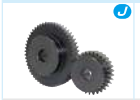
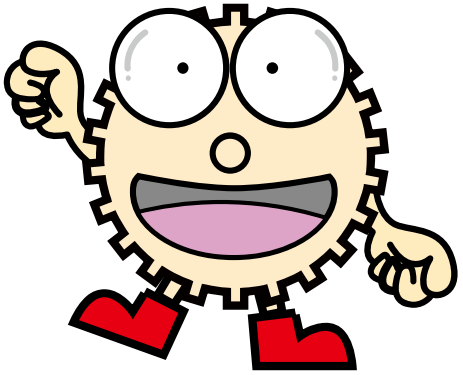
Helical Gears

KHG Ground Helical Gears	SH Helical Gears
	
Material: SCM440	Material: S45C
*m*1~3 Page 194	*m*2, 3 Page 204



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) Helical Gears

K H G 1 - 20 R

- R — Direction of Helix (Right)
- 20 — No. of Teeth (20)
- 1 — Module (1)
- G — Other Products (Ground Gears)
- H — Type (Helical Gears)
- K — Material (SCM440)

Material
S S45C
K SCM440

Type
H Helical Gears

Other Information
G Ground Gears

Features

KHK stock helical gears are quiet, high-strength and easy to use. They are suitable wherever you require high-speed rotation including in machine tools, speed reducers, etc. The following table lists the main features.

Catalog Number	KHG	SH
Module	1~3	2~3
Reference section of gear	Rotating plane	Normal plane
Material	SCM440	S45C
Heat Treatment	Thermal refined, gear teeth induction hardened	–
Tooth Surface Finish	Ground	Cut
Precision JIS B 1702-1:1998	N6	N8
Secondary Operations	Possible except for tooth	Possible
Features	It has excellent accuracy, strength, wear resistance and quietness, and allows secondary operations. Usable in the same center distance of the spur gear.	It has higher strength and quietness than the SS spur gears.

Selection Hints

It is important to thoroughly understand the contents of the product tables as well as “CAUTION” notes before making the selection. You must specify the right or left hand by including the letter R or L in the catalog number when ordering.

1. Caution in Selecting the Mating Gears

The KHK stock helical gears are not interchangeable with KHG series (transverse module) and SH series (normal module). Please keep this in mind when making your selection. Also, right hand and left hand helical mating gears are packaged as a set. See the photos below for reference and for help in making a proper selection.

■ Direction of Helix


Pinion (L) & Rack (R)


Pinion (R) & Rack (L)

■ Mating Helical Gear Selection Chart (○ Allowable × Not allowable)

Catalog Number and Direction of Helix		KHG		SH		KRHG KRHGF		SRH	
		RH	LH	RH	LH	RH	LH	RH	LH
KHG	RH	×	○	×	×	×	○	×	×
	LH	○	×	×	×	○	×	×	×
SH	RH	×	×	×	○	×	×	×	○
	LH	×	×	○	×	×	×	○	×

2. Caution in Selecting Gears Based on Gear Strength

The gear strength values shown in the product pages were computed by assuming the application environment in the table 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 of Bending Strength of Gears

Item \ Catalog Number	KHG	SH
Formula NOTE 1	Formula of spur and helical gears on bending strength (JGMA401-01)	
No. of teeth of mating gears	Same no. of teeth	
Rotational Speed	600rpm	100rpm
Design Life (Durability)	Over 10^7cycles	
Impact from motor	Uniform load	
Impact from load	Uniform load	
Direction of load	Bidirectional load (calculated with allowable bending stress of 2/3)	
Allowable bending stress at root σ_{Flim} (kgf/mm²) NOTE 2	30	19
Safety factor S_F	1.2	

■ Calculation of Surface Durability (Except where it is common with bending strength)

Item \ Catalog Number	KHG	SH
Formula NOTE 1	Formula of spur and helical gears on surface durability (JGMA402-01)	
Kinematic viscosity of lubricant	100cSt(50°C)	
Gear support	Symmetric support by bearings	
Allowable Hertz stress σ_{Hlim} (kgf/mm²)	116	49
Safety factor S_H	1.15	

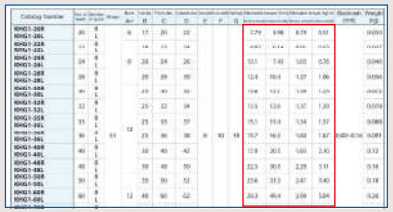
[NOTE 1] The gear strength formula is based on JGMA (Japanese Gear Manufacturers Association) specifications.
The units for the rotational speed (rpm) and the stress (kgf/mm²) are adjusted to the units needed in the formula.

Selecting the Gears

Step 1 Determine the calculated load torque applied to the gear and the gear type suitable for the purpose.

Step 2 Select provisionally from the allowable torque table of the Master Catalog or Web Catalog based on the load torque.

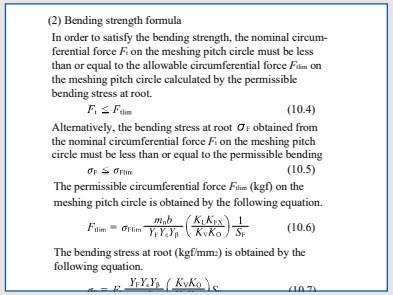
■ For provisional selection from the Master Catalog



Step 3 Calculate the strength under the actual usage conditions.

Calculate the strength formally using the various gear strength formulas. Please see our separate technical reference book for more details. We recommend using the Web Catalog that allows the strength to be easily calculated.

