155	20	8	28	8
FXM 100 - 40 SX	45	50	55	60	70	75	80*	40	50	190	130	140	M10	100	60	1.5	165	25	10	35	12
FXM 120 - 50 SX	60	65	70	75	80	95	95	50	60	210	150	160	M10	120	70	1.5	185	25	10	35	12
FXM 140 - 50 SX	65	90	100	110	–	–	110	50	70	245	170	180	M12	140	70	2	218	25	12	35	12
FXM 170 - 63 SX	70	85	90	100	120	–	130	63	80	290	200	210	M16	170	80	2	258	28	12	38	12
FXM 200 - 63 SX	130	–	–	–	–	–	155	63	80	310	230	240	M16	200	80	2	278	32	12	42	12
FXM 240 - 63 UX	–	–	–	–	–	–	185	63	80	400	280	310	M20	240	90	2	360	48	12	60	12
FXM 240 - 96 UX	–	–	–	–	–	–	185	96	125	420	280	310	M24	240	120	2	370	48	15	60	16
FXM 260 - 63 UX	–	–	–	–	–	–	205	63	80	430	300	330	M20	260	105	2	380	48	18	60	16
FXM 290 - 70 UX	–	–	–	–	–	–	230	70	80	460	330	360	M20	290	105	2	410	48	18	60	16
FXM 290 - 96 UX	–	–	–	–	–	–	230	96	110	460	330	360	M20	290	120	2	410	48	18	60	16
FXM 310 - 70 UX	–	–	–	–	–	–	240	70	125	497	360	380	M20	310	110	3	450	48	18	60	24
FXM 310 - 96 UX	–	–	–	–	–	–	240	96	125	497	360	380	M20	310	120	3	450	48	18	60	24
FXM 320 - 70 UX	–	–	–	–	–	–	250	70	80	490	360	390	M24	320	105	3	440	55	20	68	16
FXM 360 - 100 UX	–	–	–	–	–	–	280	100	120	540	400	430	M24	360	125	3	500	55	20	68	24
FXM 410 - 100 UX	–	–	–	–	–	–	320	100	120	630	460	480	M24	410	125	3	560	55	20	68	24
FXM 2.410 - 100 UX	–	–	–	–	–	–	320	200	220	630	460	480	M30	410	220	3	560	55	20	68	24

Keyway according to DIN 6885, p. 1. Bores marked * have keyways to DIN 6885, p. 3. Keyway width: tolerance class IT10. Other bore diameters made to order.

Supply

Optional cover (ill. 22) available on request. Please note separately on your order.

Mounting Instructions:

The backstop is not fitted with bearings so that the outer ring must be mounted concentric with the inner ring. The maximum permitted limits for T.I.R. must be adhered to (see table on page 10). Shaft tolerance should be ISO h6 or j6. As tolerance of the pilot diameter at the intermediate flange for the diameter the outer ring F we recommend h6 or j6.

Internal Backstops FXRV and FXRT - bolted on
with Torque Limiter
with or without Controllable Release Facility

Backstop with Torque Limiter

The backstop with torque limiter solves the problem of uneven distribution of the backdriving torque on conveyors with multiple drives where each drive is fitted with its own backstop. The backstop contains a torque limiter which balances the previously uneven torque distribution when the load comes to a standstill.

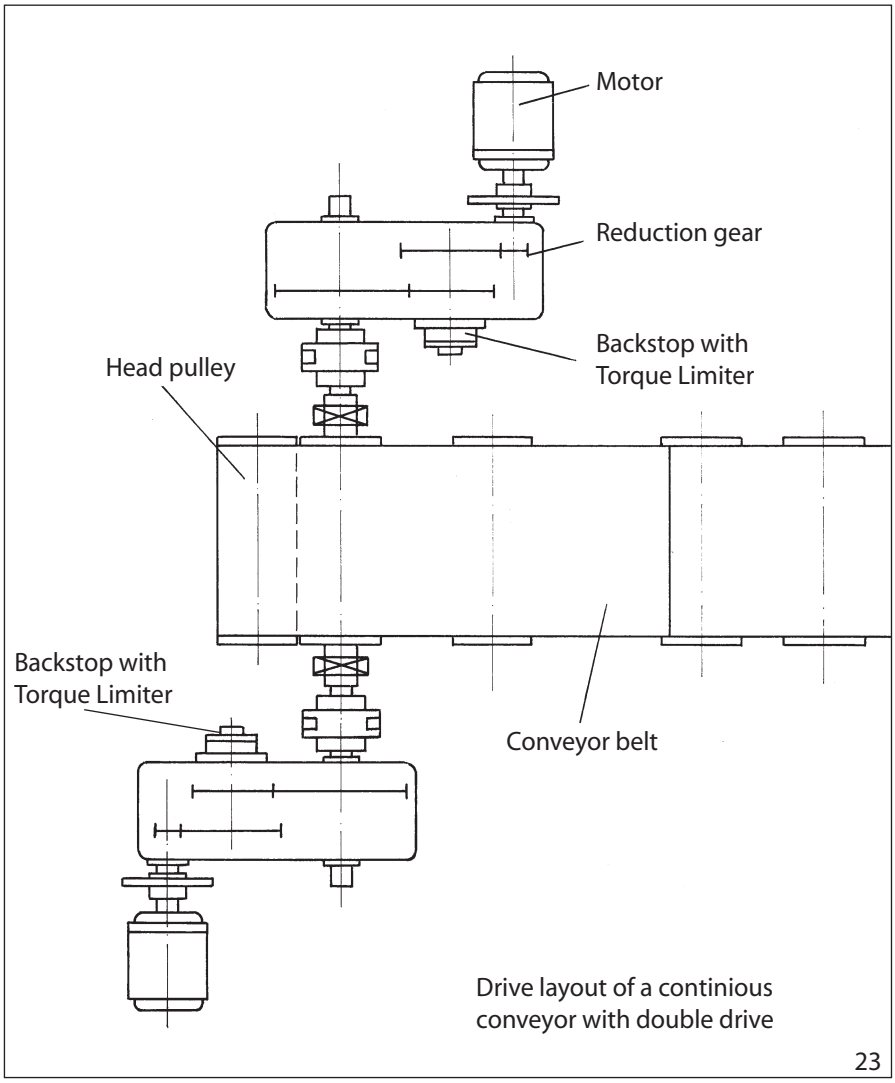
The dynamic peak torques of the stopping process are reduced so that the reduction gear is protected against damaging peak torques.

The backstop is equipped with centrifugal lift-off X and therefore operates without wear.

This backstop therefore represents a valuable design element to increase operating safety in ascending conveyors. The backstops have proved very reliable in the most demanding conditions, particularly in the coal mining industry.

Advantages

- Protection of gears against dynamic peak torques during the backstopping process
- Protection of gears against overload through unevenly distributed load by multiple gears
- Smaller dimensioned gears can be used without affecting operating safety
- Protection for backstops because the torque limiter cuts off the dynamic peak torques



Drive layout of a continious conveyor with double drive

23

Series FXRV Internal Backstop with Torque Limiter without Controllable Release Facility

This series of backstops with torque limiter is the simpler design. The construction and available standard sizes are shown on page 14.

Series FXRT Internal Backstop with Torque Limiter with Controllable Release Facility

Designed like the series FXRV but with the addition of a finely controllable release mechanism. See page 15 for the description of the design and function of the release mechanism and the standard sizes available.

The backstops with controllable release facility are used when a controlled relaxing of the conveyor belt tension or of the installation is required - perhaps in the case of jamming at a non - drive drum or for a limited reverse movement of the conveyor installation at low speed.

Selection of Backstop Size

Provided the backdriving torque M_L is known, the backstop is then selected as follows:

$$M_A = 1{,}2 \cdot M_L \text{ [Nm]} \qquad (5)$$

If only the nominal motor power P_0 [kW] is known, the backstop is selected as follows:

$$M_A = 1{,}2 \cdot 9550 \cdot \eta^2 \cdot P_0/n_{sp} \text{ [Nm]} \qquad (6)$$

In equations 5 and 6 are:

M_A = Selection torque of backstop FXRV or FXRT [Nm]

M_L = $9550 \cdot \eta \cdot P_L/n_{sp}$ [Nm]

= Static backdriving torque of load in relation to backstop shaft [Nm]

P_L = Elevating power of conveyor installation at full load [kW]

= Conveyor lift [m] multiplied by load conveyed per second [kN/s]

P_0 = Nominal motor power [kW]

n_{sp} = Revolutions per minute of backstop shaft [min^{-1}]

η = Efficiency of installation

$$= \frac{\text{Elevating power}}{\text{Elevating power + Power loss}}$$

After calculating M_A the backstop should be selected according to the catalogue tables so that the following always applies:

$M_R \geqq M_A$

M_R = Max slipping torque of the backstop acoording to tables on page 14 and 15 [Nm]

Approximate values for η:

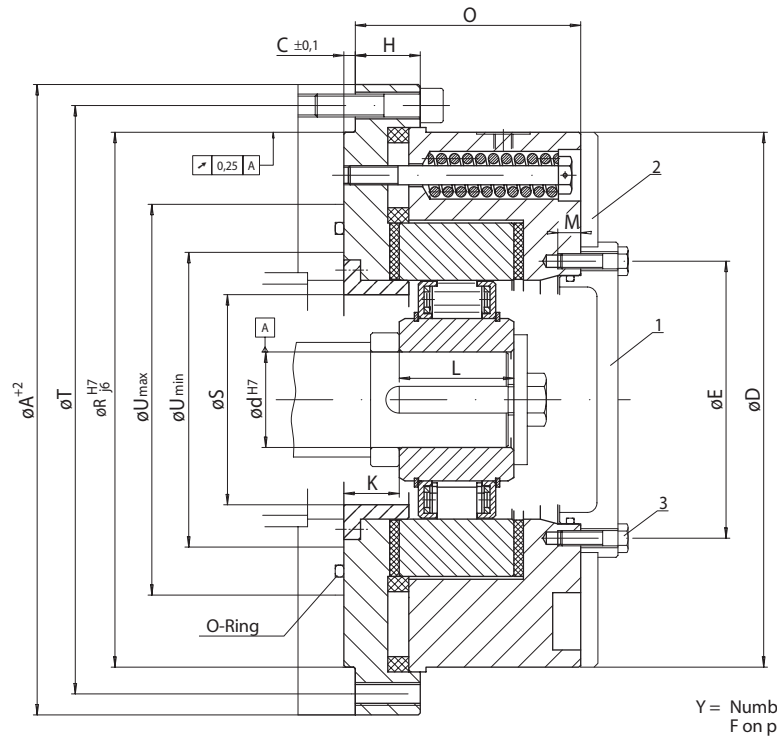
Type of Installation	η	η^2
Conveyor belts, gradient up to 6°	0,71	0,50
Conveyor belts, gradient up to 8°	0,78	0,61
Conveyor belts, gradient up to 10°	0,83	0,69
Conveyor belts, gradient up to 12°	0,86	0,74
Conveyor belts, gradient up to 15°	0,89	0,79
Screw pumps	0,93	0,87
Ball mills, drying drums	0,85	0,72
Bucket conveyors, elevators	0,92	0,85
Hammer mills	0,93	0,87

Where an application incorporates multi-drives, fitting backstops with torque limiter assumes an even distribution of load to all the backstops. Although the static backdriving torque of the installation (even with overload) must never reach the proportionate slipping torque of the individual backstops. The torques listed in the tables represent maximum values. Lower values can be set on request.

