Calculation

Resulting and equivalent bearing loads

For angular-contact thrust ball bearings LGN and LGF

Angular-contact thrust ball bearings are preloaded. The chart shows the resulting axial bearing load F_{ax} as a function of preload and axial operating load F_{Lax}.
For a purely axial load $F_{comb} = F_{ax}$.

$$F_{comb} = X \cdot F_{rad} + Y \cdot F_{ax} \quad (20)$$

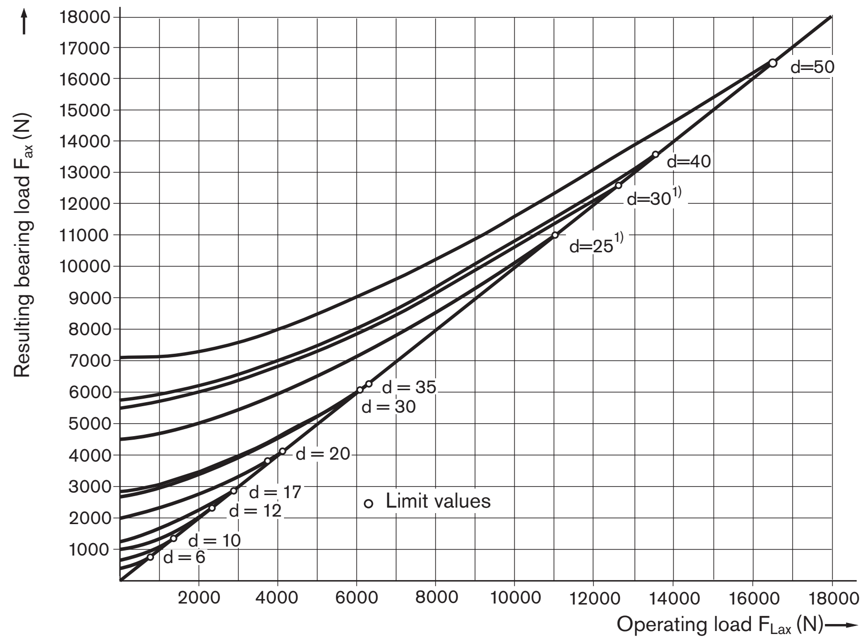
F_{ax} = resulting axial bearing load (N)
F_{comb} = combined equivalent load (N)
F_{rad} = radial bearing load (N)

$\alpha = 60°$	X	Y
$\frac{F_{ax}}{F_{rad}} \leq 2.17$	1.90	0.55
$\frac{F_{ax}}{F_{rad}} > 2.17$	0.92	1.00

α = pressure angle
F_{ax} = resulting bearing load
F_{Lax} = operating load
X, Y = dimensionless factor

If the radial operating forces are not insignificant, the equivalent bearing loads are calculated according to formula (20).
Bearings for Ball Screw Assemblies are also suitable to accommodate tipping forces. The moments that usually occur due to the mass and drive motion of the screw do not generally need to be included in the calculation of the equivalent bearing load.

Internal preload limit and resulting bearing load



[1)] Four row version

Permissible static axial load for bearing series LGF

The permissible static axial load of LGF series bearings in screw-down direction is:

$$F_{0ax\ p} \leq \frac{C_0}{2}$$

$F_{0ax\ p}$ = permissible static axial bearing load (N)

The static axial load rating C_0 is stated in the Dimension Tables.

⚠ **Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)**

Calculation

Resulting and equivalent bearing loads

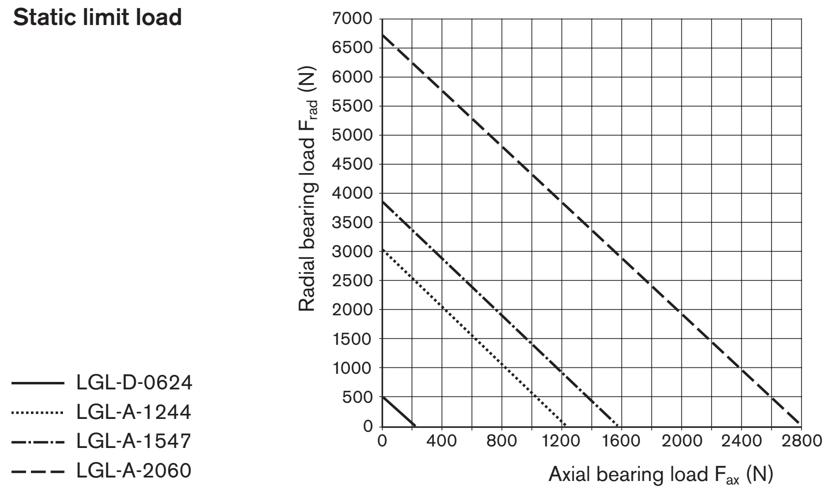
For angular-contact thrust ball bearings LGL
Before determining the combined equivalent load, $\mathbf{F_{comb}}$, you must check the bearing size for the static limit load using the diagram. In this connection, the intersection point of the axial and radial bearing load must be below the muss boundary for a bearing to be suitable for the application.

