



Precision Rolled Ball Screw Drives

Contents

Precision Rolled Ball Screw Drives

| | |
|-------------------------------------|----|
| Product Description | 2 |
| Ball Nuts | 3 |
| Load Rating And Life | 4 |
| Critical Speed And Buckling Load | 5 |
| Ordering Designations | 6 |
| Rolled Ball Screws | 7 |
| Flanged Ball Nuts | 8 |
| Cylindrical Ball Nuts | 9 |
| Standard Screw Ends | 10 |
| Standard Screw Ends | 11 |
| Bearing Components For Screw Drives | 12 |
| Sales Offices | |

Product Description

Ball Screw Assembly KGT

A precision rolled ball screw assembly KGT consists of at least one KGF or KGM nut on a screw shaft KGS.

The thread design is a right hand, gothic arch profile. KGT Ball screw assemblies are available in various metric diameter-lead combinations.

Ball Screw Shaft KGS

Series KGS precision rolled metric ball screw shafts are manufactured from high strength steel, Cf53 (SAE 1055). The thread surface is induction hardened to 60 HRC (1.5 mm case depth), min.

Lead accuracies of 23µm/300mm and 50µm/300mm are offered.

Single and multi-start thread designs are used. The number of starts is determined by the diameter-lead combination, and is listed in the dimensional chart for each size.

Standard machined end configurations are offered. Screws can also be machined to customer specifications (drawing required).

Operating Limits

The maximum rotational speed for INA ball screw drives is 4500 rpm. Application specific parameters, such as critical speed may further reduce the speed limit; verification is required.

The permissible operating temperature range is from -30° to +80° C, and up to 110° C for short periods. This assumes proper lubrication.

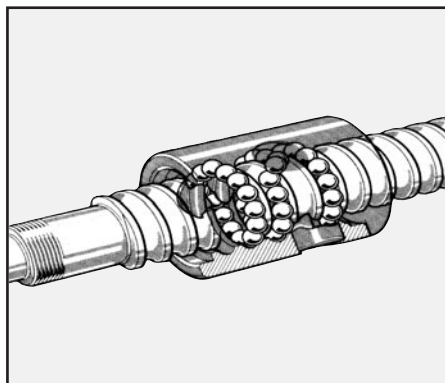


Figure 1
Button-type Segment Ball Return System.
Used On Single Start 5 and 10mm leads

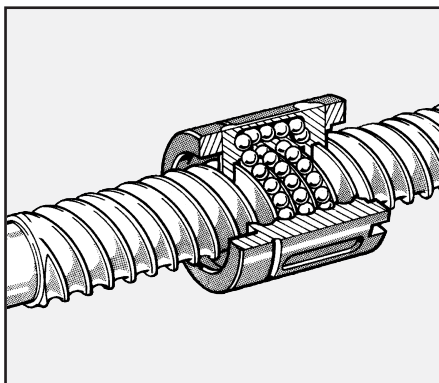


Figure 2
Duct-type Ball Return System.
Used On Dual Start 10mm Leads

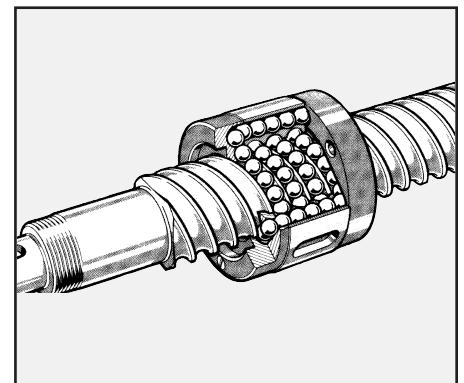


Figure 3
Endcap Ball Return System.
Used On High-helix, Multi-start Leads

Table 1 • INA Ball Screw Drive Assemblies

| Series | Description |
|---------|--|
| KGT..F | Ball screw assembly, KGS screw with single flanged nut KGF |
| KGT..M | Ball screw assembly, KGS screw with single cylindrical nut KGM |
| KGT..FM | Ball screw assembly, KGS screw with double preloaded nut unit (1 KGF, 1 KGM) |
| KGT..MM | Ball screw assembly, KGS screw with double preloaded nut unit (2 KGM) |

Table 2 • INA Ball Screw Drive Components

| Series | Description |
|--------|----------------------|
| KGS | Ball Screw Shaft |
| KGF | Flanged Ball Nut |
| KGM | Cylindrical Ball Nut |

Ball Nuts

Flanged Ball Nut KGF

Cylindrical Ball Nut KGM

Series KGF and KGM ball nuts are manufactured from high quality bearing steel, 100Cr6 (SAE 52100). After hardening, the locating surfaces and raceways are precision ground in a single setting to assure accuracy.

INA ball nuts use internal ball return systems. The result is an easy to install compact design.

KGF and KGM ball nuts are offered with Nitrile contact seals on each end face (Suffix EE). The end seals prevent the ingress of contamination and escape of lubrication from the nut.

Preloaded Ball Nuts

Due to low friction and high accuracy, INA ball nuts can be preloaded or assembled to reduce backlash. Two methods are employed to reduce backlash or establish preload:

The most cost-effective method is to reduce or eliminate clearance in the ballnut by ball size selection. This method may result in increased friction in the unloaded state due to four-point ball contact. However, as soon as axial load is applied, normal two-point contact conditions are established and the ballnut operates efficiently, without backlash upon load reversal. The standard preload for this method is 2% of the dynamic load rating [C].

For applications demanding optimum stiffness, INA ball nuts can also be combined to create a preloaded double-nut assembly. The preload is achieved by tensioning the two nuts against each other in conjunction with a ground spacer ring. The total nut length can be enlarged up to 10mm as a consequence of the applied pretensioning ring.

The standard preload for a double-nut assembly is 10% of the dynamic load rating [C]. Other preload values, ranging from 0% to 30% C can be provided upon request.

NOTE: Double-nut preloading is only possible with 5mm and 10mm leads. Leads of 20mm, 25mm, 40mm and 50mm can only be set to low backlash or preloaded by ball selection. Please consult INA Engineering to determine the correct preload for your application.

Preload Variants

KGT-MM

A preloaded nut unit per variation MM consists of two KGM cylindrical nuts and a pretensioning ring.

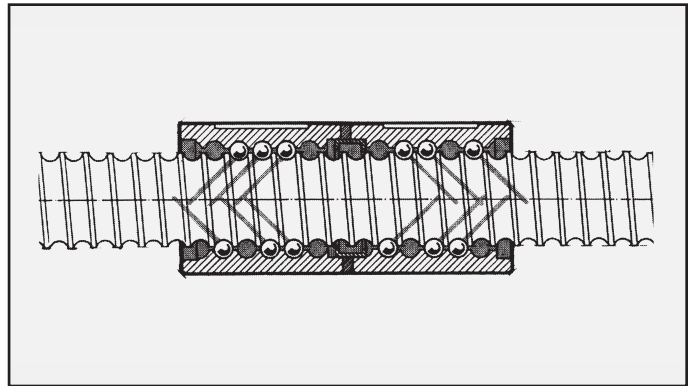


Figure 4

KGT-FM

A preloaded nut unit per variation FM consists of one KGF flanged nut, one KGM cylindrical nut and a pretensioning ring.