If you are unsure, please contact RINGSPANN, giving precise details of the installation and the operating conditions or preferably fill in the questionnaire on page 27.

Internal Backstops FXRV - bolted on
for high torques and high speeds
with Torque Limiter without Controllable Release Facility

DBP and Foreign Patents



Z = Number of tapped holes G on pitch circle T

Y = Number of tapped holes F on pitch circle E

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Type	Art.no.	Slipping torque M_R	Lift-off speed	Max. speed	Bore d standard							A	C	D	E	F	G	H	K	L	M	O	R	S	T	U**		Y	Z
											max.															min.	max.		
FXRV		Nm	min^{-1}	min^{-1}	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm			mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		
85 - 40 SX	0867.085.106	1400	430	6000	45	50	60	65	–	–	65	330	6	280	145	M8	M12	34	29	60	12	118	280	110	308	165	215	4	6
100 - 50 SX	0867.100.105	2300	400	4500	45	50	55	60	70	75	80*	350	6	311	160	M8	M12	34	31	70	12	125	300	125	328	180	240	4	6
120 - 50 SX	0867.120.114	3400	320	4000	60	65	70	75	80	95	95	400	6	345	180	M8	M16	36	31	70	12	125	340	145	373	200	260	6	6
140 - 50 SX	0867.140.106	4500	320	3000	65	90	100	110	–	–	110	430	6	386	200	M8	M16	36	31	70	12	125	375	165	403	220	280	6	6
170 - 63 SX	0867.170.115	9000	250	2700	70	85	90	100	120	–	130	500	6	462	230	M8	M16	43	40	80	15	147	425	196	473	250	340	6	6
200 - 63 SX	0867.200.102	12500	240	2100	130	–	–	–	–	–	155	555	6	516	260	M8	M16	43	40	80	15	147	495	226	528	275	390	6	6
240 - 63 UX	0867.240.101	21200	220	3000	–	–	–	–	–	–	185	710	8	630	335	M12	M20	50	50	90	20	160	630	290	670	355	455	8	12
260 - 63 UX	0867.260.102	30000	210	2500	–	–	–	–	–	–	205	750	8	670	355	M12	M20	50	50	105	20	170	670	307	710	375	500	8	12
290 - 70 UX	0867.290.102	42500	200	2500	–	–	–	–	–	–	230	850	8	755	387	M12	M24	50	50	105	20	180	730	335	800	405	560	8	12
310 - 96 UX	0867.310.101	53000	195	2100	–	–	–	–	–	–	240	900	10	775	412	M12	M24	63	63	120	25	230	775	355	850	435	600	12	12
360 - 100 UX	0867.360.101	75000	180	1800	–	–	–	–	–	–	280	975	10	850	462	M12	M30	63	63	125	25	230	850	400	925	485	670	12	12
410 - 100 UX	0867.410.101	100000	170	1500	–	–	–	–	–	–	320	1060	10	950	515	M12	M30	63	63	125	25	230	950	450	1000	535	750	12	12

Keyway according to DIN 6885, page 1. Bores marked * have keyways to DIN 6885, p. 3. Keyway width: tolerance class IT10. ** Range for O-Ring sealing

Torques:

The backstops FXRV are supplied with the slipping torque M_R of the torque limiter already set. The static back-driving torque M_L of the installation (even with overload) must never reach this slipping torque. The torques M_R listed in the table represent maximum values. Lower values can also be set.

Mounting Instructions:

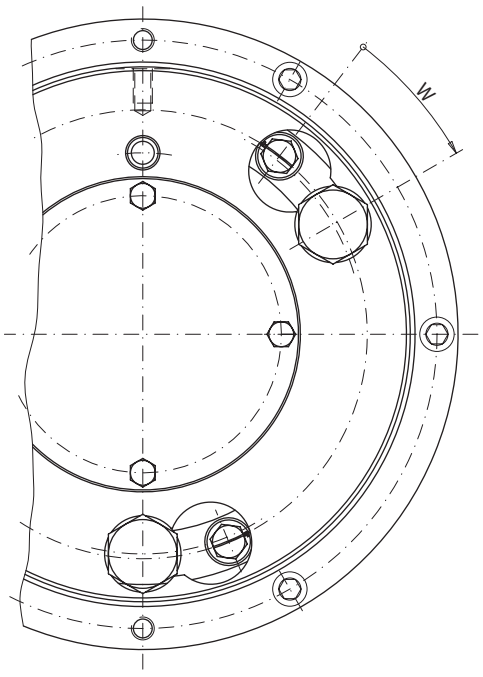
The backstops FXRV have no bearing characteristics and it is therefore important that the concentricity error between centering diameter R and shaft diameter d does not exceed 0,25 mm. The tolerance of the shaft diameter d should be ISO h6 or j6.

Dimension C applies to the fastening flange of the backstop. Centering depth in the connecting part must be atleast C + 0,2 mm.

Cover (1) with seal, cover plate (2) and fixing screws (3) as illustrated, can also be supplied. If manufacturing your own, please refer to us for the necessary connection dimensions.

Internal Backstops FXRT - bolted on
for high torques and high speeds
with Torque Limiter and Controllable Release Facility

DBP and Foreign Patents



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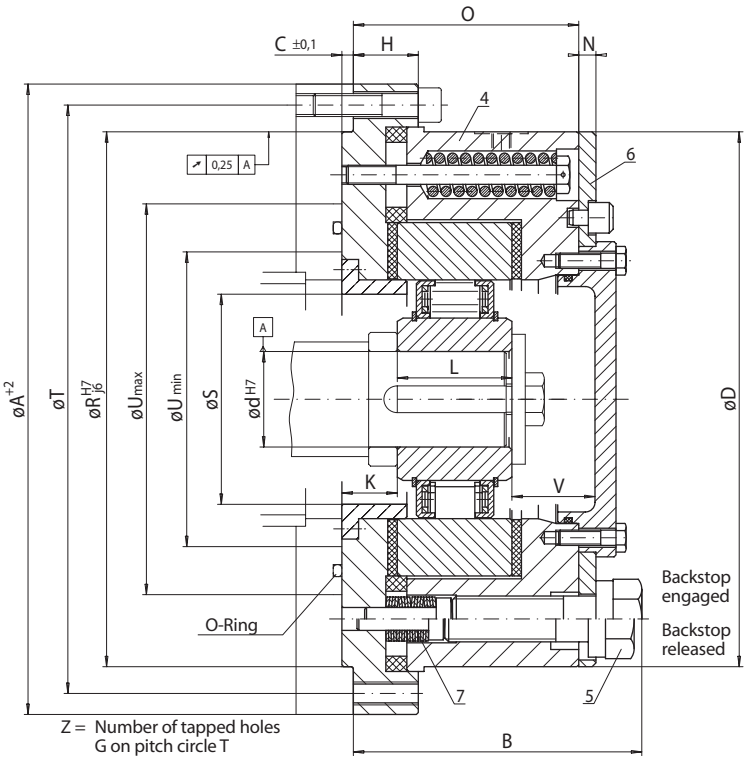

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Type FXRT	Art.no.	Slipping torque M_R Nm	Lift-off speed min^{-1}	Max. speed min^{-1}	Bore d standard mm						max. mm	A mm	B mm	C mm	D mm	G	H mm	K mm	L mm	M mm	N mm	O mm	R mm	S mm	T mm	U** min. mm	U** max. mm	V mm	Z
85 - 40 SX	0867.085.107	1400	430	6000	45	50	60	65	–	–	65	330	151	6	280	M12	34	29	60	12	9	118	280	110	308	165	215	38	6
100 - 50 SX	0867.100.106	2300	400	4500	45	50	55	60	70	75	80*	350	163	6	311	M12	34	31	70	12	9	125	300	125	328	180	240	38	6
120 - 50 SX	0867.120.113	3400	320	4000	60	65	70	75	80	95	95	400	163	6	345	M16	36	31	70	12	9	125	340	145	373	200	260	38	6
140 - 50 SX	0867.140.107	4500	320	3000	65	90	100	110	–	–	110	430	167	6	386	M16	36	31	70	12	9,5	125	375	165	403	220	280	50	6
170 - 63 SX	0867.170.111	9000	250	2700	70	85	90	100	120	–	130	500	193	6	462	M16	43	40	80	15	10	147	425	196	473	250	340	38	6
200 - 63 SX	0867.200.104	12500	240	2100	130	–	–	–	–	–	155	555	193	6	516	M16	43	40	80	15	10	147	495	226	528	275	390	38	6
240 - 63 UX	0867.240.102	21200	220	3000	–	–	–	–	–	–	185	710	200	8	630	M20	50	50	90	20	12,5	160	630	290	670	355	455	38	12
260 - 63 UX	0867.260.103	30000	210	2500	–	–	–	–	–	–	205	750	212	8	670	M20	50	50	105	20	12,5	170	670	307	710	375	500	38	12
290 - 70 UX	0867.290.103	42500	200	2500	–	–	–	–	–	–	230	850	212	8	755	M24	50	50	105	20	12,5	180	730	335	800	405	560	38	12
310 - 96 UX	0867.310.102	53000	195	2100	–	–	–	–	–	–	240	900	280	10	775	M24	63	63	120	25	16	230	775	355	850	435	600	50	12
360 -100 UX	0867.360.102	75000	180	1800	–	–	–	–	–	–	280	975	280	10	850	M30	63	63	125	25	16	230	850	400	925	485	670	50	12
410 -100 UX	0867.410.102	100000	170	1500	–	–	–	–	–	–	320	1060	280	10	950	M30	63	63	125	25	16	230	950	450	1000	535	750	50	12

Keyway according to DIN 6885, page 1. Bores marked * have keyways to DIN 6885, p. 3. Keyway width: tolerance class IT10. ** Range for O-Ring sealing

Torques:

The backstops FXRT are supplied with the slipping torque M_R of the torque limiter already set. The static back-driving torque M_L of the installation (even with overload) must never reach this slipping torque. The torques M_R listed in the table above represent maximum values. Lower values can also be set.

