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
HL	Laser 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 up 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	1.5~3	500	SCM415	Tooth area carburized	Ground	1	Racks that have been carburized and ground that have excellent accuracy, strength and wear resistance. Secondary operations are possible except for tooth.
KRGF-H KRGFD-H	1.5~3	500, 1000	SCM440	Thermal refined, gear teeth induction hardened	Ground	1	Racks that have been tempered, hardened and ground that have excellent accuracy, strength and wear resistance. Secondary operations are possible except for tooth.
KRG/KRGF/ KRGFD	1~3	100, 500, 1000	SCM440	Thermal refined	Ground	1	Racks that have been tempered and ground that have excellent accuracy and strength.
SRG/SRGF SRGFD/SRGFK	0.5~6	100, 300, 500, 1000	S45C	Gear teeth induction hardened NOTE 2	Ground	3	Racks that have been hardened and ground with a good balance of accuracy, wear resistance and cost. Secondary operations are possible except for tooth.
KRF-H/KRFD-H	1.5~5	1000	SCM440	Thermal refined, gear teeth induction hardened	Cut	5	Racks that have been tempered and hardened that have excellent strength and wear resistance. Secondary operations are possible except for tooth.
SRF-H SRFD-H	1.5~6	1000	S45C	Gear teeth induction hardened	Cut	5	Racks that have been hardened with excellent wear resistance. Secondary operations are possible except for tooth.
SRF-HL SRFD-HL	1.5~6	1000, 1500, 2000	S45C	Gear teeth laser hardened	Cut	4	Racks that have been laser hardened with a good balance of wear resistance and cost. Secondary operations are possible except for tooth.
KRF/KRFD	1.5~5	500, 1000	SCM440	Thermal refined	Cut	4	Racks that have been tempered with excellent strength.
SRAF/SRAFD SRAFK	1.5~4	1000, 2000	S45C	—	Cut	4	These racks have smaller tooth height in comparison to SRF Racks.
SR/SRF SRFD/SRFK	0.5~10	100, 300, 500, 1000, 1500, 2000	S45C	—	Cut	4	Many lineups are available at a low price and excellent usability.
SUR/SURF SURFD	1~4	500, 1000	SUS304	Solution treated	Cut	5	Stainless steel racks with rust resistance.
DRF/DRFD DRFK	1~3	500, 1000	Polyacetal	—	Cut	5	Racks made of polyacetal with shorter overall length than nylon, making them suitable for joining together.
PR/PRF	1~3	500, 1000	MC901	—	Cut	5	Nylon racks can be used with no lubrication.
BSR	0.5~1	300	Free-cutting Brass (C3604)	—	Cut	4	Brass racks with excellent machinability.
SRO/SROS	1~5	500, 1000	S45C	—	Cut	4	Round racks that are suitable when the rack side moves.
SURO	1~3	500, 1000	SUS303	—	Cut	5	Round racks made of stainless steel. Suitable when the rack side moves.
DR	0.8~2	2000	Duracon (R) (M25-44) NOTE 4	—	Injection Molded	8	Thin plastic racks that can be bent.
KRHG/KRHGF KRHGFD	1~3	100, 500, 1000	SCM440	Thermal refined	Ground	1	Helical racks that have been tempered and ground with excellent accuracy that have higher strength and quietness as compared with KRGF.
SRH/SRHF SRHFD	2~3	100, 500, 1000	S45C	—	Cut	5	As they are helical racks, they have higher strength and quietness as compared with SRF.
SRHEF	1.5~6	1000	S45C	—	Cut	4	As they are helical racks, they have higher strength and quietness as compared with SRF. They can be used like CP racks.
ZST/ZSTD	2~6	1000, 2000	DIN C45 (JIS Grade S45C equivalent)	Gear teeth induction hardened	Ground	Grade 2 equivalent	Helical racks that have been hardened and ground that have excellent accuracy, wear resistance and quietness. They can be used like CP racks. Secondary operations are possible except for tooth.

