Catalog Number of KHK Stock Gears

The Catalog Number for KHK stock gears is based on the simple formula listed below. Please order KHK gears by specifying the Catalog Numbers.

Example: Worm Gear Pair

Worms

K  W  G  D L  2  -  R 1

Hand thread & Number of Starts
(Right hand, Single thread)
Module (2)

Type (Duplex Worm)

Others (Ground Gear)

Type (Worm)

Material (SCM440)

Worm Wheels

A  G  1.5  -  20  R 2

Hand thread & Number of starts
(Right hand, Double thread)
Number of teeth (20)
Module (1.5)

Type (Worm Wheel)

Material (CAC702)

Material

Type

Type

Other Information

K  SCM440

Material

W  Worms

Worms

K  SCM440

Material

K  CAC702 (AℓBC2)

Material

G  Ground Gears

S  Worm Shafts

SU  SUS303

Type (Worm Wheel)

Material

A  CAC702 (AℓBC2)

Material

B  CAC502 (PBC2)

Material

C  FC200

Material

D  Polyacetal

Material

P  MC901

* ( ) indicates old JIS designation

Series

Others

Series

Others

Series

Others

Series

Others

Series

Others

Series

Others

Series

Others

Series

Others
The simplest way to obtain a large speed reduction with high torque in a compact space is with worm gear drives. KHK stock worms and worm wheels are available in modules 0.5 to 6 and in speed ratios of 1/10 to 1/120, made in a variety of materials and styles. We also offer duplex worms and worm wheels with which you can obtain a very low backlash, high rotational precision system. The following table lists the main features for easy selection.

### Characteristics

<table>
<thead>
<tr>
<th>Type</th>
<th>Catalog No.</th>
<th>Module No.</th>
<th>No. of threads or reduction ratio</th>
<th>Material</th>
<th>Heat treatment</th>
<th>Tooth surface finish</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGF</td>
<td>AGF-1</td>
<td>0.5 ~ 1.5</td>
<td>10 ~ 60</td>
<td>CAC702</td>
<td>Cut</td>
<td>Ground</td>
<td>Made of aluminum bronze; have excellent wear-resistance. Wide selection is available for this item.</td>
</tr>
<tr>
<td>AGF</td>
<td>AGF-2</td>
<td>2 ~ 6</td>
<td>10 ~ 60</td>
<td>CAC702</td>
<td>Cut</td>
<td>Ground</td>
<td>Made of aluminum bronze; have excellent wear-resistance. Allows compact design.</td>
</tr>
<tr>
<td>SWG</td>
<td></td>
<td>1 ~ 6</td>
<td>Single thread - Triple thread</td>
<td>S45C</td>
<td>Ground</td>
<td>Ground</td>
<td>Neatly priced ground worms. Ready-to-use finished J Series products are also available.</td>
</tr>
<tr>
<td>SWG</td>
<td>AGF-2</td>
<td>1 ~ 6</td>
<td>10 ~ 60</td>
<td>CAC702</td>
<td>Cut</td>
<td>Ground</td>
<td>Made of aluminum bronze; have excellent wear-resistance. Wide selection is available for this item.</td>
</tr>
<tr>
<td>SW</td>
<td></td>
<td>0.5 ~ 6</td>
<td>Single thread - Double thread</td>
<td>S45C</td>
<td>Cut (Thread rolled)</td>
<td>Ground</td>
<td>Heat-resistance worms made of stainless steel suitable for mating with DG or PG worm wheels. Finished J Series products are also available.</td>
</tr>
<tr>
<td>SW</td>
<td></td>
<td>0.5 ~ 3</td>
<td>Single thread - Double thread</td>
<td>SUS303</td>
<td>Cut</td>
<td>Ground</td>
<td>Phosphorous bronze worm wheels have excellent wear-resistance. Interchangeable with CG Worm Wheels, and enhances strength.</td>
</tr>
<tr>
<td>BG</td>
<td></td>
<td>0.5 ~ 6</td>
<td>10 ~ 60</td>
<td>CA1002</td>
<td>Cut</td>
<td>Ground</td>
<td>Commonly used worm wheels that have broad utility. Available with a large selection of modules and number of teeth.</td>
</tr>
<tr>
<td>CG</td>
<td></td>
<td>1 ~ 6</td>
<td>10 ~ 120</td>
<td>FC200</td>
<td>Cut</td>
<td>Ground</td>
<td>Fine pitch worm wheels made of polycetal, a stable plastic material.</td>
</tr>
<tr>
<td>DG</td>
<td></td>
<td>0.5 ~ 0.8</td>
<td>10 ~ 60</td>
<td>Polyacetal</td>
<td>Cut</td>
<td>Ground</td>
<td>Fine pitch worm wheels made of polycetal, a stable plastic material.</td>
</tr>
<tr>
<td>PG</td>
<td></td>
<td>1 ~ 3</td>
<td>10 ~ 50</td>
<td>MC601</td>
<td>Cut</td>
<td>Ground</td>
<td>Lightweight and strong HNylon worm wheels. Suitable for use in food machinery, and can be used without lubricant.</td>
</tr>
</tbody>
</table>

- **NOTE 1**: The material of cast hubs for AGF and AG worm wheels is FC200 (Cast iron). AG worm wheels mate primarily with SWG worms. But, for Modules 0.8 or smaller, AG worm wheels mate with KKW worms.
- **NOTE 2**: KHK stock worms and worm wheels are produced to KHK’s own precision grades. See the “Precision of Worms and Worm Wheels” in the “Selection Hints” section.

### Application Examples

KHK stock worm gears are used in a wide range of fields, including reduction gears and positioning mechanisms.

- **Wiper Drive Device**
  - Worm gear used for the oscillating mechanism of wipers

- **Yaesu Steam Kettle**
  - SW worm and CG worm wheel used for adjusting height

- **Masdac Food Filling Device**
  - SW worm and CG worm wheel used for rotating large pans

- **Gonio Stage Design Example**
  - SW worm and BG worm wheel used for rotating large pans

- **Fabric Feeding Device**
  - KGWDL used for indexing and driving, for accurate filling of a fixed amount of ingredients

**Worm Gear Pair**

High-precision ground gear worms are available.

We use screw grinding machines manufactured by DRAKE, USA, to manufacture high-precision ground worms of module 0.5 to 8.

**KHK Technical Information**

**Image: Provided by PK Design**
Selection Hints

1. Caution in Selecting the Mating Gears

Worms and worm wheels have either right-hand or left-hand helix. The same hand worms and worm wheels comprise sets. However, the number of threads and whether they use normal module or axial module system must also be matched. The table below shows available combinations of KHK stock worms and worm wheels.

### Mating Worm Wheels Selection Chart

<table>
<thead>
<tr>
<th>Worm</th>
<th>KWDL</th>
<th>KWGDS</th>
<th>AG</th>
<th>AG0.5</th>
<th>AG1.5</th>
<th>PG</th>
<th>FG</th>
<th>JG</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>R1</td>
<td>R1</td>
<td>R1</td>
<td>R1</td>
<td>R1</td>
<td>R1</td>
<td>R2</td>
<td>R2</td>
</tr>
<tr>
<td>D</td>
<td>R2</td>
<td>R2</td>
<td>R2</td>
<td>R2</td>
<td>R1</td>
<td>R1</td>
<td>R2</td>
<td>R2</td>
</tr>
<tr>
<td>E</td>
<td>R2</td>
<td>R2</td>
<td>R2</td>
<td>R2</td>
<td>R1</td>
<td>R1</td>
<td>R2</td>
<td>R2</td>
</tr>
<tr>
<td>F</td>
<td>R2</td>
<td>R2</td>
<td>R2</td>
<td>R2</td>
<td>R1</td>
<td>R1</td>
<td>R2</td>
<td>R2</td>
</tr>
<tr>
<td>G</td>
<td>R2</td>
<td>R2</td>
<td>R2</td>
<td>R2</td>
<td>R1</td>
<td>R1</td>
<td>R2</td>
<td>R2</td>
</tr>
</tbody>
</table>

**NOTE 1:** Select the same module for both members.

2. Caution in Selecting Gears Based on Gear Strength

The gear strength values shown in the product pages were compute by assuming a certain application environment as shown below. Therefore, they should be used as reference only. We recommend that each user computes their own values by applying the actual usage conditions.

### Calculation assumptions for Surface Durability

**Formulas:**
- Formula of worm gear's strength (JGAM405-01)
- Lewis formula

<table>
<thead>
<tr>
<th>Item</th>
<th>Catalog No.</th>
<th>Formula of worm gear's strength (JGAM405-01)</th>
<th>The Lewis formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotational speed of the worm</td>
<td>600rpm</td>
<td>100rpm</td>
<td>Allowable bending stress (kg/mm²)</td>
</tr>
<tr>
<td>Lubricant</td>
<td>Oil bath</td>
<td>Lubricant for gears with proper viscosity and with anti-pressure additives</td>
<td></td>
</tr>
<tr>
<td>Starting condition</td>
<td>Torque less than 30% of rated torque. Less than 3 starts per hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Life (Durability)</td>
<td>26000 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact from motor</td>
<td>Uniform load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact from load</td>
<td>Uniform load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable stress factor $S_{aw}$</td>
<td>0.67</td>
<td>0.70</td>
<td>0.42</td>
</tr>
</tbody>
</table>

**NOTE 2:** The gear strength formula is based on JGAM (Japanese Gear Manufacturer’s Association) specifications and “NK Nylon Technical Data” by Nippon Polymeric Limited. The units for the rotational speed (rpm) and the stress (kgf/mm²) are adjusted to the units needed in the formula.

**NOTE 3:** Allowable bending stress of DG worm wheel is the value estimated.

When selecting KHK standard gears, glance over the Cautions on Product Characteristics and Cautions on Performing Secondary Operations in the respective dimension tables.

1. Products not listed in this catalog or materials, modules, number of teeth and the like not listed in the dimensional tables can be manufactured as custom items. Please see Page 16 for more details about custom-made orders.
2. The color and shape of the product images listed on the dimension table page of each product may differ from the actual product. Be sure to confirm the shape in the dimension table before selection.
3. The details (specifications, dimensions, prices, etc.) listed in the catalog may be changed without prior notice. Changes are announced on the KHK website.

Website URL: https://khhkgears.net/
Overseas Sales Department: TEL: 81-48-254-1744 FAX: 81-48-254-1765 E-mail: info@khhkgears.net

The most important factor in selecting gears is the gear strength.

**Step 1**

Use the actual load torque applied to the gear and the sliding speed to determine the worm gear suitable for the purpose.

**Step 2**

Select provisionally from the allowable torque table of the Master Catalog based on the load torque.