Mounting Instructions:

The backstops FXRT have no bearing characteristics and it is therefore important that the concentricity error between centering diameter R and shaft diameter d does not exceed 0,25 mm. The tolerance of the shaft diameter d should be ISO h6 or j6. Dimension C applies to the fastening flange of the backstop. The centering depth in the connecting part must be at least C + 0,2 mm. When actuating the release facility it is possible that a small amount of oil may escape.

Function of Release Facility:

The sensitive controllable release facility consists basically of three special screws (5) located in the spring container (4), and the locking plate (6). To release the backstop, first the special screws have to be unscrewed slightly, then the locking plate has to be turned clockwise by angle W. After that the special screws can be tightened and, assisted by the plate spring pack (7) the finely controlled release process begins.

Internal Backstops FXN - pressed in
for high torques and high speeds
with sprags and centrifugal lift-off X

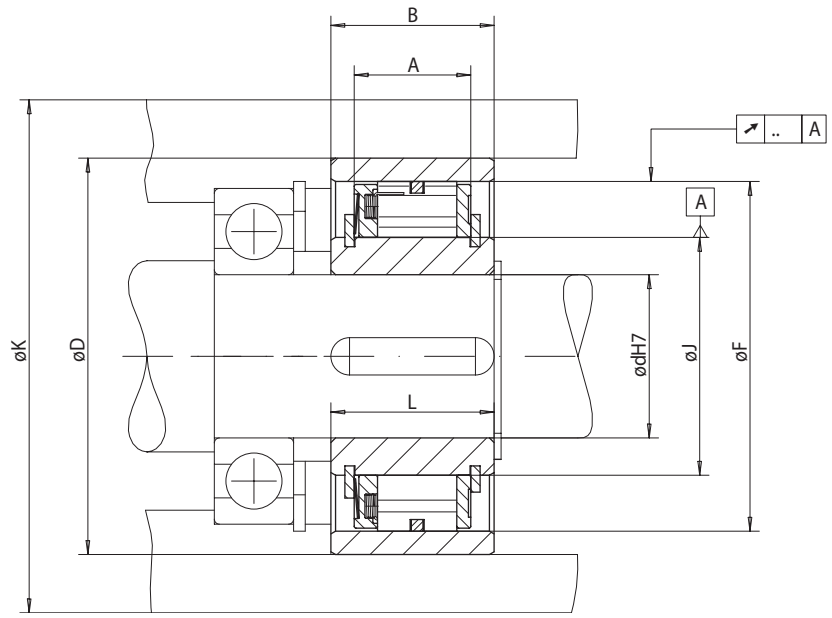
Type	Art. no.	Theor. Nominal torque ⌀ 0 A Nm	Nominal torque M_N at existing run out T.I.R. ⌀ 0,1 A Nm	⌀ 0,2 A Nm	⌀ 0,3 A Nm	⌀ 0,4 A Nm	⌀ 0,5 A Nm	Lift-off speed min^{-1}	Max. speed min^{-1}
FXN 31 - 17 DX/ 60	4867.031.127	100	100	95	–	–	–	890	5 000
FXN 31 - 17 DX/ 62	4867.031.128	100	100	95	–	–	–	890	5 000
FXN 38 - 17 DX/ 70	4867.038.103	150	140	130	–	–	–	860	5 000
FXN 46 - 25 DX/ 80	4867.046.101	390	380	350	–	–	–	820	5 000
FXN 51 - 25 DX/ 85	4867.051.112	480	470	420	–	–	–	750	5 000
FXN 56 - 25 DX/ 90	4867.056.105	580	570	490	–	–	–	730	5 000
FXN 61 - 19 DX/ 95	4867.061.140	420	410	370	–	–	–	750	5 000
FXN 61 - 19 DX/106	4867.061.135	420	410	370	–	–	–	750	5 000
FXN 66 - 25 DX/100	4867.066.208	800	780	700	–	–	–	700	5 000
FXN 66 - 25 DX/110	4867.066.209	800	780	700	–	–	–	700	5 000
FXN 76 - 25 DX/115	4867.076.112	1 050	1 040	890	–	–	–	670	5 000
FXN 76 - 25 DX/120	4867.076.105	1 050	1 040	890	–	–	–	670	5 000
FXN 86 - 25 DX/125	4867.086.205	1 350	1 300	1 030	–	–	–	630	5 000
FXN 86 - 25 DX/130	4867.086.207	1 350	1 300	1 030	–	–	–	630	5 000
FXN 101 - 25 DX/140	4867.101.204	1 700	1 600	1 400	–	–	–	610	5 000
FXN 101 - 25 DX/149	4867.101.208	1 700	1 600	1 400	–	–	–	610	5 000
FXN 101 - 25 DX/150	4867.101.205	1 700	1 600	1 400	–	–	–	610	5 000
FXN 85 - 40 SX/140	4867.085.111	1 900	1 900	1 800	1 800	1 700	1 600	430	6 000
FXN 85 - 40 SX/150	4867.085.112	1 900	1 900	1 800	1 800	1 700	1 600	430	6 000
FXN 100 - 40 SX/160	4867.100.110	2 700	2 600	2 500	2 400	2 200	2 000	400	4 500
FXN 105 - 50 SX/165	4867.105.105	4 000	3 800	3 500	3 300	2 900	2 800	380	4 500
FXN 120 - 50 SX/198	4867.120.516	6 500	6 300	5 800	4 800	4 400	3 600	320	4 000
FXN 170 - 63 SX/258	4867.170.508	20 000	19 000	16 000	14 000	13 000	12 000	250	2 700

The maximum transmissible torque is twice the shown torque. Therefore, the peak torque should not exceed twice the nominal torque. The theoretical torque presumes perfect concentricity between inner and outer ring. In practice the concentricity is affected by bearing play and concentricity errors of the adjacent parts. Then the nominal torques in the table apply which take into consideration the existing T.I.R. Hiqher speeds on request.

Characteristics:

Compact designed backstop for high performance. The large amount of permissible radial runout means that the backstop can be attached without difficulty even to shafts carried in taper roller bearings or plain bearings. Sprags with centrifugal lift-off ensure maximum life. No special lubrication required for speeds above the lift-off speed. This backstop is therefore maintenance free. When operating below the lift-off speed please refer to us by using the questionnaire on page 27.

Internal Backstops FXN - pressed in
for high torques and high speeds
with sprags and centrifugal lift-off X



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Type	bore d standard							A	B	D	F	J	K	L
	mm	mm	mm	mm	mm	mm	max. mm	mm	mm	mm	mm	mm	min. mm	mm
FXN 31 - 17 DX/ 60	20*	–	–	–	–	–	20*	17	25	60 P6	55	31	85	24
FXN 31 - 17 DX/ 62	20*	–	–	–	–	–	20*	17	25	62 P6	55	31	85	24
FXN 38 - 17 DX/ 70	25*	–	–	–	–	–	25*	17	25	70 P6	62	38	90	24
FXN 46 - 25 DX/ 80	25	–	–	–	–	–	30	25	35	80 P6	70	46	95	35
FXN 51 - 25 DX/ 85	25	30	35	–	–	–	36	25	35	85 P6	75	51	105	35
FXN 56 - 25 DX/ 90	35	–	–	–	–	–	40	25	35	90 P6	80	56	110	35
FXN 61 - 19 DX/ 95	30	35	40	–	–	–	45*	19	26	95 P6	85	61	120	25
FXN 61 - 19 DX/106	30	35	40	–	–	–	45*	19	25	106 H7	85	61	120	25
FXN 66 - 25 DX/100	35	40	45	–	–	–	48*	25	30	100 P6	90	66	132	35
FXN 66 - 25 DX/110	35	40	45	–	–	–	48*	25	40	110 P6	90	66	132	35
FXN 76 - 25 DX/115	45	55	–	–	–	–	60*	25	40	115 P6	100	76	140	35
FXN 76 - 25 DX/120	45	55	–	–	–	–	60*	25	32	120 J6	100	76	140	35
FXN 86 - 25 DX/125	40	45	50	60	65	–	70*	25	40	125 P6	110	86	150	40
FXN 86 - 25 DX/130	40	45	50	60	65	–	70*	25	40	130 P6	110	86	150	40
FXN 101 - 25 DX/140	55	70	–	–	–	–	75	25	45	140 P6	125	101	175	50
FXN 101 - 25 DX/149	70	–	–	–	–	–	75	25	62	149 H6	125	101	175	62
FXN 101 - 25 DX/150	55	70	–	–	–	–	75	25	45	150 P6	125	101	175	50
FXN 85 - 40 SX/140	45	50	60	65	–	–	65	40	45	140 P6	125	85	175	60
FXN 85 - 40 SX/150	45	50	60	65	–	–	65	40	45	150 P6	125	85	175	60
FXN 100 - 40 SX/160	45	50	55	60	70	75	75	40	50	160 P6	140	100	190	60
FXN 105 - 50 SX/165	80	–	–	–	–	–	80	50	62	165 P6	145	105	195	62
FXN 120 - 50 SX/198	60	65	70	75	80	95	95	50	70	198 H6	160	120	210	70
FXN 170 - 63 SX/258	70	85	100	120	–	–	130	63	80	258 H6	210	170	290	80

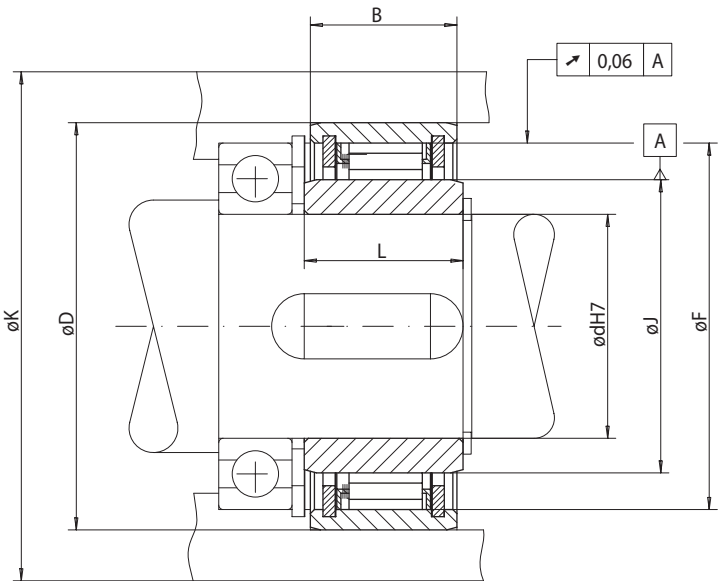
Keyway according to DIN 6885, page 1. Bores marked * have keyways to DIN 6885, page 3. Keyway width: tolerance class IT10.

