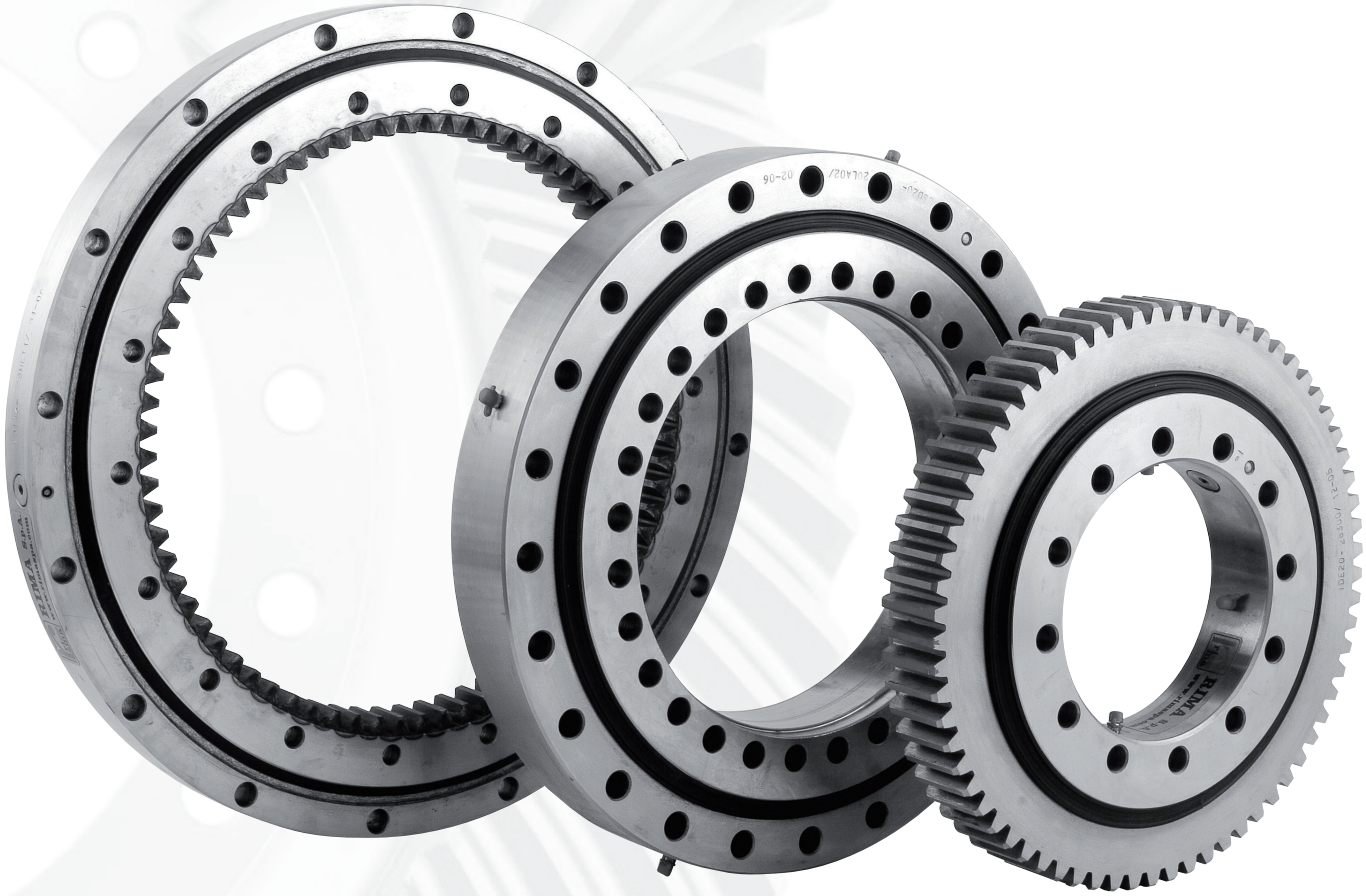
EURONORM

DRIVE SYSTEMS



MANUAL SLEWING RINGS

Selection of slewing rings

The selection of slewing rings should be done by comparing the loads occurring **tilting moment** (Mt), **axial force** (Fa), **radial force** (Fr) with the load diagram for the raceway and the bolted connection. Unless otherwise stated, the diagrams for quality 8.8 bolts apply.