**Step 3**

We recommend that each user computes their own values by applying the actual usage conditions to determine the suitability of the gear strength.

Calculate the strength formally using the various gear strength formulas. Please see Page 97 of our technical reference book for more details.

**Strength confirmation is simple when using the website.**

Example of wear due to insufficient surface durability
3. Selecting Worms and Worm Wheels by Precision

The precision standards of KHK stock worms and worm wheels are established by us. The table below indicates the tolerance ranges for our products.

### Precision Grades of Worms (KHK W 001) (Unit: μm)

<table>
<thead>
<tr>
<th>Series</th>
<th>2 (2)</th>
<th>2.5 (2.5)</th>
<th>3 (3)</th>
<th>4 (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 module</td>
<td>over 8 up to 1otland</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>over 10 up to 16</td>
<td>12</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>over 16 up to 25</td>
<td>18</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>over 25 up to 40</td>
<td>24</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>over 40 up to 60</td>
<td>30</td>
<td>35</td>
<td>40</td>
</tr>
</tbody>
</table>

2. Tooth profile error

- 1.5 μm
- 1.0 μm
- 0.5 μm
- 0.3 μm
- 0.15 μm

### Precision Grades of Worm Wheels (KHK W 002)

We have established standard grades 1 to 5 of worm wheels using the JIS Standard as reference. Lead errors are measured over one full revolution.

### Precision Grades of Worm Wheels (KHK W 002) (Unit: μm)

<table>
<thead>
<tr>
<th>Series</th>
<th>2 (2)</th>
<th>2.5 (2.5)</th>
<th>3 (3)</th>
<th>4 (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 module</td>
<td>over 8 up to 1otland</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>over 10 up to 16</td>
<td>12</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>over 16 up to 25</td>
<td>18</td>
<td>20</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>over 25 up to 40</td>
<td>24</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>over 40 up to 60</td>
<td>30</td>
<td>35</td>
<td>40</td>
</tr>
</tbody>
</table>

3. Overall Length Tolerance of Worms

<table>
<thead>
<tr>
<th>Series</th>
<th>Total length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWG</td>
<td>Uniform Tolerance</td>
</tr>
<tr>
<td>SW, SUW</td>
<td>0 over 30 up to 100</td>
</tr>
<tr>
<td>KG, KWG</td>
<td>0.10 over 100</td>
</tr>
</tbody>
</table>

4. Cautions in Selecting Worm Gears Based on Efficiency

The efficiency of power transmission varies somewhat with the conditions of assembly and lubricant, but is generally 30 ~ 90% (excludes losses from bearings and churning of lubricants). The efficiency of KHK stock worm gear pair is given below as a reference. To learn more about strength calculations, please refer to the technical information contained in the “Surface Durability of Cylindrical Worm Gearing” section on Page 96.
In order to use KHK stock worms and worm wheels safely, carefully read the Application Hints before proceeding. If there are questions or you require clarifications, please contact our technical department or your nearest distributor.

1. Cautions on Handling
   ① KHK products are packaged one by one to prevent scratches and dents, but if you find issues such as rust, scratches, or dents when the product is removed from the box after purchase, please contact the supplier.
   ② Depending on the handling method, the product may become deformed or damaged. Resin gears and ring gears deform particularly easily, so please handle with care.

2. Caution on Performing Secondary Operations
   ① If you are reboring, it is important to pay special attention to locating the center in order to avoid runout. (Fig.1) The reference datum for gear cutting or grinding is the bore. (For worm shafts, it is ground portion of the shaft.) Therefore, use the bore or shaft 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.

   ② To open up the bore to its maximum, calculate the bore size so that the tooth strength is weaker than the strength of the remaining material. For machining the maximum bore diameter, it should be designed so that the thickness between hub diameter (or root diameter) to bore diameter has more strength than the gear strength. As a guide, the maximum machined bore diameter should be within 60% to 70% of the hub diameter (or root diameter). When the keyway is processed, it should be 50% to 60%. As well, because the cast FC200 boss is weaker and more brittle than other steels, sufficient thickness strength is required. Note that the guideline is about 10% lower again.

   ③ Since DG worm wheels are molded products, they may have air bubbles inside the material. In case you find air bubbles inside when performing secondary operations, and if the bubbles are found to be troublesome, please contact your KHK distributor.

3. Points of Caution in Assembling
   ① KHK stock worms and worm wheels are designed such that when assembled according to the specified mounting distance with a tolerance of H7 to H8, the normal direction backlash shown in the product tables is obtained. Do not attempt to eliminate backlash by pushing worms into worm wheels or operate with the worm shifted in the direction along the tooth.

   ② The figure below shows the datum clamp face of a worm wheel. When assembling worm gears, be sure that the worm axis is in the center of the worm wheel face width.

   ③ Because of the helix of the gear teeth, worms and worm wheels produce axial thrust forces. The directions of thrust depend on the hand of the helix and the direction of rotation. This is illustrated below in Fig.2. The bearings must be selected properly to be able to handle these thrust forces. See the “Gear Forces” section in separate technical reference book for more details (Page 107).

4. Verifying the orientation of assembly
   ① Check the following items before starting.
     - Are the gears installed securely?
     - Is there uneven tooth contact?
     - Is there adequate backlash? Be sure to avoid zero-backlash.
     - Has proper lubrication been supplied?

   ② If gears are exposed, be sure to attach a safety cover to ensure safety. Also, be careful not to touch rotating gears.

   ③ Gears can be lubricated with the “grease lubrication method”, “splash lubrication method (oil bath method)”, or “forced lubrication method (circulation lubrication method)”. For initial operation, the lubricant may deteriorate markedly, so check the condition of the lubricant after starting. For more technical information, please see the section “Gear Lubrication” (Page 112) of our technical reference book.

5. Cautions on Starting
   ① Check the following items before starting.

   ② If there is any abnormality such as noise or vibration during startup, check the gears and assembly condition. “High gear accuracy”, “smooth gear teeth surface” and “correct tooth contact” are some of the measures against gear noise. For more technical information, please see the section “Gear Noise and Countermeasures” (Page 119) of our technical reference book.

KHK considers safety a priority in the use of our products. When handling, adding secondary operations, assembling, and operating KHK products, please be aware of the following issues in order to prevent accidents.

**Warning: Precautions for preventing physical and property damage**
1. (When using KHK products, follow relevant safety regulations (Occupational Safety and Health Regulations, etc.).
2. Pay attention to the following items when installing, removing, or performing maintenance and inspection of the product:
   - Turn off the power supply.
   - Do not reach or crawl under the product.
   - Wear appropriate clothing and protective equipment for the work.

**Cautions in Preventing Accidents**
1. Before using a KHK product, read the precautions in the catalog carefully in order to use it correctly.
2. Avoid use in environments that may adversely affect the product.
3. Our products are manufactured under a superior quality control system based on the ISO9000 quality management system, if you notice any malfunctions upon purchasing a product, please contact the supplier.
**Description of duplex worm gears**

The usual method of adjusting the backlash of a worm gear assembly is to modify the center distance. Once assembled, such adjustment requires a major rework of the gearbox housing. The use of duplex worm gears allows the backlash adjustment to be made by axially shifting the worm. This simplifies greatly the assembly and maintenance operations. Because of the unique characteristics of the product, please take time to study its construction and proper use.

**Backlash adjustment mechanism and method of adjustment**

The dual-lead worm is formed to give a difference between the right tooth surface and left tooth surface so that it provides a unique tooth profile in which the tooth thickness varies continuously, corresponding with the lead difference. When such a worm and worm gear are set up at a constant assembly distance and the worm is moved in the axial direction, the tooth thickness of the worm in mesh with the worm gear changes making backlash adjustment possible.

**Application Examples**

Adjusting Screw

Adjusting Shim

*The illustration above is a design example, not a design for machinery or a device in actual use.

**Point of caution during assembly**

KHK duplex worm gears differs in module between the right and left tooth surface and, therefore, you must orient the worm and worm wheel properly. Please carefully verify the following two aspects before proceeding with assembly.

1. **Verifying the orientation of assembly**

   An arrow indicating the orientation of assembly is stamped on both the duplex worm and worm wheel. When assembling the worm and worm wheel, check the worm wheel of the arrow mark on the front such that the direction of arrow mark on the worm coincides with that on the worm wheel. Should the assembly be incorrect, the center distance “a” will become larger than the normal distance, resulting in difficulty of assembly and improper gear engagement.

2. **Verifying the reference position**

   A V-groove (60°, 0.3 mm deep line) on tip peripheral of the duplex worm tooth marks the reference tooth. The gear set is designed to have a backlash of nearly zero (± 0.045) when the reference tooth is positioned in alignment with the center of rotation of the worm wheel with the center distance set at the value “a”. (Fig.4)

---

**Diagram Descriptions**

- **Fig.1**: Illustration of the dual-lead worm and worm gear showing the difference in tooth thickness.
- **Fig.2**: Diagram showing the backlash adjustment mechanism.
- **Fig.3**: Illustration of the assembly orientation check.
- **Fig.4**: Diagram depicting the reference tooth and center distance.
Duplex Worms

When the center distance is moved to reduce the backlash, the \( V_{\text{max}} \) is the maximum amount of distance that you may shift without causing problems with the gear mesh. The \( V_{\text{max}} \) is not a recommended value to use for adjustment when assembling.

These worms produce axial thrust forces. See Page 362 for more details.

**Table 1.5, 2**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Reduction ratio</th>
<th>Nominal axial module</th>
<th>Nominal lead module</th>
<th>Normal thread</th>
<th>Shape</th>
<th>No. of thread</th>
<th>Tooth hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGDL1.5-20R1</td>
<td>20</td>
<td>20</td>
<td>3°20'</td>
<td>R</td>
<td>H1</td>
<td>8</td>
<td>22</td>
</tr>
</tbody>
</table>

① The tolerable torques shown in the table are the calculated values according to the assumed usage conditions. Please see Page 358 for more details.

② Duplex worms and worm wheels must be mated in a predetermined orientation, which is indicated by the arrows. Therefore, the arrow on the wheel does not indicate the mounting direction, but the rotating direction. Please refer to the Application Hints on Page 365.

③ Please read “Caution on Performing Secondary Operations” (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gear, the KHK’s system for quick modification of KHK stock gears is also available.

④ Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).
### Duplex Worms

#### Module 2.5, 3

**Catlog No.**

<table>
<thead>
<tr>
<th>Nominal module</th>
<th>Pinion</th>
<th>Nominal module</th>
<th>Gear</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5</td>
<td>m2.5</td>
<td>3.5</td>
<td>m</td>
</tr>
<tr>
<td>3</td>
<td>m2.5</td>
<td>3.5</td>
<td>m3</td>
</tr>
</tbody>
</table>

**Specifications**

- **Material:** CX45U, CX38U, CX32U, CX27U
- **Surface treatment:** Engineering  
- **Heat treatment:** Induction hardened
- **Pressure angle:** 17°30'
- **Pitch line pressure angle:** 17°30'
- **Tooth hardness:** 60HRC
- **Normal Tooth Hardness:**
  - **Surface treatment:** Black oxide coated except for the ground part
  - **Heat treatment:** Thermal refined, tooth surface induction hardened

**Table of Dimensions**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Reduction ratio</th>
<th>Nominal module</th>
<th>No. of module</th>
<th>Pitch circle diameter</th>
<th>Pinion diameter</th>
<th>Teeth</th>
<th>Pinion diameter</th>
<th>Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGDL3-30R1</td>
<td>20</td>
<td>3.5</td>
<td>m2.5</td>
<td>30</td>
<td>150</td>
<td>50</td>
<td>82.5</td>
<td>22</td>
</tr>
<tr>
<td>AGDL3-30R2</td>
<td>30</td>
<td>3.5</td>
<td>m2.5</td>
<td>30</td>
<td>150</td>
<td>50</td>
<td>82.5</td>
<td>22</td>
</tr>
<tr>
<td>AGDL3-30R3</td>
<td>36</td>
<td>3.5</td>
<td>m2.5</td>
<td>30</td>
<td>150</td>
<td>50</td>
<td>82.5</td>
<td>22</td>
</tr>
<tr>
<td>AGDL3-30R4</td>
<td>40</td>
<td>3.5</td>
<td>m2.5</td>
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</tbody>
</table>

**NOTE:**

- **C5 has a sand mold casting finish.**
- **Vmax:** Maximum allowable velocity in rpm
- **Catalog No.:** KWGDLS2.5-R1, KWGDLS2.5-R2

---

### Duplex Worm Wheels

**Catlog No.**

<table>
<thead>
<tr>
<th>Nominal module</th>
<th>Pinion</th>
<th>Nominal module</th>
<th>Gear</th>
</tr>
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<tbody>
<tr>
<td>3.5</td>
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<td>3.5</td>
<td>m</td>
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<tr>
<td>3</td>
<td>m2.5</td>
<td>3.5</td>
<td>m3</td>
</tr>
</tbody>
</table>

**Specifications**

- **Material:** CX45U, CX38U, CX32U, CX27U
- **Surface treatment:** Engineering  
- **Heat treatment:** Induction hardened
- **Pressure angle:** 17°30'
- **Pitch line pressure angle:** 17°30'
- **Tooth hardness:** 60HRC
- **Normal Tooth Hardness:**
  - **Surface treatment:** Black oxide coated except for the ground part
  - **Heat treatment:** Thermal refined, tooth surface induction hardened

**Table of Dimensions**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Reduction ratio</th>
<th>Nominal module</th>
<th>No. of module</th>
<th>Pitch circle diameter</th>
<th>Pinion diameter</th>
<th>Teeth</th>
<th>Pinion diameter</th>
<th>Teeth</th>
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**NOTE:**

- **C5 has a sand mold casting finish.**
- **Vmax:** Maximum allowable velocity in rpm
- **Catalog No.:** KWGDLS2.5-R1, KWGDLS2.5-R2
Module 3.5, 4

### AGDL Duplex Worm Wheels

**Specifications**
- **Material**: S45C (Surface treatment: Nitriding 5 4 8 2, 4)
- **Head hardness**: HRC5
- **Thread hardness**: HRC5
- **M18 screw class**: 6H
- **Radial runout**: 0.006

**Module 3.5, 4**

<table>
<thead>
<tr>
<th>Catalog No.</th>
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<th>Module</th>
<th>Normal axial module</th>
<th>Nominal lead angle</th>
<th>Normal number of starts</th>
<th>Gear teeth</th>
<th>Normal number of teeth</th>
<th>Thread pitch</th>
<th>Face width</th>
<th>Module width</th>
<th>Total length</th>
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<td>3.5</td>
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<td>155</td>
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**Module 3.5, 4**

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<th>Catalog No.</th>
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<th>Module</th>
<th>Normal axial module</th>
<th>Nominal lead angle</th>
<th>Normal number of starts</th>
<th>Gear teeth</th>
<th>Normal number of teeth</th>
<th>Thread pitch</th>
<th>Face width</th>
<th>Module width</th>
<th>Total length</th>
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<tr>
<td>AGDL3.5-30R1</td>
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<td>3.5</td>
<td>3°47'</td>
<td>20</td>
<td>61</td>
<td>105</td>
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<td>AGDL3.5-40R1</td>
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<td>70</td>
<td>126</td>
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<td>136.5</td>
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<tr>
<td>AGDL3.5-50R1</td>
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<td>162</td>
<td>165.5</td>
<td>32</td>
<td>18</td>
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**CAUTION ON PERFORMING SECONDARY OPERATIONS**
- When performing secondary operations, please refer to the "Caution on Performing Secondary Operations" (Page 362) when performing modifications or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.
- Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 mm).
You can download CAD data (DXF format) of KHK Products from the Web Catalog.

KWG

Ground Worm Shafts

Specifications
- Module: 0.5, 0.8
- Pitch: 5° 36'
- Addendum: 0.8
- Pressure angle: 30°
- Material: SCM440
- Pressure angle: 20°
- Material: C450 (GCr15, 52100)

Catalog No. | Axial module | Number of charts | Axial angle | Round thread | Shape | Lead length | Part length | Pitch length | Face width | Max length | Part length | Pitch length |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>KWG0.5-R1</td>
<td>m0.5</td>
<td>1</td>
<td>3°31'</td>
<td>R</td>
<td>W5</td>
<td>65</td>
<td>19</td>
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<td>34</td>
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<td>KWG0.5-R2</td>
<td>m0.5</td>
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<td>6°20'</td>
<td>R</td>
<td>W5</td>
<td>65</td>
<td>19</td>
<td>12</td>
<td>34</td>
<td>9</td>
<td>12</td>
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<tr>
<td>KWG0.8-R1</td>
<td>m0.8</td>
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<td>3°49'</td>
<td>R</td>
<td>W5</td>
<td>85</td>
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<td>40</td>
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<td>7°36'</td>
<td>R</td>
<td>W5</td>
<td>85</td>
<td>25</td>
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<td>40</td>
<td>12</td>
<td>20</td>
<td>40</td>
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</tbody>
</table>

(Catalog in Selectable Operations) 
- These worms produce axial thrust forces. See Page 362 for more details.

AG

Worm Wheels

Specifications
- Module: 0.5, 0.8
- Bore: 48
- Hub: 49.6
- Pitch: 20
- Face width: 15
- Outside dia: 40
- Outside dia: 5

Catalog No. | Reduction ratio | Transverse module | No. of teeth | Number of charts | Index angle | Round thread | Shape | Bore | Hub | Length | Pitch length | Face width | Max length | Part length | Pitch length |
<table>
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<th></th>
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<td>R</td>
<td>HA</td>
<td>4</td>
<td>9</td>
<td>10</td>
<td>11</td>
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<td>R</td>
<td>HA</td>
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<td>12</td>
<td>15</td>
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<td>15</td>
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<td>HA</td>
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<td>15</td>
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<tr>
<td>AGG-S-60R2</td>
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<td>50</td>
<td>1</td>
<td>3°31'</td>
<td>R</td>
<td>HA</td>
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<td>26</td>
<td>26</td>
<td>5</td>
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</tr>
</tbody>
</table>

(Catalog in Selectable Operations) 
- These worm wheels are used in power transmission systems. See Page 362 for more details.

NOTE 1: Allowable torque based on worm speed (rpm)

- 7.05
- 2.82
- 2.62
- 1.77
- 1.46
- 2.02
- 0.88
- 0.63
- 0.33
- 0.26
- 0.06
- 0.01

NOTE 2: Allowable torque based on worm speed (rpm)

- 1200
- 900
- 600
- 300
- 150
- 75

NOTE 3: Allowable torque based on worm speed (rpm)

- 18
- 9.5
- 0.26
- 0.10
- 0.01

NOTE 4: Allowable torque based on worm speed (rpm)

- 2.42
- 1.50
- 0.88
- 0.43
- 0.26
- 0.10

NOTE 5: Allowable torque based on worm speed (rpm)

- 0.035
- 0.068
- 0.018
- 0.10
- 0.06
- 0.02

Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm). Use carbide tools for the modification of the shaft area near the bottom land.

You can download CAD data (DXF format) of KHK Products from the Web Catalog.
**Ground Worm Shafts**

### Module 1, 1.5

**KWG**

### Ground Worm Shafts

**Specifications**
- Spur gear
- Gear pitch
- 20°
- AL-1440
- "Bore" hole
- Normal surface hardness
- GS: 54 to 60 HRC

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Spur Gear Module</th>
<th>Number of Teeth</th>
<th>Spur Gear Module</th>
<th>Pitch Diameter</th>
<th>Face Width</th>
<th>Spur Gear Module</th>
<th>Pitch Diameter</th>
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<td>3°26'</td>
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<td>50</td>
<td>15</td>
<td>70</td>
</tr>
<tr>
<td>KGW1.5-R1</td>
<td>m1.5</td>
<td>1</td>
<td>3°35'</td>
<td>190</td>
<td>50</td>
<td>15</td>
<td>70</td>
</tr>
<tr>
<td>KGW1.5-R2</td>
<td>m1.5</td>
<td>2</td>
<td>3°26'</td>
<td>190</td>
<td>50</td>
<td>15</td>
<td>70</td>
</tr>
</tbody>
</table>

(For orders, see Page 358 for more details.)

---

**AG Worm Wheels**

### Module 1, 1.5

**AG**

### Worm Wheels

**Specifications**
- Worm gear
- Gear pitch
- 20°
- AL-1440
- "Bore" hole
- Normal surface hardness
- GS: 54 to 60 HRC

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Spur Gear Module</th>
<th>Number of Teeth</th>
<th>Spur Gear Module</th>
<th>Pitch Diameter</th>
<th>Face Width</th>
<th>Spur Gear Module</th>
<th>Pitch Diameter</th>
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<td>190</td>
<td>50</td>
<td>15</td>
<td>70</td>
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(For orders, see Page 358 for more details.)