Mounting Instructions:

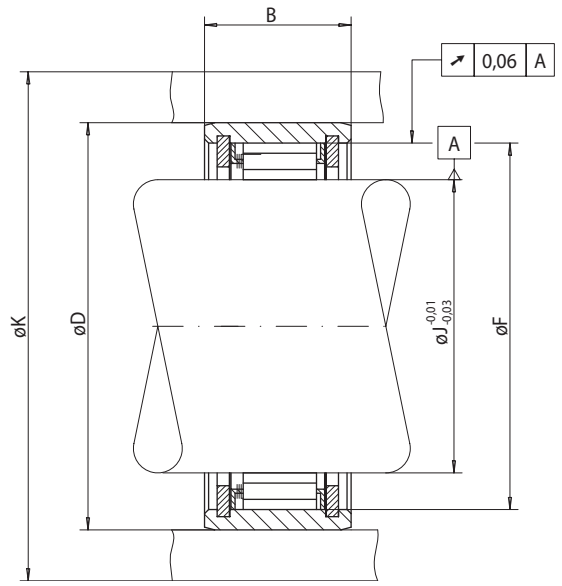
The backstop is not fitted with bearings so that the outer ring must be mounted concentric with the inner ring. The maximum permitted limits for T.I.R. must be adhered to. The torque is transmitted with press fit on the outer ring. The housing tolerance is mentioned in the table. Shaft tolerance should be ISO h6 or j6.

To transmit the table torques the outer ring must be accommodated in a steel housing with outer diameter K. Steel or grey-iron of a minimum quality of GG-20 must be provided for the housing. If other materials are used for the housing or if the outer diameters are smaller please contact us to request the transmissible torque values.

Internal Backstops FEN and FE - pressed in
for high torques and medium speeds
with sprags – oil lubrication



Series FEN 29



Series FE 30

Series FEN with inner ring				Series FE without inner ring				Nominal torque	Max. speed	Bore d standard				B	D[1]	F	J	K	L
Standard design		RIDUVIT design		Standard design		RIDUVIT design													
Art.no.		Art.no.		Art.no.		Art.no.							max.					min.	
								Nm	min^{-1}	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
37 SF	4869.037.123	37 SFT	4869.037.124	37 SF	4869.037.023	37 SFT	4869.037.024	220	1 050	20	25*	-	25*	25	62 P6	55	37	85	35
44 SF	4869.044.105	44 SFT	4869.044.107	44 SF	4869.044.005	44 SFT	4869.044.007	315	1 000	25	-	-	32*	25	70 P6	62	44	90	35
44 SF	4869.044.106	44 SFT	4869.044.108	44 SF	4869.044.005	44 SFT	4869.044.007	315	1 000	30	-	-	32*	25	70 P6	62	44	90	19
57 SF	4869.057.105	57 SFT	4869.057.106	57 SF	4869.057.005	57 SFT	4869.057.006	630	900	30	35	40	42*	35	85 P6	75	57	105	45
72 SF	4869.072.105	72 SFT	4869.072.107	72 SF	4869.072.005	72 SFT	4869.072.007	1 250	850	45	50	-	55*	36	100 P6	90	72	132	60
82 SF	4869.082.104	82 SFT	4869.082.106	82 SF	4869.082.004	82 SFT	4869.082.006	1 900	800	50	55	-	65*	40	115 P6	100	82	140	60
82 SF	4869.082.105	82 SFT	4869.082.107	82 SF	4869.082.005	82 SFT	4869.082.007	1 900	800	50	55	-	65*	32	120 P6	100	82	140	60
107 SF	4869.107.102	107 SFT	4869.107.104	107 SF	4869.107.002	107 SFT	4869.107.004	2 800	750	70	-	-	85*	45	140 P6	125	107	175	65
107 SF	4869.107.103	107 SFT	4869.107.105	107 SF	4869.107.003	107 SFT	4869.107.005	2 800	750	70	-	-	85*	45	150 P6	125	107	175	65
127 SF	4869.127.109	127 SFT	4869.127.111	127 SF	4869.127.009	127 SFT	4869.127.011	4 000	500	90	-	-	100*	62	165 P6	145	127	195	75

The maximum transmissible torque is twice the shown torque. Therefore, the peak torque should not exceed twice the nominal torque. Keyway according to DIN 6885, p. 1. Bores marked * have keyways according to DIN 6885, p. 3. Tolerance of keyway width: IT10. Other bore diameters made to order.
[1] for housing tolerance P6

Characteristics:

Compactly fitting backstop for high torques and medium speeds. Good oil lubrication is essential. Please contact us if intended operation is above maximum speeds, or with grease lubrication.

Mounting Instructions:

The backstop has no bearings so the outer ring must be mounted concentric with the inner ring. The max. permissible runout must be observed.

The torque is transmitted on the outer ring with press fit. The housing tolerance is P6. Shaft tolerance should be either ISO h6 or j6. In order to transmit the torques listed in the table the outer ring must be accommodated in a housing with an outer diameter K. The housing material should consist of GG-20 minimum grade iron or grey iron. Please contact us if other housing materials are to be used or if the outer diameter is smaller.

Lubrication:

Please note the instructions on page 24.

Sprag track at inner race

In the case of series FE the customer manufactures the inner race by himself. It must be hardened and finished machined by grinding or hard-turning after which the inner race should show the following characteristics:

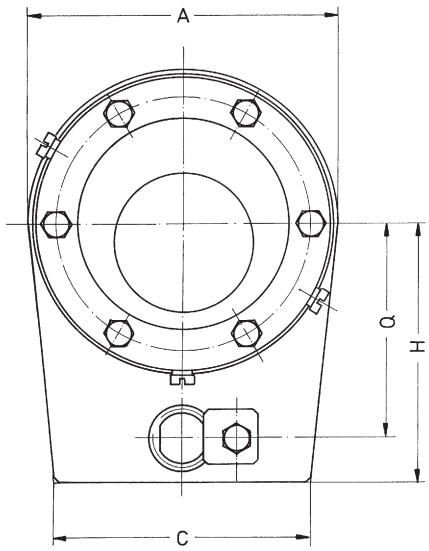
- conicity: ≤ 3 µm per 10 mm length of inner race
- peak-to-valley-height Rz as per DIN 4768, p. 1: 1,6 µm ≤ Rz ≤ 6,3 µm
- hardness: 62 ± 2HRC

For casehardening: case hardening depth Eht as per DIN 50190, p. 1: 1 to 1,5 mm, limit hardness HG = 550 HV1, core strength ≥ 1 000 N/mm^2

External Backstops BA

for high torques and high speeds

with sprags and centrifugal lift-off X – grease lubrication



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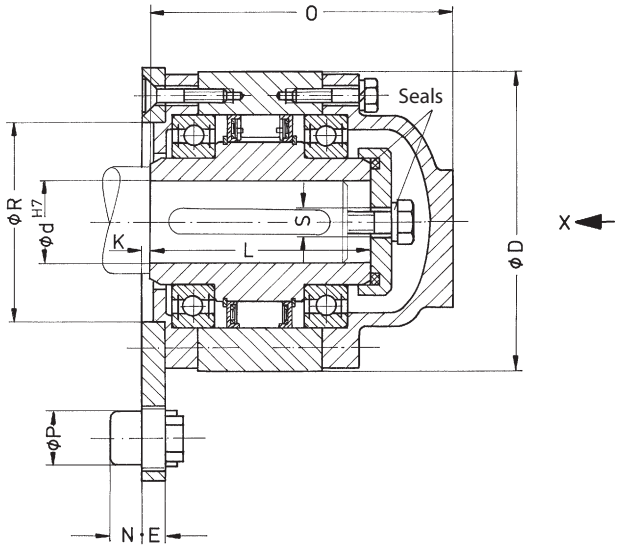

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Type	Art. no.	Nominal torque max. Nm	Lift-off speed min^{-1}	Max. speed min^{-1}	bore d standard mm	bore d min. mm	bore d max. mm	A mm	C mm	D mm	E mm	H mm	K mm	L mm	N mm	O mm	P mm	Q mm	R mm	S for screw
BA 20 DXG	6445.020.044	400	750	2500	30	20	30	110	90	106	8	80	2.5	77	11	104	19.5	65	70	M10
BA 25 DXG	6445.025.044	650	700	2350	40	25	40	126	100	126	8	90	2.5	93	11	125	19.5	75	80	M12
BA 30 DXG	6445.030.044	1100	630	2350	50	30	50	155	120	151	10	120	3.5	102	16	140	27.5	95	100	M16
BA 40 SXG	6445.040.044	1400	430	2200	60	40	60	190	150	181	12	160	5.5	116	22	160	37.5	130	120	M16
BA 45 SXG	6445.045.044	2300	400	2200	65	45	70	210	160	196	14	175	7,5	130	26	176	41.5	140	130	M16
BA 52 SXG	6445.052.044	4900	320	2200	80	50	80	230	190	216	14	200	4.5	150	26	208	41.5	160	150	M20
BA 55 SXG	6445.055.044	6500	320	2000	90	50	90	255	200	246	15	210	3.5	170	29	228	49.5	170	160	M20
BA 60 SXG	6445.060.044	14500	250	1800	100	60	105	295	220	291	20	250	8.5	206	35	273	60,5	200	190	M24
BA 70 SXG	6445.070.044	21000	240	1650	120	70	120	335	260	321	25	280	14,5	215	39	291	65,5	225	210	M24
BA 100 SXG	6445.100.044	42500	210	1450	150	100	150	420	380	411	45	345	31.5	276	60	372	80,5	280	270	M30

Keyway according to DIN 6885, page 1. Tolerance of keyway width IT10. The maximum transmissible torque is twice the shown torque. Therefore, the peak torque should not exceed twice the nominal torque.

