KSN Screw Gears (spiral gear)

Module 1, 1.5, 2

Specifications
- Precision grade: J8B grade N0 (JS8 IT1)
- Normal plane
- Gear teeth: Standard full depth
- Pressure angle: 20°
- Face width
- Involute: 64°NC

Internal Spur Screw Worm Gearboxes

KSN2-26R
KSN2-20L
KSN2-15L
KSN2-13L
KSN2-20R
KSN2-15R
KSN1-26L
KSN1-26R
KSN1-20R
KSN1-15R
KSN1-20L
KSN1-15L
KSN1-13R
KSN1.5-26L
KSN1.5-26R
KSN1.5-20R
KSN1.5-20L
KSN1.5-13L
KSN1.5-13R
KSN1.5-10R
KSN1.5-10L
KSN1.5-15R
KSN1.5-15L
KSN1.5-8R
KSN1.5-8L
KSN1-26L
KSN1-25R
KSN1-20L
KSN1-15L
KSN1-13R
KSN1-12R
KSN1-10R
KSN1-5R
KSN1-5L
KSN1-3R
KSN1-3L

[Caution on Secondary Operations]

KSN2-30L
KSN2-30R
KSN2-26L
KSN2-26R
KSN2-20L
KSN2-20R
KSN2-15L
KSN2-15R
KSN2-10L
KSN2-10R
KSN2-8L
KSN2-8R
KSN2-6L
KSN2-6R
KSN2-5L
KSN2-5R
KSN2-3L
KSN2-3R
KSN2-2L
KSN2-2R

[Caution on Product Characteristics]

If the bore diameter is less than φ4, the bore tolerance class is H8. If the bore diameter is φ5 or φ6, and the hole length is identical to the teeth of the gears in mesh.

Page 342 for more details.

Black oxide coating

To order J Series products, please specify: Catalog No. + J + BORE.

<table>
<thead>
<tr>
<th>Bore</th>
<th>Series</th>
<th>Price and lead time</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>S1T</td>
<td>$0.14 ~ 0.30</td>
</tr>
<tr>
<td>10</td>
<td>S1T</td>
<td>$0.10 ~ 0.22</td>
</tr>
<tr>
<td>15</td>
<td>S1T</td>
<td>$0.22</td>
</tr>
</tbody>
</table>

When using S1T set screws for fastening gears to a shaft, only use this method for applications with light load usage. For secure fastening, please use dowel pins in combination.
KHK Technical Information

Screw Gears

Features

KHK stock screw gears come in four materials, S45C, SUS303, CAC702 (old JIS AℓBC2) and MC nylon, in modules 1~4 and numbers of teeth from 10 to 30.

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Module</th>
<th>Material</th>
<th>Heat Treatment</th>
<th>Tooth Treatment</th>
<th>Precision</th>
<th>Tolerance</th>
<th>Secondary Dimension</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSN</td>
<td>1 to 4</td>
<td>S45C</td>
<td>—</td>
<td>Cut</td>
<td>N9</td>
<td>+0.1</td>
<td>—</td>
<td>○</td>
</tr>
<tr>
<td>KSN</td>
<td>1 to 3</td>
<td>SUS303</td>
<td>—</td>
<td>Cut</td>
<td>N9</td>
<td>+0.1</td>
<td>—</td>
<td>○</td>
</tr>
<tr>
<td>KAN</td>
<td>1 to 4</td>
<td>CAC702 (AℓBC2)</td>
<td>—</td>
<td>Cut</td>
<td>N9</td>
<td>+0.1</td>
<td>—</td>
<td>○</td>
</tr>
<tr>
<td>KPN</td>
<td>1 to 3</td>
<td>MC901</td>
<td>—</td>
<td>Cut</td>
<td>N9</td>
<td>+0.1</td>
<td>—</td>
<td>○</td>
</tr>
</tbody>
</table>

— Popular screw gear. Additionally, gear tooth hardening secondary operation can be performed. * Series products are also available.