---

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

- The product shapes of J Series items are identified by background color.
- Screw size: 6 x 1.8, 8 x 2.3

<table>
<thead>
<tr>
<th>Screw size</th>
<th>6 x 1.8</th>
<th>8 x 2.3</th>
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<td>M5</td>
<td>M4</td>
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<tr>
<td>M5</td>
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</table>

(For products, see Page 358 for more details.)
**Module 2, 2.5**

### AGF Worm Wheels

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Module</th>
<th>Teeth</th>
<th>Start</th>
<th>End</th>
<th>Pressure Angle</th>
<th>Normal</th>
<th>Heat treatment</th>
<th>Profile shift</th>
<th>Coefficient</th>
<th>Outside dia.</th>
<th>Neck dia.</th>
<th>Shaft dia.</th>
<th>Weight (kg)</th>
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<tbody>
<tr>
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<td>25</td>
<td>20°</td>
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<td>H9, H8 shape</td>
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<td>H8</td>
<td>H9, H8 shape</td>
<td>H8</td>
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<td>42.7</td>
<td>23.1</td>
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<td>H9, H8 shape</td>
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<td>23.2</td>
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### Module 2.5

<table>
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<th>Teeth</th>
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<th>End</th>
<th>Pressure Angle</th>
<th>Normal</th>
<th>Heat treatment</th>
<th>Profile shift</th>
<th>Coefficient</th>
<th>Outside dia.</th>
<th>Neck dia.</th>
<th>Shaft dia.</th>
<th>Weight (kg)</th>
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<td>73.3</td>
<td>42.7</td>
<td>23.0</td>
<td>0.07</td>
</tr>
<tr>
<td>AGF-2.5-40R2</td>
<td>2.5</td>
<td>30</td>
<td>0</td>
<td>30</td>
<td>20°</td>
<td>H8</td>
<td>H9, H8 shape</td>
<td>H8</td>
<td>0.5</td>
<td>82.5</td>
<td>42.7</td>
<td>23.1</td>
<td>0.08</td>
</tr>
<tr>
<td>AGF-2.5-50R2</td>
<td>2.5</td>
<td>40</td>
<td>0</td>
<td>40</td>
<td>20°</td>
<td>H8</td>
<td>H9, H8 shape</td>
<td>H8</td>
<td>0.5</td>
<td>97.2</td>
<td>42.7</td>
<td>23.2</td>
<td>0.09</td>
</tr>
</tbody>
</table>

---

**KWG Ground Worm Shafts**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Module</th>
<th>Teeth</th>
<th>Start</th>
<th>End</th>
<th>Pressure Angle</th>
<th>Normal</th>
<th>Heat treatment</th>
<th>Profile shift</th>
<th>Coefficient</th>
<th>Outside dia.</th>
<th>Neck dia.</th>
<th>Shaft dia.</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KWG2-R1</td>
<td>2.5</td>
<td>25</td>
<td>0</td>
<td>25</td>
<td>20°</td>
<td>H8</td>
<td>H9, H8 shape</td>
<td>H8</td>
<td>0.5</td>
<td>73.3</td>
<td>42.7</td>
<td>23.0</td>
<td>0.07</td>
</tr>
<tr>
<td>KWG2-R2</td>
<td>2.5</td>
<td>30</td>
<td>0</td>
<td>30</td>
<td>20°</td>
<td>H8</td>
<td>H9, H8 shape</td>
<td>H8</td>
<td>0.5</td>
<td>82.5</td>
<td>42.7</td>
<td>23.1</td>
<td>0.08</td>
</tr>
<tr>
<td>KWG2.5-R1</td>
<td>2.5</td>
<td>40</td>
<td>0</td>
<td>40</td>
<td>20°</td>
<td>H8</td>
<td>H9, H8 shape</td>
<td>H8</td>
<td>0.5</td>
<td>97.2</td>
<td>42.7</td>
<td>23.2</td>
<td>0.09</td>
</tr>
<tr>
<td>KWG2.5-R2</td>
<td>2.5</td>
<td>50</td>
<td>0</td>
<td>50</td>
<td>20°</td>
<td>H8</td>
<td>H9, H8 shape</td>
<td>H8</td>
<td>0.5</td>
<td>110.0</td>
<td>42.7</td>
<td>23.3</td>
<td>0.10</td>
</tr>
</tbody>
</table>
These worms produce axial thrust forces. See Page 362 for more details.

The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see Page 358 for more details.

① Please read “Caution on Performing Secondary Operations” (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gear, the KHK’s system for quick modification of KHK stock gears is also available.

② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm). Use carbide tools for the modification of the shaft area near the bottom land.

③ These gears produce axial thrust forces. See Page 362 for more details.

④ Please read “Caution on Performing Secondary Operations” (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gear, the KHK’s system for quick modification of KHK stock gears is also available.

⑤ The tooth and the hub areas, fastened by casting, are designed to have higher strength than other parts of the gear. However, please avoid areas other than the hub. Also, the strength may decrease if secondary operations are performed.

⑥ The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see Page 358 for more details.

⑦ There may be space in the casting between the two materials, but it will not affect the joint strength.
[Caution on Product Characteristics]  
① These worms produce axial thrust forces. See Page 362 for more details.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Reduction ratio</th>
<th>Module</th>
<th>No. of teeth</th>
<th>Module angle</th>
<th>Profile shift coefficient</th>
<th>Material</th>
<th>Normal</th>
<th>Gear teeth Standard full depth section of gear Rotating plane</th>
<th>Precision grade KHK W 002 grade 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGF5-20R1</td>
<td>20</td>
<td>m5</td>
<td>20</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF5-25R1</td>
<td>25</td>
<td>m5</td>
<td>25</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF5-30R1</td>
<td>30</td>
<td>m5</td>
<td>30</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF5-35R1</td>
<td>35</td>
<td>m5</td>
<td>35</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF5-40R1</td>
<td>40</td>
<td>m5</td>
<td>40</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF6-20R1</td>
<td>20</td>
<td>m6</td>
<td>20</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF6-25R1</td>
<td>25</td>
<td>m6</td>
<td>25</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF6-30R1</td>
<td>30</td>
<td>m6</td>
<td>30</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF6-35R1</td>
<td>35</td>
<td>m6</td>
<td>35</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF6-40R1</td>
<td>40</td>
<td>m6</td>
<td>40</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
<tr>
<td>AGF6-45R1</td>
<td>45</td>
<td>m6</td>
<td>45</td>
<td>0°54'18&quot; R</td>
<td>5°43'</td>
<td>CS</td>
<td>0.22</td>
<td>F01300</td>
<td>KHK W 002 grade 2</td>
</tr>
</tbody>
</table>

[Caution on Secondary Operations]  
① Please read “Caution on Performing Secondary Operations” (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK’s system for quick modification of KHK stock gears is also available.

② Due to the gear teeth being induction hardened, no secondary operations can be performed on the tooth areas including the bottom land (approx. 2 to 3 mm). Use carbide tools for the modification of the shaft area near the bottom land.

③ For H0-shaped products with a bore size of φ 190 or more, the bore tolerance is H8.

[Section: Internal/Spur Screw/Miter Gear]  
① These gears produce axial thrust forces. See Page 362 for more details.
For W2-shaped products, a set screw is included. When setting up the mating wheel, make sure no friction occurs within the set screw.

### Specifications

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWG1-R1</td>
<td>1</td>
<td>3°35'</td>
<td>R</td>
<td>W2</td>
<td>8</td>
<td>—</td>
<td>16 18 22 (20)</td>
</tr>
<tr>
<td>SWG1-R2</td>
<td>2</td>
<td>7°08'</td>
<td>R</td>
<td>W2</td>
<td>8</td>
<td>—</td>
<td>16 18 22 (20)</td>
</tr>
<tr>
<td>SWG1.5-R1</td>
<td>1</td>
<td>3°26'</td>
<td>R</td>
<td>W1</td>
<td>10</td>
<td>20 25 28 30 10</td>
<td></td>
</tr>
<tr>
<td>SWG1.5-R2</td>
<td>2</td>
<td>6°51'</td>
<td>R</td>
<td>W1K</td>
<td>10</td>
<td>20 25 28 30 10</td>
<td></td>
</tr>
</tbody>
</table>

Module 1, 1.5

For products having a tapped hole, a set screw is included. When setting up the mating wheel, make sure no friction occurs within the set screw.

### AG Worm Wheels

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG1-20R1</td>
<td>20</td>
<td>1</td>
<td>5°30'</td>
<td>R</td>
<td>H1</td>
<td>6 16 20 22 23</td>
<td></td>
</tr>
<tr>
<td>AG1-20R2</td>
<td>20</td>
<td>2</td>
<td>7°08'</td>
<td>R</td>
<td>H1</td>
<td>6 16 20 22 23</td>
<td></td>
</tr>
<tr>
<td>AG1-30R1</td>
<td>30</td>
<td>1</td>
<td>3°35'</td>
<td>R</td>
<td>H1</td>
<td>6 20 30 32 33</td>
<td></td>
</tr>
<tr>
<td>AG1-30R2</td>
<td>30</td>
<td>2</td>
<td>7°08'</td>
<td>R</td>
<td>H1</td>
<td>6 20 30 32 33</td>
<td></td>
</tr>
<tr>
<td>AG1-40R1</td>
<td>40</td>
<td>1</td>
<td>3°35'</td>
<td>R</td>
<td>H1</td>
<td>6 20 30 42 43</td>
<td></td>
</tr>
<tr>
<td>AG1-40R2</td>
<td>40</td>
<td>2</td>
<td>7°08'</td>
<td>R</td>
<td>H1</td>
<td>6 20 30 42 43</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Keyway (mm)</th>
<th>Screw size</th>
<th>Catalog No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 8 10 12 14</td>
<td>4 x 1.8</td>
<td>M4 M5 M6</td>
</tr>
<tr>
<td>16 18 20 22 24</td>
<td>5 x 2.3</td>
<td>M6 M7 M8</td>
</tr>
<tr>
<td>26 28 30 32 34</td>
<td>6 x 2.8</td>
<td>M8 M9 M10</td>
</tr>
</tbody>
</table>

### Caution on J Series

- As available-on-request products, requires a lead-time for shipping within 2 working-days (includes the day ordered), after placing an order. Please allow additional shipping time to get to your local distributor.
- For products having a tapped hole, a set screw is included.
- The use of 1/16” shaped set screws for fastening gears to a shaft is a method only applicable to the usage for light loads. For secure fastening, please use dowel pins in combination.

You can download CAD data (DXF format) of KHK Products from the Web Catalog.
You can download CAD data (DXF format) of KHK Products from the Web Catalog.