Characteristics:

Backstops for fitting to shaft ends with axial restrain. The torque arm is located by a securing stud. When the securing stud is unscrewed the shaft can be turned in either direction.

Lubrication:

Please refer to details on page 24.

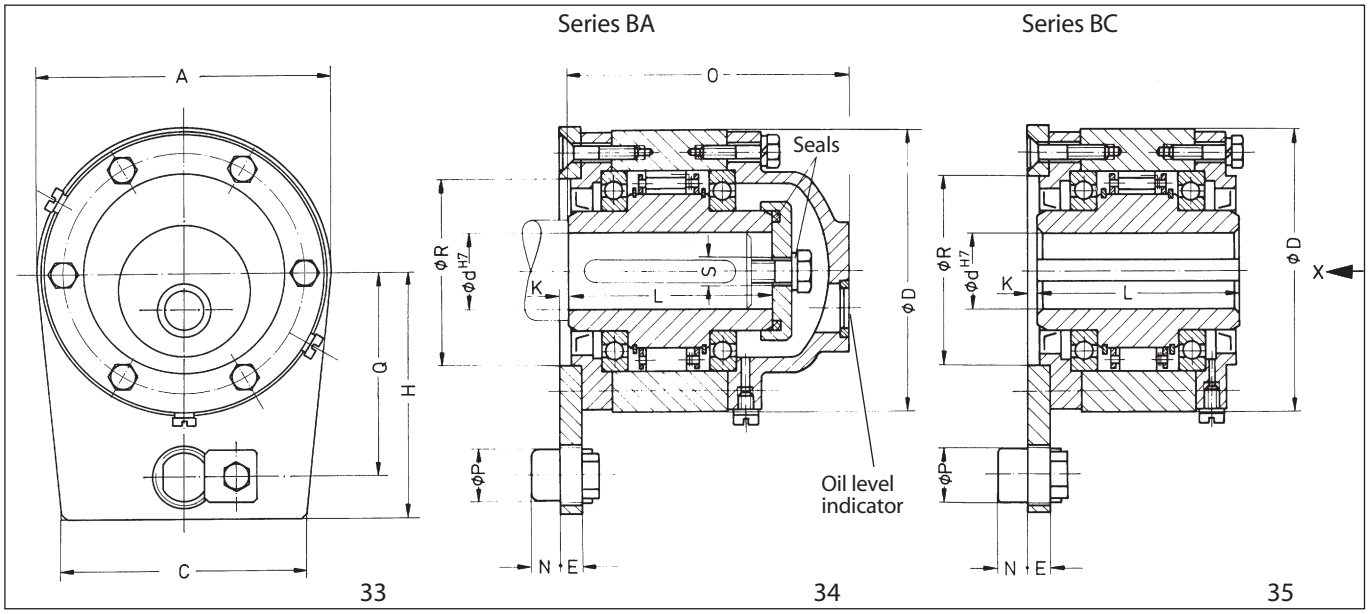
Mounting Instructions:

The securing stud of the torque arm engages in a slot or a bore in the frame of the machine. It should have 0,5 to 2 mm play in the axial and radial directions. With series BA, the freewheel inner ring must be secured axially with a retainer plate. The retainer plate, seal and bolt can be supplied with the unit. Please advise if required. Shaft tolerance should be ISO h6 or j6. The operating and maintenance instructions regarding mounting and lubrication should be noted before fitting.

Direction of Rotation:

Please specify with your order: direction of rotation of the shaft or the backstop inner ring when viewed in direction X. The direction of rotation can be reversed by changing the securing stud and cover plate.

External Backstops BA and BC
for high torques and medium speeds
with sprags and centrifugal lift-off X – oil lubrication



Type	Art.no.	Type	Art.no.	Nominal torque	Lift-off speed	Max. speed	Bore d			A	C	D	E	H	K	L	N	O	P	Q	R	S
							stand-ard	min.	max.													
				Nm	min^{-1}	min^{-1}	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	
BA 20 DX	6440.020.044	BC 20 DX	6440.020.043	400	750	1 700	30	20	30	110	90	106	8	80	2.5	77	11	104	19.5	65	70	M10
BA 25 DX	6440.025.044	BC 25 DX	6440.025.043	650	700	1 600	40	25	40	126	100	126	8	90	2.5	93	11	125	19.5	75	80	M12
BA 30 DX	6440.030.044	BC 30 DX	6440.030.043	1 100	630	1 600	50	30	50	155	120	151	10	120	3.5	102	16	140	27.5	95	100	M16
BA 40 SX	6440.040.044	BC 40 SX	6440.040.043	1 400	430	1 500	60	40	60	190	150	181	12	160	5.5	116	22	160	37.5	130	120	M16
BA 45 SX	6440.045.044	BC 45 SX	6440.045.043	2 300	400	1 500	65	45	70	210	160	196	14	175	7,5	130	26	176	41.5	140	130	M16
BA 52 SX	6440.052.044	BC 52 SX	6440.052.043	4 900	320	1 500	80	50	80	230	190	216	14	200	4.5	150	26	208	41.5	160	150	M20
BA 55 SX	6440.055.044	BC 55 SX	6440.055.043	6 500	320	1 250	90	50	90	255	200	246	15	210	3.5	170	29	228	49.5	170	160	M20
BA 60 SX	6440.060.044	BC 60 SX	6440.060.043	14 500	250	1 100	100	60	105	295	220	291	20	250	8.5	206	35	273	60,5	200	190	M24
BA 70 SX	6440.070.044	BC 70 SX	6440.070.043	21 000	240	1 000	120	70	120	335	260	321	25	280	14,5	215	39	291	65,5	225	210	M24
BA 100 SX	6440.100.044	BC 100 SX	6440.100.043	42 500	210	750	150	100	150	420	380	411	45	345	31.5	276	60	372	80,5	280	270	M30

Keyway according to DIN 6885, page 1. Tolerance of keyway width IT10. The maximum transmissible torque is twice the shown torque. Therefore, the peak torque should not exceed twice the nominal torque.

Characteristics:

Series BA: backstops for fitting to shaft ends with axial restraint.

Series BC: backstops for fitting to continuous shafts.

The torque arm is located by a securing stud. When the securing stud is unscrewed the shaft can be turned in either direction.

Lubrication:

Please refer to details on page 24.

Mounting Instructions:

The securing stud of the torque arm engages in a slot or a bore in the frame of the machine. It should have 0,5 to 2 mm play in the axial and radial directions.

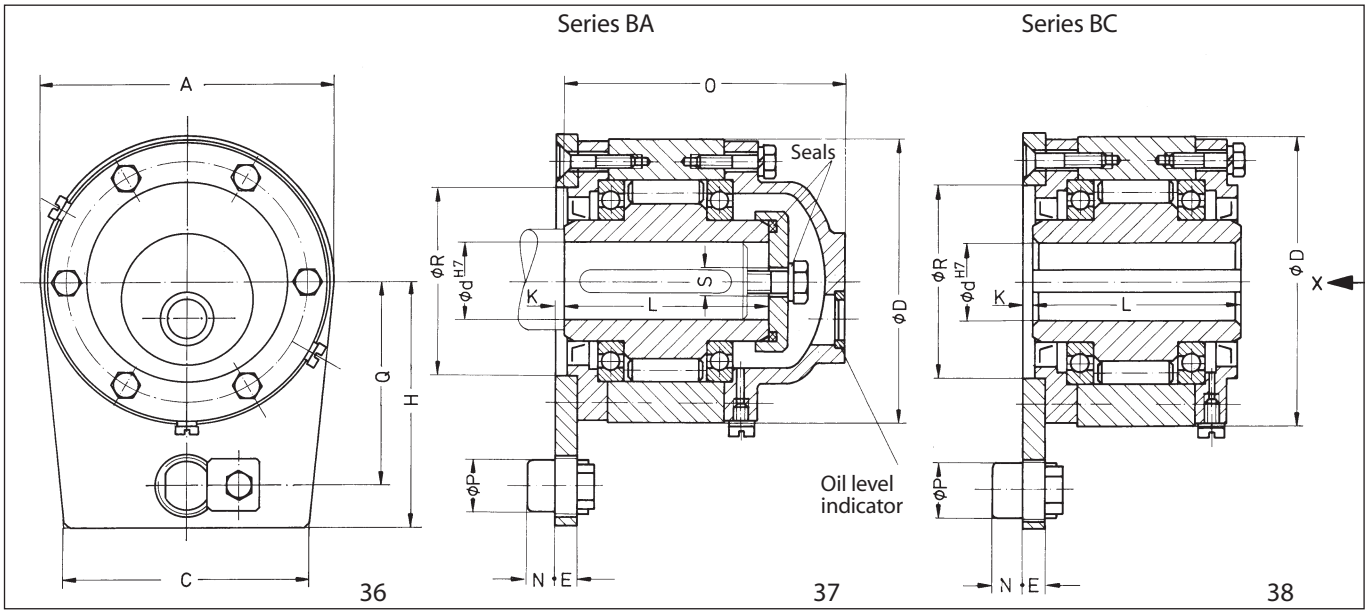
With series BA, the freewheel inner ring must be secured axially with a retainer plate. The retainer plate, seal and bolt can be supplied with the unit. Please state if required.