$$F_{comb} = X \cdot F_{rad}^{A} + Y \cdot F_{ax}^{B} + Z \quad (21)$$

Bearing size	X	Y	Z	A	B
LGL-D-0624	0.003	0.1300	140	1.90	1.40
LGL-A-1244	0.076	0.0460	580	1.28	1.30
LGL-A-1547	0.022	0.0110	540	1.45	1.50
LGL-A-2060	0.017	0.0082	960	1.45	1.50

F_{ax}	=	axial bearing load	(N)
F_{comb}	=	combined equivalent load	(N)
F_{rad}	=	radial bearing load	(N)
X, Y, Z	=	calculation factors	(–)
A, B	=	exponents	(–)

Static limit load



Average speed and average bearing load
When the bearing load varies in steps over a specific period of time (22), calculate the dynamic equivalent bearing.
When the speed varies, use formula (23). In these formulas $\mathbf{q_t}$ denotes the discrete time steps for the individual phases in %.

$$F_m = \sqrt[3]{F_{comb1}^{3} \cdot \frac{|n_1|}{n_m} \cdot \frac{q_{t1}}{100} + F_{comb2}^{3} \cdot \frac{|n_2|}{n_m} \cdot \frac{q_{t2}}{100} + \ldots + F_{combn}^{3} \cdot \frac{|n_n|}{n_m} \cdot \frac{q_{tn}}{100}} \quad (22)$$

$$n_m = \frac{q_1}{100} \cdot n_1 + \frac{q_2}{100} \cdot n_2 + \ldots + \frac{q_n}{100} \cdot n_n \quad (23)$$

$F_{comb1} \ldots F_{combn}$	=	combined equivalent axial load in phases 1 … n	(N)
F_m	=	dynamic equivalent bearing load	(N)
$n_1 \ldots n_n$	=	speeds in phases 1 … n	(rpm)
n_m	=	average speed	(rpm)
$q_{t1} \ldots q_{tn}$	=	discrete time steps in phases 1 … n	(%)

Service life and load safety factor

Nominal service life
The nominal service life is calculated as follows:

Attention:
Pay attention to the dynamic load rating of the nut!

$$L = \left(\frac{C}{F_m}\right)^{3} \cdot 10^{6} \quad (24)$$

$$L_h = \frac{16\,666}{n_m} \cdot \left(\frac{C}{F_m}\right)^{3} \quad (25)$$

C	=	dynamic bearing load rating	(N)
F_m	=	combined equivalent load on bearing	(N)
L	=	nominal service life in revolutions	(–)
L_h	=	nominal service life in operating hours	(h)
n_m	=	average speed	(rpm)

Static load safety factor
The static load safety factor for machine tools should not be lower than 4.

$$S_0 = \frac{C_0}{F_{0max}} \quad (26)$$

F_{0max}	=	maximum static load	(N)
C_0	=	static load capacity	(N)
S_0	=	static load safety factor	(–)

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Find your local contact person here: www.boschrexroth.com/adressen

Application

New design ☐ Revised design ☐

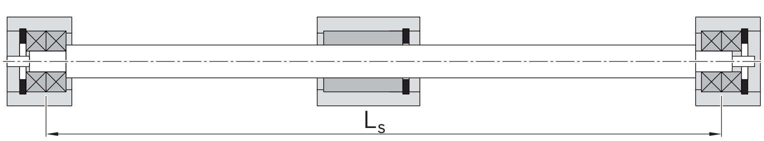
Operating conditions

Discrete time step parameters			or Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
Discrete time steps (%)	**Speed** (1/min)	**Action of force x**	**Dynamic cycle parameters**												
T_1 =	n_1 =		**Path** (mm)												
T_2 =	n_2 =		**V** (m/s)												
T_3 =	n_3 =		**a** (m/s²)												
T_4 =	n_4 =		**Time** (s)												
T_5 =	n_5 =		**Action of force x**												
T_6 =	n_6 =														

	F1	F2	F3	F4	F5	F6
Forces (N) =						
Mass (kg) =						
Max. stroke (mm) =						

Bearing type

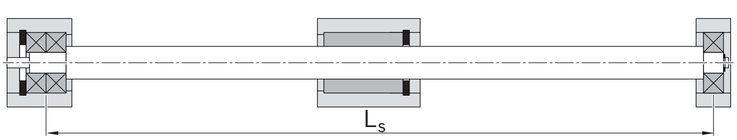
1. ☐ Tight



Tight

Installation Position
Horizontal ☐
Vertikal ☐

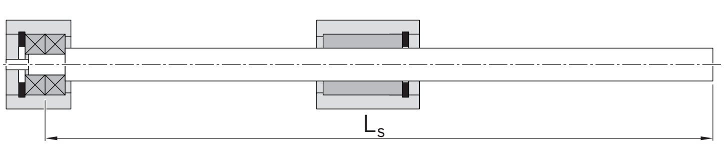
2. ☐ Tight



Loose

Drawing enclosed (recommended) ☐

3. ☐ Tight



Free

Delivery with bearing ☐

Required life: Operating temperature: °C Up to °C

Type of lubrication:

Short description of the application / unusual operating conditions:

Visit out official homepage and use the provided configurators and our dimensioning program Linear Motion Designer free of charge.