Worm Wheels

| Module 2, 2.5 |

**Specifications**

- **Precision grade**: KHK W 002 grade 2 +
- **Material**: AK4K, steel, hardened, case carburized
- **Heat treatment**: Case carburized by heat hardening

**Catalog No.**

- AG2.5-60R1
- AG2.5-50R1
- AG2.5-40R1
- AG2.5-30R1
- AG2.5-20R1
- AG2-60R1
- AG2-40R1
- AG2-20R1

**Torque Hardness**

- **50**: 50
- **65**: 65

**Compliance**

- [Caution on Secondary Operations]

1. Please read "Caution on Performing Secondary Operations" (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mold Gears, the KHK system for quick modification of KHK stock gears is also available.
2. Due to the gear teeth being induction hardened, no secondary operations can be performed on the tooth areas including the bottom land (approx. 2 to 3 mm).
3. Keyways are made according to JIS B1301 standards, Js9 tolerance.
4. Areas of products which have been rewound will not be black oxide coated.
5. For products having a tapped hole, a set screw is included.

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

**Keyway cut**

<table>
<thead>
<tr>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>25</th>
<th>28</th>
<th>30</th>
<th>32</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>50</td>
</tr>
</tbody>
</table>

**Catalog No.**

- H14
- H16
- H18
- H20
- H25
- H30
- H35

**Dimensions**

- **Keyway cut**: H1K
- **Boss**: HSK

**Tooth Hardness**

- **50**:(Material: S45C)

**Reference**

- To the value shown in the table.
**Module 3, 4**

### AG Worm Wheels

**Specifications**
- **Precision grade**: KHM W 002 grade 2
- **Flattened plane**: R-stud plane
- **Y-axis**: Standard full depth
- **Material**: C45 (SUJ2)
- **Heat treatment**: Teeth induction hardened
- **Head**: Flat head
- **Thread**: Full thread
- **Pitch dia.**: 16° to 25°
- **Pitch dia.**: R3 to R4
- **Flank width**: H3 to H4
- **Flank width**: 0.16 to 0.30

### Catalog No. H3K

- **SWG3-R3J17**
- **SWG3-R3J20**
- **SWG3-R1J19**
- **SWG3-R2J18**
- **SWG3-R2J17**
- **SWG3-R1J18**
- **SWG3-R2J20**
- **SWG3-R3J18**
- **SWG3-R3J19**
- **SWG3-R1J17**
- **SWG3-R2J19**
- **SWG3-R2J20**
- **SWG3-R3J20**

### Specifications

- **Tooth hardness**: 100 to 120 on the Rockwell C scale
- **Screw size**: M5 to M10
- **Tooth width**: 9 to 11 mm

### AG Worm Wheels

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

- **The product shapes of J Series items are identified by background color.**

<table>
<thead>
<tr>
<th>Keyway</th>
<th>20</th>
<th>22</th>
<th>25</th>
<th>28</th>
<th>30</th>
<th>32</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
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</thead>
<tbody>
<tr>
<td>Keyway</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Swing Gears**

- **Spur Gears**
- **Helical Gears**
- **Internal Gears**
- **Racks**
- **CP Racks & Pinions**
- **Miter Gears**
- **Bevel Gears**
- **Screw Gears**
- **Worm Gear Pairs**
- **Bevel Gearboxes**
- **Other Products**

---

1. **These worms produce axial thrust forces.** See Page 362 for more details.
2. **Quick-Mod Gears**, the KHK's system for quick modification of KHK stock gears is also available.
3. **Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).**
4. **As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes the day ordered), after placing an order.**
5. **Number of products we can process for one order is 1 to 20 units. For quantities of 21 or more pieces, we need to quote price and lead time.**

---

**H5**

- **Module 3, 4**
- **Ground Worms**
- **Ground Worms**

---

**Note on secondary operations**: 1. Please read “Caution on Performing Secondary Operations” (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.
2. Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).
### Ground Worms

**Module 5, 6**

**Specifications**
- **Precision grade**: KHK W 001 grade 2
- **Reference section of gear**: Axial
- **Gear teeth**: Standard full depth
- **Normal pressure angle**: 20°
- **Material**: S-45C
- **Heat treatment**: Teeth induction hardened
- **Tooth hardness**: 50 ~ 60 HR C
- **Surface treatment**: Black oxide coated except for ground part

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Axial module</th>
<th>Number of starts</th>
<th>Lead angle</th>
<th>Hand thread</th>
<th>Shape</th>
<th>Bore LH7</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
<th>Q</th>
<th>Q'</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWG5-R1</td>
<td>m5</td>
<td>1</td>
<td>4°05'</td>
<td>R</td>
<td>W3</td>
<td>25</td>
<td>56</td>
<td>70</td>
<td>80</td>
<td>85</td>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>SWG5-R2</td>
<td>m5</td>
<td>2</td>
<td>8°08'</td>
<td>R</td>
<td>W3</td>
<td>25</td>
<td>56</td>
<td>70</td>
<td>80</td>
<td>85</td>
<td>30</td>
<td>5</td>
</tr>
<tr>
<td>SWG6-R1</td>
<td>m6</td>
<td>1</td>
<td>4°17'</td>
<td>R</td>
<td>W3</td>
<td>30</td>
<td>63</td>
<td>80</td>
<td>92</td>
<td>100</td>
<td>35</td>
<td>5</td>
</tr>
<tr>
<td>SWG6-R2</td>
<td>m6</td>
<td>2</td>
<td>8°32'</td>
<td>R</td>
<td>W3</td>
<td>30</td>
<td>63</td>
<td>80</td>
<td>92</td>
<td>100</td>
<td>35</td>
<td>5</td>
</tr>
</tbody>
</table>

[Caution on Product Characteristics] ① These worms produce axial thrust forces. See Page 362 for more details.

### Worm Wheels

**Module 5, 6**

**Specifications**
- **Precision grade**: KHK W 002 grade 2
- **Reference section of gear**: Rotating plane
- **Gear teeth**: Standard full depth
- **Normal pressure angle**: 20°
- **Material**: CACT02 (formerly JIS48C2)
- **Heat treatment**: —
- **Tooth hardness**: —

* H4, H5 shape have a hub made from FC200 cast iron. FC200’s tensile strength (200N/mm²) is derived from test specimens and does not represent that of the boss.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Reduction ratio</th>
<th>Transverse module</th>
<th>No. of teeth</th>
<th>Number of starts</th>
<th>Helix angle</th>
<th>Hand thread</th>
<th>Shape</th>
<th>Bore A/B</th>
<th>Pitch dia.</th>
<th>Throat dia.</th>
<th>Outside dia.</th>
<th>Face width</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG5-20R1</td>
<td>20</td>
<td>m5</td>
<td>20</td>
<td>1</td>
<td>4°05'</td>
<td>R</td>
<td>H4</td>
<td>22</td>
<td>75</td>
<td>100</td>
<td>115</td>
<td>35</td>
</tr>
<tr>
<td>AG5-20R2</td>
<td>10</td>
<td>m5</td>
<td>20</td>
<td>2</td>
<td>8°08'</td>
<td>R</td>
<td>H4</td>
<td>22</td>
<td>75</td>
<td>100</td>
<td>115</td>
<td>35</td>
</tr>
<tr>
<td>AG5-30R1</td>
<td>30</td>
<td>m5</td>
<td>30</td>
<td>1</td>
<td>4°05'</td>
<td>R</td>
<td>H5</td>
<td>22</td>
<td>75</td>
<td>150</td>
<td>160</td>
<td>35</td>
</tr>
<tr>
<td>AG5-30R2</td>
<td>15</td>
<td>m5</td>
<td>30</td>
<td>2</td>
<td>8°08'</td>
<td>R</td>
<td>H5</td>
<td>22</td>
<td>75</td>
<td>150</td>
<td>160</td>
<td>35</td>
</tr>
<tr>
<td>AG5-40R1</td>
<td>40</td>
<td>m5</td>
<td>40</td>
<td>1</td>
<td>4°05'</td>
<td>R</td>
<td>H5</td>
<td>22</td>
<td>110</td>
<td>200</td>
<td>210</td>
<td>215</td>
</tr>
<tr>
<td>AG5-50R1</td>
<td>50</td>
<td>m5</td>
<td>50</td>
<td>1</td>
<td>4°05'</td>
<td>R</td>
<td>H5</td>
<td>22</td>
<td>120</td>
<td>250</td>
<td>260</td>
<td>265</td>
</tr>
<tr>
<td>AG5-60R1</td>
<td>60</td>
<td>m5</td>
<td>60</td>
<td>1</td>
<td>4°05'</td>
<td>R</td>
<td>H5</td>
<td>22</td>
<td>130</td>
<td>300</td>
<td>310</td>
<td>315</td>
</tr>
<tr>
<td>AG6-20R1</td>
<td>20</td>
<td>m6</td>
<td>20</td>
<td>1</td>
<td>4°17'</td>
<td>R</td>
<td>H4</td>
<td>25</td>
<td>85</td>
<td>120</td>
<td>132</td>
<td>138</td>
</tr>
<tr>
<td>AG6-20R2</td>
<td>10</td>
<td>m6</td>
<td>20</td>
<td>2</td>
<td>8°32'</td>
<td>R</td>
<td>H4</td>
<td>25</td>
<td>85</td>
<td>120</td>
<td>132</td>
<td>138</td>
</tr>
<tr>
<td>AG6-30R1</td>
<td>30</td>
<td>m6</td>
<td>30</td>
<td>1</td>
<td>4°17'</td>
<td>R</td>
<td>H5</td>
<td>25</td>
<td>100</td>
<td>180</td>
<td>192</td>
<td>198</td>
</tr>
<tr>
<td>AG6-30R2</td>
<td>15</td>
<td>m6</td>
<td>30</td>
<td>2</td>
<td>8°32'</td>
<td>R</td>
<td>H5</td>
<td>25</td>
<td>100</td>
<td>180</td>
<td>192</td>
<td>198</td>
</tr>
<tr>
<td>AG6-40R1</td>
<td>40</td>
<td>m6</td>
<td>40</td>
<td>1</td>
<td>4°17'</td>
<td>R</td>
<td>H5</td>
<td>25</td>
<td>120</td>
<td>240</td>
<td>252</td>
<td>258</td>
</tr>
<tr>
<td>AG6-50R1</td>
<td>50</td>
<td>m6</td>
<td>50</td>
<td>1</td>
<td>4°17'</td>
<td>R</td>
<td>H5</td>
<td>25</td>
<td>130</td>
<td>300</td>
<td>312</td>
<td>318</td>
</tr>
<tr>
<td>AG6-60R1</td>
<td>60</td>
<td>m6</td>
<td>60</td>
<td>1</td>
<td>4°17'</td>
<td>R</td>
<td>H5</td>
<td>25</td>
<td>150</td>
<td>360</td>
<td>372</td>
<td>378</td>
</tr>
</tbody>
</table>

[Caution on Product Characteristics] ① The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see Page 358 for more details.