Shaft tolerance should be ISO h6 or j6. The operating and maintenance instructions regarding mounting and lubrication should be noted before fitting.

Direction of Rotation:

Please specify with your order: direction of rotation of the shaft or the backstop inner ring when viewed in direction X. The direction of rotation can be reversed by changing the securing stud and cover plate.

External Backstops BA and BC
for high torques and low speeds
with rollers – oil lubrication



Type	Art. no.	Type	Art. no.	Nominal torque	Max. speed	Bore d			A	C	D	E	H	K	L	N	O	P	Q	R	S
						standard	min.	max.														
				Nm	min^{-1}	min^{-1}	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
BA 12 R	6430.012.034	BC 12 R	6430.012.033	150	1 750	15	12	15	71	50	71	8	53	4.5	68	8.5	91	11.5	42	45	M 6
BA 15 R	6430.015.034	BC 15 R	6430.015.033	230	1 650	20	15	20	81	60	81	8	62	4.5	70	8.5	93	13.5	50	50	M 6
BA 18 R	6430.018.034	BC 18 R	6430.018.033	340	1 550	25	18	25	96	70	96	8	73	4.5	70	8.5	96	15.5	60	60	M 10
BA 20 R	6430.020.034	BC 20 R	6430.020.033	420	1 450	30	20	30	110	90	106	8	80	2.5	77	11	104	19.5	65	70	M 10
BA 25 R	6430.025.034	BC 25 R	6430.025.033	800	1 250	40	25	40	126	100	126	8	90	2.5	93	11	125	19.5	75	80	M 12
BA 28 R	6430.028.034	BC 28 R	6430.028.033	1 200	1 100	45	25	45	140	110	136	10	105	3.5	95	14	129	24.5	85	90	M 12
BA 30 R	6430.030.034	BC 30 R	6430.030.033	1 600	1 000	50	30	50	155	120	151	10	120	3.5	102	16	140	27.5	95	100	M 16
BA 35 R	6430.035.034	BC 35 R	6430.035.033	1 800	900	55	35	55	170	130	161	10	140	3.5	110	19	151	33.5	112	110	M 16
BA 40 R	6430.040.034	BC 40 R	6430.040.033	3 500	800	60	40	60	190	150	181	12	160	5.5	116	22	160	37.5	130	120	M 16
BA 45 R	6430.045.034	BC 45 R	6430.045.033	7 100	750	65	45	70	210	160	196	14	175	7	130	26	176	41.5	140	130	M 16
BA 50 R	6430.050.034	BC 50 R	6430.050.033	7 500	700	70	50	75	220	180	206	14	185	7	132	26	178	41.5	150	140	M 16
BA 52 R	6430.052.034	BC 52 R	6430.052.033	9 300	650	80	50	80	230	190	216	14	200	4.5	150	26	208	41.5	160	150	M 20
BA 55 R	6430.055.034	BC 55 R	6430.055.033	12 500	550	90	50	90	255	200	246	15	210	3.5	170	29	228	49.5	170	160	M 20
BA 60 R	6430.060.034	BC 60 R	6430.060.033	14 500	500	100	60	100	295	220	291	20	250	8.5	206	35	273	60	200	190	M 24
BA 70 R	6430.070.034	BC 70 R	6430.070.033	22 500	425	120	70	120	335	260	321	25	280	14	215	39	291	65	225	210	M 24
BA 80 R	6430.080.034	BC 80 R	6430.080.033	25 000	375	130	80	130	360	280	351	30	280	18.5	224	39	302	65	225	220	M 24
BA 90 R	6430.090.034	BC 90 R	6430.090.033	33 500	350	140	90	140	385	300	371	35	310	22.5	236	55	314	70	250	240	M 30
BA 95 R	6430.095.034	BC 95 R	6430.095.033	35 000	300	150	90	150	400	350	391	40	310	27.5	249	55	337	70	250	250	M 30
BA 100 R	6430.100.034	BC 100 R	6430.100.033	57 500	250	150	100	150	420	380	411	45	345	31.5	276	60	372	80	280	270	M 30

Keyway according to DIN 6885, page 1. Keyway width: tolerance class IT10. The maximum transmissible torque is twice the shown torque. Therefore, the peak torque should not exceed twice the nominal torque.

Characteristics:

Series BA: backstops for fitting to shaft ends with axial restraint.

Series BC: backstops for fitting to continuous shafts.

The torque arm is located by a securing stud. When the securing stud is unscrewed the shaft can be turned in either direction.

Lubrication:

Please refer to details on page 24.

Mounting Instructions:

The securing stud of the torque arm engages in a slot or a bore in the frame of the machine. It shouid have 0,5 to 2 mm play in the axial and radial directions.

With series BA, the freewheel inner ring must be secured axially with a retainer plate. The retainer plate, seal and bolt can be supplied with the unit.

Shaft tolerance should be ISO h6 or j6.

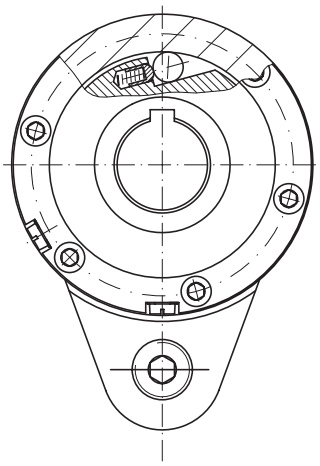
The operating and maintenance instructions regarding mounting and lubrication should be noted before fitting.

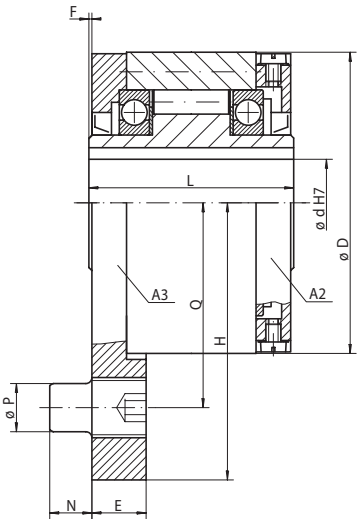
Direction of Rotation:

Please specify with your order: direction of rotation of the shaft or the backstop inner ring when viewed in direction X. The direction of rotation can be reversed by changing the securing stud and cover plate.

External Backstops FGR A2-A3 and FGR A3-A4
for high torques and low speeds
with rollers – grease lubrication

Series FGR A2-A3





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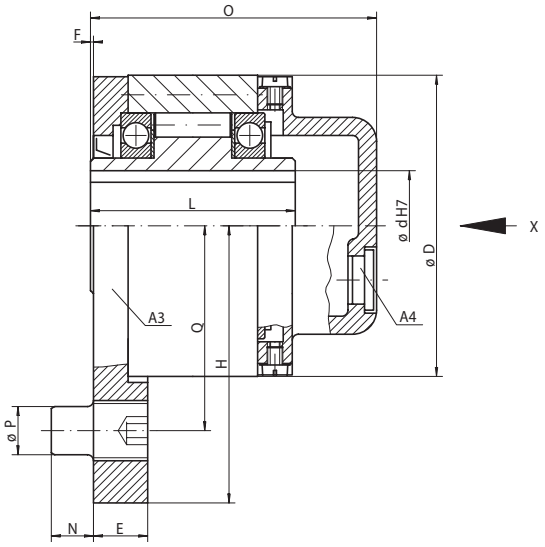
Series FGR A3-A4



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Type FGR ... A2-A3	Art. no.	Type FGR ... A3-A4	Art. no.	Nominal torque Nm	Max. speed min^{-1}	Bore d mm	D mm	E mm	F mm	G	H mm	L mm	N mm	O mm	P mm	Q mm
FGR 12	4884.026.140	FGR 12	4884.026.130	55	2 500	12	62	13	1	M14	59	42	10	64	10	44
FGR 15	4884.031.140	FGR 15	4884.031.130	130	2 200	15	68	13	1	M14	62	52	10	78	10	47
FGR 20	4884.039.140	FGR 20	4884.039.130	180	1 900	20	75	15	1	M16	72	57	11	82	12	54
FGR 25	4884.050.140	FGR 25	4884.050.130	290	1 550	25	90	18	1	M20x2	84	60	14	85	16	62
FGR 30	4884.055.140	FGR 30	4884.055.130	500	1 400	30	100	18	1	M20x2	92	68	14	95	16	68
FGR 35	4884.060.140	FGR 35	4884.060.130	730	1 300	35	110	22	1	M24x2	102	74	18	102	20	76
FGR 40	4884.066.140	FGR 40	4884.066.130	1 000	1 150	40	125	22	1	M24x2	112	86	18	115	20	85
FGR 45	4884.071.140	FGR 45	4884.071.130	1 150	1 100	45	130	26	1	M30x2	120	86	22	115	25	90
FGR 50	4884.080.140	FGR 50	4884.080.130	2 100	950	50	150	26	1	M30x2	135	94	22	123	25	102
FGR 55	4884.085.140	FGR 55	4884.085.130	2 600	900	55	160	30	1	M36x2	142	104	25	138	32	108
FGR 60	4884.095.140	FGR 60	4884.095.130	3 500	800	60	170	30	1	M36x2	145	114	25	147	32	112
FGR 70	4884.104.140	FGR 70	4884.104.130	6 000	700	70	190	35	1	M42x2	175	134	30	168	38	135
FGR 80	4884.120.140	FGR 80	4884.120.130	6 800	600	80	210	35	1	M42x2	185	144	30	178	38	145
FGR 90	4884.136.140	FGR 90	4884.136.130	11 000	500	90	230	45	1	M55x2	205	158	40	192	50	155
FGR 100	4884.160.140	FGR 100	4884.160.130	20 000	350	100	270	45	1	M55x2	230	182	40	217	50	180
FGR 130	4884.190.140	FGR 130	4884.190.130	31 000	250	130	310	60	1	M72x2	268	212	55	250	68	205
FGR 150	4884.238.140	FGR 150	4884.238.130	68 000	200	150	400	60	1	M72x2	325	246	55	286	68	255

Keyway according to DIN 6885, page 1. Tolerance of keyway width IT10. The maximum transmissible torque is twice the shown torque. Therefore, the peak torque should not exceed twice the nominal torque.

Characteristics:

Series FGR A2-A3: backstops for fitting to continuous shafts.

