Racks

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) Racks

K R G F 2 - 500 H

- H — Gear teeth induction hardened
- 500 — Total Length (500mm)
- 2 — Module (2)
- F — Other Products (End Machined)
- G — Other Products (Ground Gears)
- R — Type (Rack)
- K — Material (SCM440)

Material

M	SCM415
K	SCM440
S	S45C
SU	Stainless Steel
BS	Brass
P	MC901
D	Polyacetal

Type

R	Racks
RH	Helical Racks
RO	Round Racks
S	Spur Gears

Other Information

F	Racks with Machined Ends
D	Racks with Bolt Holes
K	Racks with Drill Holes
G	Ground Gears
H	Gear teeth induction hardened

Features

KHK stock racks are made for high precision linear motion applications. We offer a large selection of racks ranging from module 0.5 to 10 and lengths from 100 to 2000 mm. The following table lists the main features.

■ Racks

Catalog Number Note 1	Module	Total length mm Parentheses show no. of teeth	Material	Heat Treatment	Tooth Surface Finish	Gear accuracy KHK R 001 Note 3 Parentheses show JIS B 1702-1	Features
MRGF/MRGFD	1.5 to 3	500	SCM415	Tooth area carburized	Ground	1	A ground rack made of carburized chromoly steel. Our highest-performance rack, with accumulated pitch error of 10μm or less. J Series products are also available.
KRGF-H KRGFD-H	1.5 to 3	500, 1000	SCM440	Thermal refined, gear teeth induction hardened	Ground	1	Heat treated ground gears with high precision and strength has excellent cost-performance ratio. J Series products are also available.
KRG/KRGF KRGD	1 to 3	100, 500, 1000	SCM440	Thermal refined	Ground	1	High strength and abrasion-resistant for precision linear motion.
SRG/SRGF SRGFD/SRGFK	0.5 to 6	100, 300, 500, 1000	S45C	Gear teeth induction hardened NOTE 2	Ground	3	Reasonably priced ground racks with abrasion-resistant characteristics. J Series products are also available.
KRF-H/KRFD-H	1.5 to 5	1000	SCM440	Thermal refined, gear teeth induction hardened	Cut	5	A high-strength, long-life, tough hardened rack suitable for compact designs. J Series products are also available.
SRF-H SRFD-H	1.5 to 6	1000	S45C	Gear teeth induction hardened	Cut	5	Stable hardened racks with high strength, long life span are reasonably priced. J Series products are also available.
SRF-HL SRFD-HL	1.5 to 6	1000, 1500, 2000	S45C	Gear teeth laser hardened	Cut	4	Hardened racks with high strength due to the laser hardened tooth surfaces and with a low price tag. J Series products are also available.
KRF/KRFD	1.5 to 5	500, 1000	SCM440	Thermal refined	Cut	4	Increased strength with SCM440 material which is thermal refined. J Series products are also available.
SRAF/SRAFD SRAFK	1.5 to 4	1000	S45C	—	Cut	4	This gear rack has the same tooth height and face width sizes, more compact and reasonably priced in comparison to SRF Racks J Series products are also available.
SR/SRF SRFD/SRFK	0.5 to 10	100, 300, 500, 1000, 1500, 2000	S45C	—	Cut	4	Low cost, large selections of modules and number of teeth. J Series products are also available.
SUR/SURF SURFD	1 to 4	500, 1000	SUS304	Solution treated	Cut	5	Suitable for food machinery due to SUS304's rust resistant qualities.
DRF/DRFD DRFK	1 to 3	500, 1000	Polyacetal	—	Cut	5	Plastic racks with little dimensional change, absorb lesser water than MC Nylon racks. J Series products are also available.
PR/PRF	1 to 3	500, 1000	MC901	—	Cut	5	Light-weight products made of MC Nylon can be used without lubrication.
BSR	0.5 to 1	300	Free cutting brass (C3604)	—	Cut	4	Small pitch racks made of free-cutting brass (C3604), excellent workability and high rust resistance.
SRO/SROS	1 to 6	500, 1000	S45C	—	Cut	4	Convenient in applications where the rack has the reciprocal motion. S Type is easy to install.
SURO	1 to 3	500, 1000	SUS303	—	Cut	5	Same dimensions as SRO racks, except in stainless steel. Use where rust-resistance is required.
DR	0.8 to 2	2000	Duracon (M25-44)	—	Injection Molded	8	Used in applications due to its flexibility, where metal racks do not have this attribute. Pinions and accessories are also available.
KRHG/KRHGF	1 to 3	100, 500, 1000	SCM440	Thermal refined	Ground	1	Excellent products with high precision and strength, and low noise and abrasion characteristics. J Series products are also available.
SRH/SRHF SRHFD	2 to 3	100, 500, 1000	S45C	—	Cut	5	Effective in reducing noise and vibration due to larger contact ratio of helical gears.
SRHEF	1.5 to 6	1000	S45C	—	Cut	4	General-purpose helical racks with product dimensions and helix angle (19° 31′ 41″) according to EU specifications.

■ Pinion

SHE	1.5 to 6	(18 to 30)	S45C	—	Cut	(N8)	A product designed so that the helix angle is 19° 31′ 41″ and the distance of the pinion traveled in one turn is an integer (mm).

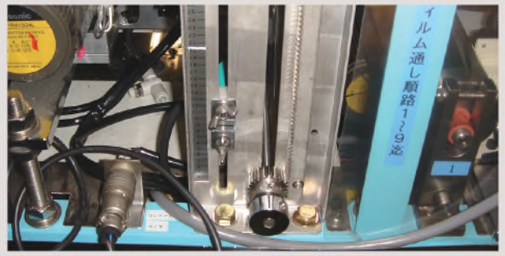
[NOTE 1] The catalog numbers in the above tables with a suffix of F have both ends machined so that they can be butted against each other to make any desired length. The items with (D) and (K) have mounting screw holes for easier assembly.
[NOTE 2] Products with module less than 0.8 are thermal refined, without their gear teeth being induction hardened.
[NOTE 3] Precision grade standard of racks are set by KHK. Please see "Precision of Racks" in Selection Hints section for details.

● **For safe handling and to prevent damage such as deformation, KHK stock racks have round chamfering at the corners of the top land of the gear tooth.**
This rounded chamfered shape is patented by KHK. It is also effective for reducing noise.
● **Black products are KHK stock gears that have an applied black oxide coating for rust resistance; this "blackness" is a product characteristic of KHK stock gears.**

Application Examples

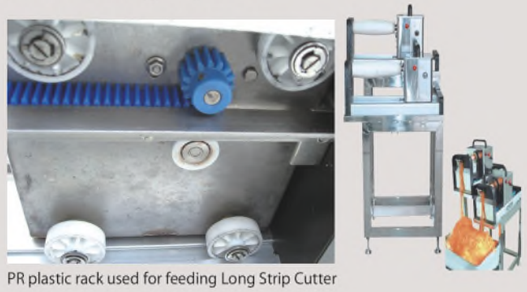
KHK stock racks & pinions are adopted in driving devices for all kinds of linear motion systems, including transport devices.

■ Automatic packaging machine manufactured by Toyota Machinery Co., Ltd.



SUR stainless steel rack used for film winding tension part

■ Dremax Long Strip Cutter

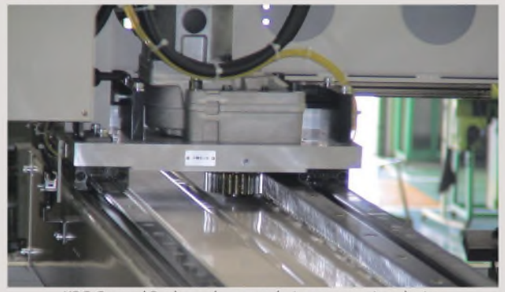


PR plastic rack used for feeding Long Strip Cutter

■ Lathe Auto Loader

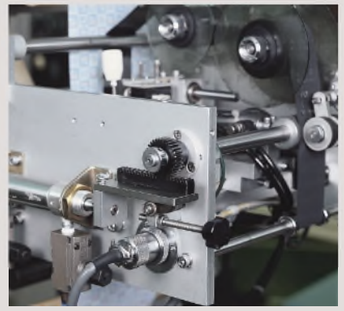
SRO Round Rack used as a workpiece storage device (lifting/lowering table)

■ Lathe Gantry Loader



KRG Ground Rack used as a workpiece conveying device

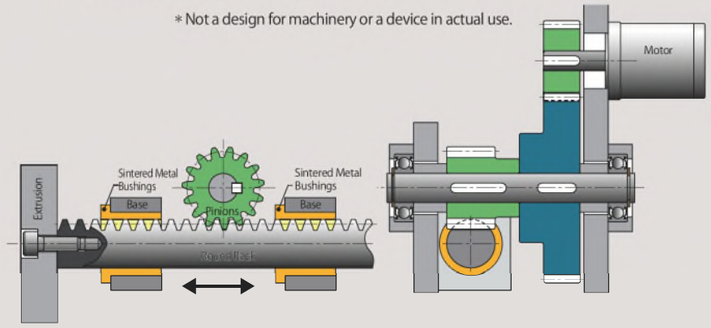
■ Packaging Machine



SR Rack used for label feeding

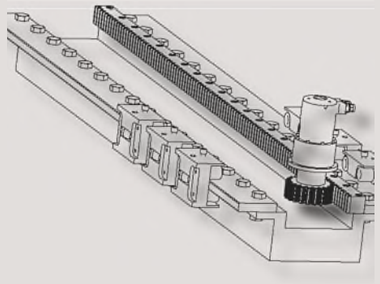
■ Extruder (design example)

＊Not a design for machinery or a device in actual use.



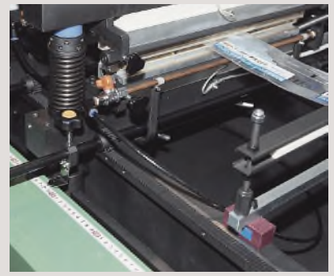
SRO Round Rack used for extruders (can also become a lifting/lowering device by setting up vertically)

■ Rack Drive Linear Guide



Example of table moving device that uses rack & pinion

■ Film Sealer



SR rack used for positioning

Selection Hints

Please select the most suitable products by carefully considering the characteristics of items and contents of the product tables. It is also important to read all applicable "CAUTION" notes shown below before the final selection.

1. Caution in Selecting the Mating Gears

① With the exception of helical racks, KHK stock racks can mate with any spur gears of the same module. Products with different tooth width can also be mated as a pinion.
② There are limited choices of mating gears for KRHG/KRHGF, SRHEF, and SRH Ground Helical Racks and Helical Racks. Be sure to check the helix direction (right or left) when selecting.

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

Catalog Number and Direction of Helix		KRHG KRHGF		SRHEF	SRH/SRHF SRHFD	
		RH	LH	RH	RH	LH
KHG	LH	○	×	×	×	×
	RH	×	○	×	×	×
SHE	LH	×	×	○	×	×
SH	LH	×	×	×	○	×
	RH	×	×	×	×	○

2. Caution in Selecting Gears Based on Gear Strength

Allowable bending strength and surface durability values shown in product tables were computed by assuming a certain application environment. They should be used as reference only. We recommend that each user computes their own values by applying the actual usage conditions. The table below contains the assumptions established for various products in order to compute gear strengths.

■ Calculation of Bending Strength of Gears

Item \ Catalog Number	Racks: MRGF MRGFD	KRGF-H KRGFD-H KRF-H KRFD-H	KRG/KRGF KRGD/KRHG KRHGF/ KRHGFD KRF/KRFD	SRG/SRGF SRGFD/SRGFK SRF-H/SRFD-H	SRF-HL SRFD-HL	SRAF/SRAFD SRAFK/SR/SRF SRFD/SRFK/SRO SROS/SRH/SRHF SRHFD/SRHEF	Pinions Racks: SUR SURF SURFD SURO	BSR	SHE	DRF DRFD DRFK	PR PRF	DR
Formula NOTE 1	Formula of spur and helical gears on bending strength (JGMA401-01)									The Lewis formula		
No. of teeth of mating gears	30								Racks	(30)		
Rotational speed	100rpm									(100 rpm)		
Design life (durability)	Over 10^7cycles									Allowable bending stress (kgf/mm²)		
Impact from motor	Uniform load									1.0 (40℃ with No Lubrication)	1.15 (40℃ with No Lubrication)	*m* 0.8 4.0 *m* 1.0 3.5 *m* 1.5 1.8 NOTE 4 *m* 2.0 1.2 (40℃ with Grease Lubrication)
Impact from load	Uniform load											
Direction of load	Bidirectional											
Allowable bending stress at root σ_{Flim} (kgf/mm²) NOTE 2	47	32		20 NOTE 3			10.5	4	30			
Safety factor S_F	1.2											

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

Item										
Formula NOTE 1	Formula of spur and helical gears on surface durability (JGMA402-01)									
Kinematic viscosity of lubricant	100cSt (50℃)									
Gear support	Supported on one end.									
Allowable Hertz stress σ_{Hlim} (kgf/mm²)	166	112	79	90 NOTE 4	80	52.5	41.3	-	49	112
Safety factor S_H	1.15									

[NOTE 1] The gear strength formula is based on JGMA (Japanese Gear Manufacturers Association) specifications, "MC Nylon Technical Data" by Nippon Polypenco Limited and "Duracon Gear Data" by Polyplastic Co.
The units for the rotational speed (rpm) and the stress (kgf/mm²) are adjusted to the units needed in the formula.
[NOTE 2] The allowable bending stress at the root σ_{Flim} is calculated from JGMA401-01, and set to 2/3 of the value in the consideration of the use of planetary-, idler-, or other gear systems, loaded in both directions.
[NOTE 3] For SRG, or SRGF Ground Racks, with a module less than *m*0.8, the allowable bending stress and allowable hertz stress are respectively 24.5 (kgf/mm²) and 62.5 (kgf/mm²).
[NOTE 4] The values for DR *m* 1.5 racks were assumed by KHK. Usage conditions for SSDR (DR Rack Pinion) are the same as for the SSCP Pinion, shown on Page 241.

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://khkgears.net/
Overseas Sales Department: TEL: 81-48-254-1744 FAX: 81-48-254-1765 E-mail: info@khkgears.net

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

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

■ Definition of Bending Strength of Gears

The allowable bending strength of a gear is defined as the allowable tangential force at the pitch circle based on the mutually allowable root stress of two meshing gears under load.


Example of failure due to insufficient bending strength

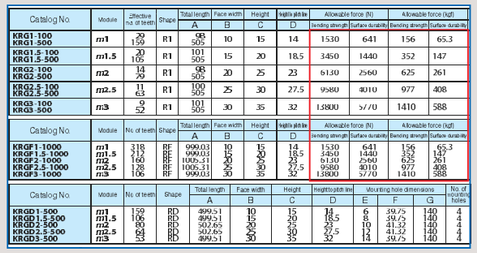
■ Definition of Surface Durability

The surface durability of a gear is defined as the allowable tangential force at the pitch circle, which permits the force to be transmitted safely without incurring surface failure. The allowable gear tooth load of a gear is defined as the allowable tangential force at the pitch circle based on the mutual gear tooth strength of two meshing gears under load.


Example of wear due to insufficient surface durability

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

■ For provisional selection from the Master Catalog



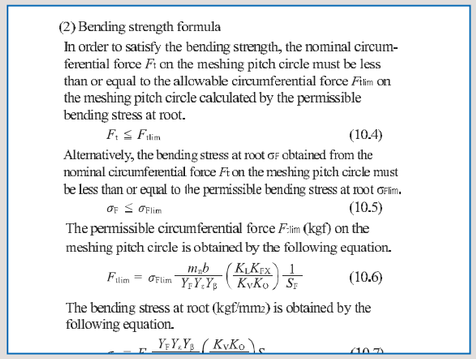
Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Face width B	Height C	Height available D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability
KRGT1-100	*m*1	29 159	R1	98 505	10	15	14	1530	641	156	65.3
KRGT1.5-500	*m*1.5	20 105	R1	101 505	15	20	18.5	3450	1440	352	147
KRG2-100	*m*2	14 79	R1	98 505	20	25	23	6130	2560	625	261
KRG2.5-100	*m*2.5	11 63	R1	100 505	25	30	27.5	9580	4010	977	408
KRG3-100	*m*3	9 52	R1	101 505	30	35	32	13800	5770	1410	588

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height available D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability
KRGF1-1000	*m*1	318	RF	999.03	10	15	14	1530	641	156	65.3
KRGF1.5-1000	*m*1.5	212	RF	999.03	15	20	18.5	3450	1440	352	147
KRGF2-1000	*m*2	160	RF	1005.31	20	25	23	6130	2560	625	261
KRGF2.5-1000	*m*2.5	128	RF	1005.31	25	30	27.5	9580	4010	977	408
KRGF3-1000	*m*3	106	RF	999.03	30	35	32	13800	5770	1410	588

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height/pitch line D	Mounting hole dimensions E	F	G	No. of mounting holes
KRGD1-500	*m*1	159	RD	499.51	10	15	14	6	39.75	140	4
KRGD1.5-500	*m*1.5	106	RD	499.51	15	20	18.5	8	39.75	140	4
KRGD2-500	*m*2	80	RD	507.65	20	25	23	10	41.32	140	4
KRGD2.5-500	*m*2.5	64	RD	507.65	25	30	27.5	12	41.32	140	4
KRGD3-500	*m*3	53	RD	499.51	30	35	32	14	39.75	140	4

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 71 of our technical reference book for more details.



(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.

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

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 stress at root σ_{Flim}.

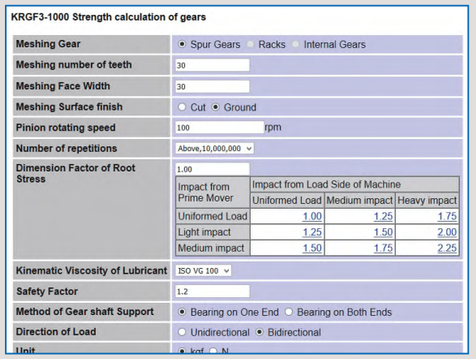
$$\sigma_F \leqq \sigma_{Flim} \quad (10.5)$$

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

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

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

Strength confirmation is simple when using the website.