■ Pinion

SHE	1.5~6	(18~30)	S45C	—	Cut	(N8)	SRHEF pinions that have excellent strength and quietness as compared with SS due to its helix.
ZSTP	2~6	(18~30)	SCM440	Thermal refined, gear teeth induction hardened	Ground	(N6)	ZST pinions with high accuracy that have excellent strength, wear resistance and quietness due to its helix. Secondary operations are possible except for tooth.

[NOTE 1] The catalog numbers of the above racks with (F) suffix have both ends machined so that they can be butted against each other. The items with (D) have mounting screw holes for immediate assembly.
[NOTE 2] Products with module under 1 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.
[NOTE 4] "Duracon (R)" is a registered trademark of Polyplastics Co., Ltd. in Japan as well as other countries.

● KHK stock racks have round semi-topping at the corners of the top land of the gear tooth.
● Black products are KHK stock gears that have an applied black oxide coating for rust resistance.

Application Examples

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

■ Circular saw cutting machine HS-400 manufactured by Kooki Co., Ltd.



SRFD racks and SSG spur gears used for automatic and manual drive for cutting, machining of both ends and deburring

■ Clamp Seamer Welder



The SRCPFD racks and SSCP spur gears used to drive weld torches at constant speed, and the SRO round racks and SS spur gears used to position workpieces

■ 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

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

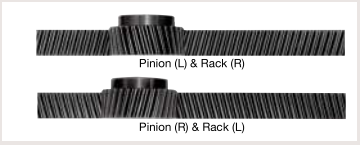
① With the exception of helical racks, KHK stock racks can mate with any spur gears of the same module. Products with different tooth width can also be mated as a pinion.
② See the table on the right for the mating gears of the helical racks.
Be sure to check the combination of helix direction (right or left) when selecting.

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

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

2. Caution in Selecting Gears Based on Gear Strength

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


Pinion (L) & Rack (R)
Pinion (R) & Rack (L)

■ Calculation of Bending Strength of Gears

Item \ Catalog Number	Racks: MRGF MRGFD	KRGF-H KRGFD-H KRF-H KRFD-H	KRG/KRGF KRGFD KRHG/KRHGF KRHGFD/KRF KRFD	SRG/SRGF SRGFD/SRGFK SRF-H/SRFD-H ZST/ZSTD	SRF-HL SRFD-HL	SRAF/SRAFD SRAFK/SR/SRF SRFD/SRFK/SRO SROS/SRH/SRHF SRHFD/SRHEF	SUR SURF SURFD SURO	Pinion: BSR	SHE	ZSTP	Racks: 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 Note 2									Racks	(30)		
Rotational Speed of Pinion	100rpm										(100rpm)		
Design Life (Durability)	Over 10^7cycles										Allowable bending stress (kgf/mm²)		
Impact from motor	Uniform load										1.0 (40°C with No Lubrication)	1.15 (40°C 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°C with Grease Lubrication)
Impact from load	Uniform load												
Direction of load	Bidirectional load (calculated with allowable bending stress of 2/3)												
Allowable bending stress at root σ_{Flim} (kgf/mm²)	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)

Formula NOTE 1	Formula of spur and helical gears on surface durability (JGMA402-01)									
Kinematic viscosity of lubricant	100cSt(50°C)									
Gear support	Supported on one end.									
Allowable Hertz stress σ_{Hlim} (kgf/mm²)	166	112	79	90 NOTE 3	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 Mitsubishi Chemical Advanced Materials and "Duracon (R) Gear" by Polyplastics Co. The units for the rotational speed (rpm) and the stress (kgf/mm²) are adjusted to the units needed in the formula.
[NOTE 2] No. of mating teeth in the ZST and ZSTD racks is the "minimum number of teeth" of the ZSTP pinion. The No. of mating teeth in the SRHEF racks is also calculated by the "minimum number of teeth" of the SHE pinion.
[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 for the SSCP Pinion, shown on Page 269.

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

① Products not listed in this catalog or materials, modules, number of teeth and the like not listed in the dimensional tables can be manufactured as custom items. Please see Page 24 for more details 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, etc.) listed in the catalog may be changed without prior notice. Changes are announced on the KHK website.