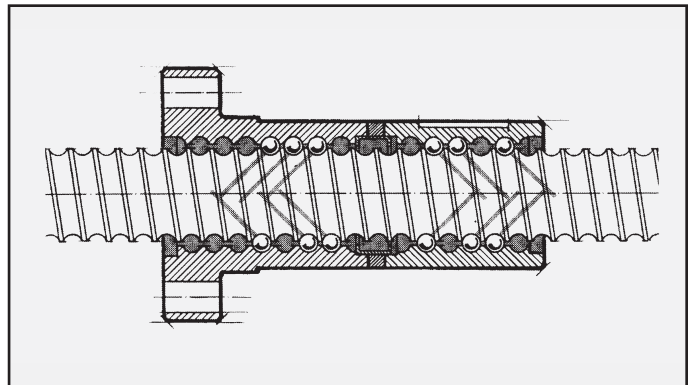


Figure 5

Load Rating And Life

Dynamic Load Rating, C

The dynamic load Rating, C, is the axial load under which 90% of a significantly large group of apparently identical ball screws will reach or exceed 1,000,000 revolutions before the first evidence of material fatigue occurs.

Static Load Rating, Co

The static load rating, Co, is the axial load under which permanent deformation of the raceways or balls occurs in the magnitude of 1/10,000 of the original ball diameter.

Basic Life Rating

The basic life rating can be calculated by using the following equations:

$$L_{10} = \left(\frac{C}{P} \right)^3 \cdot 10^6 \quad (1)$$

$$L_h = \frac{16,666}{n} \cdot \left(\frac{C}{P} \right)^3 \quad (2)$$

L_{10} revolutions
Basic life rating in revolutions

L_h hours
Basic life rating in operating hours

C N
Dynamic load rating

P N
Equivalent axial load

n rpm
Equivalent speed

Equivalent load and equivalent speed

If ball screws are subject to alternating loads and/or alternating speeds, equivalent values must be calculated for use in the basic life calculation.

The equations for equivalent load and equivalent speed are as follows:

$$P_a = \sqrt[3]{\frac{q_1 \cdot n_1 \cdot F_1^3 + q_2 \cdot n_2 \cdot F_2^3 + \dots + q_z \cdot n_z \cdot F_z^3}{q_1 \cdot n_1 + q_2 \cdot n_2 + \dots + q_z \cdot n_z}} \quad (3)$$

$$n = \frac{q_1 \cdot n_1 + q_2 \cdot n_2 + \dots + q_z \cdot n_z}{100} \quad (4)$$

P N
Equivalent axial load

$F_{1...z}$ N
Constant operating load within a time interval

$n_{1...z}$ rpm
Constant speed within a time interval

$q_{1...z}$ %
Duration of time interval

N rpm
Equivalent speed

Critical Speed And Buckling Load

Critical Speed

The critical speed of a shaft is the rotational speed at which the shaft becomes dynamically unstable due to resonance of the rotational imbalances with the natural frequency of the shaft. At the critical speed, the shaft can vibrate and deflect in large magnitudes which could result in damage to the shaft and to the machine of which it is part.

It is recommended that the maximum rotational speed of a ball screw be limited to 80% of the critical speed. The equations to calculate critical speed and maximum speed of INA ball screws are as follows:

$$n_{crit} = \frac{k_n \cdot d_2}{L^2} \cdot 10^7 \quad (5)$$

$$n_{max} = 0.8 \cdot n_{crit} \quad (6)$$

n_{crit} rpm
Critical speed of screw shaft

k_n mm/min⁻¹
Factor from Table 1 for the type of support bearing arrangement

d_2 mm
Root diameter of screw shaft listed in dimension table

L mm
Unsupported shaft length according to Table 1

n_{max} rpm
Maximum permissible shaft speed

Buckling Load

A shaft under compressive axial load is subject to potential buckling. It is recommended that the maximum axial load on the ball screw be limited to 50% of the buckling load. Limits due to static and dynamic load ratings must be observed as well.

The equations to calculate buckling load and permissible axial load of INA ball screws are as follows:

$$F_{buckling} = \frac{k_k \cdot d_2^4}{L^2} \cdot 10^4 \quad (7)$$

$$F_{perm} = 0.5 \cdot F_{buckling} \quad (8)$$

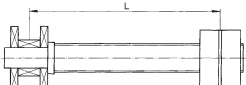


$F_{buckling}$ N
Buckling load of screw shaft

k_k N/mm²
Factor from Table 1 for the type of support bearing arrangement

d_r mm
Root diameter of screw shaft listed in dimension table

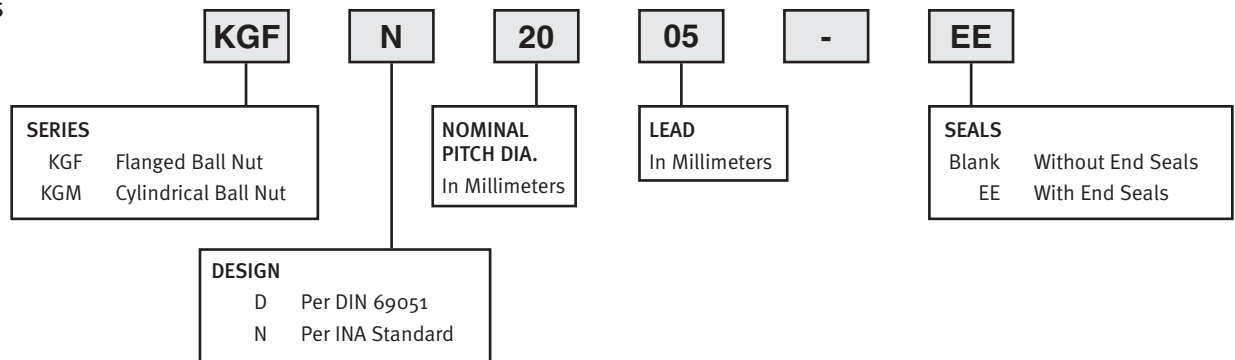
L mm
Unsupported shaft length according to Table 1