■ For strength calculation from the Master Catalog



(2) Bending strength formula

In order to satisfy the bending strength, the nominal circumferential force F_t on the meshing pitch circle must be less than or equal to the allowable circumferential force F_{tlim} on the meshing pitch circle calculated by the permissible bending stress at root.

$$F_t \leq F_{tlim} \quad (10.4)$$

Alternatively, the bending stress at root σ_F obtained from the nominal circumferential force F_t on the meshing pitch circle must be less than or equal to the permissible bending

$$\sigma_F \leq \sigma_{Flim} \quad (10.5)$$

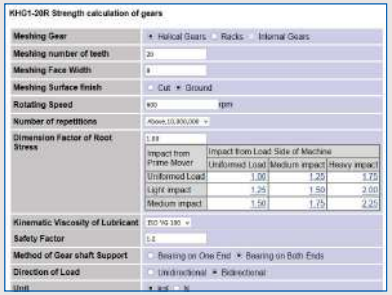
The permissible circumferential force F_{tlim} (kgf) on the meshing pitch circle is obtained by the following equation.

$$F_{tlim} = \sigma_{Flim} \frac{m_n b}{Y_\varepsilon Y_\beta} \left(\frac{K_1 K_{FX}}{K_V K_O} \right) \frac{1}{S_F} \quad (10.6)$$

The bending stress at root (kgf/mm²) is obtained by the following equation.

$$\sigma_F = F_t \frac{Y_\varepsilon Y_\beta}{m_n b} \left(\frac{K_V K_O}{K_1 K_{FX}} \right) S_F \quad (10.7)$$

■ For strength calculation from the Web Catalog



■ Bending strength

Calculated values of the strength at which the gear teeth do not break due to fatigue.


Example of failure due to insufficient bending strength

■ Surface durability

Calculated values of the strength at which the gear teeth do not wear due to surface fatigue damage.


Example of wear due to insufficient surface durability

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 24 for more details.

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, etc.) listed in the catalog may be changed without prior notice. Changes are announced on the KHK website.

Website URL: https://khkgears.net/new/
Overseas Sales Department: Phone: +81-48-254-1744 Fax: +81-48-254-1765 E-mail: info@khkgears.net

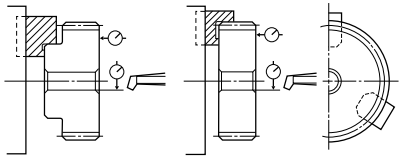
Application Hints

In order to use KHK stock gears 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.

E-mail: info@khkgears.net

1. Caution on Performing Secondary Operations

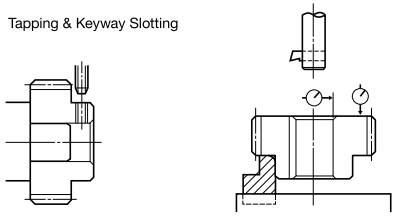
① If reboring, it is important to pay special attention to locating the center in order to avoid runout.
② The reference datum for gear machining is the bore. Therefore, use the bore for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface.
③ 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.



Lathe Operations

④ The maximum bore size is dictated by the requirement that the strength of the hub is to be higher than that of the gear teeth. The maximum bore size should be 60% to 70% of the hub diameter (or tooth root diameter), and 50% to 60% for keyway applied modifications.
⑤ In order to avoid stress concentration, round the keyway corners.

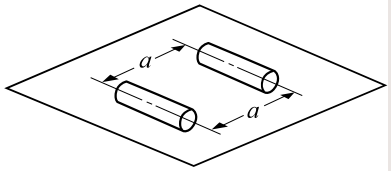
Tapping & Keyway Slotting



⑥ To avoid problems of reduced gear precision and other manufacturing difficulties, do not attempt to machine the gears to reduce face widths.
⑦ When induction-hardening S45C products, thermal stress cracks may appear. Also, note that the precision grade of the product declines by 1 or 2 grades, as deformation on material may occur. If you require tolerance for bore or other parts, machining is necessary after heat treatment.

2. Points of Caution during Assembly

① The recommended center distance tolerance of KHK stock helical gears is H7 for ground gears and H8 for cut gears.
The amount of backlash is given in the product table for each gear. For the center distance of SH, refer to the dimensional table page.



$$a = \frac{d_1 + d_2}{2}$$

Where
a : Center distance
d_1 : Pitch diameter of pinion
d_2 : Pitch diameter of gear

② The table below indicates the tolerance on the total length of KHK stock spur gears. Please refer to this data when designing gearboxes or other components.

■ Total Length Tolerance for Spur and Helical Gears

Total Length (mm)	Tolerance
30 or less	0 -0.10
31 to 100	0 -0.15
Over 100	0 -0.20

[Note] The following products are excluded from this table: Spur pinion shafts, Injection molded spur gears, F-loc hub spur gears, and MC nylon products.

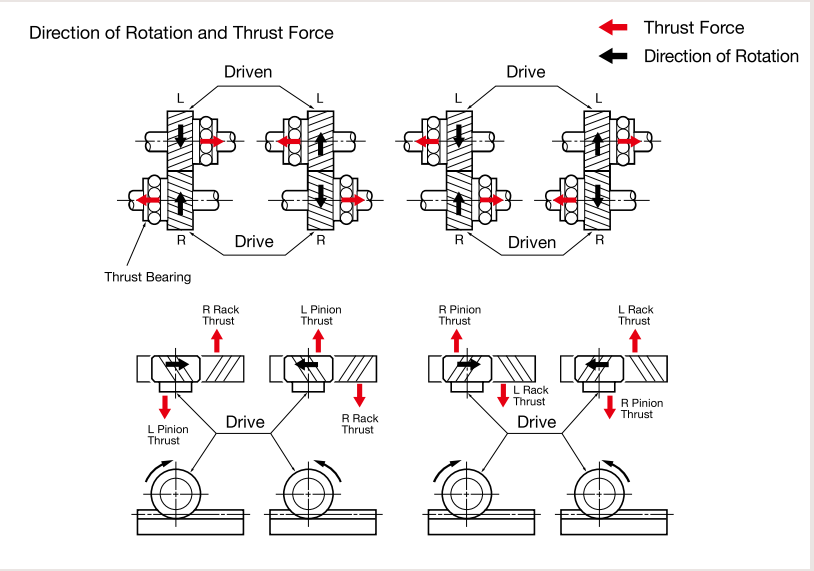
③ Verify that the two shafts are parallel. Incorrect assembly will lead to uneven teeth contact which will cause noise and wear. (After assembly, check the tooth contact by painting a thin layer of red lead primer or the like on the gear teeth, meshing them together and rotating them.)