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

Selecting the Gears

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

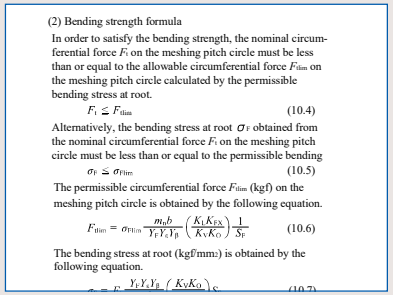
Step 2 Select provisionally from the allowable torque table of the Master Catalog or Web Catalog based on the load torque.

■ For provisional selection from the Master Catalog

Step 3 Calculate the strength under the actual usage conditions.

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

■ For strength calculation from the Master Catalog


(2) Bending strength formula

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

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

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

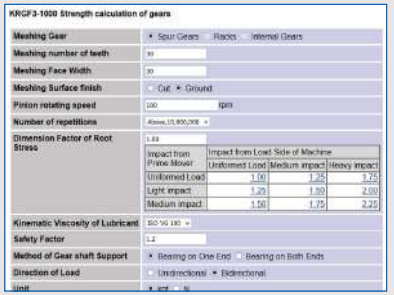
$$\sigma_F \leqq \sigma_{Flim} \quad (10.5)$$

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

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

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

■ For strength calculation from the Web Catalog


KRGF3-1000 Strength calculation of gears

■ Bending strength

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


Example of failure due to insufficient bending strength

■ Surface durability

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


Example of wear due to insufficient surface durability

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 old 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

Unit: μ m

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.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.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.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.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.C.E.	110	-	115	135	120	140	130	145	140	160	160	180
8	S.P.E.	206	206	212	212	219	219	-	-	-	-	-	-

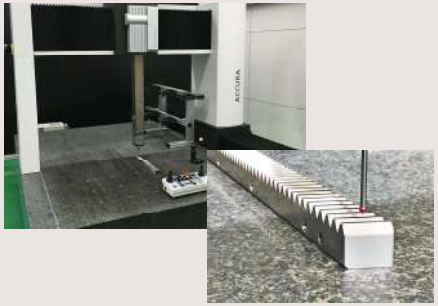
[NOTE] ① Since the pitch accuracy of racks may vary due to humidity, the precision grades are evaluated at the bottom surface of the product, at the temperature of 20°C. The dimensions of the KHK PR Plastic Racks may vary widely due to humidity. Therefore, the total composite error is assumed to be excluded from this accuracy standard. Please refer to our separate technical reference book to "Design of Plastic Gears" 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).

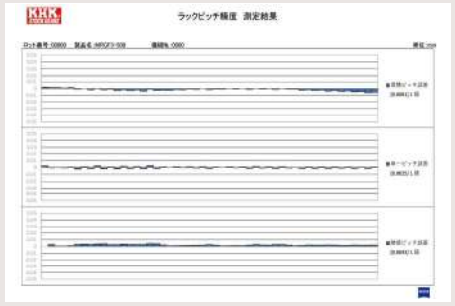
■ Comparison Table of Precision Grades of Racks

KHK R001	1	2	3	4	5	6	7	8
DIN 3962	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12

* Values in the table are guidelines only and not guaranteed values.
* In the gray area, there are no equivalent products for stock gears.

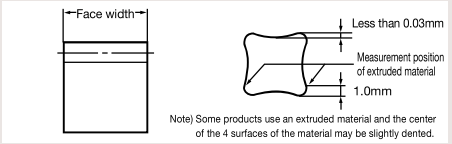
■ Pitch inspection and a sample report using Karl Zeiss ACCURA Coordinate Measuring Machine. (KHK R 001 Grade 1)





② Precision of Rack Blanks

■ Tolerances for Face Width and Height



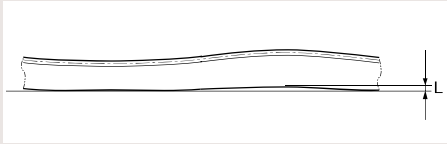
Note) Some products use an extruded material and the center of the 4 surfaces of the material may be slightly dented.