② There may be space in the casting between the two materials, but it will not affect the joint strength.
You can download CAD data (DXF format) of KHK Products from the Web Catalog.

<table>
<thead>
<tr>
<th>Spur Gears</th>
<th>Helical Gears</th>
<th>Internal Gears</th>
<th>Racks &amp; Pinions</th>
<th>Miter Gears</th>
<th>Bevel Gears</th>
<th>Screw Gears</th>
<th>Worm Gearboxes</th>
<th>Other Products</th>
</tr>
</thead>
</table>

You can download CAD data (DXF format) of KHK Products from the Web Catalog.
These worms produce axial thrust forces. See Page 362 for more details.

If bore size is less than φ4, the diameter tolerance is H8. If bore size is φ5 or φ6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

These worms produce axial thrust forces. See Page 362 for more details.

If bore size is less than φ4, the diameter tolerance is H8. If bore size is φ5 or φ6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

These worms produce axial thrust forces. See Page 362 for more details.

If bore size is less than φ4, the diameter tolerance is H8. If bore size is φ5 or φ6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

These worms produce axial thrust forces. See Page 362 for more details.

If bore size is less than φ4, the diameter tolerance is H8. If bore size is φ5 or φ6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

These worms produce axial thrust forces. See Page 362 for more details.

If bore size is less than φ4, the diameter tolerance is H8. If bore size is φ5 or φ6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

These worms produce axial thrust forces. See Page 362 for more details.

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These worms produce axial thrust forces. See Page 362 for more details.

If bore size is less than φ4, the diameter tolerance is H8. If bore size is φ5 or φ6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

These worms produce axial thrust forces. See Page 362 for more details.

If bore size is less than φ4, the diameter tolerance is H8. If bore size is φ5 or φ6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

These worms produce axial thrust forces. See Page 362 for more details.

If bore size is less than φ4, the diameter tolerance is H8. If bore size is φ5 or φ6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

These worms produce axial thrust forces. See Page 362 for more details.

If bore size is less than φ4, the diameter tolerance is H8. If bore size is φ5 or φ6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.
① For W2-shaped products, a set screw is included. When setting up the mating wheel, make sure no friction occurs within the set screw.

② These worms produce axial thrust forces. See Page 362 for more details.

③ If bore size is less than φ 4, the diameter tolerance is H8. If bore size is φ 5 or φ 6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

④ Keyways are made according to JIS B1301 standards, Js9 tolerance.

⑤ Please read “Caution on Performing Secondary Operations” (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK’s system for quick modification of KHK stock gears is also available.

⑥ Please read “Caution on Performing Secondary Operations” (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK’s system for quick modification of KHK stock gears is also available.

⑦ As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes the day ordered), after placing an order.

⑧ To order J Series products, please specify; Catalog No. + J + BORE

NOTE 1: Allowable torque based on worm speed (rpm)

NOTE 2: The product shapes of J Series items are identified by background color.

NOTE 3: The allowable tolerances in the table are the calculated values according to the assumed usage conditions. Please see Page 358 for more details.

NOTE 4: For bore sizes less than φ 4, the tolerance is H8. If bore size is φ 5 or φ 6, and the hole length exceeds 3 times the diameter, the tolerance is also H8.

NOTE 5: Please read “Caution on Performing Secondary Operations” (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK’s system for quick modification of KHK stock gears is also available.

NOTE 6: When using H1T set screws for fastening gears to a shaft, only use this method for light loads. For secure fastening, please use dowel pins in combination.
Steel Worms

Module 1.5

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Catalog No.</th>
<th>Module</th>
<th>Bore Dia.</th>
<th>Thrust Load</th>
<th>Gear Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel Worms</td>
<td>SW1.5-R1</td>
<td>SW1.5-S1.5-J8</td>
<td>1</td>
<td>3°26'</td>
<td>R</td>
<td>10</td>
</tr>
<tr>
<td>Other Products</td>
<td></td>
<td></td>
<td>2</td>
<td>6°54'</td>
<td>R</td>
<td>10</td>
</tr>
</tbody>
</table>

**Caution on Product Characteristics**

1. Worms produce axial thrust forces. See Page 362 for more details.
2. Gear tooth hardening of the worm reduces the precision (intolerance error) in the load and pressure angle. Avoid heat treating as it will cause bad tooth contact causing abrasion of the wheel.

---

### Module 1.5

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Module</th>
<th>Bore Dia.</th>
<th>Thrust Load</th>
<th>Gear Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1.5-R1</td>
<td>1</td>
<td>R</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>SW1.5-R2</td>
<td>2</td>
<td>R</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

**Caution on Secondary Operations**

1. Worm Wheels are profile shifted to create the proper center distance.
2. These worms produce axial thrust forces. See Page 362 for more details.

---

**CG**

**Bronze Worm Wheels & Gray Iron Worm Wheels**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Module</th>
<th>Bore Dia.</th>
<th>Thrust Load</th>
<th>Gear Teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1.5-R1</td>
<td>1</td>
<td>R</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>SW1.5-R2</td>
<td>2</td>
<td>R</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

**Caution on Product Characteristics**

1. These worms produce axial thrust forces. See Page 362 for more details.
2. Gear tooth hardening of the worm reduces the precision (intolerance error) in the load and pressure angle. Avoid heat treating as it will cause bad tooth contact causing abrasion of the wheel.

---

**To order J Series products, please specify:**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>J BORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1.5-R1</td>
<td>J</td>
</tr>
<tr>
<td>SW1.5-R2</td>
<td>J</td>
</tr>
</tbody>
</table>

---

**Notes**

1. As available-on-request products, requires a lead-time for shipping within 2 working days (excludes the day ordered), after placing an order.
2. Please allow additional shipping time to get to your local distributor.
3. Number of products we can process for one order is 1 to 20 units. For quantities of 21 or more pieces, we need to quote price and lead time.
4. Keyways are made according to JIS B1301 standards, JISF tolerance.
5. Areas of products which have been re-worked will be black oxide coated.
6. For products having a tapped hole, a set screw is included.

---

**Specifications**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Keyway</th>
<th>Set Screw</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1.5-R1</td>
<td>J</td>
<td>M5</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>SW1.5-R2</td>
<td>J</td>
<td>M5</td>
<td>0.11</td>
<td></td>
</tr>
</tbody>
</table>

---

**To order J Series products, please specify:**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>J BORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1.5-R1</td>
<td>J</td>
</tr>
<tr>
<td>SW1.5-R2</td>
<td>J</td>
</tr>
</tbody>
</table>

---

**Notes**

1. As available-on-request products, requires a lead-time for shipping within 2 working days (excludes the day ordered), after placing an order.
2. Please allow additional shipping time to get to your local distributor.
3. Number of products we can process for one order is 1 to 20 units. For quantities of 21 or more pieces, we need to quote price and lead time.
4. Keyways are made according to JIS B1301 standards, JISF tolerance.
5. Areas of products which have been re-worked will be black oxide coated.
6. For products having a tapped hole, a set screw is included.
7. When using HT set screws for fastening gears to a shaft, only use this method for applications with the usage for light loads. For secure fastening, please use dowel pins in combination.
**Steel Worms**

**Specifications**
- Precision grade: K8K W01 grade 4 +
- Normal plane type
- Gear teeth: Standard full depth
- Pressure angle: 14° 30'
- Material: 16Cr
- Heat treatment: Black oxide coating

### Catalog No.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Module</th>
<th>Normal number of teeth</th>
<th>Module</th>
<th>Module</th>
<th>Standard full depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW2-L1</td>
<td>1</td>
<td>34° 2'</td>
<td>SW2-R1</td>
<td>1</td>
<td>3° 42'</td>
</tr>
<tr>
<td>SW2-L2</td>
<td>2</td>
<td>7° 25'</td>
<td>SW2-R2</td>
<td>2</td>
<td>7° 25'</td>
</tr>
<tr>
<td>SW2-L1J14</td>
<td>1</td>
<td>34° 2'</td>
<td>SW2-R1J14</td>
<td>1</td>
<td>3° 42'</td>
</tr>
<tr>
<td>SW2-L2J14</td>
<td>2</td>
<td>7° 25'</td>
<td>SW2-R2J14</td>
<td>2</td>
<td>7° 25'</td>
</tr>
</tbody>
</table>

- These worms produce axial thrust forces. See Page 362 for more details.

---

**BG • CG**

**Bronze Worm Wheels & Gray Iron Worm Wheels**

**Specifications**
- Precision grade: K8K W02 grade 4 +
- Normal plane type
- Gear teeth: Standard full depth
- Pressure angle: 14° 30'
- Material: 16Cr
- Heat treatment: Black oxide coating

### Catalog No.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Module</th>
<th>Normal number of teeth</th>
<th>Module</th>
<th>Module</th>
<th>Standard full depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG2-20R1</td>
<td>1</td>
<td>3° 42'</td>
<td>CG2-20L2</td>
<td>2</td>
<td>7° 25'</td>
</tr>
<tr>
<td>BG2-20R2</td>
<td>2</td>
<td>7° 25'</td>
<td>CG2-20L2</td>
<td>2</td>
<td>7° 25'</td>
</tr>
<tr>
<td>BG2-20L1</td>
<td>1</td>
<td>3° 42'</td>
<td>CG2-20L2</td>
<td>2</td>
<td>7° 25'</td>
</tr>
<tr>
<td>BG2-20L2</td>
<td>2</td>
<td>7° 25'</td>
<td>CG2-20L2</td>
<td>2</td>
<td>7° 25'</td>
</tr>
</tbody>
</table>

- The precision grade of S series products is equivalent to the value shown in the table.
- *P, *U0, and *U1 are derived from test specimens and differ according to the product shape.

---

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

<table>
<thead>
<tr>
<th>Keyway (in)</th>
<th>12</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>20</th>
<th>22</th>
<th>25</th>
<th>30</th>
<th>32</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw size</td>
<td>4 X 1.8</td>
<td>5 X 2.3</td>
<td>6 X 2.8</td>
<td>8 X 3.3</td>
<td>10 X 3.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- For [Caution on J Series], please see Page 395.

---

**SW**

**Steel Worms**

**Module 2**

**Specifications**
- The precision grade of S series products is equivalent to the value shown in the table.
- *P, *U0, and *U1 are derived from test specimens and differ according to the product shape.