■ Test example: Abrasion occurred on SSG3-30 due to poor edge contact (only 30% with proper contact).

Poor tooth contact and pitting

Gear oil (equivalent to JIS gear oil category 2 No. 3)
The design conditions were load torque at 278 rpm, 42.5 kg/m (12 kW), 1.5 times the allowable bending strength, and 3 times the allowable surface durability torque.
The pitting occurred on the poor tooth contact area after 60 hours of continuous operation.

④ Due to the helix of helical gears, they produce thrust force (axial). The bearings must be selected properly to be able to handle these thrust forces. The direction of the thrust forces depend on the helix direction and the direction of rotation as shown below.
For details, please refer to our separate technical reference book, section of “Gear Forces”.



3. Cautions on Starting

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 For more technical information on lubricating gears, please see the section “Gear Lubrication” in our separate technical reference book.
④ If there is any abnormality such as noise or vibration during startup, stop the operation immediately and check the assembly condition such as tooth contact, eccentricity and looseness.
For more technical information, please see the section “Gear Noise and Countermeasures” in our separate 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.
   ① Turn off the power switch.
   ② Do not reach or crawl under the product.
   ③ Wear appropriate clothing and protective equipment for the work.

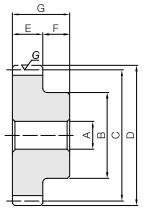
⚠ Caution Cautions in Preventing Accidents

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.

KHG Module 1
Ground Helical Gears

Specifications	
Precision grade	JIS grade N6 (JIS B1702-1: 1998)*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Transverse pressure angle	20°
Helix angle	21°30'
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for teeth

* The precision grade of J Series products is equivalent to the value shown in the table.



S1

Catalog Number	No. of teeth	Direction of spiral	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N-m) Bending strength	Allowable torque (N-m) Surface durability	Allowable torque (kgf-m) Bending strength	Allowable torque (kgf-m) Surface durability	Backlash (mm)	Weight (kg)
KHG1-20R **KHG1-20L**	20	R L	S1	6	17	20	22	8	10	18	7.79	4.98	0.79	0.51	0.08~0.16	0.034
KHG1-22R **KHG1-22L**	22	R L		8	18	22	24				8.92	6.14	0.91	0.63		0.037
KHG1-24R **KHG1-24L**	24	R L			20	24	26				10.1	7.43	1.03	0.76		0.046
KHG1-28R **KHG1-28L**	28	R L			20	28	30				12.4	10.4	1.27	1.06		0.056
KHG1-30R **KHG1-30L**	30	R L		10	25	30	32				13.6	12.1	1.39	1.23		0.072
KHG1-32R **KHG1-32L**	32	R L			25	32	34				13.5	12.6	1.37	1.29		0.078
KHG1-35R **KHG1-35L**	35	R L			25	35	37				15.1	15.4	1.54	1.57		0.088
KHG1-36R **KHG1-36L**	36	R L			25	36	38				15.7	16.3	1.60	1.67		0.091
KHG1-40R **KHG1-40L**	40	R L			30	40	42				17.9	20.5	1.83	2.10		0.12
KHG1-48R **KHG1-48L**	48	R L			30	48	50				22.5	30.5	2.29	3.11		0.16
KHG1-50R **KHG1-50L**	50	R L		12	35	50	52				23.6	33.3	2.41	3.40		0.18
KHG1-60R **KHG1-60L**	60	R L			40	60	62				29.3	49.4	2.99	5.04		0.26
KHG1-70R **KHG1-70L**	70	R L			40	70	72				35.2	68.9	3.58	7.02		0.32
KHG1-90R **KHG1-90L**	90	R L		15	50	90	92				46.9	118	4.78	12.1		0.53
KHG1-100R **KHG1-100L**	100	R L			50	100	102				50.4	142	5.14	14.5		0.62

[Caution on Product Characteristics]
① The allowable torques shown in the table are calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.
③ These gears produce axial thrust forces. Please see Page 193 for more details.
④ Right handed and left handed helical gears in the same module are designed to mesh as a pair, but KHG gears are not interchangeable with SH type helical gears.

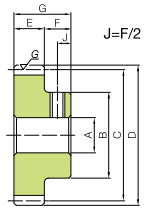
[Caution on Secondary Operations]
① Please read "Cautions on Performing Secondary Operations" (Page 192) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).
③ While cutting off the entire hub may cause curvature deformation by residual stress, some products are straightened and annealed after refining the material.

Usable in the assembly distance of the spur gear.

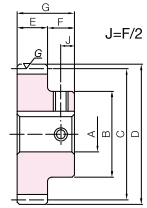
KHG ground helical gears use a "transverse" module.
The assembly distance is the same as spur gear pairs with the same module and number of teeth.
Improved strength and low noise: Take the next step up from spur gears.

* For details of transverse helical gears, please see our separate technical reference book.

J Series



S1T



S1K

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

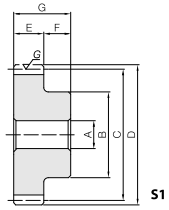
Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30
Screw size	—		4×1.8		5×2.3				6×2.8				8×3.3		
Catalog Number	M4	M5	M4						M5				M6		
KHG1-20R J BORE	S1T														
KHG1-20L J BORE	S1T														
KHG1-22R J BORE		S1T													
KHG1-22L J BORE		S1T													
KHG1-24R J BORE		S1T													
KHG1-24L J BORE		S1T													
KHG1-28R J BORE		S1T													
KHG1-28L J BORE		S1T													
KHG1-30R J BORE			S1K	S1K											
KHG1-30L J BORE			S1K	S1K											
KHG1-32R J BORE			S1K	S1K											
KHG1-32L J BORE			S1K	S1K											
KHG1-35R J BORE			S1K	S1K											
KHG1-35L J BORE			S1K	S1K											
KHG1-36R J BORE			S1K	S1K											
KHG1-36L J BORE			S1K	S1K											
KHG1-40R J BORE			S1K	S1K	S1K	S1K	S1K	S1K							
KHG1-40L J BORE			S1K	S1K	S1K	S1K	S1K	S1K							
KHG1-48R J BORE			S1K	S1K	S1K	S1K	S1K	S1K							
KHG1-48L J BORE			S1K	S1K	S1K	S1K	S1K	S1K							
KHG1-50R J BORE				S1K	S1K	S1K	S1K	S1K	S1K	S1K					
KHG1-50L J BORE				S1K	S1K	S1K	S1K	S1K	S1K	S1K					
KHG1-60R J BORE				S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG1-60L J BORE				S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG1-70R J BORE				S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG1-70L J BORE				S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG1-90R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG1-90L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG1-100R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG1-100L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K