Series FGR A3-A4: backstops for fitting to shaft ends with axial restraint.

The torque arm is located by a securing stud. When the securing stud is unscrewed the shaft can be turned in either direction.

Mounting Instructions:

The securing stud of the torque arm engages in a slot or a bore in the frame of the machine. It should have 0,5 to 2 mm play in the axial and radial directions.

Shaft tolerance should be ISO h6 or j6. The operating and maintenance instructions regarding mounting and lubrication should be noted before fitting.

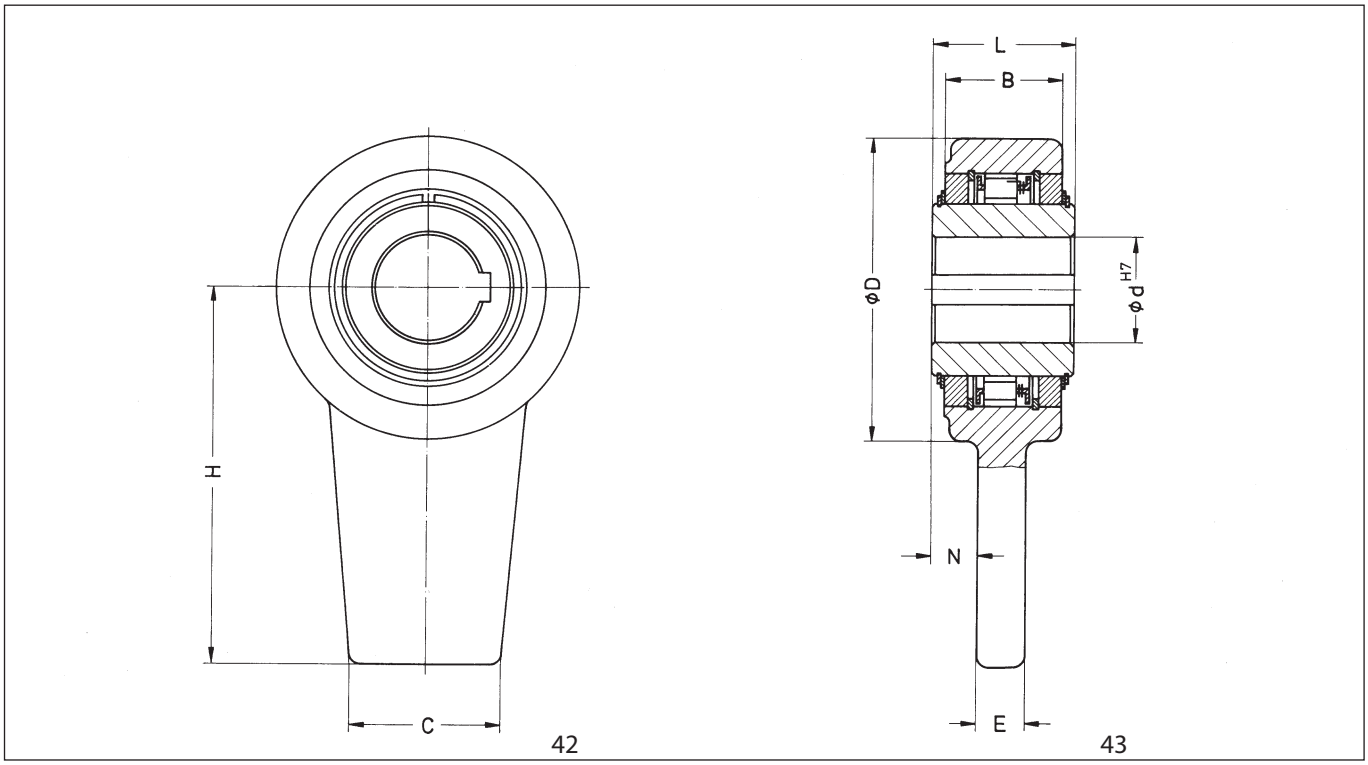
Direction of Rotation:

Please specify with your order: direction of rotation of the shaft or the backstop inner ring when viewed in direction X. The direction of rotation can be reversed by changing the securing stud and cover plate.

Lubrication:

Please refer to details on page 24.

External Backstops FA
for low torques and low speeds
with sprags – grease lubrication



Type	Art.no.	Max. speed	Type	Art.no.	Max. speed	Nominal torque	bore d				B	C	D	E	H	L	N
							stand-ard										
		min^{-1}			min^{-1}	Nm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
FA 37 SF	4853.037.100	250	FA 37 SFT	4853.037.101	500	230	20	–	–	25*	28	35	76	12	90	35	11.5
FA 57 SF	4853.057.100	170	FA 57 SFT	4853.057.101	340	630	30	35	40	42*	38	50	100	16	125	45	14.5
FA 82 SF	4853.082.100	130	FA 82 SFT	4853.082.101	260	1 600	50	55	–	65*	48	60	140	18	160	60	21,0
FA 107 SF	4853.107.100	90	FA 107 SFT	4853.107.101	180	2 500	70	80	–	85*	50	80	170	20	180	65	22.5

Keyway according to DIN 6885, page 1. Keyway width: tolerance class IT10. Bores marked with * have keyways according to DIN 6885, page 3. The maximum transmissible torque is twice the shown torque. Therefore, the peak torque should not exceed twice the nominal torque. Backstops with standard bores are available immediately, other bore diameters made to specification.

Characteristics:

Cost effective backstop with plain bearings. Type SFT with wear resistant RIDUVIT sprags for long life. Maintenance free through grease lubrication for life.

Mounting Instructions:

The torque arm is not hardened to allow customers to drill their own holes. The torque arm must not be clamped tight. It should have 0,5 to 2 mm play in axial and radial directions.

Shaft tolerance should be ISO h6 or j6.

Lubrication

Only non-resinous oil with a viscosity rating according to the table below should be used. In the case of backstops series BA, BC and FGR, the correct amount is given in the respective Operating and Maintenance instructions.

Backstops of the series FXM, FXRV, FXRT and FXN can be operated with either splash lubrication, pressure lubrication or – if operating above lift-off speed – without any lubrication. For this series the use of oil or grease with coefficient of friction decreasing additives (Molybdenum disulphide) is allowed. If operating without, the sprag elements (freewheel cage) must be protected against corrosion prior to fitting with a suitable fluid oil – see operating instructions for details.

For backstops FEN and FE is a splash lubrication or a circulation lubrication with an oil according to the following oil selection table necessary.

Backstops series BA with centrifugally released sprags and grease lubrication (DXG and SXG) have built-in greased ball bearings. The operating life of the freewheel/backstop depends on the life of the grease in the ball bearings. Based on calculations provided by the manufacturers of grease lubricated ball bearings, the customer should determine the life of the grease which depends on the operating speed. We shall be pleased to provide information on the built-in bearing types, if requested.

Backstops of the series FA are greased for life.

Please note that oil or grease with added molybdenum disuphide or other friction reducing solid lubricants must not be used. Exception: backstops FXM, FXRV, FXRT and FXN.

Use of grease as corrosion protection is allowed, grease thickness must be less than 0,01". Take care not to put grease in the sprag pockets.

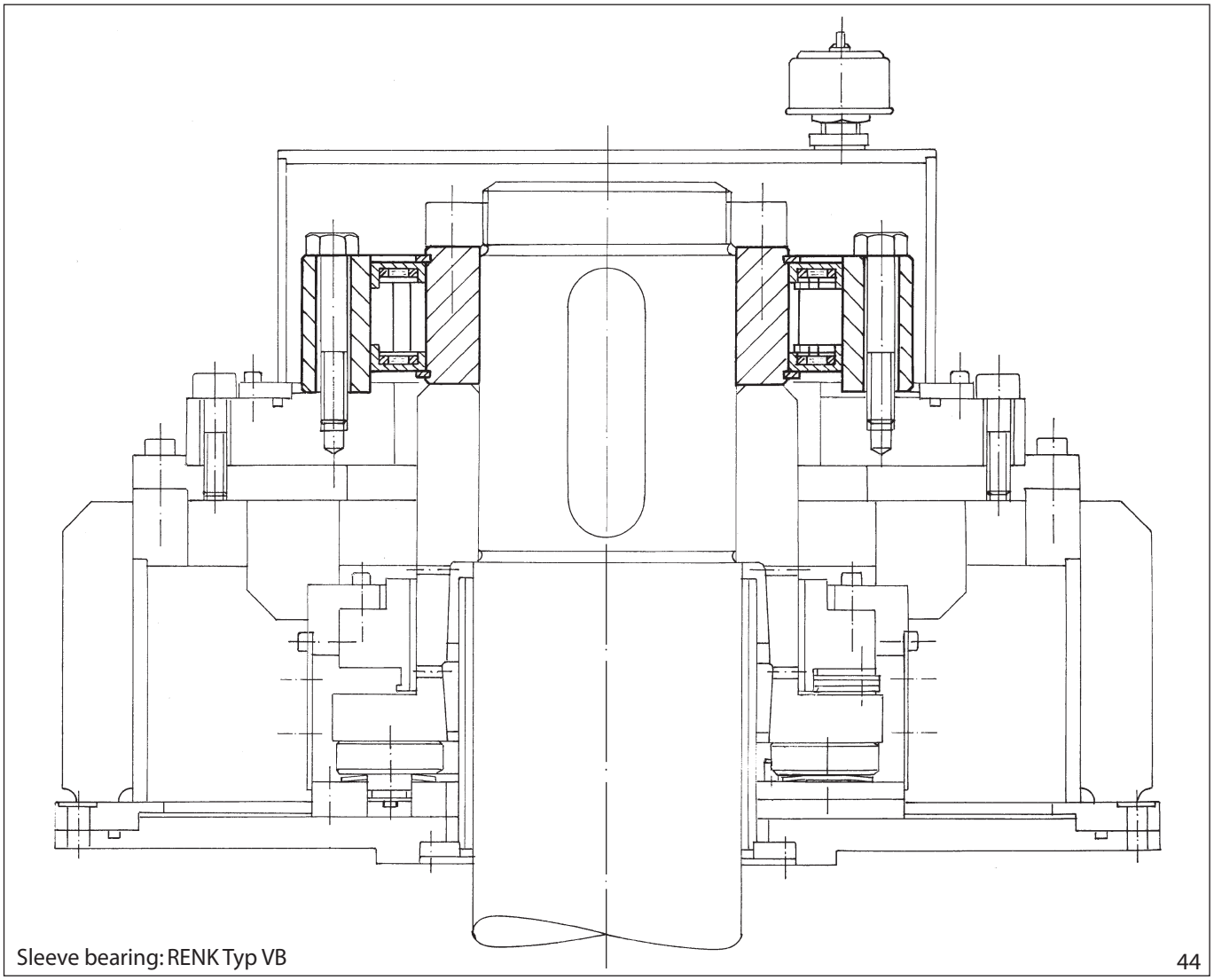
If using long-life synthetic oils we recommend MOBIL SHC 626.