Radial forces can, if their value is greater than $0{,}2 * \frac{Mt}{D_L} + 0{,}046 * F_a$, multiplied

a factor of 2.18 and then added to the axial force, where *Mt* the tilting moment, D_L the tread diameter and F_a the axial force is (if there is another value, please consult us).

These values are multiplied by the appropriate application factor before comparison.

Application factors

Excavator	1,70	Column turner	1,30
Grab Crane	1,70	Tower crane	1,25
Dragline	1,50	Aerial platform	1,25
Ship's crane	1,40	Agricultural crane	1,10
Mobile crane	1,35	Aerator	1,10
Concrete pump	1,30		

All values in the graphs refer to an overlying load and an ambient temperature of -25°C to +60°C. In case of hanging load or different temperature, please consult us.

Driving torque

The nominal torque required to drive a slewing ring bearing is:

$M_{nom} = M_w + M_r$, where M_w the resistance from the seals and M_r the moment from the rolling resistance is.

$M_w = D_L * 200\ N_m$ and $M_r = \left(\frac{4{,}37 * M_t}{D_L} + F_a \right) * 0{,}01 * \frac{D_r}{2}\ \mathrm{N_m}$

Torque required for start-up: $M_{max} = M_{nom} + M_a$.

$M_a = \frac{J * \pi * n}{30 * t_a}\ Nm$, where *J* is the inertia *n* is the rotational speed and t_a is the time till the rotational speed is reached.

The resulting nominal and maximum tooth force must be checked against the values given in the tables Fz_{nom} and Fz_{max}.

CAUTION !

All data has been duly checked for accuracy. However, we cannot take any responsibility for any incorrect or incomplete information. We reserve the right to make changes to dimensions and design.

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Installation and mounting

**The installation and fastening of slewing rings must be carried out with great care.
Incorrect installation seriously impairs performance and safety.**

Cleaning

The preservative on the outside can be removed with commercially available cold solvents (e.g. petroleum wax, diesel oil, etc.). The solvent must not come into contact with the seals and raceways.

Conditions for mounting

For the installation of slewing rings, a surface free of foreign materials (paint, welding spatters, etc.) and flat mounting surface is required.
The inner and outer rings of the bearing must be laid flat and with the entire width on the connection construction. For unprocessed mounting surfaces, a hardenable casting resin must be used. When using resin support, consultation is required, as new bolt calculations are necessary. A work instruction and list of resin suppliers can be sent on request.

Table 1 - Permissible plane and angle deviation of the surfaces

Career diameter		250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
		mm											
Level deviation including angular deviation of each mounting surface	four-point bearing	0,08	0,10	0,13	0,15	0,18	0,20	0,23	0,25	0,28	0,30	0,33	0,35
	cross roller bearing	0,06	0,08	0,09	0,10	0,11	0,13	0,14	0,15	0,16	0,17	0,18	0,20

The deviations may only be reached once per sector of 180°. The angular error refers to a flange width of 100 mm and may only be half the table value.
If the flange width deviates from 100 mm, the value can be calculated proportionally.

Arrangement for mounting

For optimum function, the two rings of the slewing ring bearing are provided with different markings.
The marked hardening gap (always fill stop position) must lie outside the load zone for the bearing ring with point load, i.e. the ring must be positioned 90° perpendicular to the load direction of the gripping load.
For serrated slewing rings, the point with the greatest eccentricity of the serration is marked with lacquer. This is where the backlash is set with a feeler gauge or lead wire. To avoid impermissible pressures on the tooth flanks, the minimum value of the flank clearance between pinion and sprocket should be approx. 0.03 - 0.04 x module.
After tightening the bolts, the play in the teeth must be checked again over the entire circumference.