[Caution on J series]
① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Keyways are made according to JIS B1301 standards, Js9 tolerance.
④ Certain products which would otherwise have a very long tapped hole are counterbored to reduce the length of the tap. For details, please see the KHK Web Catalog.
⑤ Areas of products which have been re-worked will not be black oxide coated.
⑥ For products having a tapped hole, a set screw is included.
⑦ 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.

KHG Module 1.5
Ground Helical Gears

Specifications	
Precision grade	JIS grade N6 (JIS B1702-1: 1998)*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Transverse pressure angle	20°
Helix angle	21°30'
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for teeth

* The precision grade of J Series products is equivalent to the value shown in the table.



S1

Catalog Number	No. of teeth	Direction of spiral	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N-m) Bending strength	Allowable torque (N-m) Surface durability	Allowable torque (kgf-m) Bending strength	Allowable torque (kgf-m) Surface durability	Backlash (mm)	Weight (kg)
KHG1.5-20R KHG1.5-20L	20	R L	S1	12	24	30	33	12	12	24	26.3	18.5	2.68	1.89	0.08~0.16	0.088
KHG1.5-22R KHG1.5-22L	22	R L			26	33	36				27.4	20.8	2.79	2.12		0.11
KHG1.5-24R KHG1.5-24L	24	R L			28	36	39				30.9	25.3	3.15	2.58		0.13
KHG1.5-25R KHG1.5-25L	25	R L			30	37.5	40.5				32.7	27.7	3.33	2.83		0.15
KHG1.5-26R KHG1.5-26L	26	R L			32	39	42				34.5	30.2	3.52	3.08		0.17
KHG1.5-28R KHG1.5-28L	28	R L		15	36	42	45				38.1	35.7	3.89	3.64		0.19
KHG1.5-30R KHG1.5-30L	30	R L			38	45	48				41.8	41.6	4.26	4.24		0.22
KHG1.5-32R KHG1.5-32L	32	R L			40	48	51				45.5	48.0	4.64	4.89		0.26
KHG1.5-36R KHG1.5-36L	36	R L			45	54	57				52.9	62.2	5.40	6.35		0.33
KHG1.5-40R KHG1.5-40L	40	R L			50	60	63				60.5	78.5	6.17	8.00		0.42
KHG1.5-48R KHG1.5-48L	48	R L		18	50	72	75				75.8	117	7.73	12.0		0.52
KHG1.5-50R KHG1.5-50L	50	R L			60	75	78				79.6	128	8.12	13.1		0.63
KHG1.5-52R KHG1.5-52L	52	R L			60	78	81				83.5	140	8.51	14.2		0.67
KHG1.5-60R KHG1.5-60L	60	R L		20	60	90	93				99.1	191	10.1	19.5		0.81
KHG1.5-70R KHG1.5-70L	70	R L			60	105	108				114	256	11.6	26.1		1.02
KHG1.5-80R KHG1.5-80L	80	R L			70	120	123				132	343	13.5	35.0		1.37
KHG1.5-90R KHG1.5-90L	90	R L			70	135	138				151	442	15.4	45.1		1.65
KHG1.5-100R KHG1.5-100L	100	R L			70	150	153				170	554	17.4	56.5		1.97

[Caution on Product Characteristics]
① The allowable torques shown in the table are calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.
③ These gears produce axial thrust forces. Please see Page 193 for more details.
④ Right handed and left handed helical gears in the same module are designed to mesh as a pair, but KHG gears are not interchangeable with SH type helical gears.

[Caution on Secondary Operations]
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KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
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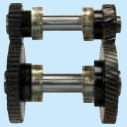
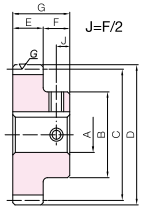
Usable in the assembly distance of the spur gear.

KHG ground helical gears use a "transverse" module.
The assembly distance is the same as spur gear pairs with the same module and number of teeth.
Improved strength and low noise: Take the next step up from spur gears.



* For details of transverse helical gears, please see our separate technical reference book.

J Series



S1K

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

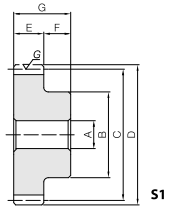
Bore $_{H7}$	* The product shapes of J Series items are identified by background color.													
Keyway $_{Js9}$	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40
Screw size	4×1.8		5×2.3			6×2.8				8×3.3			10×3.3		12×3.3
Catalog Number	M4					M5				M6			M8		
KHG1.5-20R J BORE	S1K														
KHG1.5-20L J BORE	S1K														
KHG1.5-22R J BORE	S1K														
KHG1.5-22L J BORE	S1K														
KHG1.5-24R J BORE	S1K	S1K	S1K												
KHG1.5-24L J BORE	S1K	S1K	S1K												
KHG1.5-25R J BORE	S1K	S1K	S1K	S1K	S1K										
KHG1.5-25L J BORE	S1K	S1K	S1K	S1K	S1K										
KHG1.5-26R J BORE	S1K	S1K	S1K	S1K	S1K										
KHG1.5-26L J BORE	S1K	S1K	S1K	S1K	S1K										
KHG1.5-28R J BORE			S1K	S1K	S1K	S1K	S1K	S1K							
KHG1.5-28L J BORE			S1K	S1K	S1K	S1K	S1K	S1K							
KHG1.5-30R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG1.5-30L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG1.5-32R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG1.5-32L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG1.5-36R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K					
KHG1.5-36L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K					
KHG1.5-40R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG1.5-40L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG1.5-48R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG1.5-48L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG1.5-50R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG1.5-50L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG1.5-52R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG1.5-52L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG1.5-60R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG1.5-60L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG1.5-70R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG1.5-70L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG1.5-80R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG1.5-80L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG1.5-90R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG1.5-90L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG1.5-100R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG1.5-100L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K