KRGF3-1000 Strength calculation of gears

Meshing Gear	◉ Spur Gears ○ Racks ○ Internal Gears
Meshing number of teeth	30
Meshing Face Width	30
Meshing Surface finish	○ Cut ◉ Ground
Pinion rotating speed	100 rpm
Number of repetitions	Above,10,000,000
Dimension Factor of Root Stress	1.00

Impact from Prime Mover	Impact from Load Side of Machine: Uniformed Load	Medium impact	Heavy impact
Uniformed Load	1.00	1.25	1.75
Light impact	1.25	1.50	2.00
Medium impact	1.50	1.75	2.25

Kinematic Viscosity of Lubricant	ISO VG 100
Safety Factor	1.2
Method of Gear shaft Support	◉ Bearing on One End ○ Bearing on Both Ends
Direction of Load	○ Unidirectional ◉ Bidirectional
Unit	◉ kgf ○ N

3. Cautions on Selecting Racks By Precision

The precision standards of KHK stock racks are established by us.
The table below indicates the tolerance ranges of our racks.

① Pitch Errors of Racks (KHK R 001)

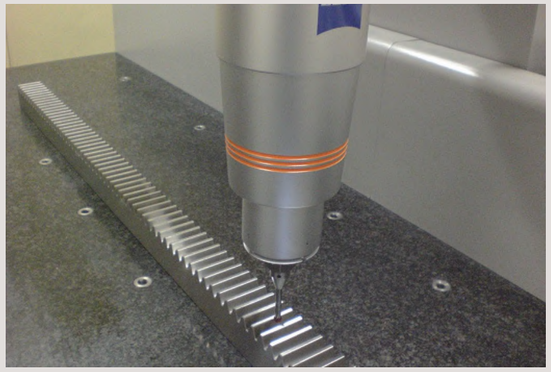
Our precision grades for pitch errors are established by referring to JIS Standards. The precision grades are set from 1 to 8, in accordance with the tolerance of a single pitch error (S.P.E.), adjacent tooth-to-tooth error (T.T.E.), and the total composite error (T.C.E.) for each module and length.

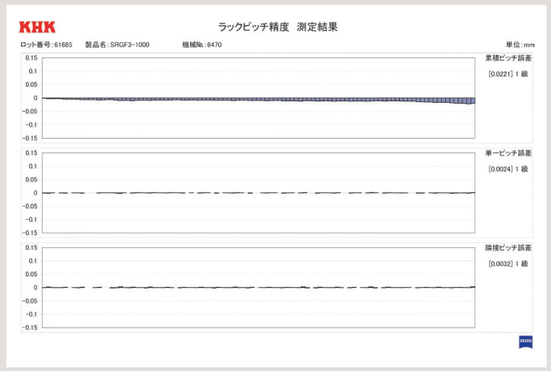
■ Precision Grades of Racks (KHK R 001)　　**Unit: μm**

Grade	Pitch Error	Over *m*0.4 to 1 CP2.5		Over *m*1 to 1.6 CP5		Over *m*1.6 to 2.5 –		Over *m*2.5 to 4 CP10		Over *m*4 to 6 CP15		Over *m*6 to 10 CP20	
		Rack Length (nominal)											
		1000 or less	1001 up to 2000	1000 or less	1001 up to 2000	1000 or less	1001 up to 2000	1000 or less	1001 up to 2000	1000 or less	1001 up to 2000	1000 or less	1001 up to 2000
1	S.P.E.	10	–	10	12	11	12	11	13	13	14	14	16
	T.T.E.	10	–	11	13	12	14	13	15	14	16	16	18
	T.C.E.	28	–	29	33	30	35	32	37	35	40	40	45
2	S.P.E.	14	–	14	17	15	17	16	18	18	20	20	23
	T.T.E.	16	–	16	19	17	19	18	21	20	24	24	27
	T.C.E.	39	–	41	48	43	49	46	53	50	57	58	64
3	S.P.E.	20	–	20	24	21	25	23	26	25	29	29	32
	T.T.E.	22	–	24	28	25	29	27	31	30	34	34	40
	T.C.E.	56	–	57	67	60	70	64	74	71	80	81	91
4	S.P.E.	28	–	29	33	30	35	32	37	35	40	40	45
	T.T.E.	33	–	34	42	38	43	40	46	44	50	51	57
	T.C.E.	79	–	81	95	85	99	91	105	100	115	115	130
5	S.P.E.	39	–	41	48	43	49	46	53	50	57	58	64
	T.T.E.	49	–	51	59	53	62	57	69	66	75	76	85
	T.C.E.	110	–	115	135	120	140	130	145	140	160	160	180
8	S.P.E.	206	206	212	212	219	219	–	–	–	–	–	–
	T.T.E.	330	330	339	339	350	350	–	–	–	–	–	–
	T.C.E.	–	–	–	–	–	–	–	–	–	–	–	–

[NOTE] ① Since the pitch accuracy of racks may vary due to humidity, the precision grades are evaluated at the bottom surface of the product, at the temperature of 20℃ . The dimensions of the KHK PR Plastic Racks may vary widely due to humidity. Therefore, the total composite error is assumed to be excluded from this accuracy standard.
Please refer in our separate technical reference book to "Design of Plastic Gears" (Page 100) for change in dimensions.
② For the accuracy of CP Rack, convert CP to *m* (module) when reference is made to the data in the table. (*m*=CP/ π).

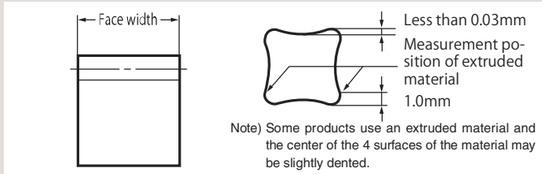
■ Pitch inspection and a sample report using Karl Zeiss UMC-550 Coordinate Measuring Machine. (KHK R 001 Grade 1)





② Precision of Rack Blanks

■ Tolerance on Face Width and Height



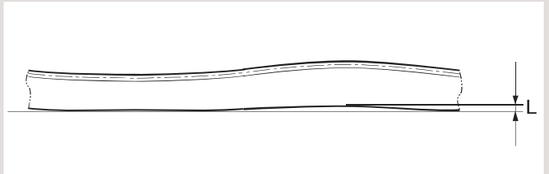
Note) Some products use an extruded material and the center of the 4 surfaces of the material may be slightly dented.

Unit: mm

Face width \ Precision grade (KHK R 001)	Grade 1	Grade 2	Grades 3 to 5*
6 or less	0 −0.05	0 −0.10	0 −0.18
7 to 10		0 −0.10	0 −0.22
11 to 18		0 −0.10	0 −0.27
19 to 30		0 −0.15	0 −0.33
31 to 50		0 −0.15	0 −0.39
51 to 90		0 −0.15	0 −0.46

[NOTE] Dimensional tolerance of hardened products is that prior to hardening. Dimensional tolerance for plastic racks is the value obtained when machining is performed, and may increase slightly due to aging.
* BSR products are not applicable.

■ Maximum Curvature Values (Flatness Tolerance L)



Unit: mm

Length (nominal) \ Precision Grade (KHK R 001)	Grades 1 & 2	Grade 3	Grades 4 & 5
500	0.05	0.1	0.2
1000	0.1	0.2	0.3
1500	–	–	0.3
2000	–	–	0.4

[NOTE] The straightness tolerances of round racks are 0.15/500 mm and 0.2/1000 mm. Plastic racks change over time so are excluded from this precision standard.

■ Tolerance on Total Length　　**Unit: mm**

Product Type	Module	Dimensional Tolerance
F Type End Machined Product	*m*0.5	$\begin{pmatrix}-0.1\\-0.3\end{pmatrix}$
	*m*0.8 (CP2.5)	$\begin{pmatrix}-0.1\\-0.5\end{pmatrix}$
	*m*1 up to 2.5	$\begin{pmatrix}-0.2\\-0.6\end{pmatrix}$
	*m*2.5 or more	$\begin{pmatrix}-0.2\\-0.8\end{pmatrix}$
FRCP and DR Flexible Racks	Uniform	± 10
Products other than the above	Uniform	$\begin{matrix}+3\\-2\end{matrix}$

[NOTE] For Type-F racks with machined ends, the dimensional tolerance is a calculated value according to assumed usage conditions, without consideration of pitch errors and aged deterioration.

③ Backlash of Rack Teeth

■ Backlash of Rack Teeth (Amount of Tooth Thinning)　　**Unit: mm**

Module (*m*) Pitch (CP) \ Precision grade (KHK R 001)	Grade 1 & 2	Grade 3	Grade 4		Grade 5		
			Excludes thermal refined racks	Includes thermal refined racks	Hardened Products	Stainless Steel/Helical Racks	Plastic Products
*m*0.5	–	0 to 0.07	0 to 0.08	–	–	–	–
*m*0.8, CP2.5	0 to 0.06	0 to 0.08	0 to 0.09	–	–	–	–
*m*1	0 to 0.06	0 to 0.10	0 to 0.11	–	–	0 to 0.13	0 to 0.20
*m*1.5, CP5	0 to 0.06	0 to 0.10	0.04 to 0.13	0.04 to 0.15	0.02 to 0.17	0.04 to 0.15	0 to 0.21
*m*2	0 to 0.06	0 to 0.10	0.05 to 0.14	0.05 to 0.16	0.03 to 0.18	0.05 to 0.16	0 to 0.22
*m*2.5	0 to 0.06	0 to 0.10	0.06 to 0.16	0.06 to 0.18	0.04 to 0.20	0.06 to 0.18	0 to 0.24
*m*3, CP10	0 to 0.06	0 to 0.10	0.07 to 0.18	0.07 to 0.20	0.05 to 0.22	0.07 to 0.20	0 to 0.27
*m*4	–	0 to 0.10	0.08 to 0.22	0.08 to 0.24	0.06 to 0.26	0.08 to 0.24	–
*m*5, CP15	–	0 to 0.10	0.09 to 0.24	0.09 to 0.26	0.07 to 0.28	0.09 to 0.26	–
*m*6, CP20	–	0 to 0.10	0.10 to 0.28	–	0.08 to 0.32	–	–
*m*8	–	–	0.13 to 0.32	–	–	–	–
*m*10	–	–	0.15 to 0.34	–	–	–	–

[NOTE] The values shown in the table are amount of tooth thinning. The theoretical backlash of assembled rack and pinion is given by:

Rack & pinion backlash = Amount of tooth thinning of the rack + Amount of tooth thinning of the pinion

Amount of tooth thinning of the rack : See above table
Amount of tooth thinning of the pinion : Take 1/2 of backlash given in the product table

Application Hints

In order to use KHK stock racks 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.

TEL: 81-48-254-1744 FAX: 81-48-254-1765 E-mail: info@khkgears.net

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. Long racks and resin racks deform particularly easily, so please handle with care.

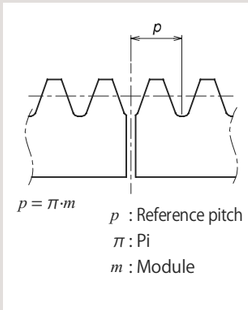
2. Cautions on Performing Secondary Operations

① Secondary operations can be performed on all KHK stock racks except for the racks with their gear teeth induction hardened. To avoid problems of gear precision, do not reduce the face width. The precision of ground racks and racks with mounting holes may drop if you do not exercise extreme caution during installation or while modifying.

② Pitch lines of racks are controlled by using the bottom surface as the reference datum and over-pin measurements on tooth thickness. If you machine the bottom surfaces, the precision of the racks may be affected.

③ When connecting two racks, the machining of the mating ends requires careful consideration in terms of the pitch (p) accuracy. The meshing will be poor if the pitch straddling the connection has a positive tolerance. We recommend a minus tolerance on pitch of at the connection.

The below is an indication of pitch tolerance for each module.



Unit: mm

Module	Pitch (p)	Tolerance
m0.5	1.57	− 0.05 − 0.15
m0.8	2.51	− 0.05 − 0.25
m1	3.14	− 0.1 − 0.3
m1.5	4.71	
m2	6.28	
m2.5	7.85	− 0.1 − 0.4
m3	9.42	
m4	12.57	
m5	15.71	
m6	18.85	
m8	25.13	
m10	31.42	

④ To use dowel pins to secure racks, attach the racks to the base and drill both simultaneously.

⑤ KHK stock racks made of S45C and SCM440 (except for ground racks) can be induction hardened. However, the precision of pitch is decreased.

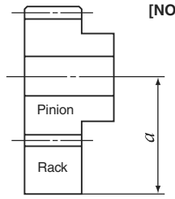
⑥ To be able to handle parts safely, all burrs and sharp corners should be removed after the secondary operations are done.

⑦ If you are going to modify the gear by gripping the teeth, please exercise caution not to crush the teeth by applying too much pressure. Any scarring will cause noise during operation.

3. Points of Caution during Assembly

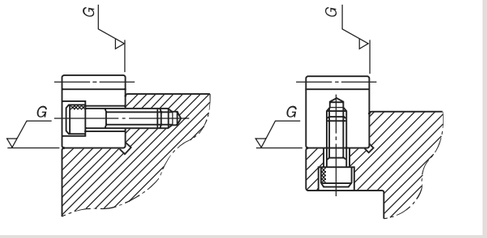
① KHK stock racks are designed to give the proper normal direction backlash when assembled using the mounting distance given by the formula below (mounting distance tolerance of H7 to H8 required). The backlash values are given in the table on Page 193. Make sure that the mounting distance stays constant for the length of the rack.

Mounting distance a = Height of pitch line of rack + Pitch radius of pinion



[NOTE] Pinions are assumed to be standard stock spur gears (x=0).

② KRG type of KHK stock ground racks have four surfaces ground parallel with high precision. To maintain true angle, they should be mounted on high precision bases (within 10μm recommended) as shown below. It is even possible to correct for the angular errors of racks by compensating the mounting base. With recent increases in the requirement for zero backlash linear drives, such accurate assembly as shown is becoming more important.

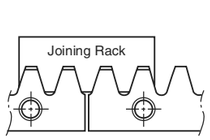


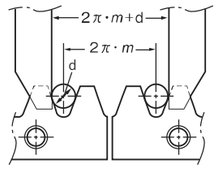
③ If the racks are not secured properly to the base, they could shift during operation and cause unexpected problems. It is very important to insure firm mounting by the use of dowel pins or similar devices.

④ Machined end type racks such as SRF and SRFD series have the pitch tolerance of -0.05 to -0.4mm at the end face. If you try to connect the racks without any space, the pitch at the connection will be too small and will cause problems. Please follow the following diagrams for assembly.

⑤ With SRFD etc., if using more than 10 racks connected together to form a rack with mounting holes machined along a length of 1 meter, the pitch precision and machining precision may cause the rack and base mounting holes to deviate, leading to set screw interference with the counterbored hole and preventing mounting. When using a rack for long lengths such as 10 meters or 20 meters, have the mounting holes additionally machined into long holes.

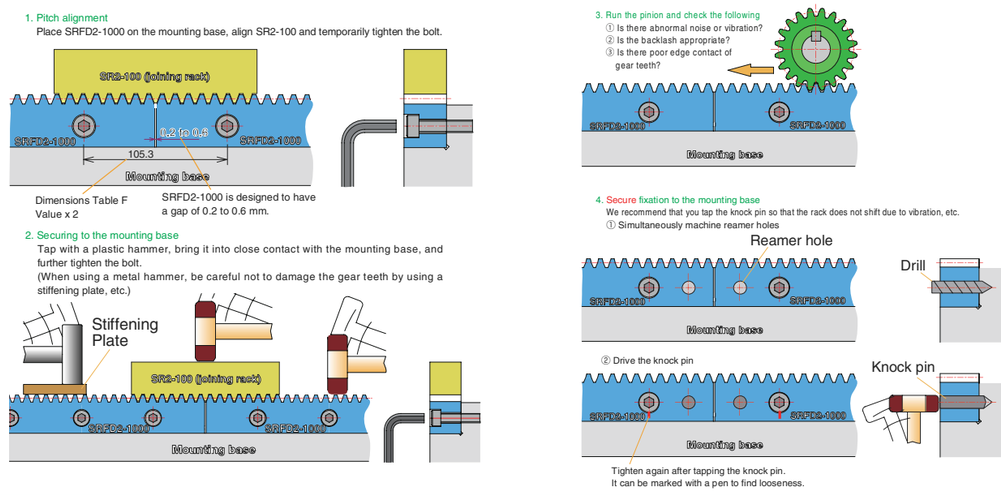
As an example of Rack Joining, we recommend the following method.





[NOTE] Joining gauge racks for helical racks must have the opposite hand from the racks. Please use 100 mm long racks as a joining gauge rack, or alternatively the rack of the same specifications on hand.

How to mount racks on a mounting base (For SRFD2-1000)



4. 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 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.

④ 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

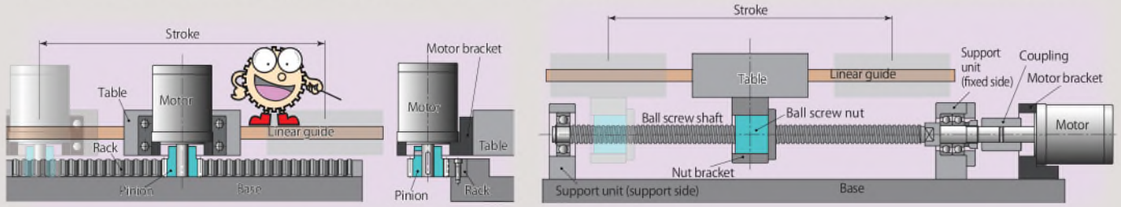
1. When using KHK products, follow relevant safety regulations (Occupational Safety and Health Regulations, etc.).
2. Pay attention to the following items when installing, removing, or performing maintenance and inspection of the product.
   ① Turn off the power switch.
   ② Do not reach or crawl under 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.

