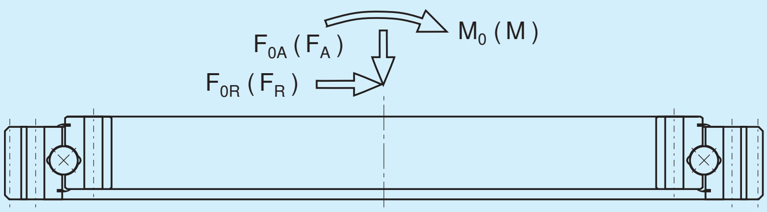
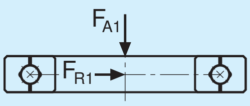
SELECTION OF SLEWING RING TYPE AND SIZE

Selection of a suitable slewing ring for common applications can be carried out from the point of view of the static load rating by means of the diagrams (curves) for the limiting static load of the raceways and fixing bolts (pages 32 - 62 of this publication) based on the calculated equivalent axial and moment static load.

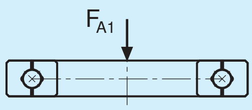
Slewing rings allow accomodation of combined loads, i.e. both axial and radial forces and tilting moments including eccentric loads. Typical examples of loading are shown in the following table.

Loading - Typical Examples

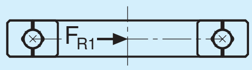




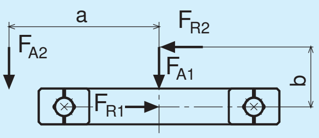
$F_A = F_{A1}$
$F_R = F_{R1}$
$M = 0$



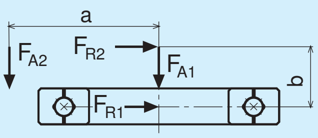
$F_A = F_{A1}$
$F_R = 0$
$M = 0$



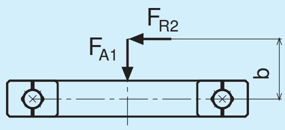
$F_A = 0$
$F_R = F_{R1}$
$M = 0$



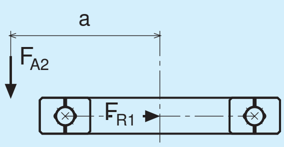
$F_A = F_{A1} + F_{A2}$
$F_R = |F_{R2} - F_{R1}|$
$M = F_{A2} . a + F_{R2} . b$



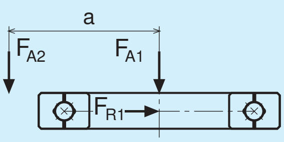
$F_A = F_{A1} + F_{A2}$
$F_R = F_{R1} + F_{R2}$
$M = |F_{A2} . a - F_{R2} . b|$



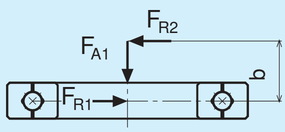
$F_A = F_{A1}$
$F_R = F_{R2}$
$M = F_{R2} . b$



$F_A = F_{A2}$
$F_R = F_{R1}$
$M = F_{A2} . a$



$F_A = F_{A1} + F_{A2}$
$F_R = F_{R1}$
$M = F_{A2} . a$



$F_A = F_{A1}$
$F_R = |F_{R2} - F_{R1}|$
$M = F_{R2} . b$

Calculation of Equivalent Axial and Moment Static Load

Slewing Rings	Formula	Valid if	
Four-Point Contact Ball Slewing Rings	$F'_{OA} = (F_{OA}+5.05.F_{OR}).s_O$ $M'_{OK} = M_{OK}.s_O$	$0.1 < \frac{F_{OR}}{F_{OA}} < 8$	$e > 2$
	$F'_{OA} = (1.23.F_{OA}+2.68.F_{OR}).s_O$ $M'_{OK} = 1.23.M_{OK}.s_O$	$0.1 < \frac{F_{OR}}{F_{OA}} < 8$	$e \leq 2$
Crossed Roller Slewing Rings	$F'_{OA} = (F_{OA}+2.05.F_{OR}).s_O$ $M'_{OK} = M_{OK}.s_O$	$0.1 < \frac{F_{OR}}{F_{OA}} < 8$	

Where: F_{OA} - Σ of axial static forces for slewing ring [kN]
F_{OR} - Σ of radial static forces for slewing ring [kN]
M_{OK} - Σ of tilting moments for slewing ring (static) [kNm]
s_O - coefficient of static safety (values - see Table 3) [–]
$e = \frac{2000.M_{OK}}{F_{OA}.D_S}$ - parameter of the load eccentricity [–]
D_S - slewing ring mean diameter [mm]

Note: - if: $\frac{F_{OR}}{F_{OA}} < 0.1$ - when calculating the equivalent load, radial force need not be taken into account.