[Caution on J series]
① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Keyways are made according to JIS B1301 standards, Js9 tolerance.
④ Certain products which would otherwise have a very long tapped hole are counterbored to reduce the length of the tap. For details, please see the KHK Web Catalog.
⑤ Areas of products which have been re-worked will not be black oxide coated.
⑥ For products having a tapped hole, a set screw is included.

Specifications	
Precision grade	JIS grade N6 (JIS B1702-1: 1998)*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Transverse pressure angle	20°
Helix angle	21°30'
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for teeth

* The precision grade of J Series products is equivalent to the value shown in the table.

J



S1

Catalog Number	No. of teeth	Direction of spiral	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N-m) Bending strength	Allowable torque (N-m) Surface durability	Allowable torque (kgf-m) Bending strength	Allowable torque (kgf-m) Surface durability	Backlash (mm)	Weight (kg)
KHG2-15R KHG2-15L	15	R L	S1	12	24	30	34	16	13	29	40.5	22.8	4.13	2.32	0.10~0.20	0.11
KHG2-18R KHG2-18L	18	R L			30	36	40				48.5	31.9	4.95	3.25		0.17
KHG2-20R KHG2-20L	20	R L		15	32	40	44				56.6	40.8	5.77	4.16		0.20
KHG2-22R KHG2-22L	22	R L			36	44	48				64.9	50.6	6.62	5.16		0.25
KHG2-24R KHG2-24L	24	R L			38	48	52				73.3	61.4	7.47	6.26		0.30
KHG2-25R KHG2-25L	25	R L			40	50	54				77.5	67.3	7.90	6.86		0.33
KHG2-26R KHG2-26L	26	R L			42	52	56				81.8	73.4	8.34	7.49		0.37
KHG2-28R KHG2-28L	28	R L			45	56	60				90.4	86.6	9.21	8.83		0.43
KHG2-30R KHG2-30L	30	R L		18	50	60	64				99.1	101	10.1	10.3		0.50
KHG2-32R KHG2-32L	32	R L			50	64	68				108	117	11.0	11.9		0.55
KHG2-35R KHG2-35L	35	R L			50	70	74				121	142	12.3	14.5		0.63
KHG2-36R KHG2-36L	36	R L			50	72	76				126	151	12.8	15.4		0.65
KHG2-40R KHG2-40L	40	R L		20	60	80	84				143	191	14.6	19.5		0.85
KHG2-44R KHG2-44L	44	R L			60	88	92				161	236	16.5	24.0		0.98
KHG2-45R KHG2-45L	45	R L			60	90	94				166	248	16.9	25.3		1.02
KHG2-48R KHG2-48L	48	R L			60	96	100				172	273	17.5	27.9		1.13
KHG2-50R KHG2-50L	50	R L		25	60	100	104				181	299	18.4	30.5		1.16
KHG2-60R KHG2-60L	60	R L			65	120	124				225	447	22.9	45.6		1.65
KHG2-70R KHG2-70L	70	R L			70	140	144				269	625	27.4	63.7		2.21
KHG2-80R KHG2-80L	80	R L			80	160	164				301	799	30.7	81.4		2.93
KHG2-90R KHG2-90L	90	R L			90	180	184				344	1030	35.0	105		3.73
KHG2-100R KHG2-100L	100	R L			100	200	204				387	1290	39.4	132		4.64

[Caution on Product Characteristics]
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② The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.
③ These gears produce axial thrust forces. Please see Page 193 for more details.
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Usable in the assembly distance of the spur gear.

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Improved strength and low noise: Take the next step up from spur gears.

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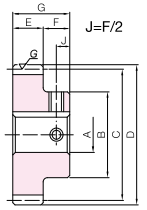
J Series



S1K

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

Bore H7	* The product shapes of J Series items are identified by background color.																	
Keyway Js9	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	
Screw size	4×1.8		5×2.3			6×2.8				8×3.3			10×3.3		12×3.3	14×3.8		
Catalog Number	M4					M5				M6			M8			M10		
KHG2-15R J BORE	S1K																	
KHG2-15L J BORE	S1K																	
KHG2-18R J BORE	S1K	S1K	S1K	S1K	S1K													
KHG2-18L J BORE	S1K	S1K	S1K	S1K	S1K													
KHG2-20R J BORE			S1K	S1K	S1K													
KHG2-20L J BORE			S1K	S1K	S1K													
KHG2-22R J BORE			S1K	S1K	S1K	S1K	S1K	S1K										
KHG2-22L J BORE			S1K	S1K	S1K	S1K	S1K	S1K										
KHG2-24R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K									
KHG2-24L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K									
KHG2-25R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K									
KHG2-25L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K									
KHG2-26R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K									
KHG2-26L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K									
KHG2-28R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K								
KHG2-28L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K								
KHG2-30R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG2-30L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG2-32R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG2-32L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG2-35R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG2-35L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG2-36R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG2-36L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K						
KHG2-40R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K				
KHG2-40L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K				
KHG2-44R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K				
KHG2-44L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K				
KHG2-45R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K				
KHG2-45L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K				
KHG2-48R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K				
KHG2-48L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K				
KHG2-50R J BORE										S1K	S1K	S1K	S1K	S1K				
KHG2-50L J BORE										S1K	S1K	S1K	S1K	S1K				
KHG2-60R J BORE										S1K	S1K	S1K	S1K	S1K				
KHG2-60L J BORE										S1K	S1K	S1K	S1K	S1K				
KHG2-70R J BORE										S1K	S1K	S1K	S1K	S1K	S1K			
KHG2-70L J BORE										S1K	S1K	S1K	S1K	S1K	S1K			
KHG2-80R J BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K		
KHG2-80L J BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K		
KHG2-90R J BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG2-90L J BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG2-100R J BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG2-100L J BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K

[Caution on J series]
① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
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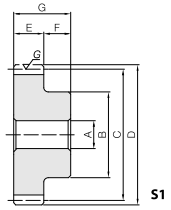
③ Keyways are made according to JIS B1301 standards, Js9 tolerance.
④ Certain products which would otherwise have a very long tapped hole are counterbored to reduce the length of the tap. For details, please see the KHK Web Catalog.
⑤ Areas of products which have been re-worked will not be black oxide coated.
⑥ For products having a tapped hole, a set screw is included.