Mounting bolts

The safe operation and service life of the slewing rings are significantly influenced by the bolted connection. It is therefore necessary that the prescribed number, quality and dimensions of the bolts are observed.
The supporting surface of the tapped part of the bolt and nut must not show any chamfered corners. With a chamfered angle, an additional alternating bending load is called up, which negatively affects the service life of the bolt.
In addition, the fixing holes of the bearing rings and the connection construction must match, otherwise this will cause tension in the bearing.
When using bolts with a higher quality class than 8.8, refined washers according to DIN 6916 are prescribed under the bolt head and nut. Due to the high tightening force of the bolts, this otherwise leads to the flow of the material and thus to the reduction of the bolt tension and the loosening of the bolts. The washers can only be dispensed with for the slewing ring with refined bearing rings.

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Mounting and fastening

The thread of the bolts must be greased. For toothed bearings, the ring must usually first be fastened. Tighten the bolts slightly and then turn the ring, which has not yet been fastened, several times without knocks. After this, the bolts must be tightened crosswise according to the table value. The loose ring must be rotated approx. 15° when tightened, this ensures correct bearing rotation guaranteed. In principle, bolts > M30 must be tightened using a hydraulic tensioning device. The ring that is not yet attached must be bolted to the connection construction as described above. The practical tightening torques for the bolts may differ from the table value due to unaffectable factors, such as more or less greased wire.

Do not use lock and spring washers under any circumstances! The bolts are secured by the pre-tensioning of the bolts. Due to material stresses, welding work on the slewing ring bearing is not permitted.

Clearances

In order to determine wear, the initial clearance must be measured and recorded immediately after installation.

Dimensions for identicating increased axial (tilting) clearance which is caused by wear:

- ball 14 mm: initial play + 1.1 mm
- ball 16 mm: initial play + 1.2 mm
- ball 20 mm: initial play + 1.3 mm
- ball 22 mm: initial play + 1.4 mm
- ball 25 mm: initial play + 1.5 mm
- ball 32 mm: initial play + 1.7 mm
- ball 40 mm: initial play + 2.0 mm

Table 2 - Tightening torques for bolts up to M30 based on VDI guideline 2230 - μ_K = 0,14 ; μ_G = 0,125

Bolt measurement	Tightening torque (Nm) for bolt quality		
	8,8	10,9	12,9
M10	45,0	63,0	39,0
M12	78,0	117,0	76,0
M14	126,0	184,0	131,0
M16	193,0	279,0	324,0
M20	387,0	558,0	630,0
M24	666,0	954,0	1080,0
M27	990,0	1395,0	1575,0
M30	1260,0	1800,0	2160,0

Permissible peripheral speed

For four-point slewing ring bearings, the permissible peripheral speed is 2 m/s. If the bearings are to be used at a higher speed, please consult us. This requires special precautions.

Checking the bolts

Approx. 100 operating hours after initial installation, the bolts must be checked for the required tightening torque. Thereafter every 700 operating hours, but at least twice a year. The bolts must be tightened with the bearing completely unloaded, i.e. free of radial force and without overhanging torque.
The control period can be changed by particular use and by specifications of Euronorm Drive Systems B.V..

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Lubricants

For the raceway, water-repellent lithium soap grease according to DIN 51825 TI of NLGI class 2 DIN 51818 must be used. Lubricating oils B according to DIN 51513 must be used for the gear teeth.

No responsibility is assumed for the selection of lubricants. Special questions about lubricants should be raised with the lubricant manufacturer.

Table 3 - Lubricants for treadmill and gearing

Manufacturer	Lubricant for the raceway	Lubricant for gear teeth
Agip	GRNG 2	GR NG 2
BP	Energrease LS 2	Energol WRL
Castrol	Speerol EPL 2	Grippa 33 S
Chevron	Dura-Lith 2	Pinion Grease MS
Esso	Beacon 2	Surret Fluid 30
Gulf	Gulf Crown 2	Gulf Lubcote 2
Mobil	Mobilux 2	Mobiltac 81
Shell	Alvania Fett R2	Cardium Compound C / Fluid C
Texaco	Multifak 2	Crater 2X Fluid
Valvoline	Valvoline LB 2	Dipper Stick

Lubrication intervals

The lubrication intervals depend to a large extent on the prevailing ambient conditions and the operating conditions (bearing load, speed) of the slewing ring. In normal use, the lubrication interval should not be less than 300 hours. However, if the number of operating hours of the slewing ring bearing per week exceeds 70 hours, the lubrication interval must be limited to 50 hours. Even in aggressive and very polluted environments, lubrication is required every 50 hours. In the lubrication points, so much grease must be pressed one after the other that the old grease is pressed outwards and a new grease edge with fresh lubricating grease forms. The lubrication must take place under slow turning of the slewing rings.