Table 3 • Coefficients k_n and k_k

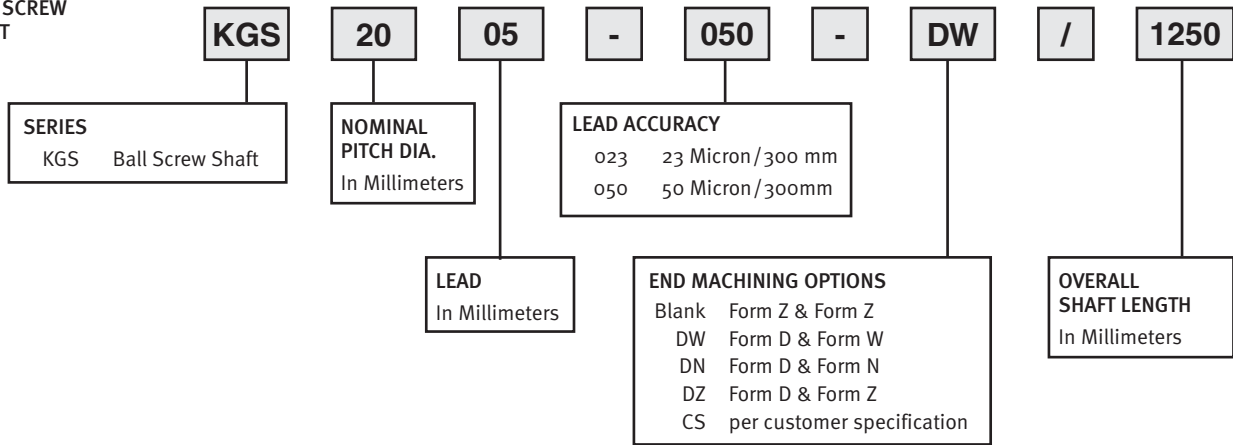
| Of Support Bearing Arrangement | Critical Speed Factor k_n | Buckling Load Factor k_k |
|---|-----------------------------|----------------------------|
| Fixed-Free  | 3.5 | 0.84 |
| Fixed-Supported  | 15.3 | 7 |
| Fixed-Fixed  | 22.3 | 13.7 |

Ordering Designations

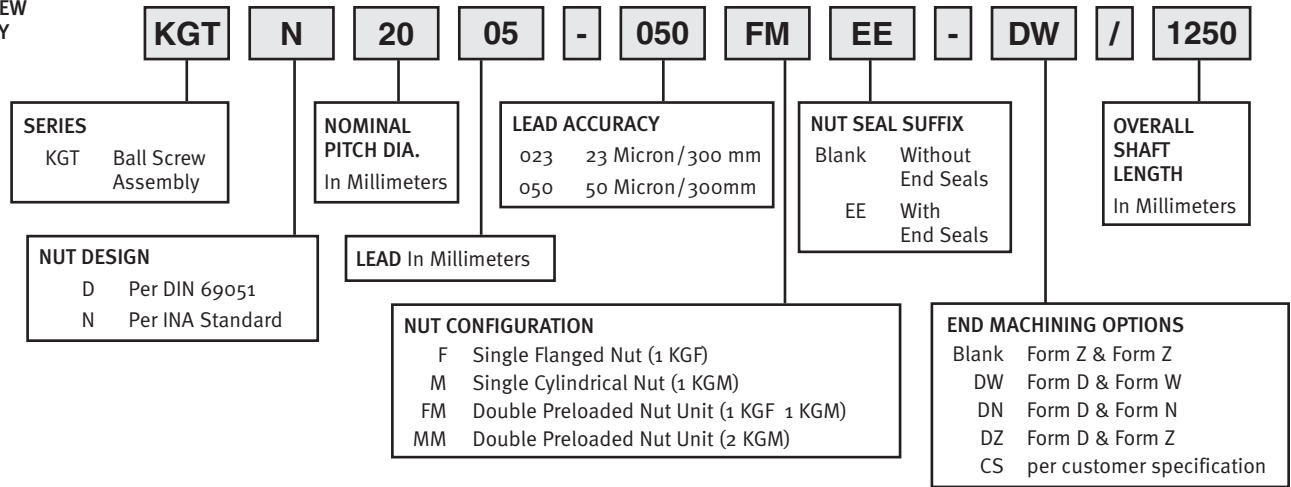
BALL NUTS



BALL SCREW SHAFT



BALL SCREW ASSEMBLY



Rolled Ball Screws

Series KGS

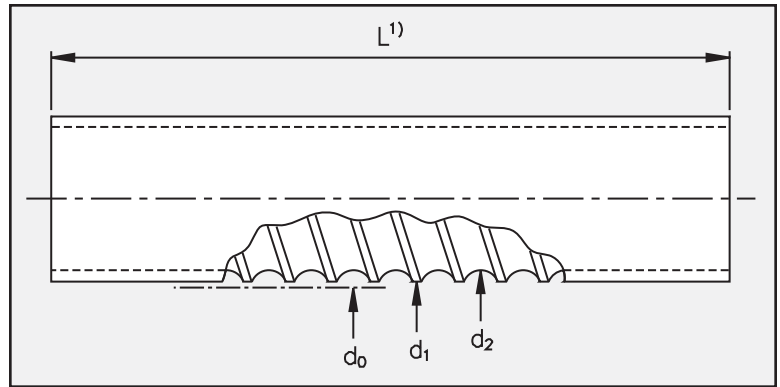


Figure 6 • KGS Rolled Ball Screw

| Nominal Pitch Diameter d_0 | Designation | Accuracy Class ($\mu\text{m}/300\text{ mm}$) | Dimensions in (mm) | | | | | Mass (kg/m) | |
|------------------------------|-------------|--|--------------------|--------|--------------------|-------|------------------|-------------|-------------------|
| | | | d_0 | Lead P | d_1 (h_{11}) | d_2 | Number Of Starts | | $L_{\text{max}1}$ |
| 16 | KGS 1605 | 23 / 50 | 16 | 5 | 15.5 | 12.9 | 1 | 5600 | 1.26 |
| | KGS 1610 | 23 / 50 | 16 | 10 | 15.4 | 13.0 | 2 | 5600 | 1.26 |
| 20 | KGS 2005 | 23 / 50 | 20 | 5 | 19.5 | 16.9 | 1 | 5600 | 2.04 |
| | KGS 2020 | 23 / 50 | 20 | 20 | 19.5 | 16.9 | 4 | 5600 | 2.07 |
| | KGS 2050 | 23 / 50 | 20 | 50 | 19.1 | 16.5 | 5 | 5600 | 2.04 |
| 25 | KGS 2505 | 23 / 50 | 25 | 5 | 24.5 | 21.9 | 1 | 5600 | 3.33 |
| | KGS 2510 | 23 / 50 | 25 | 10 | 24.5 | 21.9 | 1 | 5600 | 3.33 |
| | KGS 2520 | 23 / 50 | 25 | 20 | 24.6 | 22.0 | 4 | 5600 | 3.33 |
| | KGS 2525 | 23 / 50 | 25 | 25 | 24.5 | 22.0 | 5 | 5600 | 3.33 |
| | KGS 2550 | 23 / 50 | 25 | 50 | 24.5 | 21.5 | 5 | 5600 | 3.33 |
| 32 | KGS 3205 | 23 / 50 | 32 | 5 | 31.5 | 28.9 | 1 | 5600 | 5.61 |
| | KGS 3210 | 23 / 50 | 32 | 10 | 32.7 | 27.3 | 1 | 5600 | 5.60 |
| | KGS 3220 | 23 / 50 | 32 | 20 | 31.7 | 27.9 | 2 | 5600 | 5.61 |
| | KGS 3240 | 23 / 50 | 32 | 40 | 30.9 | 28.3 | 4 | 5600 | 5.61 |
| 40 | KGS 4005 | 23 / 50 | 40 | 5 | 39.5 | 36.9 | 1 | 5600 | 9.03 |
| | KGS 4010 | 23 / 50 | 40 | 10 | 39.5 | 34.1 | 2 | 5600 | 8.33 |
| | KGS 4020 | 23 / 50 | 40 | 20 | 39.7 | 35.9 | 2 | 5600 | 9.01 |
| | KGS 4040 | 23 / 50 | 40 | 40 | 38.9 | 36.3 | 4 | 5600 | 9.01 |
| 50 | KGS 5010 | 50 | 50 | 10 | 49.5 | 44.1 | 1 | 5600 | 13.48 |
| | KGS 5020 | 50 | 50 | 20 | 49.5 | 44.1 | 2 | 5600 | 13.50 |
| 63 | KGS 6310 | 50 | 63 | 10 | 62.5 | 57.1 | 1 | 5600 | 22.04 |