KHG Module 2.5 Ground Helical Gears

Specifications	
Precision grade	JIS grade N6 (JIS B1702-1: 1998)*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Transverse pressure angle	20°
Helix angle	21°30'
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for teeth

* The precision grade of J Series products is equivalent to the value shown in the table.

J



S1

Catalog Number	No. of teeth	Direction of spiral	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N-m) Bending strength	Allowable torque (N-m) Surface durability	Allowable torque (kgf-m) Bending strength	Allowable torque (kgf-m) Surface durability	Backlash (mm)	Weight (kg)
KHG2.5-18R **KHG2.5-18L**	18	R L	S1	15	38	45	50	20	14	34	94.8	63.4	9.67	6.47	0.10~0.20	0.33
KHG2.5-20R **KHG2.5-20L**	20	R L		18	40	50	55				111	81.3	11.3	8.29		0.38
KHG2.5-22R **KHG2.5-22L**	22	R L			44	55	60				127	101	12.9	10.3		0.47
KHG2.5-24R **KHG2.5-24L**	24	R L			48	60	65				143	122	14.6	12.5		0.57
KHG2.5-25R **KHG2.5-25L**	25	R L		20	50	62.5	67.5				151	134	15.4	13.7		0.61
KHG2.5-26R **KHG2.5-26L**	26	R L			50	65	70				160	146	16.3	14.9		0.65
KHG2.5-28R **KHG2.5-28L**	28	R L			60	70	75				176	173	18.0	17.6		0.83
KHG2.5-30R **KHG2.5-30L**	30	R L			65	75	80				193	201	19.7	20.5		0.97
KHG2.5-32R **KHG2.5-32L**	32	R L			70	80	85				211	232	21.5	23.7		1.13
KHG2.5-35R **KHG2.5-35L**	35	R L			70	87.5	92.5				236	284	24.1	28.9		1.28
KHG2.5-40R **KHG2.5-40L**	40	R L		25	70	100	105				268	365	27.3	37.2		1.53
KHG2.5-48R **KHG2.5-48L**	48	R L			75	120	125				336	547	34.2	55.8		2.13
KHG2.5-50R **KHG2.5-50L**	50	R L			80	125	130				353	599	36.0	61.0		2.35
KHG2.5-52R **KHG2.5-52L**	52	R L			80	130	135				370	652	37.7	66.5		2.51
KHG2.5-60R **KHG2.5-60L**	60	R L			80	150	155				439	890	44.7	90.8		3.20

[Caution on Product Characteristics]
① The allowable torques shown in the table are calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.
③ These gears produce axial thrust forces. Please see Page 193 for more details.
④ Right handed and left handed helical gears in the same module are designed to mesh as a pair, but KHG gears are not interchangeable with SH type helical gears.

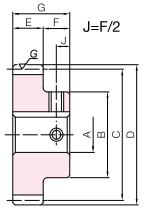
[Caution on Secondary Operations]
① Please read "Cautions on Performing Secondary Operations" (Page 192) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).
③ While cutting off the entire hub may cause curvature deformation by residual stress, some products are straightened and annealed after refining the material.

Usable in the assembly distance of the spur gear.

KHG ground helical gears use a "transverse" module.
The assembly distance is the same as spur gear pairs with the same module and number of teeth.
Improved strength and low noise: Take the next step up from spur gears.

* For details of transverse helical gears, please see our separate technical reference book.

J Series



S1K

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

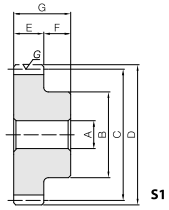
Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	5×2.3			6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M4			M5				M6			M8			M10	
KHG2.5-18R J BORE	S1K	S1K	S1K	S1K	S1K	S1K	S1K								
KHG2.5-18L J BORE	S1K	S1K	S1K	S1K	S1K	S1K	S1K								
KHG2.5-20R J BORE				S1K	S1K	S1K	S1K								
KHG2.5-20L J BORE				S1K	S1K	S1K	S1K								
KHG2.5-22R J BORE				S1K	S1K	S1K	S1K	S1K							
KHG2.5-22L J BORE				S1K	S1K	S1K	S1K	S1K							
KHG2.5-24R J BORE				S1K	S1K	S1K	S1K	S1K	S1K						
KHG2.5-24L J BORE				S1K	S1K	S1K	S1K	S1K	S1K						
KHG2.5-25R J BORE						S1K	S1K	S1K	S1K	S1K					
KHG2.5-25L J BORE						S1K	S1K	S1K	S1K	S1K					
KHG2.5-26R J BORE						S1K	S1K	S1K	S1K	S1K					
KHG2.5-26L J BORE						S1K	S1K	S1K	S1K	S1K					
KHG2.5-28R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG2.5-28L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG2.5-30R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG2.5-30L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG2.5-32R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K		
KHG2.5-32L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K		
KHG2.5-35R J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K		
KHG2.5-35L J BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K		
KHG2.5-40R J BORE								S1K	S1K	S1K	S1K	S1K	S1K		
KHG2.5-40L J BORE								S1K	S1K	S1K	S1K	S1K	S1K		
KHG2.5-48R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG2.5-48L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG2.5-50R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG2.5-50L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG2.5-52R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG2.5-52L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG2.5-60R J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG2.5-60L J BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	

[Caution on J series]
① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Keyways are made according to JIS B1301 standards, Js9 tolerance.
④ Certain products which would otherwise have a very long tapped hole are counterbored to reduce the length of the tap. For details, please see the KHK Web Catalog.
⑤ Areas of products which have been re-worked will not be black oxide coated.
⑥ For products having a tapped hole, a set screw is included.