Comparison of Racks & Pinions and Ball Screws

Since racks are a simple mechanism, the material, hardening, strength and precision can be designed according to the environment.
They are also inexpensive, with parts that can be purchased separately for replacement.
In the designing process, please refer to Features of Racks & Pinions and Ball Screws in the table below.



● Features of Racks & Pinions

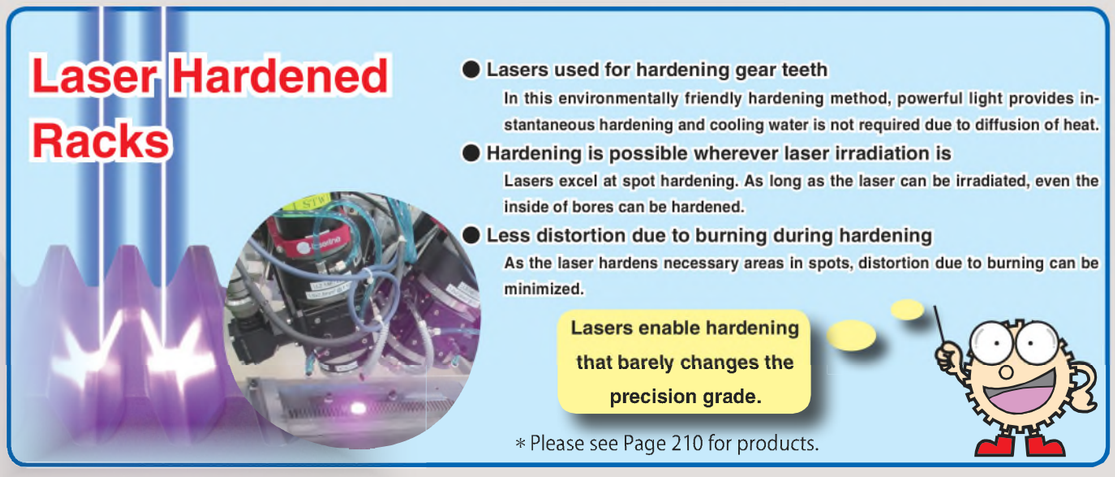
Advantages	Details
Few component parts	Since it does not have parts such as balls and retainers, there is less risk of accidentally falling apart during assembly and disassembly.
Supports heavy loads	Racks with large module can be used for heavy loads.
Compact products can be manufactured	Since it can be made smaller than products with ball screws, it can be used compactly for light loads.
High transmission efficiency	High transmission efficiency of about 98% (excluding lubrication oil stirring resistance and bearing resistance).
High feed speed	If the pinion diameter is large, it supports high-speed feeding.
No length limit	Screws can only be up to about 2 m to avoid excessive bending, but racks can be joined together and used at greater lengths.
Flexible production is available	Materials, hardening, shapes and the like can be designed flexibly, allowing easy adjustment to the machine.
High-precision products can be manufactured	Gear grinding can be provided to minimize pitch error.
Can be used for food-related machinery	MC nylon and stainless steel products can be manufactured.

Disadvantages	Details
Backlash is present	Backlash is required for smooth rotation. Backlash may become a problem in forward/reverse rotation positioning.
Lubrication is required	Metal racks require lubrication. Plastic racks do not require lubrication at light loads, but their precision is lower.

● Features of Ball Screws

Advantages	Details
High transmission efficiency	Transmission efficiency of 90% or higher.
High-precision products can be manufactured	High-precision ball screws can be manufactured by grinding.
High feed speed	High-speed feed is possible with high-lead ball screws.
No backlash	The use of pressure eliminates backlash.

Disadvantages	Details
Length is limited	Since the screw deflects, about 2 meters is the practical limit.
Hard to manufacture special products	Since it is hard to manufacture special products, machines must be adjusted to the shape of the ball screw.



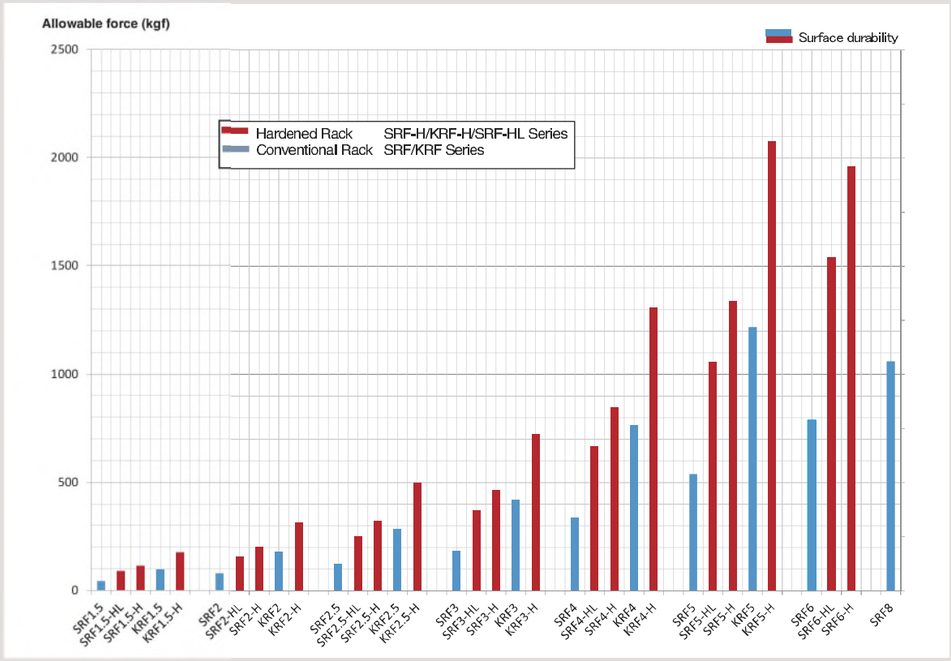
＊Please see Page 210 for products.

Rack downsizing

The H Series, KHK stock racks with induction hardened gear teeth, and the HL Series, with laser hardening, are available.

The graph below simulates the downsizing of KHK stock racks. It is possible to reduce the module (size) with equivalent transmission power, or to reduce the price likewise. Please select a product that fits your needs.

■ Comparison table of permissible transmission force of hardened racks



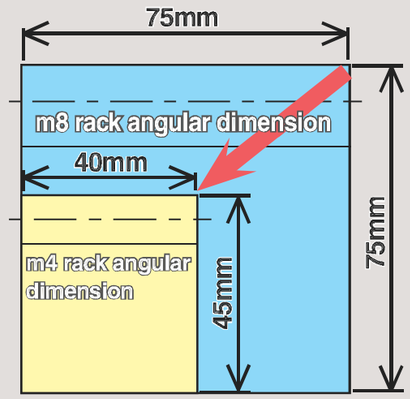
Comparison table per series (module 3, rack length: 1,000 mm)

Catalog Numbers (Comparison Example)	Material	Heat Treatment	Allowable force kgf		Precision	Series nominal total length mm
			Bending strength	Surface durability	KHK R 001	
SRF3-1000	S45C	None (raw material)	879	186	Grade 4	300,500,1000,1500,2000
KRF3-1000	SCM440	Thermal refined	1410	421	Grade 4	500,1000
SRF3-1000HL	S45C	Laser hardened	879	407	Grade 4	1000,1500,2000
SRF3-1000H	S45C	Induction hardened	799	468	Grade 5	1000
KRF3-1000H	SCM440	Thermal refined / induction hardened	1280	725	Grade 5	1000
MRGF 3-500 (2 units)	SCM415	Carburized	2070	1900	Grade 1	500

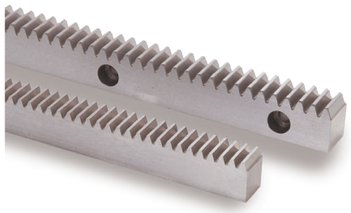
■ Example of rack downsizing

The surface durability can be increased by hardening the gear teeth. By increasing the strength thus, the angular dimensions of modules and racks can be reduced. This helps reduce the cost.

Increased strength leads to smaller size	
SRF8-1000	39.7kg
KRF4-1000H	12.9kg
Mass reduced ⇒	26.8 kg

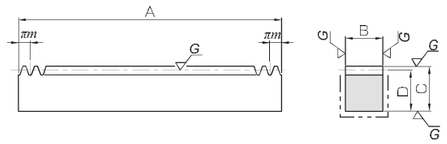


Hardened Ground Racks J Series



Specifications	
Precision grade	KHK R 001 grade 1 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM415
Heat treatment	Tooth area carburized
Tooth hardness	55 ～ 60HRC

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



RF

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
MRGF1.5-500	***m1.5***	106	RF	499.51	15	20	18.5	5070	4620	517	472	1.09
MRGF2-500	***m2***	80		502.65	20	25	23	9010	8240	918	840	1.82
MRGF2.5-500	***m2.5***	64		502.65	25	30	27.5	14100	12900	1440	1310	2.71
MRGF3-500	***m3***	53		499.51	30	35	32	20300	18600	2070	1900	3.76

Catalog No. ●: J Series (Available-on-request)	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of mounting holes	Mounting screw size
●**MRGFD1.5-500J**	***m*1.5**	106	RD	499.51	15	20	18.5	8	24.76	150	4	M5
●**MRGFD2-500J**	***m*2**	80		502.65	20	25	23	10	26.33			M6
●**MRGFD2.5-500J**	***m*2.5**	64		502.65	25	30	27.5	12	26.33			M8
●**MRGFD3-500J**	***m*3**	53		499.51	30	35	32	14	24.76			M10

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

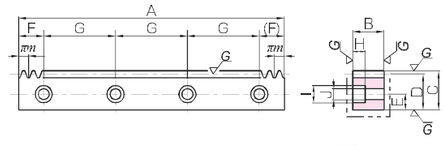
[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.
② In the illustration, the area surrounded with — - - — line is masked during the carburization process and can be modified. However, the end faces on both sides do not have an anti-carburization coating on the taped holes, otherwise they could not be machined.

[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes 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.

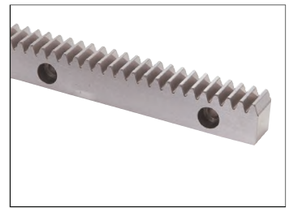
Surface durability;
4 times higher than the SRG Hardened Ground Racks, 2 times higher than the KRG-H Hardened Ground Racks.

J Series

Ground Racks



RD



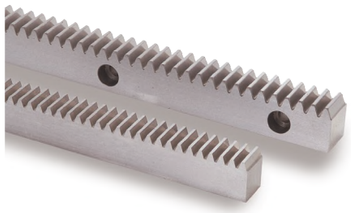
Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No. ●: J Series (Available-on-request)
6	10	6	5070	4620	517	472	1.07	●**MRGFD1.5-500J**
7	11	7	9010	8240	918	840	1.78	●**MRGFD2-500J**
8.6	14	9	14100	12900	1440	1310	2.64	●**MRGFD2.5-500J**
10.8	17.5	11	20300	18600	2070	1900	3.63	●**MRGFD3-500J**

Recommended Mating Pinions

MSGA・MSGB Ground Spur Gears

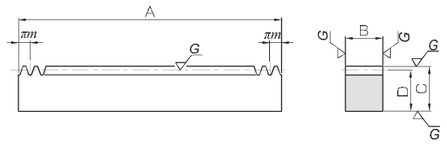
Please see Page 28 for more details.

Hardened Ground Racks J Series



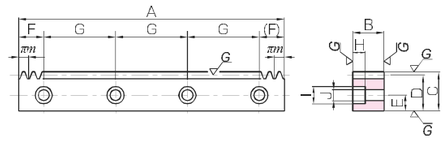
Specifications	
Precision grade	KHK R 001 grade 1 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, teeth induction hardened
Tooth hardness	50 ～ 60HRC

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



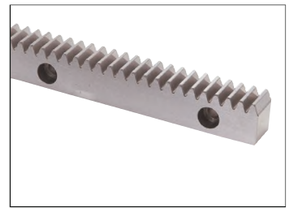
RF

J Series



RD

Ground Racks



Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
KRGF1.5-500H **KRGF1.5-1000H**	***m*1.5**	106 212	RF	499.51 999.03	15	20	18.5	3450	2110	352	215	1.09 2.18
KRGF2-500H **KRGF2-1000H**	***m*2**	80 160	RF	502.65 1005.31	20	25	23	6130	3750	625	382	1.82 3.63
KRGF2.5-500H **KRGF2.5-1000H**	***m*2.5**	64 128	RF	502.65 1005.31	25	30	27.5	9580	5870	977	598	2.71 5.43
KRGF3-500H **KRGF3-1000H**	***m*3**	53 106	RF	499.51 999.03	30	35	32	13800	8470	1410	863	3.76 7.53

Catalog No. ● : J Series (Available-on-request)	Module	Effective no. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of mounting holes	Mounting screw size
●**KRGFD1.5-500HJ** ●**KRGFD1.5-1000HJ**	***m*1.5**	106 212	RD	499.51 999.03	15	20	18.5	8	24.76 49.51	150 180	4 6	M5
●**KRGFD2-500HJ** ●**KRGFD2-1000HJ**	***m*2**	80 160	RD	502.65 1005.31	20	25	23	10	26.33 52.65	150 180	4 6	M6
●**KRGFD2.5-500HJ** ●**KRGFD2.5-1000HJ**	***m*2.5**	64 128	RD	502.65 1005.31	25	30	27.5	12	26.33 52.65	150 180	4 6	M8
●**KRGFD3-500HJ** ●**KRGFD3-1000HJ**	***m*3**	53 106	RD	499.51 999.03	30	35	32	14	24.76 49.51	150 180	4 6	M10

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No. ● : J Series (Available-on-request)
6	10	6	3450	2110	352	215	1.07 2.14	●**KRGFD1.5-500HJ** ●**KRGFD1.5-1000HJ**
7	11	7	6130	3750	625	382	1.78 3.58	●**KRGFD2-500HJ** ●**KRGFD2-1000HJ**
8.6	14	9	9580	5870	977	598	2.64 5.31	●**KRGFD2.5-500HJ** ●**KRGFD2.5-1000HJ**
10.8	17.5	11	13800	8470	1410	863	3.63 7.32	●**KRGFD3-500HJ** ●**KRGFD3-1000HJ**

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 mm to 3 mm). Please use wire EDM or other carbide tools to modify the length.

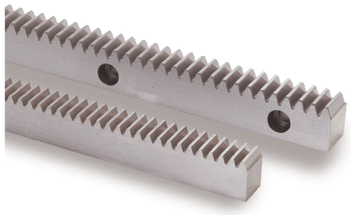
[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes the day ordered), after placing an order. Please allow additional shipping time to get to your local distributor.
② Number of products we can process for one order is 1 to 20 units. For quantities of 21 or more pieces, we need to quote price and lead time.

Recommended Mating Pinions

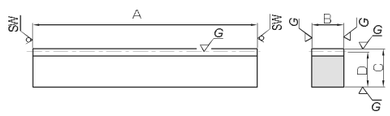
KSG Ground Spur Gears

Please see Page 38 for more details.

Thermal Refined Ground Racks



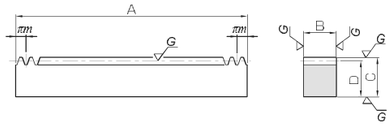
Specifications	
Precision grade	KHK R 001 grade 1
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 ～ 285HB



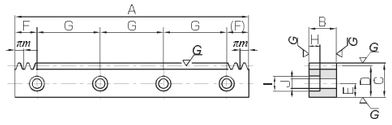
SW: Sawing surface

R1

KRGD



RF



RD

Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
KRG1-100	***m*1**	29	R1	98	10	15	14	1530	641	156	65.3	0.11
KRG1-500		159		505								0.55
KRG1.5-100	***m*1.5**	20	R1	101	15	20	18.5	3450	1440	352	147	0.22
KRG1.5-500		105		505								1.10
KRG2-100	***m*2**	14	R1	98	20	25	23	6130	2560	625	261	0.35
KRG2-500		79		505								1.82
KRG2.5-100	***m*2.5**	11	R1	100	25	30	27.5	9580	4010	977	408	0.54
KRG2.5-500		63		505								2.73
KRG3-100	***m*3**	9	R1	101	30	35	32	13800	5770	1410	588	0.76
KRG3-500		52		505								3.81

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
KRGF1-1000	***m*1**	318	RF	999.03	10	15	14	1530	641	156	65.3	1.49
KRGF1.5-1000	***m*1.5**	212	RF	999.03	15	20	18.5	3450	1440	352	147	2.18
KRGF2-1000	***m*2**	160	RF	1005.31	20	25	23	6130	2560	625	261	3.63
KRGF2.5-1000	***m*2.5**	128	RF	1005.31	25	30	27.5	9580	4010	977	408	5.43
KRGF3-1000	***m*3**	106	RF	999.03	30	35	32	13800	5770	1410	588	7.53

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of mounting holes	Mounting screw size
KRGD1-500	***m*1**	159	RD	499.51	10	15	14	6	39.75	140	4	M4
KRGD1.5-500	***m*1.5**	106	RD	499.51	15	20	18.5	8	39.75	140	4	M5
KRGD2-500	***m*2**	80	RD	502.65	20	25	23	10	41.32	140	4	M6
KRGD2.5-500	***m*2.5**	64	RD	502.65	25	30	27.5	12	41.32	140	4	M8
KRGD3-500	***m*3**	53	RD	499.51	30	35	32	14	39.75	140	4	M10

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No.
5	8	4.5	1530	641	156	65.3	0.54	**KRGD1-500**
6	10	6	3450	1440	352	147	1.06	**KRGD1.5-500**
7	11	7	6130	2560	625	261	1.77	**KRGD2-500**
8.6	14	9	9580	4010	977	408	2.62	**KRGD2.5-500**
10.8	17.5	11	13800	5770	1410	588	3.59	**KRGD3-500**

＊ Ground racks with these specifications: up to Module 10, Total length (A) up to1500 mm, and Heights of (C) 120 mm or less, are also available by request as custom-made products.