Notes

i) For 5600mm, delivered length is 6000 mm with both ends soft-annealed over a length of 200 mm.

Flanged Ball Nuts

Series KGF

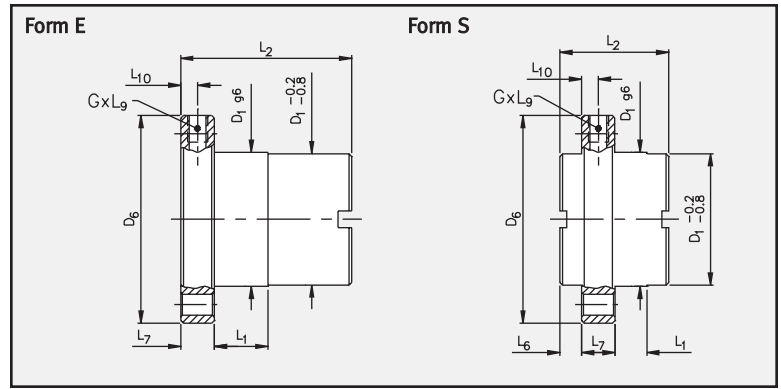


Figure 7 • KGF Flanged Ball Nuts

| Nomina Pitch Diameter d_o | Designation d_o Lead | Seal Suffix | Form | Hole Pattern | Dimensions in (mm) | | | | | | | | | | Lube Hole G | Axial Backlash Max | Load Rating | | |
|-----------------------------|------------------------|-------------|------|--------------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------|--------------------|-------------|------------|-----------------|
| | | | | | D_1 | D_4 | D_5 | D_6 | L_1 | L_2 | L_6 | L_7 | L_8 | L_9 | | | L_{10} | Dyn C (kN) | Stat C_o (kN) |
| 16 | KGF D 16 05 | EE | E | 1 | 28 | 38 | 5.5 | 48 | 10 | 42 | - | 10 | 40 | 10 | 5 | M6 | 0.08 | 12.0 | 12.7 |
| | KGF D 16 10 | EE | E | 1 | 28 | 38 | 5.5 | 48 | 10 | 55 | - | 10 | 40 | 10 | 5 | M6 | 0.08 | 23.0 | 26.0 |
| 20 | KGF N 20 05 | EE | E | 3 | 32 | 45 | 7 | 55 | 8 | 44 | - | 12 | - | 8 | 6 | M6 | 0.08 | 14.0 | 17.0 |
| | KGF N 20 20 | EE | S | 3 | 35 | 50 | 7 | 62 | 4 | 30 | 8 | 10 | - | 8 | 5 | M6 | 0.08 | 12.0 | 19.2 |
| | KGF N 20 50 | EE | S | 3 | 35 | 50 | 7 | 62 | 10 | 56 | 9 | 10 | - | 8 | 5 | M6 | 0.15 | 18.0 | 22.0 |
| 25 | KGF D 25 05 | EE | E | 1 | 40 | 51 | 6.6 | 62 | 10 | 42 | - | 10 | 48 | 10 | 5 | M6 | 0.08 | 15.0 | 22.4 |
| | KGF D 25 10 | EE | E | 1 | 40 | 51 | 6.6 | 62 | 16 | 55 | - | 10 | 48 | 10 | 5 | M6 | 0.08 | 17.5 | 25.0 |
| | KGF D 25 20 | EE | S | 1 | 40 | 51 | 6.6 | 62 | 4 | 35 | 10.5 | 10 | 48 | 8 | 5 | M6 | 0.15 | 19.0 | 23.5 |
| | KGF D 25 25 | EE | S | 1 | 40 | 51 | 6.6 | 62 | 9 | 35 | 8 | 10 | .1) | 8 | 5 | M6 | 0.08 | 21.0 | 31.0 |
| | KGF D 25 50 | EE | S | 1 | 40 | 51 | 6.6 | 62 | 10 | 58 | 10.5 | 10 | 48 | 8 | 5 | M6 | 0.15 | 22.5 | 29.0 |
| 32 | KGF N 32 05 | EE | E | 3 | 45 | 58 | 7 | 70 | 10 | 59 | - | 16 | - | 8 | 8 | M6 | 0.08 | 24.0 | 49.0 |
| | KGF N 32 10 | EE | E | 3 | 53 | 68 | 7 | 80 | 10 | 73 | - | 16 | - | 8 | 8 | M8x1 | 0.08 | 44.0 | 53.0 |
| | KGF D 32 20 | EE | E | 1 | 53 | 65 | 9 | 80 | 16 | 80 | - | 12 | 62 | 10 | 6 | M6 | 0.08 | 42.5 | 61.0 |
| | KGF N 32 40 | EE | S | 3 | 53 | 68 | 7 | 80 | 14 | 45 | 7.5 | 16 | - | 10 | 8 | M6 | 0.08 | 17.0 | 32.0 |
| 40 | KGF D 40 05 | EE | E | 2 | 63 | 78 | 9 | 93 | 10 | 57 | - | 14 | 70 | 10 | 7 | M6 | 0.08 | 26.0 | 63.5 |
| | KGF D 40 10 | EE | E | 2 | 63 | 78 | 9 | 95 | 16 | 71 | - | 14 | 70 | 10 | 7 | M8x1 | 0.08 | 50.0 | 70.0 |
| | KGF D 40 20 | EE | E | 2 | 63 | 78 | 9 | 93 | 16 | 80 | - | 14 | 70 | 10 | 7 | M8x1 | 0.08 | 44.5 | 77.0 |
| | KGF D 40 40 | EE | S | 2 | 63 | 78 | 9 | 93 | 16 | 85 | 7.5 | 14 | .1) | 10 | 7 | M8x1 | 0.08 | 42.0 | 93.0 |
| 50 | KGF D 50 10 | EE | E | 2 | 75 | 93 | 11 | 110 | 16 | 95 | - | 16 | 85 | 10 | 8 | M8x1 | 0.08 | 78.0 | 153.0 |
| | KGF D 50 20 | EE | E | 2 | 85 | 103 | 11 | 125 | 22 | 95 | - | 18 | 95 | 10 | 9 | M8x1 | 0.08 | 82.0 | 137.0 |
| 63 | KGF N 63 10 | EE | E | 3 | 85 | 105 | 11 | 125 | 10 | 99 | - | 20 | - | 8 | 10 | M8x1 | 0.08 | 86.0 | 200.0 |

Notes

1) Round flange.