KHG Module 3
Ground Helical Gears

Specifications	
Precision grade	JIS grade N6 (JIS B1702-1: 1998)*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Transverse pressure angle	20°
Helix angle	21°30'
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for teeth

* The precision grade of J Series products is equivalent to the value shown in the table.



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Catalog Number	No. of teeth	Direction of spiral	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N-m) Bending strength	Allowable torque (N-m) Surface durability	Allowable torque (kgf-m) Bending strength	Allowable torque (kgf-m) Surface durability	Backlash (mm)	Weight (kg)
KHG3-16R **KHG3-16L**	16	R L	S1	18	38	48	54	25	16	41	143	87.2	14.6	8.89	0.10~0.20	0.42
KHG3-18R **KHG3-18L**	18	R L			40	54	60				171	115	17.4	11.8		0.53
KHG3-20R **KHG3-20L**	20	R L		20	50	60	66				199	148	20.3	15.1		0.70
KHG3-24R **KHG3-24L**	24	R L			58	72	78				258	224	26.3	22.8		1.03
KHG3-25R **KHG3-25L**	25	R L			60	75	81				272	245	27.8	25.0		1.12
KHG3-28R **KHG3-28L**	28	R L			70	84	90				318	316	32.4	32.2		1.47
KHG3-30R **KHG3-30L**	30	R L		25	75	90	96				348	369	35.5	37.6		1.65
KHG3-32R **KHG3-32L**	32	R L			75	96	102				363	407	37.0	41.5		1.82
KHG3-35R **KHG3-35L**	35	R L			80	105	111				407	498	41.5	50.7		2.17
KHG3-36R **KHG3-36L**	36	R L			80	108	114				422	530	43.0	54.0		2.27
KHG3-40R **KHG3-40L**	40	R L			80	120	126				482	670	49.2	68.3		2.69
KHG3-44R **KHG3-44L**	44	R L			80	132	138				543	828	55.4	84.4		3.16
KHG3-45R **KHG3-45L**	45	R L			80	135	141				558	869	56.9	88.6		3.28
KHG3-48R **KHG3-48L**	48	R L			85	144	150				604	1000	61.6	102		3.75
KHG3-50R **KHG3-50L**	50	R L		30	85	150	156				635	1090	64.7	112		3.95
KHG3-60R **KHG3-60L**	60	R L			90	180	186				757	1560	77.2	159		5.57

[Caution on Product Characteristics]
① The allowable torques shown in the table are calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.
③ These gears produce axial thrust forces. Please see Page 193 for more details.
④ Right handed and left handed helical gears in the same module are designed to mesh as a pair, but KHG gears are not interchangeable with SH type helical gears.

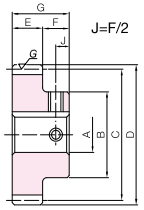
[Caution on Secondary Operations]
① Please read "Cautions on Performing Secondary Operations" (Page 192) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).
③ While cutting off the entire hub may cause curvature deformation by residual stress, some products are straightened and annealed after refining the material.

Usable in the assembly distance of the spur gear.

KHG ground helical gears use a "transverse" module.
The assembly distance is the same as spur gear pairs with the same module and number of teeth.
Improved strength and low noise: Take the next step up from spur gears.

* For details of transverse helical gears, please see our separate technical reference book.

J Series



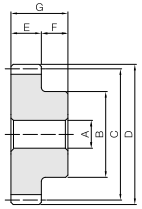
S1K

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

Bore H7	* The product shapes of J Series items are identified by background color.											
Keyway Js9	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M5				M6			M8			M10	
KHG3-16R J BORE	S1K	S1K	S1K	S1K								
KHG3-16L J BORE	S1K	S1K	S1K	S1K								
KHG3-18R J BORE	S1K	S1K	S1K	S1K								
KHG3-18L J BORE	S1K	S1K	S1K	S1K								
KHG3-20R J BORE			S1K	S1K	S1K	S1K	S1K					
KHG3-20L J BORE			S1K	S1K	S1K	S1K	S1K					
KHG3-24R J BORE			S1K	S1K	S1K	S1K	S1K	S1K				
KHG3-24L J BORE			S1K	S1K	S1K	S1K	S1K	S1K				
KHG3-25R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG3-25L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K			
KHG3-28R J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K		
KHG3-28L J BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K		
KHG3-30R J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-30L J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-32R J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-32L J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-35R J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-35L J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-36R J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-36L J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-40R J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-40L J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-44R J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-44L J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-45R J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-45L J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	
KHG3-48R J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG3-48L J BORE					S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K
KHG3-50R J BORE							S1K	S1K	S1K	S1K	S1K	S1K
KHG3-50L J BORE							S1K	S1K	S1K	S1K	S1K	S1K
KHG3-60R J BORE							S1K	S1K	S1K	S1K	S1K	S1K
KHG3-60L J BORE							S1K	S1K	S1K	S1K	S1K	S1K

[Caution on J series]
① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Keyways are made according to JIS B1301 standards, Js9 tolerance.
④ Certain products which would otherwise have a very long tapped hole are counterbored to reduce the length of the tap. For details, please see the KHK Web Catalog.
⑤ Areas of products which have been re-worked will not be black oxide coated.
⑥ For products having a tapped hole, a set screw is included.

Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle	15°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating



S1

Catalog Number	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
					A_{H7}	B	C	D	E	F	G
SH2-15R **SH2-15L**	***m*2**	15	R L	S1	12	24	31.06	35.06	25	10	35
SH2-20R **SH2-20L**		20	R L		12	32	41.41	45.41			
SH2-30R **SH2-30L**		30	R L		12	50	62.12	66.12			
SH2-40R **SH2-40L**		40	R L		18	60	82.82	86.82			
SH2-60R **SH2-60L**		60	R L		18	70	124.23	128.23			
SH2-90R **SH2-90L**		90	R L		18	120	186.35	190.35			
SH3-15R **SH3-15L**	***m*3**	15	R L	S1	15	36	46.59	52.59	35	15	50
SH3-20R **SH3-20L**		20	R L		15	50	62.12	68.12			
SH3-30R **SH3-30L**		30	R L		20	70	93.17	99.17			
SH3-40R **SH3-40L**		40	R L		20	80	124.23	130.23			
SH3-60R **SH3-60L**		60	R L		20	140	186.35	192.35			

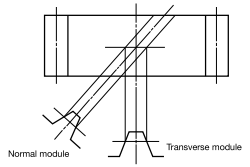
[Caution on Product Characteristics]
① The allowable torques shown in the table are calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.
③ These gears produce axial thrust forces. Please see Page 193 for more details.
④ Right handed and left handed helical gears in the same module are designed to mesh as a pair, but KHG gears are not interchangeable with helical gears.

Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
Bending strength	Surface durability	Bending strength	Surface durability			
43.7	2.90	4.46	0.30	0.12~0.26	0.15	**SH2-15R** **SH2-15L**
67.1	5.85	6.84	0.60		0.30	**SH2-20R** **SH2-20L**
117	15.3	11.9	1.56		0.72	**SH2-30R** **SH2-30L**
169	28.9	17.2	2.95		1.21	**SH2-40R** **SH2-40L**
275	70.8	28.0	7.22		2.61	**SH2-60R** **SH2-60L**
437	173	44.6	17.6		6.17	**SH2-90R** **SH2-90L**
138	9.67	14.0	0.99	0.14~0.32	0.52	**SH3-15R** **SH3-15L**
211	19.4	21.6	1.98		0.99	**SH3-20R** **SH3-20L**
368	50.2	37.5	5.12		2.20	**SH3-30R** **SH3-30L**
531	95.5	54.1	9.73		3.80	**SH3-40R** **SH3-40L**
866	236	88.3	24.0		9.18	**SH3-60R** **SH3-60L**

[Caution on Secondary Operations]
① Please read “Cautions on Performing Secondary Operations” (Page 192) 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 Avoid performing secondary operations that narrow the tooth width, as it affects precision and strength.

Reference Section of Gears

Transverse module (SH helical gears) and normal module (KHG ground helical gears) are available for the gear teeth according to the gear reference cross section. Even if products have the same helix angle and module, transverse and normal module gears have different gear teeth and thus cannot engage.



* Above is for illustration purposes only and differs from actual tooth forms. To find more details, please see the section “4.3 Helical Gears” in our separate technical reference book.

■ Center Distance Table of SH Helical Gears

Catalog Number	SH2-15 R L	SH2-20 R L	SH2-30 R L	SH2-40 R L	SH2-60 R L	SH2-90 R L
SH2-15 R L	31.06	—	—	—	—	—
SH2-20 R L	36.23	41.41	—	—	—	—
SH2-30 R L	46.59	51.76	62.12	—	—	—
SH2-40 R L	56.94	62.12	72.47	82.82	—	—
SH2-60 R L	77.65	82.82	93.17	103.53	124.23	—
SH2-90 R L	108.70	113.88	124.23	134.59	155.29	186.35

■ Center Distance Table of SH Helical Gears

Catalog Number	SH3-15 R L	SH3-20 R L	SH3-30 R L	SH3-40 R L	SH3-60 R L
SH3-15 R L	46.59	—	—	—	—
SH3-20 R L	54.35	62.12	—	—	—
SH3-30 R L	69.88	77.65	93.17	—	—
SH3-40 R L	85.41	93.17	108.70	124.23	—
SH3-60 R L	116.47	124.23	139.76	155.29	186.35

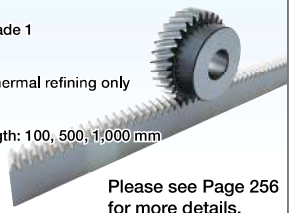
KHG Ground Helical Gears

Precision: JIS Grade N6
Material: SCM440
Heat Treatment: Thermal refined / gear teeth induction hardened
Module: m1 to 3

Please see Page 194 for more details.

KRHG/KRHGF/KRHGFD Ground Helical Racks

Precision: KHK Grade 1
Material: SCM440
Heat Treatment: Thermal refining only
Module: m1 to 3
Nominal Total Length: 100, 500, 1,000 mm



Please see Page 256 for more details.

SH Helical Gears

Precision: JIS Grade N8
Material: S45C
Heat Treatment: -
Module: m2, 3

Please see Page 204 for more details.

SRH·SRHF·SRHFD Helical Racks

Precision: KHK Grade 5
Material: S45C
Heat Treatment: -
Module: m2, 3
Nominal Total Length: 100, 500, 1,000 mm

Please see Page 258 for more details.

ZSTP Ground Helical Gears

Dedicated for racks

Precision: JIS Grade N6
Material: SCM440
Heat Treatment: Thermal refined / gear teeth induction hardened
Module: m2 to 6

Please see Page 262 for more details.

SHE Helical Gears

Dedicated for racks

Precision: JIS Grade N8
Material: S45C
Heat Treatment: -
Module: m1.5 to 6

Please see Page 260 for more details.

ZST/ZSTD Hardened Ground Helical Racks

Precision: DIN Grade 6 (KHK Grade 2 equivalent)
Material: DIN C45 (JIS S45C equivalent)
Heat Treatment: Gear teeth induction hardened
Module: m2 to 6
Nominal Total Length: 1,000, 2,000 mm

Please see Page 262 for more details.

SRHEF Helical Racks

Precision: KHK Grade 4
Material: S45C
Heat Treatment: -
Module: m1.5 to 6
Nominal Total Length: 1,000 mm

Please see Page 260 for more details.