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.
③ After attaching the racks to the base, please fasten with dowel pins. Clamping only with mounting screws could possibly cause the screws to be broken, due to a heavy load. For details, please see the assembly method to the mounting base on Page 195.

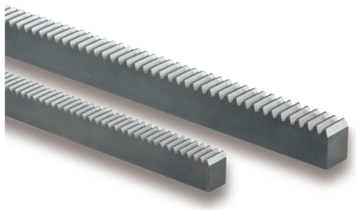
[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.

Recommended Mating Pinions

SSG　Ground Spur Gears

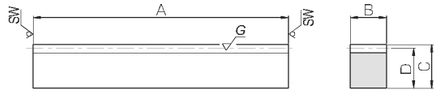
Please see Page 42 for more details.

Hardened Ground Racks J Series



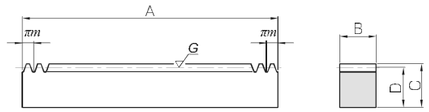
Specifications	
Precision grade	KHK R 001 grade 3 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Tooth surface induction hardened ＊＊
Tooth hardness	50 ～ 60HRC ＊＊＊
Surface treatment	Black oxide coated except for teeth

＊ The precision grade of J Series products is equivalent to the value shown in the table.
＊＊ Tooth surfaces, where the pitch is less than module 0.8, hardness range is 200HB～270HB.
＊＊＊ Due to the decarburization layer of about 0.5 mm thickness, the rectangular surface have (less than HB187) hardness.



SW: Sawing surface

R1



RF

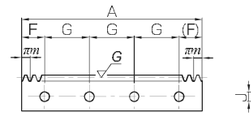
Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SRG0.5-100	***m*0.5**	61	R1	101	5	12	11.5	293	80.5	29.9	8.21	0.046
SRG0.8-100	***m*0.8**	38	R1	101	8	12.3	11.5	751	206	76.6	21.0	0.073
SRG1-100	***m*1**	29	R1	98	10	12	11	862	514	87.9	52.4	0.085
SRG1.5-100	***m*1.5**	20	R1	101	15	20	18.5	2160	1360	220	138	0.22
SRG2-100	***m*2**	14	R1	98	20	25	23	3830	2410	391	246	0.35
SRG2.5-100	***m*2.5**	11	R1	100	25	30	27.5	5990	3770	611	384	0.54
SRG3-100	***m*3**	9	R1	101	30	35	32	8620	5420	879	553	0.76
SRG4-100	***m*4**	6	R1	98	40	45	41	15300	9640	1560	983	1.26
SRG5-110	***m*5**	5	R1	108	50	50	45	24000	15100	2440	1540	1.91
SRG6-110	***m*6**	4	R1	111	60	60	54	34500	21700	3520	2210	2.82

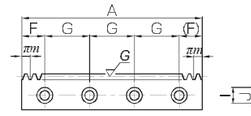
Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SRGF0.5-300	***m*0.5**	191	RF	300.02	5	12	11.5	293	80.5	29.9	8.21	0.14
SRGF0.8-300	***m*0.8**	119	RF	299.08	8	12.3	11.5	751	206	76.6	21.0	0.22
SRGF1-300	***m*1**	96	RF	301.59	10	12	11	862	514	87.9	52.4	0.26
SRGF1-500		159		499.51								0.43
SRGF1.5-500	***m*1.5**	106	RF	499.51	15	20	18.5	2160	1360	220	138	1.09
SRGF1.5-1000		212		999.03								2.18
SRGF2-500	***m*2**	80	RF	502.65	20	25	23	3830	2410	391	246	1.82
SRGF2-1000		160		1005.31								3.63
SRGF2.5-500	***m*2.5**	64	RF	502.65	25	30	27.5	5990	3770	611	384	2.71
SRGF2.5-1000		128		1005.31								5.43
SRGF3-500	***m*3**	53	RF	499.51	30	35	32	8620	5420	879	553	3.76
SRGF3-1000		106		999.03								7.53
SRGF4-500	***m*4**	40	RF	502.65	40	45	41	15300	9640	1560	983	6.47
SRGF4-1000		80		1005.31								12.9
SRGF5-500	***m*5**	32	RF	502.65	50	50	45	24000	15100	2440	1540	8.88
SRGF5-1000		64		1005.31								17.8
SRGF6-500	***m*6**	26	RF	490.09	60	60	54	34500	21700	3520	2210	12.5
SRGF6-1000		53		999.03								25.4

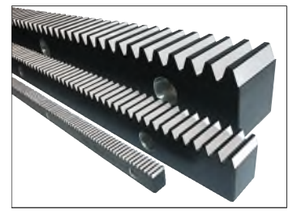
Catalog No. ●: J Series (Available-on-request)	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of mounting holes	Mounting screw size
●**SRGFK0.5-300J**	***m*0.5**	191	RA	300.02	5	12	11.5	5.5	15.01	90	4	M3
●**SRGFK0.8-300J**	***m*0.8**	119	RA	299.08	8	12.3	11.5	5.5	14.54	90	4	M4
●**SRGFK1-300J**	***m*1**	96	RA	301.59	10	12	11	5	20.80	130	3	M4
●**SRGFK1-500J**		159		499.51					24.76	150	4	
●**SRGFD1.5-500J**	***m*1.5**	106	RD	499.51	15	20	18.5	8	24.76	150	4	M5
●**SRGFD1.5-1000J**		212		999.03					49.51	180	6	
●**SRGFD2-500J**	***m*2**	80	RD	502.65	20	25	23	10	26.33	150	4	M6
●**SRGFD2-1000J**		160		1005.31					52.65	180	6	
●**SRGFD2.5-500J**	***m*2.5**	64	RD	502.65	25	30	27.5	12	26.33	150	4	M8
●**SRGFD2.5-1000J**		128		1005.31					52.65	180	6	
●**SRGFD3-500J**	***m*3**	53	RD	499.51	30	35	32	14	24.76	150	4	M10
●**SRGFD3-1000J**		106		999.03					49.51	180	6	
●**SRGFD4-500J**	***m*4**	40	RD	502.65	40	45	41	18	26.33	150	4	M12
●**SRGFD4-1000J**		80		1005.31					52.65	180	6	
●**SRGFD5-500J**	***m*5**	32	RD	502.65	50	50	45	20	31.33	220	3	M14
●**SRGFD5-1000J**		64		1005.31					62.65	220	5	
●**SRGFD6-500J**	***m*6**	26	RD	490.09	60	60	54	23	25.04	220	3	M16
●**SRGFD6-1000J**		53		999.03					59.51	220	5	

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No. ●: J Series (Available-on-request)
—	—	3.4	293	80.5	29.9	8.21	0.13	●**SRGFK0.5-300J**
—	—	4.5	751	206	76.6	21.0	0.21	●**SRGFK0.8-300J**
—	—	4.5	862	514	87.9	52.4	0.26	●**SRGFK1-300J**
—	—						0.43	●**SRGFK1-500J**
6	10	6	2160	1360	220	138	1.07	●**SRGFD1.5-500J**
							2.14	●**SRGFD1.5-1000J**
7	11	7	3830	2410	391	246	1.78	●**SRGFD2-500J**
							3.58	●**SRGFD2-1000J**
8.6	14	9	5990	3770	611	384	2.64	●**SRGFD2.5-500J**
							5.31	●**SRGFD2.5-1000J**
10.8	17.5	11	8620	5420	879	553	3.63	●**SRGFD3-500J**
							7.32	●**SRGFD3-1000J**
13	20	14	15300	9640	1560	983	6.21	●**SRGFD4-500J**
							12.6	●**SRGFD4-1000J**
15.2	23	16	24000	15100	2440	1540	8.56	●**SRGFD5-500J**
							17.2	●**SRGFD5-1000J**
17.5	26	18	34500	21700	3520	2210	12.0	●**SRGFD6-500J**
							24.6	●**SRGFD6-1000J**

J Series — Ground Racks



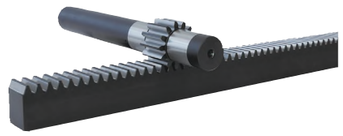




Recommended Mating Pinions

SSG Ground Spur Gears

Please see Page 42 for more details.



SSGS Ground Spur Gears

Please see Page 40 for more details.

＊ Ground racks with these specifications: up to Module 10, Total length (A) up to 1500 mm, and Heights of (C) 120 mm or less, are also available by request as custom-made products.

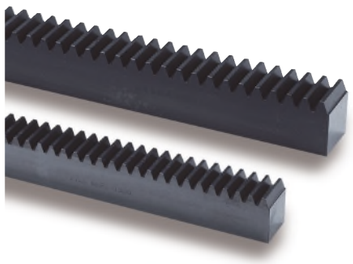
[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

[Caution on Secondary Operations]
①Please read "Caution on Performing Secondary Operations" (Page 194) 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.
②Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 mm to 3 mm). Please use wire EDM or other carbide tools to modify the length.

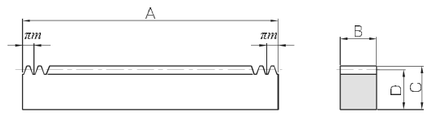
[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes the day ordered), after placing an order. Please allow additional shipping time to get to your local distributor.
② Number of products we can process for one order is 1 to 20 units. For quantities of 21 or more pieces, we need to quote price and lead time.
③ No black oxide is re-applied after adding secondary operation of adding mounting holes.

Hardened Racks

J Series



Specifications	
Precision grade	KHK R 001 grade 5 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, teeth induction hardened
Tooth hardness	50 ～ 60HRC ＊＊
Surface treatment	Black oxide coating



RF

＊ The precision grade of J Series products is equivalent to the value shown in the table.
＊＊ Due to the decarburization layer of about 0.5 mm thickness, the rectangular surface have (less than HB187) hardness.

Catalog No.	Module	No. of teeth	Shape	Total length	Face width	Height	Height to pitch line	Allowable force (N)		Allowable force (kgf)		Weight
				A	B	C	D	Bending strength	Surface durability	Bending strength	Surface durability	(kg)
KRF1.5-1000H	***m*1.5**	212	RF	999.03	15	20	18.5	3140	1710	320	175	2.18
KRF2-1000H	***m*2**	160		1005.31	20	25	23	5570	3090	568	315	3.63
KRF2.5-1000H	***m*2.5**	128		1005.31	25	30	27.5	8710	4890	888	499	5.43
KRF3-1000H	***m*3**	106		999.03	30	35	32	12500	7110	1280	725	7.53
KRF4-1000H	***m*4**	80		1005.31	40	45	41	22300	12900	2270	1310	12.9
KRF5-1000H	***m*5**	64		1005.31	50	50	45	34800	20400	3550	2080	17.8

Catalog No. ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total length	Face width	Height	Height to pitch line	Mounting hole dimensions			No. of mounting holes	Mounting screw size
				A	B	C	D	E	F	G		
●KRFD1.5-1000HJ	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
●KRFD2-1000HJ	***m*2**	160		1005.31	20	25	23	10	52.65	180	6	M6
●KRFD2.5-1000HJ	***m*2.5**	128		1005.31	25	30	27.5	12	52.65	180	6	M8
●KRFD3-1000HJ	***m*3**	106		999.03	30	35	32	14	49.51	180	6	M10
●KRFD4-1000HJ	***m*4**	80		1005.31	40	45	41	18	52.65	180	6	M12
●KRFD5-1000HJ	***m*5**	64		1005.31	50	50	45	20	62.65	220	5	M14

Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Weight	Catalog No.
H	I	J	Bending strength	Surface durability	Bending strength	Surface durability	(kg)	● : J Series (Available-on-request)
6	10	6	3140	1710	320	175	2.14	**●KRFD1.5-1000HJ**
7	11	7	5570	3090	568	315	3.58	**●KRFD2-1000HJ**
8.6	14	9	8710	4890	888	499	5.31	**●KRFD2.5-1000HJ**
10.8	17.5	11	12500	7110	1280	725	7.32	**●KRFD3-1000HJ**
13	20	14	22300	12900	2270	1310	12.6	**●KRFD4-1000HJ**
15.2	23	16	34800	20400	3550	2080	17.2	**●KRFD5-1000HJ**

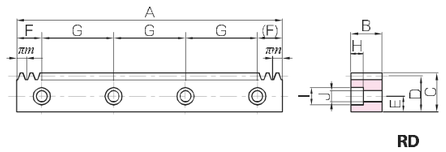
[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 mm to 3 mm). Please use wire EDM or other carbide tools to modify the length.

[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes 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 No black oxide is re-applied after adding secondary operation of adding mounting holes.

J Series

Hardened Racks



RD

Recommended Mating Pinions

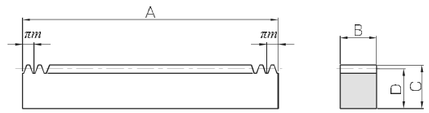
KS-H Hardened Spur Gears

Please see Page 70 for more details.

Hardened Racks

J Series

Specifications	
Precision grade	KHK R 001 grade 5 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Tooth surface induction hardened
Tooth hardness	50 ～ 60HRC ＊＊
Surface treatment	Black oxide coating



RF

＊ The precision grade of J Series products is equivalent to the value shown in the table.
＊＊ Due to the decarburization layer of about 0.5 mm thickness, the rectangular surface have (less than HB187) hardness.

Catalog No.	Module	No. of teeth	Shape	Total length	Face width	Height	Height to pitch line	Allowable force (N)		Allowable force (kgf)		Weight (kg)
				A	B	C	D	Bending strength	Surface durability	Bending strength	Surface durability	
SRF1.5-1000H	***m*1.5**	212	RF	999.03	15	20	18.5	1960	1110	200	113	2.18
SRF2-1000H	***m*2**	160		1005.31	20	25	23	3480	2000	355	204	3.63
SRF2.5-1000H	***m*2.5**	128		1005.31	25	30	27.5	5440	3160	555	322	5.43
SRF3-1000H	***m*3**	106		999.03	30	35	32	7840	4590	799	468	7.53
SRF4-1000H	***m*4**	80		1005.31	40	45	41	13900	8310	1420	847	12.9
SRF5-1000H	***m*5**	64		1005.31	50	50	45	21800	13200	2220	1340	17.8
SRF6-1000H	***m*6**	53		999.03	60	60	54	31400	19200	3200	1960	25.4

Catalog No. ●: J Series (Available-on-request)	Module	No. of teeth	Shape	Total length	Face width	Height	Height to pitch line	Mounting hole dimensions			No. of mounting holes	Mounting screw size
				A	B	C	D	E	F	G		
●**SRFD1.5-1000HJ**	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
●**SRFD2-1000HJ**	***m*2**	160		1005.31	20	25	23	10	52.65	180	6	M6
●**SRFD2.5-1000HJ**	***m*2.5**	128		1005.31	25	30	27.5	12	52.65	180	6	M8
●**SRFD3-1000HJ**	***m*3**	106		999.03	30	35	32	14	49.51	180	6	M10
●**SRFD4-1000HJ**	***m*4**	80		1005.31	40	45	41	18	52.65	180	6	M12
●**SRFD5-1000HJ**	**m5**	64		1005.31	50	50	45	20	62.65	220	5	M14
●**SRFD6-1000HJ**	**m6**	53		999.03	60	60	54	23	59.51	220	5	M16

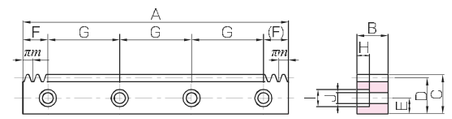
[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 mm to 3 mm). Please use wire EDM or other carbide tools to modify the length.

[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes 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 No black oxide is re-applied after adding secondary operation of adding mounting holes.

J Series

Hardened Racks



RD

Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Weight (kg)	Catalog No. ●: J Series (Available-on-request)
H	I	J	Bending strength	Surface durability	Bending strength	Surface durability		
6	10	6	1960	1110	200	113	2.14	●**SRFD1.5-1000HJ**
7	11	7	3480	2000	355	204	3.58	●**SRFD2-1000HJ**
8.6	14	9	5440	3160	555	322	5.31	●**SRFD2.5-1000HJ**
10.8	17.5	11	7840	4590	799	468	7.32	●**SRFD3-1000HJ**
13	20	14	13900	8310	1420	847	12.6	●**SRFD4-1000HJ**
15.2	23	16	21800	13200	2220	1340	17.2	●**SRFD5-1000HJ**
17.5	26	18	31400	19200	3200	1960	24.6	●**SRFD6-1000HJ**

Recommended Mating Pinions

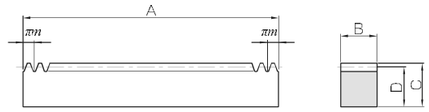
SS-H Hardened Spur Gears

Please see Page 78 for more details.

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

Laser Hardened Racks J Series

Specifications	
Precision grade	KHK R 001 Grade 4 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth laser hardened
Tooth hardness	55～65HRC ＊＊
Surface treatment	Black oxide coating



RF

＊ The precision grade of these products is equivalent to the value shown in the table.
＊＊ Due to the decarburization layer of about 0.5 mm thickness, the rectangular surface have (less than HB187) hardness.