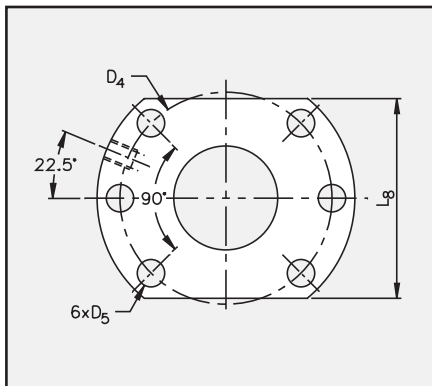


Figure 8 • Hole Pattern 1

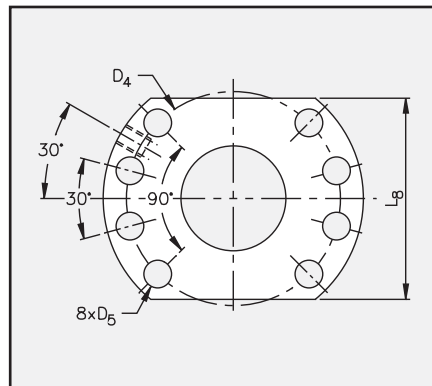


Figure 9 • Hole Pattern 2

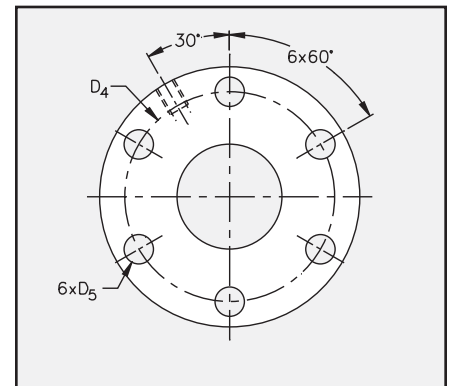


Figure 10 • Hole Pattern 3

Cylindrical Ball Nuts

Series KGM

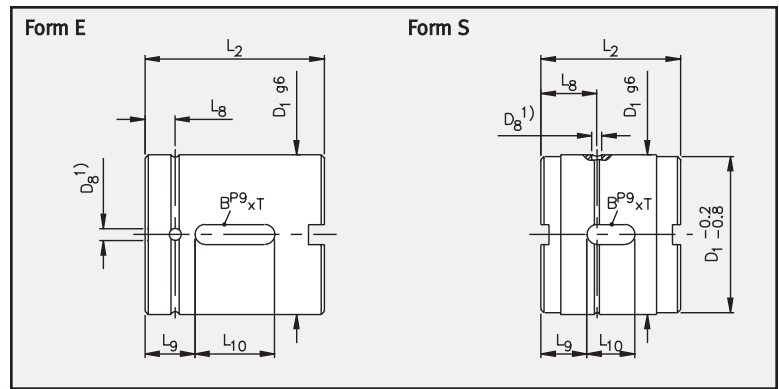


Figure 11 • KGM Cylindrical Ball Nuts

| Nominal Pitch Diameter d_o | Designation | | Seal Suffix | Form | Dimensions in (mm) | | | | | | | Axial Backlash Max | Dyn C (kN) | Stat C_o (kN) |
|------------------------------|-------------|-------|-------------|------|--------------------|------------|-------|-------|-------|----------|-------|--------------------|------------|-----------------|
| | d_o | Lead | | | D_1 | $D_8^{1)}$ | L_2 | L_8 | L_9 | L_{10} | BxT | | | |
| 16 | KGM D | 16 05 | EE | E | 28 | 3 | 34 | 7 | 7 | 20 | 5X2 | 0.08 | 12.5 | 12.7 |
| | KGM D | 16 10 | EE | E | 28 | 3 | 50 | 7 | 15 | 20 | 5X2 | 0.08 | 23.0 | 26.0 |
| 20 | KGM N | 20 05 | EE | E | 32 | 3 | 34 | 7 | 7 | 20 | 5X2 | 0.08 | 14.0 | 17.0 |
| | KGM N | 20 20 | EE | S | 35 | 1.5 | 30 | 11.5 | 9 | 12 | 5X3 | 0.08 | 12.0 | 19.2 |
| | KGM N | 20 50 | EE | S | 35 | 1.5 | 56 | 16 | 18 | 20 | 5X3 | 0.15 | 18.0 | 22.0 |
| 25 | KGM D | 25 05 | EE | E | 40 | 3 | 34 | 7 | 7 | 20 | 5X2 | 0.08 | 15.0 | 22.4 |
| | KGM D | 25 10 | EE | E | 40 | 3 | 45 | 7.5 | 12.5 | 20 | 5X2 | 0.08 | 17.5 | 25.0 |
| | KGM D | 25 20 | EE | S | 40 | 1.5 | 35 | 14 | 11.5 | 12 | 5X3 | 0.15 | 19.0 | 23.5 |
| | KGM D | 25 25 | EE | S | 40 | 1.5 | 35 | 11.5 | 11 | 13 | 5X3 | 0.08 | 21.0 | 31.0 |
| | KGM D | 25 50 | EE | S | 40 | 1.5 | 58 | 17 | 19 | 20 | 5X3 | 0.15 | 22.5 | 29.0 |
| 32 | KGM N | 32 05 | EE | E | 45 | 3 | 45 | 7.5 | 8 | 30 | 6X2.5 | 0.08 | 24.0 | 49.0 |
| | KGM N | 32 10 | EE | E | 53 | 4 | 60 | 10 | 15 | 30 | 6X2.5 | 0.08 | 44.0 | 53.0 |
| | KGM N | 32 20 | EE | E | 53 | 3 | 70 | 7.5 | 20 | 30 | 6X2.5 | 0.08 | 42.5 | 61.0 |
| | KGM N | 32 40 | EE | S | 53 ²⁾ | 1.5 | 45 | 13 | 10 | 25 | 6X4 | 0.08 | 17.0 | 32.0 |
| 40 | KGM D | 40 05 | EE | E | 63 | 3 | 45 | 7.5 | 8 | 30 | 6X2.5 | 0.08 | 26.0 | 63.5 |
| | KGM D | 40 10 | EE | E | 63 | 4 | 60 | 10 | 15 | 30 | 6X2.5 | 0.08 | 50.0 | 70.0 |
| | KGM D | 40 20 | EE | E | 63 | 3 | 70 | 7.5 | 20 | 30 | 6X2.5 | 0.08 | 44.5 | 77.0 |
| | KGM D | 40 40 | EE | S | 63 | 1.5 | 85 | 15 | 27.5 | 30 | 6X3.5 | 0.08 | 42.0 | 93.0 |
| 50 | KGM D | 50 10 | EE | E | 75 | 4 | 82 | 11 | 23 | 36 | 6X2.5 | 0.08 | 78.0 | 153.0 |
| | KGM N | 50 20 | EE | E | 85 | 4 | 82 | 10 | 23 | 36 | 6X2.5 | 0.08 | 82.0 | 137.0 |
| 63 | KGM N | 63 10 | EE | E | 85 | 4 | 82 | 11 | 23 | 36 | 6X2.5 | 0.08 | 86.0 | 200.0 |