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Transport and storage

Transport and storage instruction

During transport and storage of slewing rings, a horizontal position is recommended; take care to avoid shocks, especially in the radial direction. If the bearings are to be transported in an inclined position (never vertically!), they must be secured with a transport cross.

The bearings should not be exposed to the elements and should be installed as soon as possible.

If the expected storage period is longer than 12 months, it is recommended to treat those surfaces that are not normally treated. On request, it is possible to treat the surfaces with a protective oil that can be washed with naphtha or degreaser.

The treads are generally supplied with a type of lubricant specified in the lubrication regulations, but the gearing is not lubricated.

The bearings are generally packed on pallets of the same size and wrapped in polyethylene material; other packing methods can be applied on request, using other support and materials to obtain the best static and dynamic conditions for transporting bearings.

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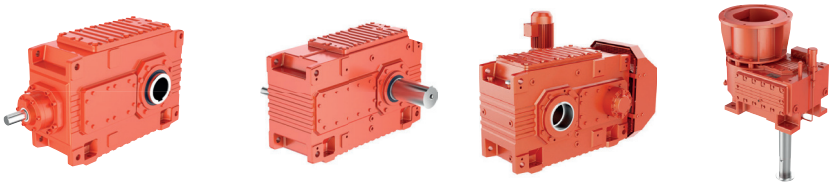
SUPPLY PROGRAMME

EURONORM
DRIVE SYSTEMS

GEAR MOTORS

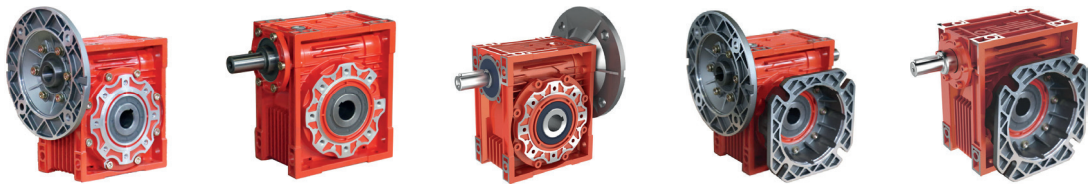
HEAVY DUTY GEAR BOXES



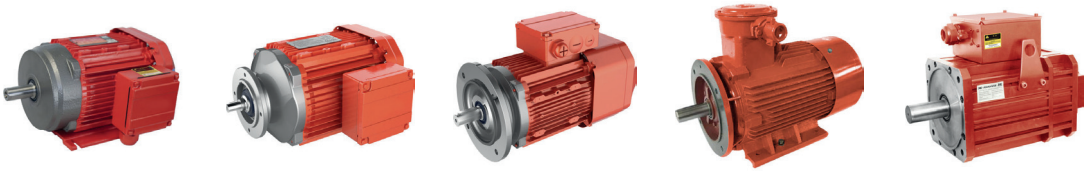
PLANETARY GEAR BOXES

CRES DRIVES

WORM GEAR REDCUERS

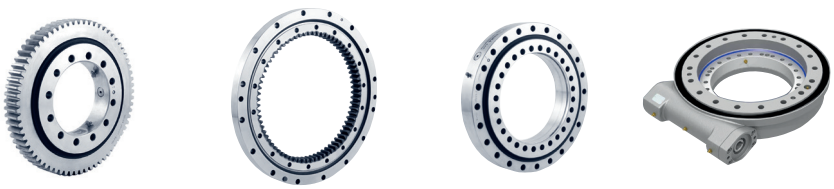


ELECTRIC MOTORS



VARIABLE-FREQUENCY
DRIVE & ENCODERS

SLEWING RINGS / DRIVES



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