Catalog No.	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SRF1.5-1000HL	***m*1.5**	212	RF	999.03	15	20	18.5	2160	961	220	98.0	2.18
SRF1.5-1500HL		320		1507.96								3.28
SRF1.5-2000HL		435		2049.88								4.47
SRF2-1000HL	***m*2**	160		1005.31	20	25	23	3830	1730	391	177	3.63
SRF2-1500HL		240		1507.96								5.45
SRF2-2000HL		326		2048.31								7.40
SRF2.5-1000HL	***m*2.5**	128		1005.31	25	30	27.5	5990	2740	611	280	5.43
SRF2.5-1500HL		192		1507.96								8.14
SRF2.5-2000HL		261		2049.88								11.1
SRF3-1000HL	***m*3**	106		999.03	30	35	32	8620	3990	879	407	7.53
SRF3-1500HL		160		1507.96								11.4
SRF3-2000HL		217		2045.17								15.4
SRF4-1000HL	***m*4**	80		1005.31	40	45	41	15300	7220	1560	736	12.9
SRF4-1500HL		120		1507.96								19.4
SRF4-2000HL		163		2048.31								26.4
SRF5-1000HL	***m*5**	64		1005.31	50	50	45	24000	11400	2440	1170	17.8
SRF5-1500HL		96		1507.96								26.6
SRF5-2000HL		130		2042.04								36.1
SRF6-1000HL	***m*6**	53		999.03	60	60	54	34500	16700	3520	1700	25.4
SRF6-1500HL		80		1507.96								38.4
SRF6-2000HL		108		2035.75								51.8

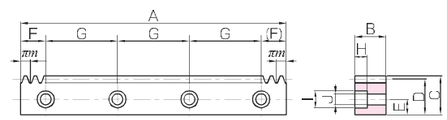
Catalog No. ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of holes	Screw size
●**SRFD1.5-1000HLJ**	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
●**SRFD1.5-1500HLJ**		320		1507.96					33.98	180	9	
●**SRFD1.5-2000HLJ**		435		2049.88					34.94	180	12	
●**SRFD2-1000HLJ**	***m*2**	160		1005.31	20	25	23	10	52.65	180	6	M6
●**SRFD2-1500HLJ**		240		1507.96					33.98	180	9	
●**SRFD2-2000HLJ**		326		2048.31					34.15	180	12	
●**SRFD2.5-1000HLJ**	***m*2.5**	128		1005.31	25	30	27.5	12	52.65	180	6	M8
●**SRFD2.5-1500HLJ**		192		1507.96					33.98	180	9	
●**SRFD2.5-2000HLJ**		261		2049.88					34.94	180	12	
●**SRFD3-1000HLJ**	***m*3**	106		999.03	30	35	32	14	49.51	180	6	M10
●**SRFD3-1500HLJ**		160		1507.96					33.98	180	9	
●**SRFD3-2000HLJ**		217		2045.17					32.58	180	12	
●**SRFD4-1000HLJ**	***m*4**	80		1005.31	40	45	41	18	52.65	180	6	M12
●**SRFD4-1500HLJ**		120		1507.96					33.98	180	9	
●**SRFD4-2000HLJ**		163		2048.31					34.15	180	12	
●**SRFD5-1000HLJ**	***m*5**	64		1005.31	50	50	45	20	62.65	220	5	M14
●**SRFD5-1500HLJ**		96		1507.96					93.98	220	7	
●**SRFD5-2000HLJ**		130		2042.04					31.02	220	10	
●**SRFD6-1000HLJ**	***m*6**	53		999.03	60	60	54	23	59.51	220	5	M16
●**SRFD6-1500HLJ**		80		1507.96					93.98	220	7	
●**SRFD6-2000HLJ**		108		2035.75					27.88	220	10	

[Caution on Product Characteristics]
① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

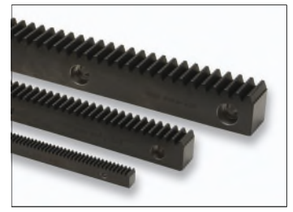
[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being laser hardened, no secondary operations can be performed on tooth areas. Please use wire EDM or other carbide tools to modify the length.

J Series

Hardened Racks



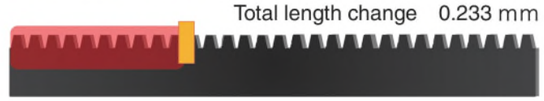
RD



＊Total length change just 1/12 compared to induction hardening! These hardened racks have minimal deformation due to heat treatment.

Laser hardened total length change

With induction hardening



With laser hardening

＊ This is a measurement of the total length change (cumulative pitch) when induction hardening and laser hardening are applied to SRF3-1000.

Recommended Mating Pinions

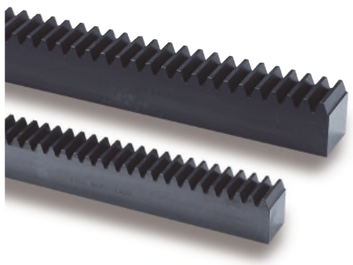
SS-H Hardened Spur Gears

Please see Page 78 for more details.

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No. ● : J Series (Available-on-request)
6	10	6	2160	961	220	98.0	2.14	●**SRFD1.5-1000HLJ**
							3.23	●**SRFD1.5-1500HLJ**
							4.40	●**SRFD1.5-2000HLJ**
7	11	7	3830	1730	391	177	3.58	●**SRFD2-1000HLJ**
							5.36	●**SRFD2-1500HLJ**
							7.29	●**SRFD2-2000HLJ**
8.6	14	9	5990	2740	611	280	5.31	●**SRFD2.5-1000HLJ**
							7.97	●**SRFD2.5-1500HLJ**
							10.8	●**SRFD2.5-2000HLJ**
10.8	17.5	11	8620	3990	879	407	7.32	●**SRFD3-1000HLJ**
							11.1	●**SRFD3-1500HLJ**
							15.0	●**SRFD3-2000HLJ**
13	20	14	15300	7220	1560	736	12.6	●**SRFD4-1000HLJ**
							18.8	●**SRFD4-1500HLJ**
							25.6	●**SRFD4-2000HLJ**
15.2	23	16	24000	11400	2440	1170	17.2	●**SRFD5-1000HLJ**
							25.9	●**SRFD5-1500HLJ**
							35.0	●**SRFD5-2000HLJ**
17.5	26	18	34500	16700	3520	1700	24.6	●**SRFD6-1000HLJ**
							37.2	●**SRFD6-1500HLJ**
							50.2	●**SRFD6-2000HLJ**

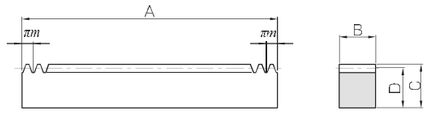
[Caution on J Series]
① As available-on-request products, these require a lead-time for shipping within 2 working days (excludes the day ordered) after placing an order.
② Number of products we can process for one order is 1 to 20 units. For quantities of 21 or more pieces, we need to quote price and lead time.
③ No black oxide is re-applied after adding secondary operation of adding mounting holes.

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



Specifications	
Precision grade	KHK R 001 grade 4 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 ~ 285HB ＊＊
Surface treatment	Black oxide coating

＊ The precision grade of these products is equivalent to the value shown in the table.
＊＊ Due to the decarburization layer of about 0.5 mm thickness, the rectangular surface have (less than HB187) hardness.



RF

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
KRF1.5-500 **KRF1.5-1000**	***m*1.5**	106 212	RF	499.51 999.03	15	20	18.5	3450	953	352	97.2	1.09 2.18
KRF2-500 **KRF2-1000**	***m*2**	80 160	RF	502.65 1005.31	20	25	23	6130	1760	625	179	1.82 3.63
KRF2.5-500 **KRF2.5-1000**	***m*2.5**	64 128	RF	502.65 1005.31	25	30	27.5	9580	2810	977	287	2.71 5.43
KRF3-500 **KRF3-1000**	***m*3**	53 106	RF	499.51 999.03	30	35	32	13800	4120	1410	421	3.76 7.53
KRF4-500 **KRF4-1000**	***m*4**	40 80	RF	502.65 1005.31	40	45	41	24500	7530	2500	768	6.47 12.9
KRF5-500 **KRF5-1000**	***m*5**	32 64	RF	502.65 1005.31	50	50	45	38300	12000	3910	1220	8.88 17.8

Catalog No. ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	Mounting hole dimensions F	Mounting hole dimensions G	No. of mounting holes	Mounting screw size
●**KRFD1.5-500J** ●**KRFD1.5-1000J**	***m*1.5**	106 212	RD	499.51 999.03	15	20	18.5	8	24.76 49.51	150 180	4 6	M5
●**KRFD2-500J** ●**KRFD2-1000J**	***m*2**	80 160		502.65 1005.31	20	25	23	10	26.33 52.65	150 180	4 6	M6
●**KRFD2.5-500J** ●**KRFD2.5-1000J**	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	12	26.33 52.65	150 180	4 6	M8
●**KRFD3-500J** ●**KRFD3-1000J**	***m*3**	53 106		499.51 999.03	30	35	32	14	24.76 49.51	150 180	4 6	M10
●**KRFD4-500J** ●**KRFD4-1000J**	***m*4**	40 80		502.65 1005.31	40	45	41	18	26.33 52.65	150 180	4 6	M12
●**KRFD5-500J** ●**KRFD5-1000J**	***m*5**	32 64		502.65 1005.31	50	50	45	20	31.33 62.65	220	3 5	M14

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No. ● : J Series (Available-on-request)
6	10	6	3450	953	352	97.2	1.07 2.14	●**KRFD1.5-500J** ●**KRFD1.5-1000J**
7	11	7	6130	1760	625	179	1.78 3.58	●**KRFD2-500J** ●**KRFD2-1000J**
8.6	14	9	9580	2810	977	287	2.64 5.31	●**KRFD2.5-500J** ●**KRFD2.5-1000J**
10.8	17.5	11	13800	4120	1410	421	3.63 7.32	●**KRFD3-500J** ●**KRFD3-1000J**
13	20	14	24500	7530	2500	768	6.21 12.6	●**KRFD4-500J** ●**KRFD4-1000J**
15.2	23	16	38300	12000	3910	1220	8.56 17.2	●**KRFD5-500J** ●**KRFD5-1000J**

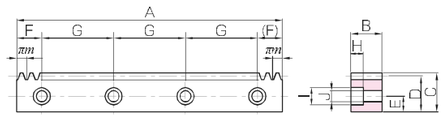
[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 If gear tooth hardening, or thermal refining, is applied, the decarburization layer (approx. 0.5 mm thickness) on the rectangular surfaces cannot have the hardness you designate.

[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes 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 No black oxide is re-applied after adding secondary operation of adding mounting holes.

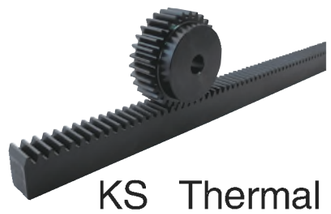
J Series

Thermal Refined Racks



RD

Recommended Mating Pinions

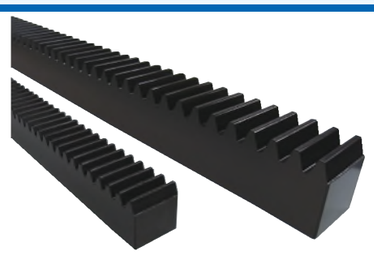


KS Thermal Refined Steel Spur Gears

Please see Page 70 for more details.

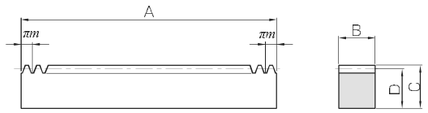
You can download CAD data (DXF format) of KHK Products from the Web Catalog.

[EU Specification] Racks J Series



Specifications	
Precision grade	KHK R 001 grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 95HRB)
Surface treatment	Black oxide coating

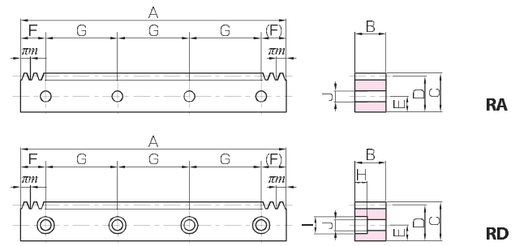
*The precision grade of J Series products is equivalent to the value shown in the table.



RF

J Series

Racks with Bolt Holes



RA

RD

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SRAF1.5-1000	***m*1.5**	212	RF	999.03	15	15	13.5	2160	421	220	42.9	1.59
SRAF2-1000	***m*2**	160		1005.31	20	20	18	3830	775	391	79.0	2.84
SRAF2.5-1000	***m*2.5**	128		1005.31	25	25	22.5	5990	1240	611	127	4.44
SRAF3-1000	***m*3**	106		999.03	30	30	27	8620	1820	879	186	6.35
SRAF4-1000	***m*4**	80		1005.31	40	40	36	15300	3330	1560	339	11.4
SRAF1.5-2000	***m*1.5**	435		2049.88	17	17	15.5	2443	421	249	43	4.24
SRAF2-2000	***m*2**	326		2048.31	20	20	18	3833	775	391	79	5.79
SRAF2.5-2000	***m*2.5**	261		2049.88	25	25	22.5	5989	1241	611	127	9.05
SRAF3-2000	***m*3**	217		2045.17	30	30	27	8624	1821	879	186	13.0

Catalog No. ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of mounting holes	Mounting screw size	Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No. ● : J Series (Available-on-request)
●**SRAFK1.5-1000J**	***m*1.5**	212	RA	999.03	15	15	13.5	5	49.51			M5	—	—	6	2160	421	220	42.9	1.57	●**SRAFK1.5-1000J**
●**SRAFD2-1000J**	***m*2**	160	RD	1005.31	20	20	18	7	52.65			M6	7	11	7	3830	775	391	79.0	2.79	●**SRAFD2-1000J**
●**SRAFD2.5-1000J**	***m*2.5**	128	RD	1005.31	25	25	22.5	9	52.65	180	6	M8	8.6	14	9	5990	1240	611	127	4.33	●**SRAFD2.5-1000J**
●**SRAFD3-1000J**	***m*3**	106	RD	999.03	30	30	27	11	49.51			M10	10.8	17.5	11	8620	1820	879	186	6.14	●**SRAFD3-1000J**
●**SRAFD4-1000J**	***m*4**	80	RD	1005.31	40	40	36	15	52.65			M12	13	20	14	15300	3330	1560	339	11.0	●**SRAFD4-1000J**

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 If gear tooth hardening, or thermal refining, is applied, the decarburization layer (approx. 0.5 mm thickness) on the rectangular surfaces cannot have the hardness you designate.

[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes 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 No black oxide is re-applied after adding secondary operation of adding mounting holes.

Recommended Mating Pinions

SS Steel Spur Gears

Please see Page 74 for more details.

SR Steel Racks

Racks

Specifications	
Precision grade	KHK R 001 grade 4
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 95HRB)
Surface treatment	Black oxide coating

SW: Sawing surface

R1

Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SR0.5-100	***m*0.5**	62	R1	101	5	12	11.5	240	39.6	24.4	4.04	0.046
SR0.8-100	***m*0.8**	38	R1	101	8	12.3	11.5	613	108	62.5	11.0	0.073
SR1-100	***m*1**	29	R1	98	10	12	11	958	177	97.7	18.0	0.085
SR1-300		94		303								0.26
SR1-500		159		505								0.44
SR1.5-100	***m*1.5**	20	R1	101	15	20	18.5	2160	421	220	42.9	0.22
SR1.5-300		62		303								0.66
SR1.5-500		105		505								1.10
SR2-100	***m*2**	14	R1	98	20	25	23	3830	775	391	79.0	0.35
SR2-300		46		303								1.09
SR2-500		79		505								1.82
SR2.5-100	***m*2.5**	11	R1	100	25	30	27.5	5990	1240	611	127	0.54
SR2.5-300		37		303								1.64
SR2.5-500		63		505								2.73
SR3-100	***m*3**	9	R1	101	30	35	32	8620	1820	879	186	0.76
SR3-300		30		303								2.28
SR3-500		52		505								3.81
SR4-100	***m*4**	6	R1	98	40	45	41	15300	3330	1560	339	1.26
SR4-500		39		505								6.50
SR5-110	***m*5**	5	R1	108	50	50	45	24000	5300	2440	540	1.91
SR5-500		31		505								8.92
SR6-110	***m*6**	4	R1	111	60	60	54	34500	7740	3520	789	2.82
SR6-500		25		505								12.8
SR8-130	***m*8**	3	R1	123	75	75	67	44200	10400	4510	1060	4.85
SR10-160	***m*10**	3	R1	155	90	80	70	66300	16100	6770	1640	7.67

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 If gear tooth hardening, or thermal refining, is applied, the decarburization layer (approx. 0.5 mm thickness) on the rectangular surfaces cannot have the hardness you designate.

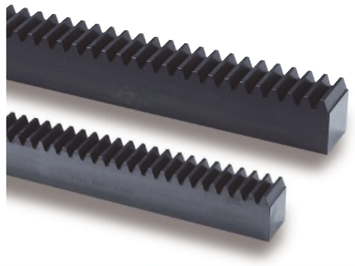
Recommended Mating Pinions

SS Steel Spur Gears

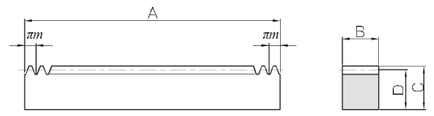
Please see Page 74 for more details.