Notes

1) Position of lubrication hole not defined on circumference.

2) $D_1 -0.2/-0.8$ is $D_1 -1/-1.5$

Standard Screw Ends

Form D

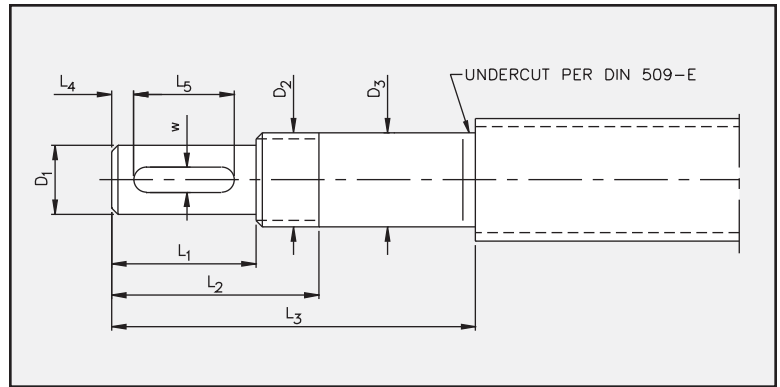


Figure 12 • Standard Screw End - Form D

| Nominal Pitch Diameter d_0 | Dimensions in (mm) | | | | | | | Keyway to DIN 6885 $w \times \text{depth} \times L_6$ |
|------------------------------|--------------------|---------|------------|-------|-------|-------|-------|--|
| | D_1^{h6} | D_2 | D_3^{h6} | L_1 | L_2 | L_3 | L_4 | |
| 16 | 9 | M12x1 | 12 | 20 | 30 | 55 | 2.5 | 3 x 1.8 x 16 |
| 20 | 11 | M15x1 | 15 | 23 | 33 | 58 | 3.5 | 4 x 2.5 x 16 |
| 25 | 14 | M20x1 | 20 | 30 | 42 | 70 | 4 | 5 x 3 x 22 |
| 32 | 19 | M25x1.5 | 25 | 40 | 54 | 82 | 6 | 6 x 3.5 x 28 |
| 40 | 24 | M30x1.5 | 30 | 50 | 64 | 92 | 7 | 8 x 4 x 36 |
| 50 | 36 | M40x1.5 | 40 | 60 | 84 | 117 | 10 | 10 x 5 x 40 |
| 63 | 40 | M50x1.5 | 50 | 80 | 111 | 144 | 12 | 12 x 5 x 56 |

| Nominal Pitch Diameter d_0 | Dimensions in (mm) | | | | | | | N x S | Bearing | Locknut |
|------------------------------|--------------------|-------|-------|-------|-------|-------|--------|-------------------|------------------|---------|
| | D_4 | D_5 | D_6 | D_7 | L_6 | L_7 | | | | |
| 16 | 55 | 42 | 22 | 42 | 8 | 25 | 3 x M6 | ZKLF 1255-2RS-PE | ZKLN 1242-2RS-PE | ZM12 |
| 20 | 60 | 46 | 25 | 45 | 8 | 25 | 3 x M6 | ZKLF 1560-2RS-PE | ZKLN 1545-2RS-PE | ZM15 |
| 25 | 68 | 53 | 32 | 52 | 10 | 28 | 4 x M6 | ZKLF 2068-2RS-PE | ZKLN 2052-2RS-PE | ZM20 |
| 32 | 75 | 58 | 38 | 57 | 12 | 28 | 4 x M6 | ZKLF 2575-2RS-PE | ZKLN 2557-2RS-PE | ZM25 |
| 40 | 80 | 63 | 45 | 62 | 12 | 28 | 6 x M6 | ZKLF 3080-2RS-PE | ZKLN 3062-2RS-PE | ZM30 |
| 50 | 100 | 80 | 58 | 75 | 14 | 34 | 4 x M8 | ZKLF 40100-2RS-PE | ZKLN 4075-2RS-PE | ZM40 |
| 63 | 115 | 94 | 70 | 90 | 14 | 34 | 6 x M8 | ZKLF 50115-2RS-PE | ZKLN 5090-2RS-PE | ZM50 |

Notes

Bearings and locknut must be ordered separately. For more information, see INA publication TPI 123 Bearings For Screw Drives