### Catalog No.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Module</th>
<th>Normal number of teeth</th>
<th>Module</th>
<th>Module</th>
<th>Standard full depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW2-L1</td>
<td>1</td>
<td>34° 2'</td>
<td>SW2-R1</td>
<td>1</td>
<td>3° 42'</td>
</tr>
<tr>
<td>SW2-L2</td>
<td>2</td>
<td>7° 25'</td>
<td>SW2-R2</td>
<td>2</td>
<td>7° 25'</td>
</tr>
<tr>
<td>SW2-L1J14</td>
<td>1</td>
<td>34° 2'</td>
<td>SW2-R1J14</td>
<td>1</td>
<td>3° 42'</td>
</tr>
<tr>
<td>SW2-L2J14</td>
<td>2</td>
<td>7° 25'</td>
<td>SW2-R2J14</td>
<td>2</td>
<td>7° 25'</td>
</tr>
</tbody>
</table>

- These worms produce axial thrust forces. See Page 362 for more details.

---

**BG • CG**

**Bronze Worm Wheels & Gray Iron Worm Wheels**

**Specifications**
- Precision grade: K8K W02 grade 4 +
- Normal plane type
- Gear teeth: Standard full depth
- Pressure angle: 14° 30'
- Material: 16Cr
- Heat treatment: Black oxide coating

### Catalog No.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Module</th>
<th>Normal number of teeth</th>
<th>Module</th>
<th>Module</th>
<th>Standard full depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG2-20L1</td>
<td>1</td>
<td>3° 42'</td>
<td>CG2-20L2</td>
<td>2</td>
<td>7° 25'</td>
</tr>
<tr>
<td>CG2-20L2</td>
<td>2</td>
<td>7° 25'</td>
<td>CG2-20L2</td>
<td>2</td>
<td>7° 25'</td>
</tr>
<tr>
<td>CG2-20L1J14</td>
<td>1</td>
<td>3° 42'</td>
<td>CG2-20L2J14</td>
<td>2</td>
<td>7° 25'</td>
</tr>
<tr>
<td>CG2-20L2J14</td>
<td>2</td>
<td>7° 25'</td>
<td>CG2-20L2J14</td>
<td>2</td>
<td>7° 25'</td>
</tr>
</tbody>
</table>

- The precision grade of S series products is equivalent to the value shown in the table.
- *P, *U0, and *U1 are derived from test specimens and differ according to the product shape.

---

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

<table>
<thead>
<tr>
<th>Keyway (in)</th>
<th>12</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>20</th>
<th>22</th>
<th>25</th>
<th>30</th>
<th>32</th>
<th>35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw size</td>
<td>4 X 1.8</td>
<td>5 X 2.3</td>
<td>6 X 2.8</td>
<td>8 X 3.3</td>
<td>10 X 3.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- For [Caution on J Series], please see Page 395.
### Steel Worms

**Specifications**
- **Precision grade**: KHK W01 grade 4
- **Number of gear**: Normal plane
- **Bore size**: Standard full depth
- **Helix angle**: 3°52’
- **Material**: 45S
- **Heat treatment**: Hardness over 58 HRB
- **Surface treatment**: Black oxide coating

#### Module 2.5

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Normal module</th>
<th>Normal module</th>
<th>Normal module</th>
<th>Normal module</th>
<th>Normal module</th>
<th>Normal module</th>
<th>Normal module</th>
<th>Normal module</th>
<th>Normal module</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG2.5-20R1</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>BG2.5-20L1</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
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</tbody>
</table>

*These products produce axial thrust forces. See Page 362 for more details.*

---

### Bronze Worm Wheels & Gray Iron Worm Wheels

**Specifications**
- **Precision grade**: KHK W01 grade 4
- **Number of gear**: Normal plane
- **Bore size**: Standard full depth
- **Helix angle**: 3°52’
- **Material**: 45S
- **Heat treatment**: Hardness over 58 HRB
- **Surface treatment**: Black oxide coating

#### Module 2.5

<table>
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</tbody>
</table>

---

### Caution on Secondary Operations
- Please read "Caution on Performing Secondary Operations" (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Lock Gears, the KHK system for quick modification of KHK stock gears, is also available.
- Gear tooth hardening of the worm reduces the precision (introduces errors in the lead and pressure angle). Avoid heat treating as it will create bad tooth contact causing abrasion of the wheel.

---

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

**Note:** The product shapes of J Series items are identified by background color.
**Module 3**

### SW Steel Worms

#### Specifications

- **Gear Tooth Hardening**: The gear tooth hardening of the worm reduces the precision (introduces errors in the lead and pressure angle). Avoid heat treatment as it will create bad tooth contact causing abrasion of the wheel.

- **Heat Treatment**: Normal equivalent to the value shown in the table.

- **Number of Teeth**: 15, 25, 30, 32, 35, 40

- **Pitch Diameter**: 50, 60, 70, 80, 90, 100

- **Thread Length**: 30, 45, 60

- **Material**: bronze, gray iron

- **Screw Diameter**: M5, M6

- **Screw Length**: 6, 8, 10

- **Screw Angle**: 30°, 40°, 50°

- **Screw Pitch**: 2.6, 3.3

- **Thread Type**: Metric, Right Hand

- **Thread Angle**: 60°

- **Throat Diameter**: 6, 8, 10

- **Effective Length**: 15-0.031

- **Weight**: 0.56, 0.6, 0.66, 0.77

- **Total Length**: 6 x 2.8, 8 x 3.3

### Caution on Secondary Operations

1. As available on request products, requires a load time for shipping within 2 working days (includes the day ordered), after placing an order. Please allow additional shipping time to get to your local distributor.

2. Number of products we can process for one order is 1 to 20 units. For quantities of 21 or more pieces, we need to quote price and lead time.

3. Keyways are made according to JIS B1031 standards, J8 tolerance.

4. Areas of products which have been machined will be black oxide coated.

5. For products having a tapped hole, a set screw is included.

---

**BG-CG Bronze Worm Wheels & Gray Iron Worm Wheels**

#### Specifications

- **Material**: bronze, gray iron

- **Screw Diameter**: M3, M4

- **Screw Length**: 5, 6, 7

- **Screw Angle**: 60°, 70°, 80°

- **Thread Type**: Metric, Right Hand

- **Thread Angle**: 60°

- **Throat Diameter**: 6, 8, 10

- **Effective Length**: 15-0.031

- **Weight**: 0.56, 0.6, 0.66, 0.77

- **Total Length**: 6 x 2.8, 8 x 3.3

### Caution on Secondary Operations

1. As available on request products, requires a load time for shipping within 2 working days (includes the day ordered), after placing an order. Please allow additional shipping time to get to your local distributor.

2. Number of products we can process for one order is 1 to 20 units. For quantities of 21 or more pieces, we need to quote price and lead time.

3. Keyways are made according to JIS B1031 standards, J8 tolerance.

4. Areas of products which have been machined will be black oxide coated.

5. For products having a tapped hole, a set screw is included.
Cylindrical gear wheels & gray iron worm wheels

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Reduction ratio</th>
<th>Normal module</th>
<th>No. of teeth</th>
<th>Helix angle</th>
<th>Lead angle</th>
<th>Shape</th>
<th>Bore</th>
<th>Module</th>
<th>Pitch dia.</th>
<th>Thread dia.</th>
<th>Outside dia.</th>
<th>Face width</th>
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<td>m4</td>
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<td>1</td>
<td>3°25'</td>
<td>R</td>
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<td>20</td>
<td>60</td>
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<td>90</td>
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<td>2</td>
<td>3°25'</td>
<td>R</td>
<td>H1</td>
<td>20</td>
<td>60</td>
<td>80.17</td>
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<td>90</td>
</tr>
<tr>
<td>BG-20L1</td>
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<td>m4</td>
<td>20</td>
<td>1</td>
<td>3°25'</td>
<td>L</td>
<td>H1</td>
<td>20</td>
<td>60</td>
<td>80.17</td>
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<td>90</td>
</tr>
<tr>
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<td></td>
<td>20</td>
<td>2</td>
<td>3°25'</td>
<td>L</td>
<td>H1</td>
<td>20</td>
<td>60</td>
<td>80.17</td>
<td>88</td>
<td>90</td>
</tr>
<tr>
<td>BG-40R1</td>
<td>10</td>
<td>m4</td>
<td>50</td>
<td>1</td>
<td>3°25'</td>
<td>R</td>
<td>H2</td>
<td>20</td>
<td>70</td>
<td>200.42</td>
<td>208</td>
<td>211</td>
</tr>
<tr>
<td>BG-40R2</td>
<td>10</td>
<td></td>
<td>50</td>
<td>2</td>
<td>3°25'</td>
<td>R</td>
<td>H2</td>
<td>20</td>
<td>70</td>
<td>200.42</td>
<td>208</td>
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<td>BG-40L1</td>
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<td>L</td>
<td>H2</td>
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<td>200.42</td>
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<td>50</td>
<td>2</td>
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<td>L</td>
<td>H2</td>
<td>20</td>
<td>70</td>
<td>200.42</td>
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- Catalog No.:
  - BG4-20R1
  - BG4-20R2
  - BG4-20L1
  - BG4-20L2
  - BG4-40R1
  - BG4-40R2
  - BG4-40L1
  - BG4-40L2

- Reduction ratio: 20
- Normal module: m4
- No. of teeth: 20
- Helix angle: 3°25'
- Lead angle: R
- Shape: H1
- Bore: 20
- Module: 60
- Pitch dia.: 80.17
- Thread dia.: 88
- Outside dia.: 90
- Face width: 35

- NOTE 1: Allowable torque based on worm speed (rpm)

- CS has a sand mold casting finish.

- You can download CAD data (DXF format) of KHK Products from the Web Catalog.
### SW Steel Worms

#### Internal Screw Other Worm Gearboxes Gear Pairs & Pinions

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Normal module</th>
<th>Normal module shape</th>
<th>Normal module number of teeth</th>
<th>Normal module normal thread</th>
<th>Normal module normal thread pitch</th>
<th>Normal module normal thread module</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2</td>
<td>8°15’</td>
<td>25</td>
<td>56</td>
<td>70</td>
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<td>CG5-20R2</td>
<td>m6</td>
<td>2</td>
<td>8°38’</td>
<td>30</td>
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</tbody>
</table>

(Caution on Product Characteristics)
- ① These worms produce axial thrust forces. See Page 362 for more details.