SRF Steel Racks with Machined Ends

Racks with Machined Ends



Specifications	
Precision grade	KHK R 001 grade 4
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 95HRB)
Surface treatment	Black oxide coating



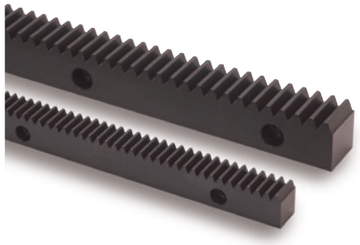
RF

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SRF0.5-300	***m*0.5**	191	RF	300.02	5	12	11.5	240	39.6	24.4	4.04	0.14
SRF0.8-300	***m*0.8**	119	RF	299.08	8	12.3	11.5	613	108	62.5	11.0	0.22
SRF1-300	***m*1**	96	RF	301.59	10	12	11	958	177	97.7	18.0	0.26
SRF1-500		159		499.51								0.43
SRF1-1000		318		999.03								0.86
SRF1.5-300	***m*1.5**	64	RF	301.59	15	20	18.5	2160	421	220	42.9	0.66
SRF1.5-500		106		499.51								1.09
SRF1.5-1000		212		999.03								2.18
SRF1.5-1500		320		1507.96								3.28
SRF1.5-2000		435		2049.88								4.47
SRF2-300	***m*2**	48	RF	301.59	20	25	23	3830	775	391	79.0	1.09
SRF2-500		80		502.65								1.82
SRF2-1000		160		1005.31								3.63
SRF2-1500		240		1507.96								5.45
SRF2-2000		326		2048.31								7.40
SRF2.5-300	***m*2.5**	38	RF	298.45	25	30	27.5	5990	1240	611	127	1.61
SRF2.5-500		64		502.65								2.71
SRF2.5-1000		128		1005.31								5.43
SRF2.5-1500		192		1507.96								8.14
SRF2.5-2000		261		2049.88								11.1
SRF3-300	***m*3**	32	RF	301.59	30	35	32	8620	1820	879	186	2.27
SRF3-500		53		499.51								3.76
SRF3-1000		106		999.03								7.53
SRF3-1500		160		1507.96								11.4
SRF3-2000		217		2045.17								15.4
SRF4-500	***m*4**	40	RF	502.65	40	45	41	15300	3330	1560	339	6.47
SRF4-1000		80		1005.31								12.9
SRF4-1500		120		1507.96								19.4
SRF4-2000		163		2048.31								26.4
SRF5-500	***m*5**	32	RF	502.65	50	50	45	24000	5300	2440	540	8.88
SRF5-1000		64		1005.31								17.8
SRF5-1500		96		1507.96								26.6
SRF5-2000		130		2042.04								36.1
SRF6-500	***m*6**	26	RF	490.09	60	60	54	34500	7740	3520	789	12.5
SRF6-1000		53		999.03								25.4
SRF6-1500		80		1507.96								38.4
SRF6-2000		108		2035.75								51.8
SRF8-500	***m*8**	20	RF	502.66	75	75	67	44200	10400	4510	1060	19.8
SRF8-1000		40		1005.31								39.7
SRF10-1000	***m*10**	32	RF	1005.31	90	80	70	66300	16100	6770	1640	49.7

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

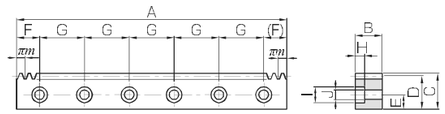
[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.
② If gear tooth hardening, or thermal refining, is applied, the decarburization layer (approx. 0.5 mm thickness) on the rectangular surfaces cannot have the hardness you designate.

Steel Racks with Bolt Holes J Series



Specifications	
Precision grade	KHK R 001 grade 4 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 95HRB)
Surface treatment	Black oxide coating

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



RD

Catalog No. ●: J Series (Available-on-request)	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of mounting holes	Mounting screw size
●SRFK0.5-300J	*m*0.5	191	RA	300.02	5	12	11.5	5.5	15.01	90	4	M3
●SRFK0.8-300J	*m*0.8	119	RA	299.08	8	12.3	11.5	5.5	14.54	90	4	M4
●SRFK1-300J	*m*1	96	RA	301.59	10	12	11	5	20.80	130	3	M4
●SRFK1-500J		159		499.51					24.76	150	4	
●SRFD1.5-300J		64	RD	301.59					20.80	130	3	
●SRFD1.5-500J		106	RD	499.51					24.76	150	4	
SRFD1.5-1000	*m*1.5	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
SRFD1.5-1500		320	RD	1507.96					33.98	180	9	
SRFD1.5-2000		435	RD	2049.88					34.94	180	12	
●SRFD2-300J		48	RD	301.59					20.80	130	3	
●SRFD2-500J		80	RD	502.65					26.33	150	4	
SRFD2-1000	*m*2	160	RD	1005.31	20	25	23	10	52.65	180	6	M6
SRFD2-1500		240	RD	1507.96					33.98	180	9	
SRFD2-2000		326	RD	2048.31					34.15	180	12	
●SRFD2.5-300J		38	RD	298.45					19.23	130	3	
●SRFD2.5-500J		64	RD	502.65					26.33	150	4	
SRFD2.5-1000	*m*2.5	128	RD	1005.31	25	30	27.5	12	52.65	180	6	M8
SRFD2.5-1500		192	RD	1507.96					33.98	180	9	
SRFD2.5-2000		261	RD	2049.88					34.94	180	12	
●SRFD3-300J		32	RD	301.59					20.80	130	3	
●SRFD3-500J		53	RD	499.51					24.76	150	4	
SRFD3-1000	*m*3	106	RD	999.03	30	35	32	14	49.51	180	6	M10
SRFD3-1500		160	RD	1507.96					33.98	180	9	
SRFD3-2000		217	RD	2045.17					32.58	180	12	
●SRFD4-500J		40	RD	502.65					26.33	150	4	
SRFD4-1000	*m*4	80	RD	1005.31	40	45	41	18	52.65	180	6	M12
SRFD4-1500		120	RD	1507.96					33.98	180	9	
SRFD4-2000		163	RD	2048.31					34.15	180	12	
●SRFD5-500J		32	RD	502.65					31.33	220	3	
SRFD5-1000	*m*5	64	RD	1005.31	50	50	45	20	62.65	220	5	M14
SRFD5-1500		96	RD	1507.96					93.98	220	7	
SRFD5-2000		130	RD	2042.04					31.02	220	10	
●SRFD6-500J		26	RD	490.09					25.04	220	3	
SRFD6-1000	*m*6	53	RD	999.03	60	60	54	23	59.51	220	5	M16
SRFD6-1500		80	RD	1507.96					93.98	220	7	
SRFD6-2000		108	RD	2035.75					27.88	220	10	

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Surface durability	Allowable force (kgf) Bending strength	Surface durability	Weight (kg)	Catalog No. ●: J Series (Available-on-request)
—	—	3.4	240	39.6	24.4	4.04	0.13	●SRFK0.5-300J
—	—	4.5	613	108	62.5	11.0	0.21	●SRFK0.8-300J
—	—	4.5	958	177	97.7	18.0	0.26	●SRFK1-300J
—	—						0.43	●SRFK1-500J
6	10	6	2160	421	220	42.9	0.64	●SRFD1.5-300J
							1.07	●SRFD1.5-500J
							2.14	SRFD1.5-1000
							3.23	SRFD1.5-1500
							4.40	SRFD1.5-2000
7	11	7	3830	775	391	79.0	1.06	●SRFD2-300J
							1.78	●SRFD2-500J
							3.58	SRFD2-1000
							5.36	SRFD2-1500
							7.29	SRFD2-2000
8.6	14	9	5990	1240	611	127	1.55	●SRFD2.5-300J
							2.64	●SRFD2.5-500J
							5.31	SRFD2.5-1000
							7.97	SRFD2.5-1500
							10.8	SRFD2.5-2000
10.8	17.5	11	8620	1820	879	186	2.17	●SRFD3-300J
							3.63	●SRFD3-500J
							7.32	SRFD3-1000
							11.1	SRFD3-1500
							15.0	SRFD3-2000
13	20	14	15300	3330	1560	339	6.21	●SRFD4-500J
							12.6	SRFD4-1000
							18.8	SRFD4-1500
							25.6	SRFD4-2000
15.2	23	16	24000	5300	2440	540	8.56	●SRFD5-500J
							17.2	SRFD5-1000
							25.9	SRFD5-1500
							35.0	SRFD5-2000
17.5	26	18	34500	7740	3520	789	12.0	●SRFD6-500J
							24.6	SRFD6-1000
							37.2	SRFD6-1500
							50.2	SRFD6-2000

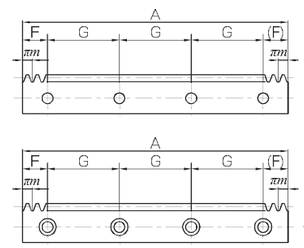
[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.
③ After attaching the racks to the base, please fasten with dowel pins. Clamping only with mounting screws could possibly cause the screws to be broken, due to the heavy load. For details, please see the assembly method to the mounting base on Page 197.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 Avoid hardening Racks with bolt holes, due to deformation occurring at the mounting hole and the difficulty of straightening the rack after hardeneing.

[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes the day ordered), after placing an order. Please allow additional shipping time to get to your local distributor.
② Number of products we handle for one order is 1 to 20 pieces. For quantities of 21 pieces or more, we need to quote price and lead time.
③ Black oxide is NOT is re-applied after the secondary operation of adding mounting holes.

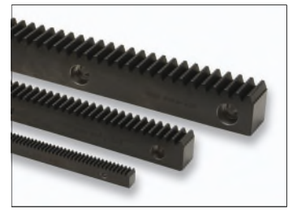
J Series

Racks with Bolt Holes



RA

RD



Recommended Mating Pinions

SS Steel Spur Gears

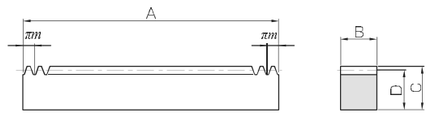
Please see Page 74 for more details.

SUR • SURF • SURFD
Stainless Steel Racks

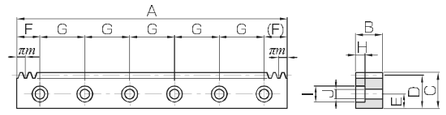
Specifications	
Precision grade	KHK R 001 grade 5
Gear teeth	Standard full depth
Pressure angle	20°
Material	SUS304
Heat treatment	Solution heat treatment
Tooth hardness	(less than 187HB)

SW: Sawing surface

R1



RF



RD

Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SUR1-500	***m*1**	159	R1	505	10	12	11	457	99.4	46.6	10.1	0.43
SUR1.5-500 **SUR1.5-1000**	***m*1.5**	105 212	R1	505 1010	15	20	18.5	1030	237	105	24.2	1.09 2.19
SUR2-500 **SUR2-1000**	***m*2**	79 159	R1	505 1010	20	25	23	1830	436	187	44.5	1.81 3.63
SUR2.5-500 **SUR2.5-1000**	***m*2.5**	63 127	R1	505 1010	25	30	27.5	2860	698	292	71.2	2.71 5.42
SUR3-500 **SUR3-1000**	***m*3**	52 105	R1	505 1010	30	35	32	4120	1030	420	105	3.79 7.57
SUR4-500 **SUR4-1000**	***m*4**	39 79	R1	505 1010	40	45	41	7320	1870	746	191	6.47 12.9

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SURF1.5-1000	***m*1.5**	212	RF	999.03	15	20	18.5	1030	237	105	24.2	2.17
SURF2-1000	***m*2**	160	RF	1005.31	20	25	23	1830	436	187	44.5	3.61
SURF2.5-1000	***m*2.5**	128	RF	1005.31	25	30	27.5	2860	698	292	71.2	5.40
SURF3-1000	***m*3**	106	RF	999.03	30	35	32	4120	1030	420	105	7.49
SURF4-1000	***m*4**	80	RF	1005.31	40	45	41	7320	1870	746	191	12.9

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of mounting holes	Mounting screw size
SURFD1.5-1000	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
SURFD2-1000	***m*2**	160	RD	1005.31	20	25	23	10	52.65	180	6	M6
SURFD2.5-1000	***m*2.5**	128	RD	1005.31	25	30	27.5	12	52.65	180	6	M8
SURFD3-1000	***m*3**	106	RD	999.03	30	35	32	14	49.51	180	6	M10
SURFD4-1000	***m*4**	80	RD	1005.31	40	45	41	18	52.65	180	6	M12

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No.
6	10	6	1030	237	105	24.2	2.13	**SURFD1.5-1000**
7	11	7	1830	436	187	44.5	3.56	**SURFD2-1000**
8.6	14	9	2860	698	292	71.2	5.29	**SURFD2.5-1000**
10.8	17.5	11	4120	1030	420	105	7.28	**SURFD3-1000**
13	20	14	7320	1870	746	191	12.5	**SURFD4-1000**

[Caution on Product Characteristics]

① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.

② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

③ For products made of stainless steel, heat treatment* and passivation ** solutions are applied. Passivation is a rust-resistance treatment, but it is not effective on the machined surface and not a totally rustproof solution.

* Heat Treatment Solution
Heat treatment by the carbon formed on the surface during blank manufacturing is made to infiltrate the material interior.

** Passivation
Immersion of the metal in a nitric acid solution to make it more rust-resistant.

④ After attaching the racks to the base, please fasten with dowel pins. Clamping only with mounting screws could possibly cause the screws to be broken, due to a heavy load.

[Caution on Secondary Operations]

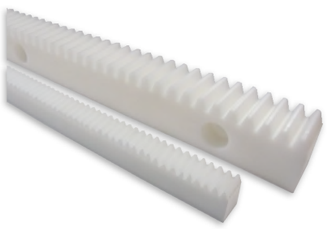
① Please read "Caution on Performing Secondary Operations" (Page 194) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.

Recommended Mating Pinions

SUS・SUSA　Stainless Steel Spur Gears

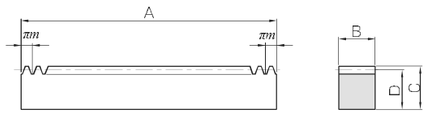
Please see Page 126 for more details.

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



Specifications	
Precision grade	KHK R 001 grade 5 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	Polyacetal
Heat treatment	—
Tooth hardness	(115 ～ 120HRR)

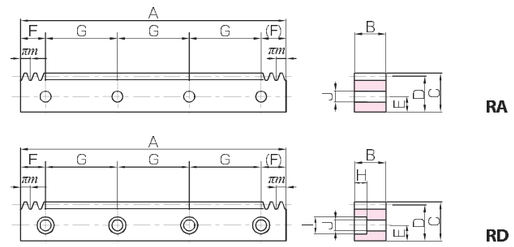
＊ The precision grade of J Series products is equivalent to the value shown in the table.



RF

J Series

Plastic Racks



Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (kgf) Bending strength	Weight (kg)
DRF1-500	***m*1**	159	RF	499.51	10	12	11	80.7	8.23	0.077
DRF1.5-500 **DRF1.5-1000**	***m*1.5**	106 212		499.51 999.03	15	20	18.5	182	18.5	0.20 0.39
DRF2-500 **DRF2-1000**	***m*2**	80 160		502.65 1005.31	20	25	23	323	32.9	0.33 0.65
DRF2.5-500 **DRF2.5-1000**	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	504	51.4	0.49 0.98
DRF3-500 **DRF3-1000**	***m*3**	53 106		499.51 999.03	30	35	32	726	74.1	0.68 1.35

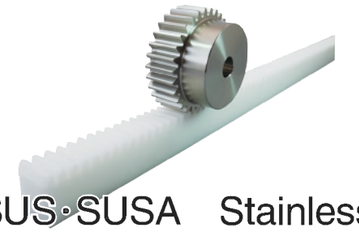
Catalog No. ●: J Series (Available-on-request)	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of mounting holes	Mounting screw size	Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (kgf) Bending strength	Weight (kg)	Catalog No. ●: J Series (Available-on-request)
●**DRFK1-500J**	***m*1**	159	RA	499.51	10	12	11	5	24.76	150	4	M4	—	—	4.5	80.7	8.23	0.077	●**DRFK1-500J**
●**DRFD1.5-500J** ●**DRFD1.5-1000J**	***m*1.5**	106 212		499.51 999.03	15	20	18.5	8	24.76 49.51	150 180	4 6	M5	6	10	6	182	18.5	0.19 0.38	●**DRFD1.5-500J** ●**DRFD1.5-1000J**
●**DRFD2-500J** ●**DRFD2-1000J**	***m*2**	80 160	RD	502.65 1005.31	20	25	23	10	26.33 52.65	150 180	4 6	M6	7	11	7	323	32.9	0.32 0.64	●**DRFD2-500J** ●**DRFD2-1000J**
●**DRFD2.5-500J** ●**DRFD2.5-1000J**	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	12	26.33 52.65	150 180	4 6	M8	8.6	14	9	504	51.4	0.47 0.95	●**DRFD2.5-500J** ●**DRFD2.5-1000J**
●**DRFD3-500J** ●**DRFD3-1000J**	***m*3**	53 106		499.51 999.03	30	35	32	14	24.76 49.51	150 180	4 6	M10	10.8	17.5	11	726	74.1	0.65 1.31	●**DRFD3-500J** ●**DRFD3-1000J**

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.
③ When using this product for food machines, sterilization is not necessary. POM resin meets the standards of Food and Drug Administration (FDA) under the food sanitation laws in USA. Care should be taken as it may be destroyed by boiling or steaming

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 Plastic gears are susceptible to the effects of temperature and moisture. Dimensional changes may occur while performing secondary operations and during post-machining operations. It is recommended to modify mounting holes and the attaching portions at the same time when stringing racks together.

[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes the day ordered), after placing an order. Please allow additional shipping time to get to your local distributor.
② Number of products we handle for one order is 1 to 20 pieces. For quantities of 21 pieces or more, we need to quote price and lead time.

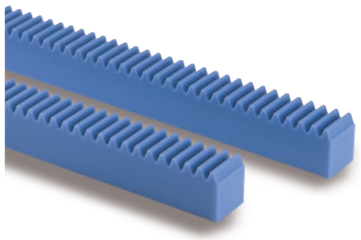
Recommended Mating Pinions



SUS·SUSA　Stainless Steel Spur Gears

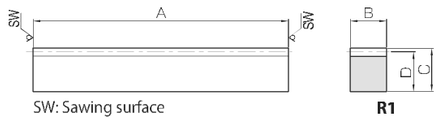
Please see Page 126 for more details.