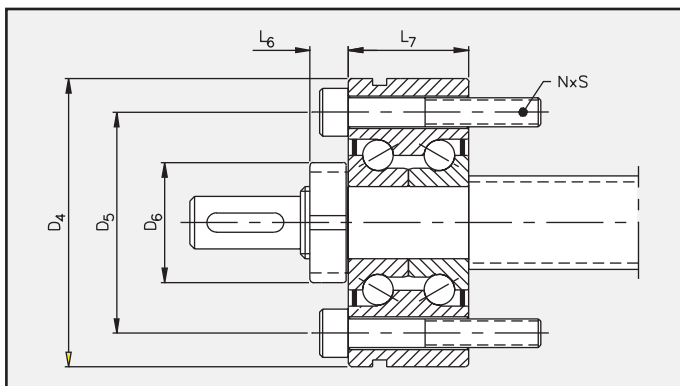


Figure 13 • Standard Screw End - Form D With ZKLF & ZM

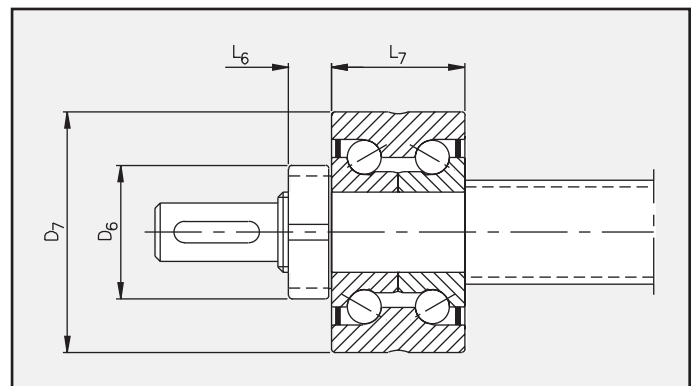


Figure 14 • Standard Screw End - Form D With ZKLN & ZM

Standard Screw Ends

Forms W, N and Z

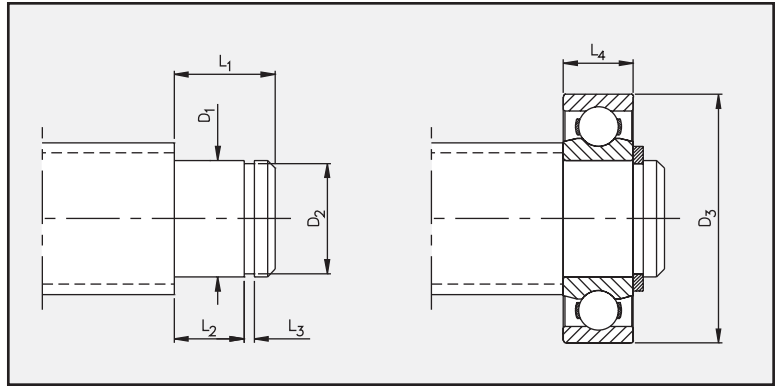


Figure 15 • Standard Screw End - Form W

Form W

| Nominal Pitch Diameter d_0 | Dimensions in (mm) | | | | | | | Bearing | Shaft Ring Per DIN 471 |
|------------------------------|--------------------|-------|-------|-------|-------|-------|-------|-----------|------------------------|
| | D_1^{j6} | D_2 | D_3 | L_1 | L_2 | L_3 | L_4 | | |
| 16 | 12 | 11.5 | 28 | 12 | 8 | 1.1 | 8 | 6001-2RSR | 12X1 |
| 20 | 15 | 14.2 | 32 | 13 | 9 | 1.3 | 9 | 6002-2RSR | 15X1 |
| 25 | 20 | 18.8 | 42 | 16 | 12 | 1.3 | 12 | 6004-2RSR | 20X1.2 |
| 32 | 25 | 23.7 | 52 | 20 | 15 | 1.3 | 15 | 6205-2RSR | 25X1.2 |
| 40 | 30 | 28.6 | 62 | 21 | 16 | 1.6 | 16 | 6206-2RSR | 30X1.5 |
| 50 | 40 | 38.5 | 80 | 25 | 18 | 1.85 | 18 | 6208-2RSR | 40X1.75 |
| 63 | 55 | 52 | 100 | 29 | 21 | 2.15 | 21 | 6211-2RSR | 55X2 |

Notes

Bearings must be ordered separately. For more information, see INA publication 901.
Shaft rings not included.

Form N

| Nominal Pitch Diameter d_0 | Dimensions in (mm) | | | | | | | INA Needle Roller Bearing | INA Snap Ring |
|------------------------------|--------------------|-------|-------|-------|-------|-------|-------|---------------------------|---------------|
| | D_1^{j6} | D_2 | D_3 | L_1 | L_2 | L_3 | L_4 | | |
| 16 | 12 | 11.5 | 24 | 18 | 14 | 1.1 | 13 | NA 4901-2RSR | WR 12 |
| 20 | 15 | 14.4 | 28 | 18 | 14 | 1.3 | 13 | NA 4902-2RSR | WR 15 |
| 25 | 20 | 19.2 | 37 | 22 | 18 | 1.3 | 17 | NA 4904-2RSR | WR 20 |
| 32 | 25 | 24 | 42 | 23 | 18 | 1.3 | 17 | NA 4905-2RSR | WR 25 |
| 40 | 30 | 29 | 47 | 23 | 18 | 1.6 | 17 | NA 4906-2RSR | WR 30 |
| 50 | 40 | 38.5 | 62 | 30 | 23 | 1.6 | 22 | NA 4908-2RSR | WR 40 |
| 63 | 50 | 48.5 | 62 | 30.5 | 23 | 1.6 | 22 | NA 4910-2RSR | WR 50 |

Notes

Bearings must be ordered separately. For more information, see INA publication 901.
Shaft rings not included.

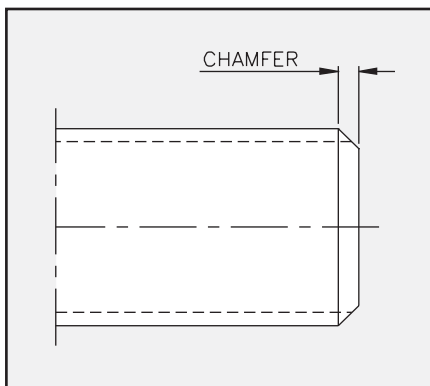


Figure 16 • Standard Screw End - Form Z

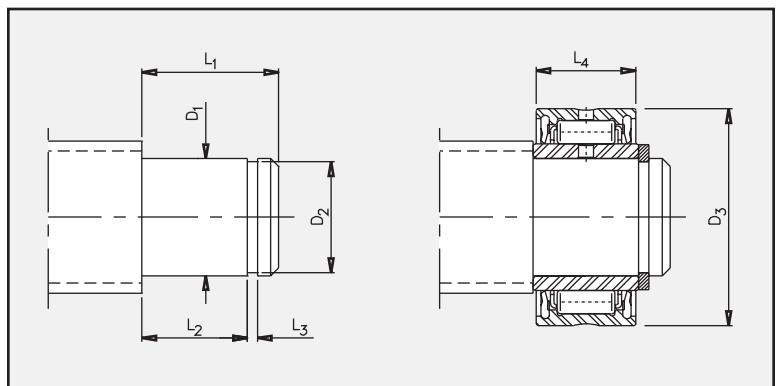
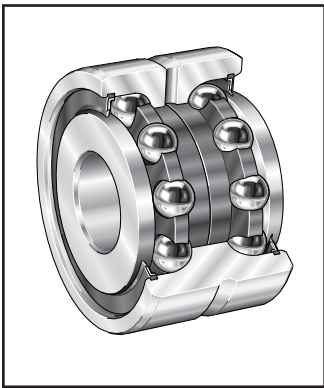


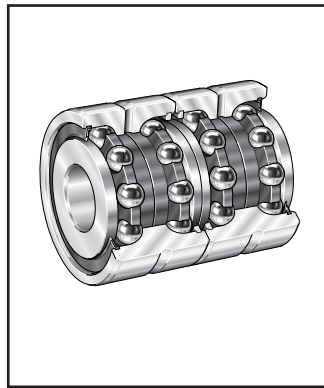
Figure 17 • Standard Screw End - Form N

Bearing Components For Screw Drives

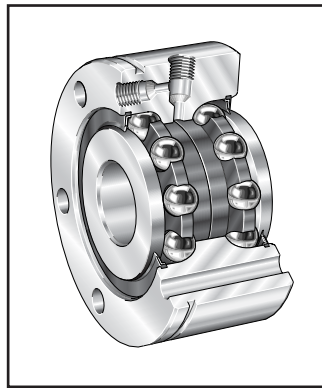
INA manufactures a complete line of ball screw support bearings and precision lock nuts. INA ball screws can be machined to accommodate numerous bearing arrangements. For more information see publication TPI123, Bearings For Screw Drives