Oil selection Table

Ambient temperature	for ambient temperatures from 0° C to 50° C	for ambient temperatures from –15° C to +15° C	for ambient temperatures from –40° C to 0° C
Kinematic viscosity at 40° C, ISO-VG	46/68 [mm^2/s]	32 [mm^2/s]	10 [mm^2/s]
AGIP	OSO 46/68	OSO 32	OSO 10
ARAL	VITAM GF 46/68	VITAM GF 32	VITAM GF 10
BP	ENERGOL HLP 46/68	ENERGOL HLP 32	AERO HYDRAULIC 1
CASTROL	VARIO HDX	VARIO HDX	ALPHASYN T 15
CHEVRON	EP HYDRAULIC OIL 46/68	EP HYDRAULIC OIL 32	HYJET IV
DEA	ASTRON HLP 46	ASTRON HLP 32	ASTRON HLP 10
ELF	ELFOLNA 46	ELFOLNA 32	ELF AVIATION HYDRAULIC OIL 20
ESSO	NUTO H 46/68	NUTO H 32	UNIVIS J 13
KLÜBER	CRUCOLAN 46/68	CRUCOLAN 32	CRUCOLAN 10
MOBIL	D.T.E. 25/26	D.T.E. 24	AERO HF A
SHELL	TELLUS OIL 46/68	TELLUS OIL 32	TELLUS OIL 10
Other manufacturers	Transmission or hydraulic oils without solid lubrication ISO-VG 46/68	Transmission or hydraulic oils without solid lubrication ISO-VG 32; Automatic-Transmission Fluids [ATF]	Transmission or hydraulic oils without solid lubrication ISO-VG 10; Watch freezing point! Aviation and hydraulic oils ISO-VG 10

Temperatures above 50° C and below -40° C please check with RINGSPANN.

Application Examples



Sleeve bearing: RENK Typ VB

44

Backstops FXM...UX in the drive of large pumps for power stations. In order to satisfy the safety requirements and in accordance with the redundancy principle, several pumps operating in parallel are arranged in a circuit. This allows the feed rate of the system to be adapted to the requirement of the process.

The backstops are used to prevent reverse running caused by the pressure of the conveyed medium when a pump is shut down, thus preventing the drive from acting as a turbine when the other pumps of the group system continue to convey.

The speeds and centrifugal forces produced in such a case would cause damage by overloading the pump as well as the drive motor and lead to breakdowns and costly repairs.

The backstop is located immediately above the sleeve bearing of the pump or as shown in illustration 44, above the sleeve bearing of the electric motor. The function of the sleeve bearing necessitates a certain play. Which, together with the unavoidable tolerances of adjacent parts, requires a large capability of misalignment of the backstop.

The largest misalignment capability is provided by the backstop FXM-UX with centrifugal lift-off X and rotating inner ring. This is achieved by the use of a newly developed sprag profile and a new cage design which permits T.I.R. up to 0,8 mm. Normal operation by the backstop is completely contact free due to the centrifugal lift-off. There is therefore no wear of the sprags and the operating life is almost unlimited. The existing oil mist protects the backstops against corrosion.

Application Examples

Backstop FXM 2.410 - 100 UX for the primary cooling water pump in a nuclear power station. Required torque 500 000 Nm. Speed 1 485 min^{-1}. In service since 1996. Manufactured and tested with extensive documentation from RINGSPANN GmbH, Bad Homburg.

Ironore conveyor plant in South Africa driven by three gear reducers with RINGSPANN backstops FXRT 170 SX.

Questionnaire for selecting RINGSPANN Backstops

Please photocopy

Company: ..... Department: .....
Adress: ..... Name: .....
..... Enquiry Ref.: .....
Telephone: ..... Date: .....
Telefax: ..... e-mail: .....

1. Where will the backstop be used?

1.1 Type of machine:_____ In case of belt conveyors: incline of steepest section _____°

1.2 Where fittet?: ❑ at gear reducer ❑ at motor ❑ elsewhere: _____

1.3 Position: ❑ on shaft-end Diameter: _____mm Length: _____mm
❑ on continious shaft Diameter: _____mm
❑ on pulley ❑ on gearwheel or sprocket ❑ elsewhere: _____

1.4 If possible, provide specificatons, data sheet, sketch or drawing with connecting dimensions.

2. Operating data

2.1 Speed of rotation of component to which backstop (at the and of shaft) is fitted n_{sp}: _____min^{-1}
Is it possible to fit the backstop on a fast rotating shaft (higher speed = lower torque = smaller backstop)?
If necessary give further details on the drawing.

2.2 Nimonal power of the driving machine P_0: ____kW

2.3 Does the backstop also have to be capable of taking the initial shock which occurs if the drive motor is started up in reverse?
(If so the backstop mechanism will need to be considerably oversized)
❑ Yes ❑ No

2.4 Maximum reverse torque M_{max}: _____Nm

2.5 Elevating power of the conveyor P_L: _____kW

2.6 Efficiency of machine between backstop and drive η: _____

2.7 Operating period per day: _____hours

3. Installation conditions

3.1 ❑ Open, in the open air
❑ In closed casing of machine

3.2 ❑ Lubrication by oil splash, oil mist in casing of machine
❑ Connection to central lubrication system possible?
Identy of lubricant:_____
Kinematic viscosity: mm^2/s _____° C _____

3.3 Does the backstop mechanism need to be released?
❑ No ❑ Yes, in emergency ❑ Yes, often

3.4 Ambient temperature of freewheel:
from _____° C to _____° C

3.5 Other remarks (e.g. accessibility, dust and other environmental factors which might be relevant):
_____
_____
_____
_____

3.6 Are there any elastic components situated between the backstop and the equipment to be immobilised (at the moment of locking flexible couplings generate high peak torques?
❑ Yes ❑ No

4. Estimated requirement

_____ off (once only) _____off per month _____off per year

5. Enclosures

❑ Specification ❑ Datasheet ❑ Sketch/Drawing

RINGSPANN GmbH

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61348 Bad Homburg

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RINGSPANN®
Power Transmission

Freewheels

Backstops
Automatic protection against reverse running of conveyor belts, elevators, pumps and fans.

Catalogue 88

Indexing Freewheels
For gradual feed of materials.

Catalogue 80

Overrunning Freewheels
Automatic engaging and disengaging of drives.

Catalogue 80

Housing Freewheels
Automatic engaging and disengaging for multi-motor drives for installations with continuous operation.

Catalogue 80.1

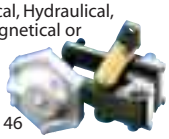
Freewheel Elements
Cage Freewheels, Sprag Sets and Freewheel Chains.

Catalogue 89

Brakes

Industrial Disc Brakes
Manual Activated – Manual Release.

Catalogue 46

Industrial Disc Brakes
Spring Activated – Pneumatical, Hydraulical, Electromagnetical or Manual Release.

Catalogue 46

Industrial Disc Brakes
Pneumatical Activated – Spring Release.

Catalogue 46

Industrial Disc Brakes
Hydraulical Activated – Spring Release.

Catalogue 46

Fail-Safe Clamping Units
For secure and precise positioning of piston rods.

Catalogue 32

Torque and Force Limiters

Torque Limiter with Screw Face
Reliable overload protection for tough operating conditions.

Catalogue 45

Torque Limiter with Rollers
With double or single Roller. Through ratcheting or disengaging, also for 360° synchronous running.

Catalogue 45

Torque Limiter with Spherical Rollers
Reliable overload protection with maximum response accuracy. Also backlash free.

Catalogue 45

Torque Limiter with Friction Linings
RIMOSTAT Torque Limiter for constant torque. Belleville Spring Torque Limiter for simple release.

Catalogue 45

Force Limiter
Reliable axial overload protection in piston rods.

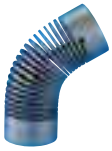
Catalogue 49

Couplings

Flexible Couplings
Large, safe radial and angular misalignements. Minimum resiliency.

Catalogue 44

Flange couplings
Rigid, easily removable shaft coupling with no clearance cone clamping elements.


HELICAL-Flexures Shaft Couplings
Design to meet requirements for specific applications. Connecting components can be integrated to save space.

Catalogue 43

HELICAL-Flexures Spring Elements
Single Spring element with maximum resistance to wear.

Catalogue 43

Clamping Coupling
For the automatic coupling of rolls. Fast, safe and free from slipping connection.


Shaft-Hub-Connection

Cone Clamping Elements
For shaft-hub connections. High torques with small dimensions.

Catalogue 31

Two-part Shrink Discs
External clamping connection. Advantages: Simple, secure mounting even without torque wrench.

Catalogue 31.1

Three-part Shrink Discs
External clamping connection for the fastening of hollow shafts on solid shafts

Catalogue 31

Star Discs
Ideal for shaft-hub-connection for frequent release.

Catalogue 30

Star Spring Washers
Axial spring elements for preloading of ball bearings.

Catalogue 20

RINGSPANN®
Workholding Technology

Precision Clamping Fixtures

Standard Parts for Clamping Fixtures
The RINGSPANN-System for the manufacture of your own precision clamping fixtures.

Catalogue 14

Standard Clamping Fixtures
Standard programme in high precision, ready manufactured chucks and mandrels.

Catalogue 13

Special Clamping Fixtures
Custom made solutions for specific clamping problems.


Collet Mandrels
Universal, cost effective standard series. Fast collet change to other clamping diameters.

Catalogue 15

Hydraulic Expanding Clamping Tools
Mandrels and chucks with high concentricity. Clamping several workpieces in one process possible.

Catalogue 16

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