Plastic Racks



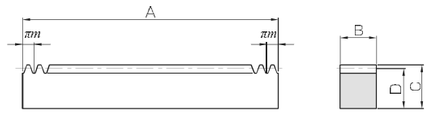
Specifications	
Precision grade	KHK R 001 grade 5 ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	MC901
Heat treatment	—
Tooth hardness	(115 ～ 120HRR)

＊ The precision grade of this product is equivalent to the value shown in the table.



SW: Sawing surface

R1



RF

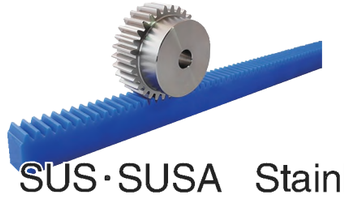
Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (kgf) Bending strength	Weight (kg)
PR1-500	***m*1**	159	R1	505	10	12	11	92.8	9.46	0.064
PR1.5-500	***m*1.5**	105	R1	505	15	20	18.5	209	21.3	0.16
PR1.5-1000		212		1010						0.33
PR2-500	***m*2**	79	R1	505	20	25	23	371	37.9	0.27
PR2-1000		159		1010						0.54
PR2.5-500	***m*2.5**	63	R1	505	25	30	27.5	580	59.2	0.40
PR2.5-1000		127		1010						0.81
PR3-500	***m*3**	52	R1	505	30	35	32	835	85.2	0.56
PR3-1000		105		1010						1.12

Catalog No.	Module	No. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (kgf) Bending strength	Weight (kg)
PRF1.5-1000	***m*1.5**	212	RF	999.03	15	20	18.5	209	21.3	0.32
PRF2-1000	***m*2**	160	RF	1005.31	20	25	23	371	37.9	0.54
PRF2.5-1000	***m*2.5**	128	RF	1005.31	25	30	27.5	580	59.2	0.80
PRF3-1000	***m*3**	106	RF	999.03	30	35	32	835	85.2	1.11

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.
③ Dimensions of Plastic Racks vary due to temperature and humidity. A 10° C rise in the ambient temperature will cause 0.45 mm increase in the length per 1000 mm. A 2% moisture absorption will cause approx. 5 mm increase in the length per 1000 mm. Please see the section "Design of Plastic Gears" in separate technical reference book. (Page 101).
④ The straightness deviation of Plastic Racks is less than 5mm per meter. However, for Plastic Racks with the total length of 1000 mm, the value may exceed 5 mm due to age deterioration. You may correct this error by using the bottom surface as the reference when attaching the racks.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 Plastic gears are susceptible to the effects of temperature and moisture. Dimensional changes may occur while performing secondary operations and during post-machining operations. It is recommended to modify mounting holes and the attaching portions at the same time when stringing racks together.

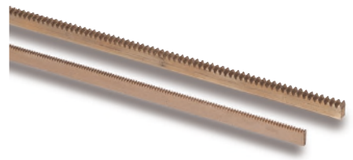
Recommended Mating Pinions



SUS・SUSA　Stainless Steel Spur Gears

Please see Page 126 for more details.

Brass Racks



Specifications	
Precision grade	KHK R 001 grade 4
Gear teeth	Standard full depth
Pressure angle	20°
Material	Free cutting brass (C3604)
Heat treatment	—
Tooth hardness	(more than 80HV)

SW: Sawing surface

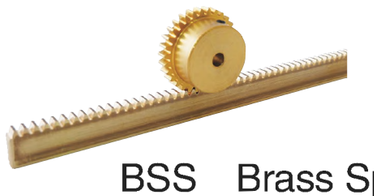
R1

Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
BSR0.5-300	***m*0.5**	190	R1	303	3	9	8.5	28.7	—	2.93	—	0.066
BSR0.8-300	***m*0.8**	118	R1	303	4	10	9.2	61.3	—	6.25	—	0.095
BSR1-300	***m*1**	94	R1	303	6	10	9	115	—	11.7	—	0.14

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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.

Recommended Mating Pinions



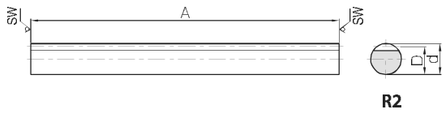
BSS　Brass Spur Gears

Please see Page 158 for more details.

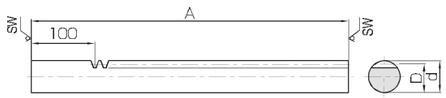
Steel Round Racks

Round Racks

Specifications	
Precision grade	KHK R 001 grade 4
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 95HRB)
Surface treatment	Black oxide coating



R2



SW: Sawing surface

R7

Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Outside dia. d_{h9}	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SRO1-500	***m*1**	159	R2	505	10	9	800	121	81.6	12.3	0.29
SRO1.5-500	***m*1.5**	105	R2	505	15	13.5	1800	288	184	29.3	0.65
SRO2-500 **SRO2-1000**	***m*2**	79 159	R2	505 1010	20	18	3200	530	326	54.0	1.16 2.31
SRO2.5-500 **SRO2.5-1000**	***m*2.5**	63 127	R2	505 1010	25	22.5	5000	848	510	86.5	1.81 3.61
SRO3-500 **SRO3-1000**	***m*3**	52 105	R2	505 1010	30	27	7200	1240	735	127	2.60 5.20
SRO4-500 **SRO4-1000**	***m*4**	39 79	R2	505 1010	40	36	12800	2270	1310	232	4.62 9.24
SRO5-1000	***m*5**	63	R2	1010	50	45	20000	3620	2040	369	14.4

Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Outside dia. d_{h9}	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SROS1-500	***m*1**	128	R7	505	10	9	800	121	81.6	12.3	0.29
SROS1.5-500	***m*1.5**	85	R7	505	15	13.5	1800	288	184	29.3	0.66
SROS2-500	***m*2**	64	R7	505	20	18	3200	530	326	54.0	1.17
SROS2.5-500	***m*2.5**	51	R7	505	25	22.5	5000	848	510	86.5	1.83
SROS3-500	***m*3**	42	R7	505	30	27	7200	1240	735	127	2.64

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.
③ Tolerance of "d" dimension of SRO6-1000 is h10.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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 Please avoid hardening of Round Racks. It causes contortion and deformation, and straightening processes can hardly be applied.

Recommended Mating Pinions

SS　Steel Spur Gears

Please see Page 74 for more details.

Stainless Steel Round Racks

Stainless Steel Round Racks

Specifications	
Precision grade	KHK R 001 grade 5
Gear teeth	Standard full depth
Pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)

SW: Sawing surface

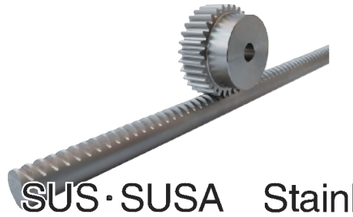
R2

Catalog No.	Module	Effective no. of teeth	Shape	Total length A	Outside dia. d_{h9}	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)
SURO1-500	***m*1**	159	R2	505	10	9	382	67.9	39.0	6.93	0.29
SURO1.5-500	***m*1.5**	105	R2	505	15	13.5	859	162	87.6	16.5	0.65
SURO2-500 **SURO2-1000**	***m*2**	79 159	R2	505 1010	20	18	1530	298	156	30.4	1.15 2.30
SURO2.5-500 **SURO2.5-1000**	***m*2.5**	63 127	R2	505 1010	25	22.5	2390	477	243	48.7	1.79 3.59
SURO3-500 **SURO3-1000**	***m*3**	52 105	R2	505 1010	30	27	3440	700	351	71.4	2.58 5.17

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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.

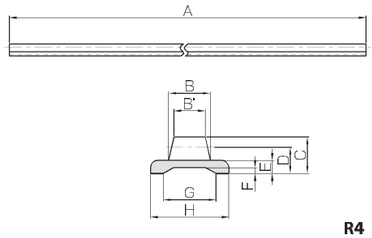
Recommended Mating Pinions



SUS・SUSA　Stainless Steel Spur Gears

Please see Page 126 for more details.

Specifications	
Precision grade	KHK R 001 grade 8
Gear teeth	Standard full depth
Pressure angle	20°
Material	Duracon（M25-44）
Heat treatment	—
Tooth hardness	(110～120HRR)



R4

Catalog No.	Module	Shape	Total length	Face width	Face width	Height	Height to pitch line	Thickness of base	Depth of groove	Width of groove	Width of base
			A	B	B'	C	D	E	F	G	H
DR0.8-2000	***m*0.8**	R4	2000	3.8	3	3.3	2.5	1.5	0.7	3.7	8
DR1-2000	***m*1**	R4	2000	5	4	4.3	3.3	2	0.9	4.9	10
DR1.5-2000	***m*1.5**	R4	2000	6.5	5	5.7	4.2	2.3	1	8	12
DR2-2000	***m*2**	R4	2000	8	6	7	5	2.5	1.1	10.1	15

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② In cases of using a molded flexible rack in an arc shape, proper meshing cannot be obtained as the pitch error and the tooth profile error increases. Be sure and adjust the center distance so that the pinion turns without any problem.
③ Molded Flexible Racks are not suitable for use when positioning accuracy is required.
④ To find the dimensional tolerance of these racks, please see the Dimensional Tolerance Table. The overall length tolerance is ±10 mm.

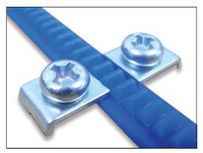
Accessories for DR Molded Flexible Racks

Molded Flexible Racks	Rack Clamps	Rack Guide Rails	DR Rack Pinions
DR0.8-2000	**SRS-1**	**ARL-0.8**	**SSDR0.8-35**
DR1-2000	**SRS-1**	**ARL-1**	**SSDR1-30**
DR1.5-2000	**SRS-2**	**ARL-1.5**	**SSDR1.5-20**
DR2-2000	**SRS-2**	**ARL-2**	**SSDR2-15**

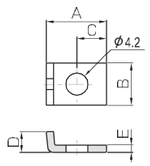
Allowable force (N) Bending strength	Allowable force (kgf) Bending strength	Weight (kg)	Catalog No.
112	11.4	0.036	**DR0.8-2000**
161	16.4	0.060	**DR1-2000**
161	16.5	0.085	**DR1.5-2000**
265	27.0	0.12	**DR2-2000**

＊ **We also accept special orders for DR racks over 2 meters in length.**

Products for DR SRS
Rack Clamps



When fixed



T7

■ Rack Clamps Material: SPCC, finished with trivalent-chromate

Catalog No.	Shape	A	B	C	D	E	F	Weight (g)
SRS-1	T7	10.2	8	4.5	2.7	1.2	—	2.24
SRS-2	T7	11.4	8	5.6	3.9	1.4	—	2.52

[Caution on Product Characteristics] ① Cross-recessed machine head screw (M4 × 12) is included as an accessory.

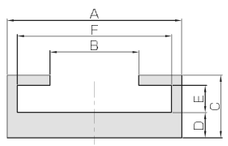
■ **DR Rack Dimensional Tolerance Table (unit: mm)**

Range	Tolerance
below 3 mm	±0.20
3 up to 6 mm	±0.25
6 up to 10 mm	±0.30
10 up to 18 mm	±0.35
18 up to 30 mm	±0.40
30 mm up	±0.50

■ **SRS/ARL Normal Bending and Dimensional Tolerance Table (unit: mm)**

Range	Grade B
below 6 mm	±0.30
6 up to 30 mm	±0.50
30 up to 120 mm	±0.80
120 up to 400 mm	±1.20
400 up to 1000 mm	±2.00
1000 up to 2000 mm	±3.00

Products for DR ARL
Rack Guide Rails



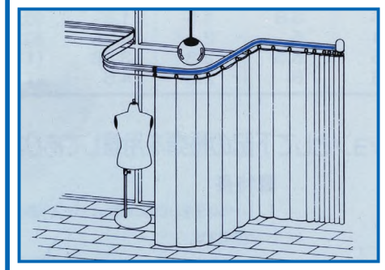
T6

■ **Rack Guide Rails Material: Aluminum** (A6063S-T5) Total Length：1000 mm

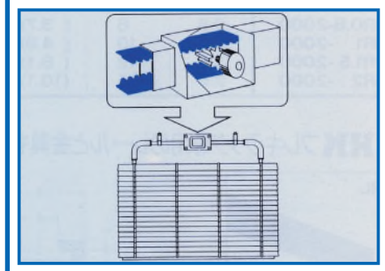
Catalog No.	Shape	A	B	C	D	E	F	Weight (kg)
ARL-0.8	T6	10.3	4.4	4.7	2	1.7	8.3	0.081
ARL-1	T6	12.3	5.6	5.2	2	2.2	10.3	0.096
ARL-1.5	T6	14.3	7.2	5.5	2	2.5	12.3	0.11
ARL-2	T6	17.3	8.8	6.2	2.5	2.7	15.3	0.15

DR Molded Flexible Rack Applications

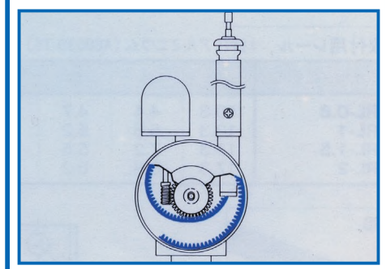
By fastening the positions of the pinions and adjusting the shape freely, DR Molded Flexible Racks can be used for various uses.



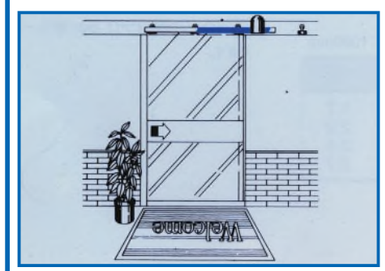
Motor Drive Curtain



Double Window with a built-in Blind

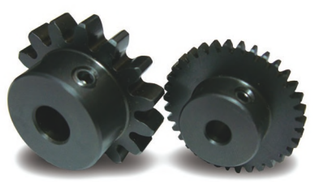


Motor Drive Antenna



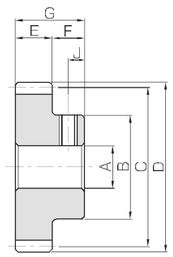
Automatic Door

SSDR
DR Rack Pinions



Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998) ＊
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating

＊ The precision grade of products with a module of less than 0.8 is equivalent to the value shown in the table.



S1T

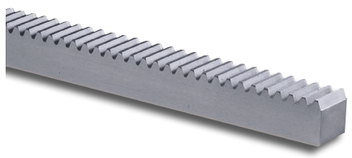
Catalog No.	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Set Screw	
				A_{H7}	B	C	D	E	F	G	Size	J
SSDR0.8-35	***m*0.8**	35	S1T	5	16	28	29.6	3	7	10	M4	3.5
SSDR1-30	***m*1**	30	S1T	6	20	30	32	4	8	12	M4	4
SSDR1.5-20	***m*1.5**	20	S1T	6	20	30	33	5	10	15	M4	5
SSDR2-15	***m*2**	15	S1T	8	22	30	34	6	10	16	M5	5

[Caution on Product Characteristics] ① For products with a tapped hole, a set screw is included.
② The allowable torque shown in the table are calculated values according to the assumed usage conditions. Please see Page 190 (NOTE 4) for more details.

Allowable torque (N-m) Bending strength	Allowable torque (kgf-m) Bending strength	Weight (g)	Catalog No.
2.59	0.26	23.5	**SSDR0.8-35**
4.46	0.45	38.6	**SSDR1-30**
7.35	0.75	48.4	**SSDR1.5-20**
10.4	1.06	56.1	**SSDR2-15**

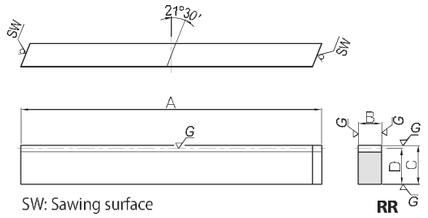
[Caution on Secondary Operations] ①Please read "Caution on Performing Secondary Operations" (Page 26) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.

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

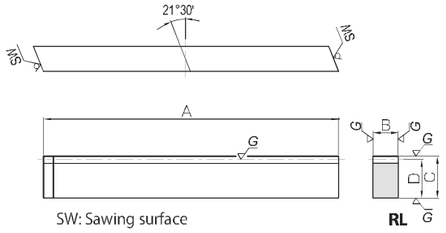


Specifications	
Precision grade	KHK R 001 grade 1 *
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Transverse pressure angle	20°
Helix angle	21°30'
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 ~ 285HB

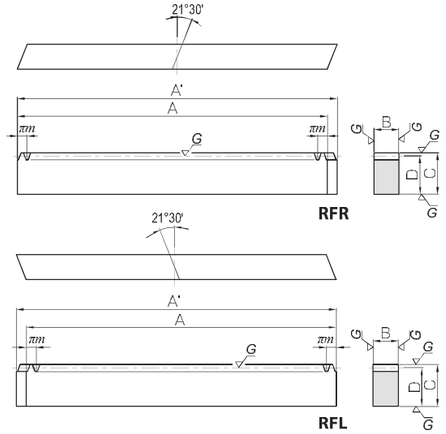
* The precision grade of J Series products is equivalent to the value shown in the table.