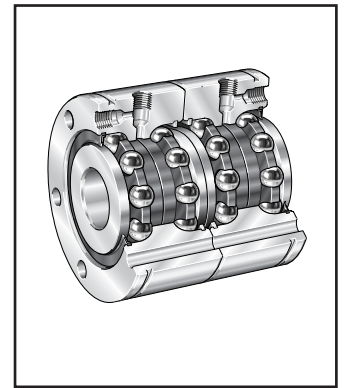
ZKLN



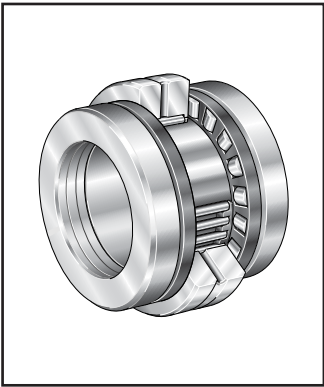
ZKLN..2AP



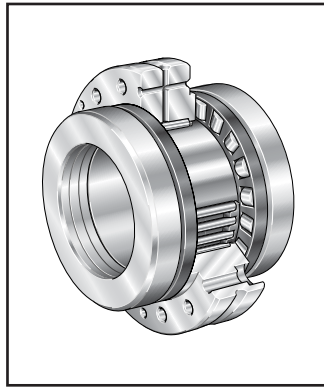
ZKLF



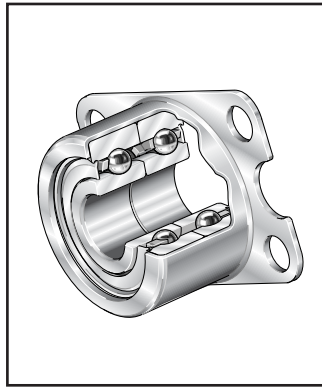
ZKLF..2AP



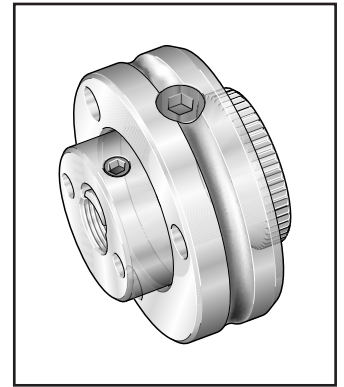
ZARN



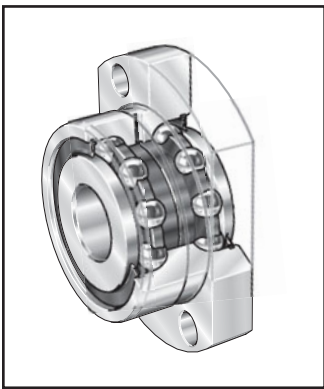
ZARF



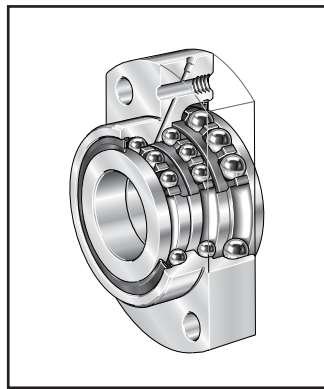
ZKLR



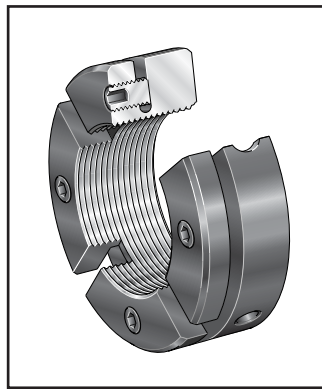
ZAXFM



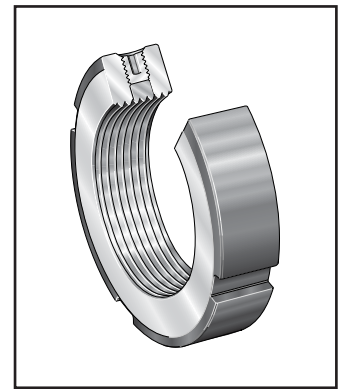
ZKLFA



DKLFA



AM



ZM, ZMA

Corporate Offices

Schaeffler Group USA Inc.
308 Springhill Farm Road
Fort Mill, South Carolina 29715
Telephone: 803-548-8500
Fax: 803-548-8599

Regional Sales Offices

CHARLOTTE

377 Ruben Center Dr., Suite 115
Fort Mill, South Carolina 29708
Telephone: 803-547-7970
Fax: 803-548-6361

CHICAGO

2525 Cabot Drive, Suite 110
Lisle, Illinois 60532
Telephone: 630-955-9360
Fax: 630-955-9365

DALLAS

1660 South Stemmons Fwy., Suite 360
Lewisville, Texas 75067
Telephone: 972-221-5150
Fax: 972-221-5373

DAYTON

261 Regency Ridge Drive
Centerville, Ohio 45459
Telephone: 937-433-6404
Fax: 937-433-6814

LOS ANGELES

34700 Pacific Coast Highway, Suite 203
Capistrano Beach, CA 92624
Tel: 949-234-9799
Fax: 949-234-9899

MILWAUKEE

N16 W23233 Stoneridge Drive, Suite 170
Waukesha, Wisconsin 53188
Telephone: 262-544-8270 x 224
Fax: 262-544-8271

PHILADELPHIA

12 Terry Drive, Suite 205
Langhorne, PA 18940
Telephone: 267-364-5401
Fax: 267-364-5416

Schaeffler Group USA, Inc.
308 Springhill Farm Road
Fort Mill, South Carolina 29715
Phone: (803)548-8500
Fax: (803)548-8599
www.schaeffler.us

ALL RIGHTS RESERVED

Schaeffler Group USA Inc.
308 Springhill Farm Road
Fort Mill, South Carolina

Reproduction of this publication in whole or in part without the express written consent of Schaeffler Group USA Inc. is prohibited.

Although every effort has been made to ensure the accuracy of the information contained in this catalog, Schaeffler Group USA Inc. shall not be liable for any omissions or errors. Purchasers should conduct their own testing to determine the suitability of any product for a particular purpose. In no event shall Schaeffler Group USA Inc. be liable for any claims for damages based upon breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory.

All sales from catalog orders are subject to the Standard Terms and Conditions of Sale. Please contact your Schaeffler Group USA Sales Representative for a copy of the Standard Terms and Conditions of Sale.

Printed in the United States.

©Copyright 2010