#### Bronze Worm Wheels & Gray Iron Worm Wheels

**Module 5, 6**

![Diagram of SW Steel Worms and Bronze Worm Wheels](image)

**Specifications**
- Gearwheel: KHK W 002 grade 4
- Normal plane: Normal plane
- Gear teeth: Standard full depth
- Pressure angle: 14° 30’
- Module: Normal
- Tooth hardness: CAC502
- Pressure angle: 14° 30’
- Gear teeth: Standard full depth

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Reduction ratio</th>
<th>Normal module</th>
<th>Normal module shape</th>
<th>Normal module number of teeth</th>
<th>Normal module normal thread</th>
<th>Normal module normal thread pitch</th>
<th>Normal module normal thread module</th>
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<tbody>
<tr>
<td>BG5-20R1</td>
<td>20</td>
<td>m5</td>
<td>2</td>
<td>8°00’</td>
<td>22</td>
<td>75</td>
<td>100</td>
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<tr>
<td>BG5-20R2</td>
<td>20</td>
<td>m6</td>
<td>1</td>
<td>8°38’</td>
<td>22</td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>

(Caution on Secondary Operations)
- ① Please read "Caution on Performing Secondary Operations" (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK’ system for quick modification of KHK stock gears is also available.
- ② Gear tooth hardening of the worm reduces the precision (introduces errors in the lead and pressure angles). Avoid heat treating as it will create bad tooth contact causing abrasion of the wheel.

**Module 5, 6**

**Bronze Worm Wheels & Gray Iron Worm Wheels**

![Diagram of Bronze Worm Wheels & Gray Iron Worm Wheels](image)

**Specifications**
- Gearwheel: KHK W 002 grade 4
- Normal plane: Normal plane
- Gear teeth: Standard full depth
- Pressure angle: 14° 30’
- Module: Normal
- Tooth hardness: CAC502
- Pressure angle: 14° 30’
- Gear teeth: Standard full depth

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Reduction ratio</th>
<th>Normal module</th>
<th>Normal module shape</th>
<th>Normal module number of teeth</th>
<th>Normal module normal thread</th>
<th>Normal module normal thread pitch</th>
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<tr>
<td>CG5-20R1</td>
<td>20</td>
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<td>2</td>
<td>8°00’</td>
<td>22</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td>CG5-20R2</td>
<td>20</td>
<td>m6</td>
<td>1</td>
<td>8°38’</td>
<td>22</td>
<td>75</td>
<td>100</td>
</tr>
</tbody>
</table>

(Caution on Product Characteristics)
- ① Worm Wheels are profile drilled to create the proper center distance.
- ② H2 Shape Worm Gears have elongated casting holes in the web (H).
- ③ The allowable torques shown in the table are calculated values according to the assumed usage condition. Please see Page 159 for more details.

### SW Steel Worms

#### Bronze Worm Wheels & Gray Iron Worm Wheels

![Diagram of SW Steel Worms and Bronze Worm Wheels](image)

**Specifications**
- Gearwheel: KHK W 002 grade 4
- Normal plane: Normal plane
- Gear teeth: Standard full depth
- Pressure angle: 14° 30’
- Module: Normal
- Tooth hardness: CAC502
- Pressure angle: 14° 30’
- Gear teeth: Standard full depth

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<th>Catalog No.</th>
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<th>Normal module shape</th>
<th>Normal module number of teeth</th>
<th>Normal module normal thread</th>
<th>Normal module normal thread pitch</th>
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<tr>
<td>CG5-20R1</td>
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<td>22</td>
<td>75</td>
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<tr>
<td>CG5-20R2</td>
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<td>1</td>
<td>8°38’</td>
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<td>75</td>
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</tbody>
</table>

(Caution on Secondary Operations)
- ① Please read "Caution on Performing Secondary Operations" (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK’ system for quick modification of KHK stock gears is also available.
**SUW Stainless Steel Worms**

### Specifications

- **Precision-grade:** KHK W 001 grade 4
- **Addendum:** Top surface gear
- **Gear tooth:** Standard full depth
- **Flank angle:** 20°
- **Material:** SUJ2,303
- **Heat treatment:**
  - **Bleed hardness:** (less than 187HB)

### Worm Wheels

- **W2-shaped products, a set screw is included. When setting up the mating wheel, make sure no friction occurs within the set screw.**

#### Catalog No.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Normal module</th>
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<th>Module size</th>
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<td>2&quot;36'</td>
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<td>W2</td>
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<td>m0.5</td>
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<td>W2</td>
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<td>R</td>
<td>W2</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>SUW0.8-R2</td>
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<td>2</td>
<td>634'</td>
<td>R</td>
<td>W2</td>
<td>6</td>
<td>14</td>
</tr>
</tbody>
</table>

(Caution on Product Characteristics)

1. For W2-shaped products, a set screw is included. When setting up the mating wheel, make sure no friction occurs within the set screw.
2. These worms produce axial thrust forces. See Page 362 for more details.

---

**DG Plastic Worm Wheels**

### Specifications

- **Precision-grade:** KHK W 002 grade 5
- **Addendum:** Normal plane
- **Gear tooth:** Standard full depth
- **Flank angle:** 20°
- **Material:** Polyacetal
- **Bleed hardness:**

#### Catalog No.

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<th>Catalog No.</th>
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<th>Normal module</th>
<th>Number of teeth</th>
<th>Module size</th>
<th>Module size</th>
<th>Number of teeth</th>
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<tbody>
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<td>HA</td>
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<tr>
<td>DG0.5-30R2</td>
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<td>2</td>
<td>317'</td>
<td>R</td>
<td>HA</td>
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<td>30</td>
<td>1</td>
<td>2&quot;36'</td>
<td>R</td>
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<td>2&quot;36'</td>
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<tr>
<td>DG0.5-50R1</td>
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<td>2&quot;36'</td>
<td>R</td>
<td>HA</td>
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<tr>
<td>DG0.5-60R1</td>
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<td>60</td>
<td>1</td>
<td>2&quot;36'</td>
<td>R</td>
<td>HA</td>
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</tr>
</tbody>
</table>

(Caution on Product Characteristics)

1. Worm Wheels are profile shifted to create the proper center distance.
2. The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see Page 358 for more details.
3. Since the bore is finished with a minus tolerance, you can use a shaft with a force fit.

---

You can download CAD data (DXF format) of KHK Products from the Web Catalog.
**Plastic Worm Wheels**

### Specifications

- **Gear teeth**: Standard full depth
- **Pressure angle**: 20°
- **Material**: SUW1.5-Nylon
- **Thread**: Machine thread

### Catalog No.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>PG1-10R1</th>
<th>PG1-10R2</th>
<th>PG1-20R1</th>
<th>PG1-20R2</th>
<th>PG1-30R1</th>
<th>PG1-30R2</th>
<th>PG1-40R1</th>
<th>PG1-40R2</th>
<th>PG1-50R1</th>
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<tbody>
<tr>
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</table>

### Weight

- **SUW1.5-R1**: 0.40 kg
- **SUW1.5-R2**: 0.40 kg
- **SUW1.5-R1J**: 0.12 kg
- **SUW1.5-R1J**: 0.12 kg
- **SUW1.5-R1J**: 0.11 kg
- **SUW1.5-R1J**: 0.11 kg

---

**Module 1, 1.5**

### Specifications

- **Gear teeth**: Standard full depth
- **Pressure angle**: 20°
- **Material**: SUS303
- **Thread**: Machine thread

### Catalog No.

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>PG1-10R1</th>
<th>PG1-10R2</th>
<th>PG1-20R1</th>
<th>PG1-20R2</th>
<th>PG1-30R1</th>
<th>PG1-30R2</th>
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</tbody>
</table>

### Weight

- **SUW1.5-R1**: 0.40 kg
- **SUW1.5-R2**: 0.40 kg
- **SUW1.5-R1J**: 0.12 kg
- **SUW1.5-R1J**: 0.12 kg
- **SUW1.5-R1J**: 0.11 kg
- **SUW1.5-R1J**: 0.11 kg

---

**In regards to MC Nylon gears, other materials are available, including Ultra High Molecular Weight Polyethylene (UHMW-PE), which has excellent abrassion resistance, and resin conforming to the Plastic Implementation Measure (PIM). A single piece order is acceptable and will be produced as a custom-made gear. For details on quotations and orders please see Page 16.**
Module 2, 2.5, 3

**PG Plastic Worm Wheels**

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Normal module</th>
<th>Normal module No.</th>
<th>Number of teeth Standard form</th>
<th>Load angle</th>
<th>Tooth width</th>
<th>Pitch circle diameter</th>
<th>Outside diam.</th>
<th>Bore (mm)</th>
<th>Height</th>
<th>Pitch circle diameter (mm)</th>
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<tbody>
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<td>W1</td>
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<td>7°46'</td>
<td>R</td>
<td>37</td>
<td>15</td>
<td>42</td>
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</table>

**Catalog No.**

- SUW2-R1
- SUW2-R1J17
- SUW2.5-R2J17
- SUW2.5-R1J16
- SUW2-R2J14
- SUW2-R1J12
- SUW2-R2J12
- SUW2-R2J14
- SUW2-R2J15
- SUW2-R1J16
- SUW3-R1J19
- SUW3-R1J17
- SUW3-R1J18
- SUW3-R1J19
- SUW3-R1J20
- SUW3-R1J17
- SUW3-R1J18
- SUW3-R1J19
- SUW3-R1J20
- SUW3-R1J17
- SUW3-R1J18
- SUW3-R1J19
- SUW3-R1J20
- SUW3-R1J17
- SUW3-R1J18
- SUW3-R1J19
- SUW3-R1J20
- SUW3-R1J17
- SUW3-R1J18
- SUW3-R1J19
- SUW3-R1J20

**Specifications**

- Module: 2, 2.5, 3
- Gear teeth: Standard form, Full depth
- Pressure angle: 24° 30' ± 1°
- Material: MC901 Nylon

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

- PG2-20R1: M4
- PG3-20R1: M5
- PG2-20: M6
- PG3-20: M6

**Caution on J Series**

- Please read "Caution on Performing Secondary Operations" (Page 362) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.

- Significant variations in temperature or humidity can cause dimensional changes in plastic gears (MC Nylon gears), for bore size (H8 when produced), tooth diameter, and backlash. Please see the section "Design of Plastic Gears" in separate technical reference book (Page 101).
Custom-Made Worm Gears

Custom-made worm gears are available.

KHK offers high-precision products.

◆ Production Range
  Module 0.5~10
  Worm outer diameter: φ 100 mm or less
  Wheel outer diameter: φ 600 mm or less
  Assembly distance: 350 mm or less

Please see Page 16 for more details about custom-made orders.

High-precision ground gear technology achieves high speed and quiet movement.

Excellent tooth contact and appropriate backlash are essential for worm gears. Give KHK’s reliable stock worm gears a try.

Klingelnberg Worm Grinding Machine
Worm Gear Tooth Contact Machine