SW: Sawing surface



SW: Sawing surface



Catalog No.	Module	Effective no. of teeth	Direction of helix	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability
KRHG1-100R **KRHG1-100L**	***m*1**	28	R L	RR RL	98	8	15	14	1290	955	131	97.4
KRHG1.5-100R **KRHG1.5-100L**	***m*1.5**	19	R L	RR RL	101	12	20	18.5	2890	2380	295	243
KRHG2-100R **KRHG2-100L**	***m*2**	13	R L	RR RL	98	16	25	23	5140	4230	524	432
KRHG2.5-100R **KRHG2.5-100L**	***m*2.5**	10	R L	RR RL	100	20	30	27.5	8030	6610	819	674
KRHG3-100R **KRHG3-100L**	***m*3**	8	R L	RR RL	102	25	35	32	12000	9810	1230	1000

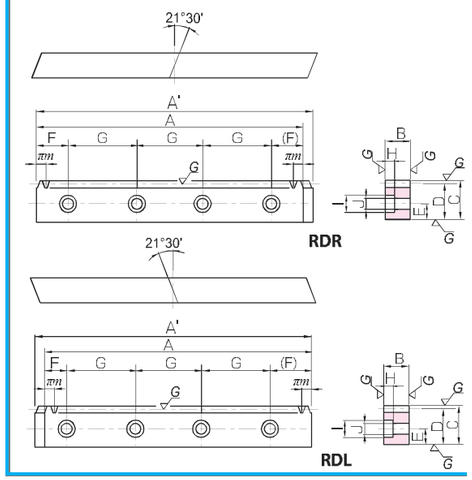
Weight (kg)	Catalog No.
0.086	**KRHG1-100R** **KRHG1-100L**
0.18	**KRHG1.5-100R** **KRHG1.5-100L**
0.28	**KRHG2-100R** **KRHG2-100L**
0.43	**KRHG2.5-100R** **KRHG2.5-100L**
0.64	**KRHG3-100R** **KRHG3-100L**

Catalog No.	Module	No. of teeth	Direction of helix	Shape	Total length A	Total length A'	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability
KRHGF1-500R **KRHGF1-500L**	***m*1**	159	R L	RFR RFL	499.51	502.66	8	15	14	1290	955
KRHGF1.5-500R **KRHGF1.5-500L**	***m*1.5**	106	R L	RFR RFL	499.51	504.23	12	20	18.5	2890	2380
KRHGF2-1000R **KRHGF2-1000L**	***m*2**	160	R L	RFR RFL	1005.31	1011.61	16	25	23	5140	4230
KRHGF2.5-1000R **KRHGF2.5-1000L**	***m*2.5**	128	R L	RFR RFL	1005.31	1013.19	20	30	27.5	8030	6610
KRHGF3-1000R **KRHGF3-1000L**	***m*3**	106	R L	RFR RFL	999.03	1008.88	25	35	32	12000	9810

Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No.
131	97.4	0.44	**KRHGF1-500R** **KRHGF1-500L**
295	243	0.87	**KRHGF1.5-500R** **KRHGF1.5-500L**
524	432	2.90	**KRHGF2-1000R** **KRHGF2-1000L**
819	674	4.34	**KRHGF2.5-1000R** **KRHGF2.5-1000L**
1230	1000	6.27	**KRHGF3-1000R** **KRHGF3-1000L**

Catalog No. ●: J Series (Available-on-request)	Module	No. of teeth	Direction of helix	Shape	Total length A	Total length A'	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	Mounting hole dimensions F	Mounting hole dimensions G	No. of mounting holes
●**KRHGFD1-500RJ** ●**KRHGFD1-500LJ**	***m*1**	159	R L	RDR RDL	499.51	502.66	8	15	14	6	24.76	150	4
●**KRHGFD1.5-500RJ** ●**KRHGFD1.5-500LJ**	***m*1.5**	106	R L	RDR RDL	499.51	504.23	12	20	18.5	8	24.76	150	4
●**KRHGFD2-1000RJ** ●**KRHGFD2-1000LJ**	***m*2**	160	R L	RDR RDL	1005.31	1011.61	16	25	23	10	52.65	180	6
●**KRHGFD2.5-1000RJ** ●**KRHGFD2.5-1000LJ**	***m*2.5**	128	R L	RDR RDL	1005.31	1013.19	20	30	27.5	12	52.65	180	6
●**KRHGFD3-1000RJ** ●**KRHGFD3-1000LJ**	***m*3**	106	R L	RDR RDL	999.03	1008.88	25	35	32	14	49.51	180	6

J Series



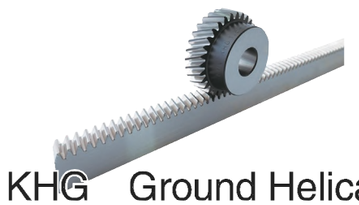
Mounting screw size	Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No. ●: J Series (Available-on-request)
M4	4.4	8	4.5	1290	955	131	97.4	0.43	●**KRHGFD1-500RJ** ●**KRHGFD1-500LJ**
M5	6	10	6	2890	2380	295	243	0.85	●**KRHGFD1.5-500RJ** ●**KRHGFD1.5-500LJ**
M6	7	11	7	5140	4230	524	432	2.86	●**KRHGFD2-1000RJ** ●**KRHGFD2-1000LJ**
M8	8.6	14	9	8030	6610	819	674	4.24	●**KRHGFD2.5-1000RJ** ●**KRHGFD2.5-1000LJ**
M10	10.8	17.5	11	12000	9810	1230	1000	6.09	●**KRHGFD3-1000RJ** ●**KRHGFD3-1000LJ**

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.
③ Please use KHG Ground Helical Gears as the mating pinion.
④ These racks produce axial thrust forces. See page 167 for more details.

[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) 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.

[Caution on J series]
① As available-on-request products, requires a lead-time for shipping within 2 working-days (excludes the day ordered), after placing an order. Please allow additional shipping time to get to your local distributor.
② Number of products we handle for one order is 1 to 20 pieces. For quantities of 21 pieces or more, we need to quote price and lead time.

Recommended Mating Pinions



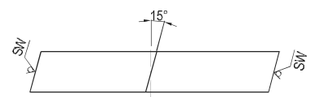
KHG Ground Helical Gears

Please see Page 168 for more details.

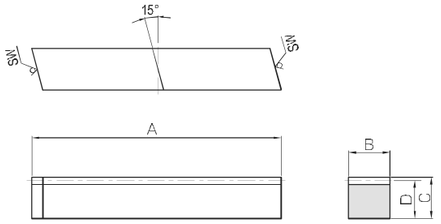
Steel Helical Racks

Specifications	
Precision grade	KHK R 001 grade 5
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 95HRB)
Surface treatment	Black oxide coating

SW: Sawing surface **R1**



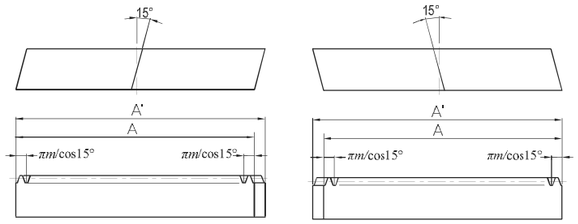
SW: Sawing surface **RR**



SW: Sawing surface **RL**

Catalog No.	Module	Effective no. of teeth	Direction of helix	Shape	Total length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability
SRH2-100R SRH2-100L	***m*2**	12	R L	RR RL	95	25	25	23	4710	1570	481	160
SRH2-500R SRH2-500L		75	R L	R1	505							
SRH2-1000R SRH2-1000L		152	R L		1010							
SRH3-100R SRH3-100L	***m*3**	7	R L	RR RL	95	35	35	32	9910	3520	1010	359
SRH3-500R SRH3-500L		49	R L	R1	505							
SRH3-1000R SRH3-1000L		101	R L		1010							

Weight (kg)	Catalog No.
0.43	**SRH2-100R SRH2-100L**
2.28	**SRH2-500R SRH2-500L**
4.56	**SRH2-1000R SRH2-1000L**
0.84	**SRH3-100R SRH3-100L**
4.44	**SRH3-500R SRH3-500L**
8.88	**SRH3-1000R SRH3-1000L**



RFR

RFL

Catalog No.	Module	No. of teeth	Direction of helix	Shape	Total length A	Total length A'	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability
SRHF2-1000R SRHF2-1000L	***m*2**	153	R L	RFR RFL	995.24	1001.94	25	25	23	4710	1570
SRHF3-1000R SRHF3-1000L	***m*3**	102	R L	RFR RFL	995.24	1004.62	35	35	32	9910	3520

Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No.
481	160	4.49	**SRHF2-1000R SRHF2-1000L**
1010	359	8.75	**SRHF3-1000R SRHF3-1000L**

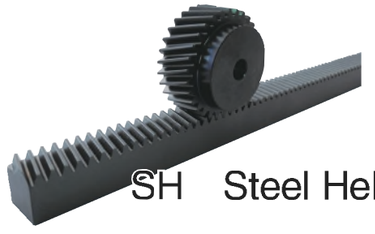
Catalog No.	Module	No. of teeth	Direction of helix	Shape	Total length A	Total length A'	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	Mounting hole dimensions F	Mounting hole dimensions G	No. of mounting holes	Mounting screw size
SRHFD2-1000R SRHFD2-1000L	***m*2**	153	R L	RDR RDL	995.24	1001.94	25	25	23	10	47.62	180	6	M6
SRHFD3-1000R SRHFD3-1000L	***m*3**	102	R L	RDR RDL	995.24	1004.62	35	35	32	14	47.62	180	6	M10

Counterbore dimensions H	Counterbore dimensions I	Counterbore dimensions J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Weight (kg)	Catalog No.
7	11	7	4710	1570	481	160	4.43	**SRHFD2-1000R SRHFD2-1000L**
10.8	17.5	11	9910	3520	1010	359	8.52	**SRHFD3-1000R SRHFD3-1000L**

[Caution on Product Characteristics]
① The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② The backlash of racks differ depending on the size of the mating pinion. Please calculate the backlash from the backlash value of the mating pinion. Also, please refer to the data in the section called 'Backlash of Rack Tooth (Amount of Tooth Thinning)' on Page 193.
③ Please use SH Helical Gears as the mating pinion.
④ These racks produce axial thrust forces. See page 167 for more details.
⑤ After attaching the racks to the base, please fasten with dowel pins. Clamping only with mounting screws could possibly cause the screws to be broken, due to a heavy load.

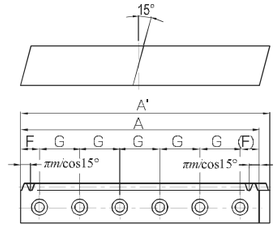
[Caution on Secondary Operations]
① Please read "Caution on Performing Secondary Operations" (Page 194) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK's system for quick modification of KHK stock gears is also available.
② If gear tooth hardening, or thermal refining, is applied, the decarburization layer (approx. 0.5 mm thickness) on the rectangular surfaces cannot have the hardness you designate.
③ Avoid hardening Racks with bolt holes, due to deformation occurring at the mounting hole and the difficulty of straightening after hardening.

Recommended Mating Pinions

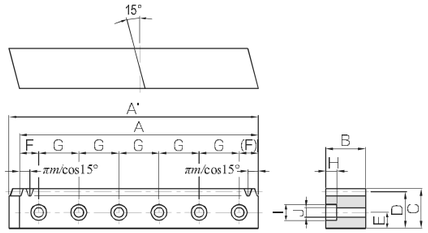


SH Steel Helical Gears

Please see Page 178 for more details.



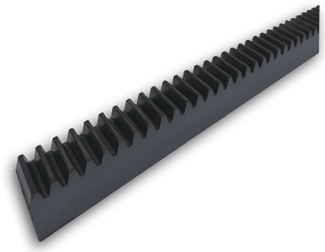
RDR



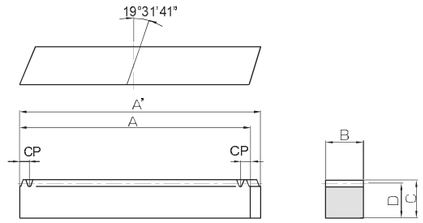
RDL

SRHEF
EU Specification Helical Racks

Helical Racks
New Product



Specifications	
Precision grade	KHK R 001 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle/direction	19° 31' 41" right helix
Material	S45C
Heat Treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating



RFR

Catalog Number	Module (front pitch mm)	No. of teeth	Shape	Total Length A	Total Length A'	Face width B	Height C	Height to pitch line D
SRHEF1.5-1000R	***m*1.5** (CP5)	200	RFR	1000	1006.03	17	17	15.5
SRHEF2-1000R	***m*2** (CP6.667)	150			1008.51	24	24	22
SRHEF3-1000R	***m*3** (CP10)	100			1010.29	29	29	26
SRHEF4-1000R	***m*4** (CP13.333)	75			1013.83	39	39	35
SRHEF5-1000R	***m*5** (CP16.667)	60			1017.38	49	39	34
SRHEF6-1000R	***m*6** (CP20)	50			1020.93	59	49	43

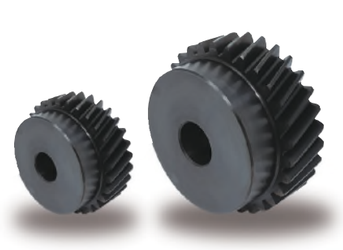
[Caution on Product Characteristics]
① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 190 for more details.
② Please use the SHE Helical Gear for the mating pinion.
③ After attaching the racks to the base, please fasten with dowel pins. Clamping only with mounting screws could possibly cause the screws to be broken, due to a heavy load.
④ These gears produce axial thrust forces. Please see Page 167 for more details.

Allowable force (N)		Allowable force (kgf)		Weight (kg)	Catalog Number
Bending strength	Surface durability	Bending strength	Surface durability		
2410	425	245	43.3	2.06	SRHEF1.5-1000R
4410	675	450	68.8	4.14	SRHEF2-1000R
8210	1650	837	168	5.91	SRHEF3-1000R
15200	2700	1550	275	10.7	SRHEF4-1000R
22500	4110	2300	419	13.1	SRHEF5-1000R
33400	7240	3410	738	19.9	SRHEF6-1000R

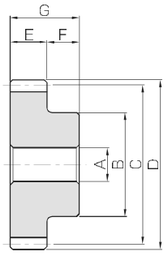
[Caution on Secondary Operations]
① Please read "Cautions on Performing Secondary Operations" (Page 194) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.

SHE
Helical Gears

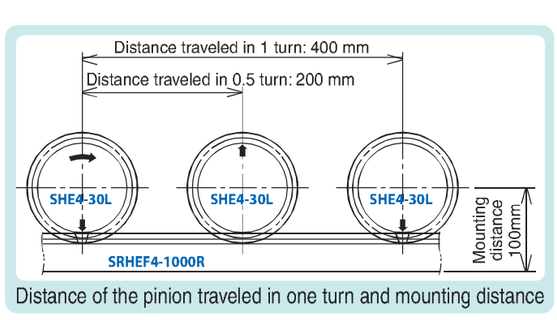
Helical Gears
New Product



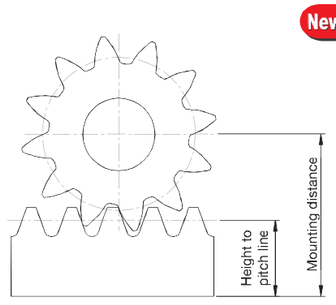
Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle/direction	19° 31' 41" left helix
Material	S45C
Heat Treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating



S1



Distance of the pinion traveled in one turn and mounting distance



Mounting distance of profile helix gear and meshing rack

Catalog Number	Module (front pitch mm)	No. of teeth	Dislocation coefficient	Mounting distance	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F
SHE1.5-20L	***m*1.5** (CP5)	20	+0.390	28	S1	10	25	31.83	36	18	14
SHE1.5-25L		25	+0.404	32		12	35	39.79	44	18	14
SHE1.5-30L		30	+0.418	36		15	40	47.75	52	18	14
SHE2-18L	***m*2** (CP6.667)	18	+0.451	42		12	30	38.20	44	25	16
SHE2-24L		24	+0.268	48		15	45	50.93	56	25	16
SHE2-30L		30	+0.085	54		18	55	63.66	68	25	16
SHE3-20L	***m*3** (CP10)	20	+0.390	59		20	55	63.66	72	30	20
SHE3-25L		25	+0.404	67		20	70	79.58	88	30	20
SHE3-30L		30	+0.418	75		25	85	95.49	104	30	20
SHE4-18L	***m*4** (CP13.333)	18	+0.201	74		20	65	76.39	86	40	25
SHE4-24L		24	+0.268	87		20	90	101.86	112	40	25
SHE4-30L		30	+0.335	100		25	110	127.32	138	40	25
SHE5-18L	***m*5** (CP16.667)	18	+0.451	84		25	85	95.49	110	50	25
SHE5-24L		24	+0.468	100		25	110	127.32	142	50	25
SHE6-20L	***m*6** (CP20)	20	+0.390	109		30	110	127.32	144	60	28
SHE6-25L		25	+0.404	125		30	140	159.15	176	60	28

[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 SRHEF Helical Racks with the same pitch.
③ These gears produce axial thrust forces. Please see Page 167 for more details.

Total Length G	Distance of the pinion traveled in one turn (mm)	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)	Catalog Number
32	100	35.6	5.89	3.63	0.60	0.08~0.20	0.16	SHE1.5-20L
32	125	46.5	10.3	4.75	1.05		0.26	SHE1.5-25L
32	150	57.6	16.3	5.87	1.66		0.36	SHE1.5-30L
41	120	78.2	11.2	7.98	1.15	0.10~0.22	0.30	SHE2-18L
41	160	107	24.4	10.9	2.48		0.56	SHE2-24L
41	200	136	43.8	13.8	4.46		0.85	SHE2-30L
50	200	238	45.7	24.2	4.66	0.12~0.26	1.06	SHE3-20L
50	250	310	80.1	31.6	8.17		1.72	SHE3-25L
50	300	384	127	39.2	12.9		2.47	SHE3-30L
65	240	474	89.8	48.3	9.16	0.16~0.34	1.99	SHE4-18L
65	320	687	183	70.0	18.6		3.76	SHE4-24L
65	400	902	317	92.0	32.3		5.78	SHE4-30L
75	300	978	171	99.7	17.4	0.18~0.38	3.91	SHE5-18L
75	400	1380	354	141	36.1		6.95	SHE5-24L
88	400	1900	402	194	40.9	0.20~0.44	8.05	SHE6-20L
88	500	2480	705	253	71.9		12.8	SHE6-25L

[Caution on Secondary Operations]
① Please read "Cautions on Performing Secondary Operations" (Page 194) 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.