2. Caution in Selecting Gears Based on Gear Strength

The allowable surface strengths listed in the product pages were determined using the Niemann formula as reference values. (Used with skewed axes)

There is a paucity of data on the strength of screw gears. The values of constant \( K_0 \) used in the calculations, which depend on the material of the mating gears, are our estimates. The mathematical expression below shows the Niemann formula to determine allowable tangential force \( F_t \) (kgf) and allowable torque \( T \) (kgf·m) on a basic circle.

\[
F_t = 1.425 \times f_{K0} \times \frac{d_1}{d_2} \times \frac{d_2}{d_1} \times \frac{d_2}{d_1} \\
T = F_t \times \frac{d_2}{2} \times \frac{d_1}{d_2} \times \frac{d_2}{d_1} \times \frac{d_2}{d_1}
\]

Here, \( d_1 \): standard pitch diameter of pinion (mm) \( \beta \): coefficient based on no. of teeth combination \( f_{K0} \): coefficient based on materials and sliding speed

\[
f_{K0} = 2 + \frac{h}{d_1}
\]

Here, \( h \): coefficient based on material selection \( V_s \): sliding speed (m/s)

\[
V_s = \frac{68000 \cos \beta \times V_c}{(n_1 + n_2)}
\]

Selection Hints

Please select the most suitable products by carefully considering the characteristics of items and contents of the product tables. Since screw gears come in right- or left-hand helix, make sure to include the letter “R” or “L” in the catalog number when you order.

1. Caution in Selecting the Mating Gears

Screw gears are used for offset shafts. Whether the shafts are paralleled offset or skewed offset depends on the helix directions of the mating gears.

- Direction of shaft: Arrangement of helix hands
  - Skewed Axes: RH-RH or LH-LH
  - Parallel Axes: RH-LH

2. Setting values depending on usage conditions

<table>
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<tr>
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<th>Tooth Treatment</th>
<th>Precision</th>
<th>Tolerance</th>
<th>Secondary Dimension</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSN</td>
<td>5</td>
<td>S45C</td>
<td>—</td>
<td>Cut</td>
<td>N9</td>
<td>+0.1</td>
<td>—</td>
<td>○</td>
</tr>
<tr>
<td>KSN</td>
<td>5</td>
<td>SUS303</td>
<td>—</td>
<td>Cut</td>
<td>N9</td>
<td>+0.1</td>
<td>—</td>
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<td>KAN</td>
<td>5</td>
<td>CAC702 (AℓBC2)</td>
<td>—</td>
<td>Cut</td>
<td>N9</td>
<td>+0.1</td>
<td>—</td>
<td>○</td>
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<td>N9</td>
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<td>—</td>
<td>○</td>
</tr>
</tbody>
</table>

Note: 1) Module values and the maximum allowable sliding speed of KSN & KPN products are set by KHK. Screw gears are basically used with lubrication. When using PF products without lubrication, the play values shown in the table are applied.

Application Hints

In order to use KHK stock screw gears safely, read the Application Hints carefully before proceeding. Please refer to Page 26 for “Cautions on Handling” and Page 27 for “Cautions on Starting”.

1. Cautions on Performing Secondary Operations

- If reboxing, it is important to pay special attention to locating the center in order to avoid runout.
- The reference datum for gear cutting is the bore. Therefore, use the bore for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface.
- If reworking using scroll chucks, we recommend the use of new or rebored jaws for improved precision. Please exercise caution not to crush the teeth by applying too much pressure. Any scarring will cause noise during operation.

2. Caution during Assembly

- KHK stock screw gears are designed to give the proper normal direction backlash when assembled using the center distance given by the formula below with a tolerance of H7 to H8. The amount of backlash is given in the product table for each gear.

\[
a = \frac{d_1}{2} - \frac{d_2}{2}
\]

Where
- \( a \): Center distance
- \( d_1 \): Pitch diameter of pinion
- \( d_2 \): Pitch diameter of gear

- Total Length of Screw Gears

<table>
<thead>
<tr>
<th>Total Length (mm)</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 or less</td>
<td>0 ± 0.10</td>
</tr>
<tr>
<td>31 to 100</td>
<td>0 ± 0.25</td>
</tr>
</tbody>
</table>

Note: KPN Plastic Screw Gears are excluded.

- Due to the helix of screw gears, they produce axial thrust forces.
- The bearings must be selected properly to be able to handle these thrust forces. The directions of thrust change with the direction of helix and the direction of rotation as illustrated below.

3. Application Hints

- Before using a KHK product, read the precautions in the catalog carefully in order to use it correctly.
- Avoid use in environments that may adversely affect the product.
- Our products are manufactured under a superior quality control system based on the ISO9001 quality management system. If you notice any malfunctions upon purchasing a product, please contact the supplier.