The calculated values of the axial and moment static load define the coordinates of the working point in the diagram for the limiting static load of the slewing ring. The working point must lie under the curve for the bolt static load. Example - see chapter DIAGRAMS FOR LIMITING STATIC LOAD, page 31.

Suitability for a given application from the point of view of gear dimensioning can be evaluated by comparison of the real nominal and maximal circumferential forces with allowed circumferential forces for the gear. Allowed nominal and maximal circumferential forces - Slewing Ring Tables.

Calculation of the nominal and maximal circumferential force:

$$F_{Tmen} = \frac{2000.M_{Tmen}}{m.(z+2x)}$$

$$F_{Tmax} = \frac{2000.M_{Tmax}}{m.(z+2x)}$$

Where:
F_{Tmen} - nominal circumferential force [kN]
F_{Tmax} - maximal circumferential force [kN]
M_{Tmen} - nominal rotating moment [kNm]
M_{Tmax} - maximal rotating moment [kNm]
m - gear module [mm]
z - number of teeth [–]
x - unit displacement of the basic profile (unit correction) [–]

The main criteria for evaluating of the gear suitability is the fatigue resistance of bending and max. static load transmission. Following conditions must be fulfilled:

$F_{Tmen} \leq F_{TDov}$ - for fatigue resistance of bending (values - see Slewing Ring Tables)
$F_{Tmax} \leq F_{TmaxDov}$ - for max. static load transmission (values - see Slewing Ring Tables)

Figure 1

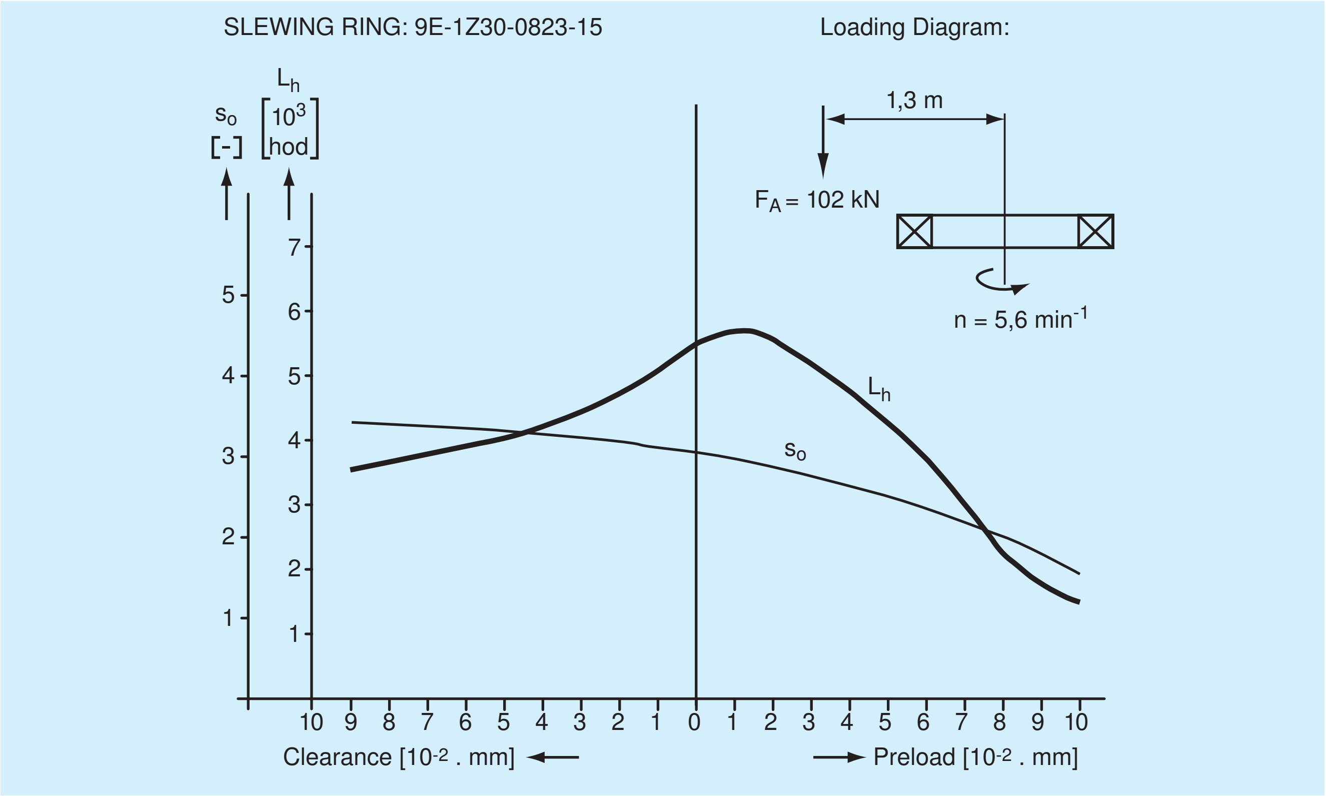


Figure 2