Unit: mm

Face width \ Precision grade (KHK R 001)	Grade 1	Grade 2	Grades 3 to 5 *
8 or less	0 -0.05	0 -0.10	0 -0.22
9 to 10		0 -0.10	0 -0.27
11 to 18		0 -0.10	0 -0.33
19 to 30		0 -0.15	0 -0.39
31 to 50		0 -0.15	0 -0.46
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)	Grade 1 & 2	Grade 3	Grade 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	(-0.1 -0.3)
	*m*0.8(CP2.5)	(-0.1 -0.5)
	*m*1 up to 2.5	(-0.2 -0.6)
	*m*2.5 or more	(-0.2 -0.8)
FRCP and DR Flexible Racks	Uniform	±10
Products other than the above	Uniform	+3 -2

[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 Racks & Pinions

■ Backlash of Racks & Pinions (Circumferential)

Unit: mm

Module	CP	Precision Grade (KHK R 001)												
		Grade 1		Grade 2	Grade 3	Grade 4		Grade 5						
		Straight	Helical			Excludes thermal refined racks	Includes thermal refined racks	Stainless Steel	Helical SRHF	Helical SRHEF	Hardened	Thermal Refined + Hardened	MC nylon	POM * Excludes DR
m0.5	-	-	-	-	0.11 0.00	0.13 0.00	-	-	-	-	-	-	-	-
m0.8	CP2.5	-	-	-	0.12 0.00	0.14 0.00	-	-	-	-	-	-	-	-
m1	-	-	-	-	0.19 0.04	0.21 0.04	-	0.23 0.04	-	-	-	-	0.39 0.18	0.36 0.15
m1.5	CP5	0.14 0.04	0.15 0.05	0.14 0.04	0.19 0.04	0.25 0.09	0.27 0.09	0.27 0.09	-	0.28 0.10	0.29 0.05	0.31 0.05	0.42 0.21	0.39 0.18
m2	-	0.16 0.05	0.17 0.06	0.16 0.05	0.21 0.05	0.28 0.11	0.30 0.11	0.30 0.11	0.31 0.12	0.32 0.12	0.32 0.07	0.34 0.07	0.45 0.24	0.42 0.21
m2.5	-	0.16 0.05	0.17 0.06	0.16 0.05	0.21 0.05	0.31 0.13	0.33 0.13	0.33 0.13	-	0.35 0.14	0.35 0.09	0.37 0.09	0.49 0.26	0.46 0.23
m3	CP10	0.16 0.05	0.17 0.06	0.16 0.05	0.21 0.05	0.35 0.14	0.37 0.14	0.37 0.14	0.38 0.15	0.39 0.15	0.39 0.10	0.41 0.10	0.56 0.32	0.52 0.28
m4	-	-	-	0.16 0.05	0.21 0.05	0.42 0.18	0.44 0.18	0.44 0.18	-	0.47 0.19	0.46 0.14	0.48 0.14	-	-
m5	CP15	-	-	0.17 0.05	0.22 0.05	0.47 0.20	0.49 0.20	-	-	0.52 0.21	0.51 0.16	0.53 0.16	-	-
m6	CP20	-	-	0.17 0.05	0.22 0.05	0.54 0.22	-	-	-	0.57 0.23	0.58 0.18	-	-	-
m8	-	-	-	-	-	0.63 0.28	-	-	-	-	-	-	-	-
m10	-	-	-	-	-	0.70 0.33	-	-	-	-	-	-	-	-

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.

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 plastic racks deform particularly easily, so please handle with care.

2. Caution on Performing Secondary Operations

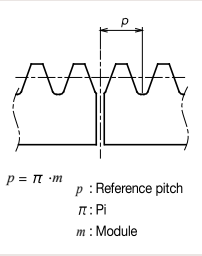
① Secondary operations can be performed on all KHK stock racks except for the racks with their gear teeth induction hardened. To avoid problems of gear precision, do not reduce the face width.

② Height of pitch lines of racks are controlled by measuring 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 Products made of S45C and SCM440 can be induction hardened. However, the precision is decreased. There is a decarburized layer (about 0.5 mm) on the block surface. The hardness of the decarburized layer does not increase even if it is quenched.

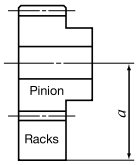
⑥ To be able to handle parts safely, all burrs and sharp corners. should be removed after the secondary operations are done.

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.

3. Points of Caution during Assembly

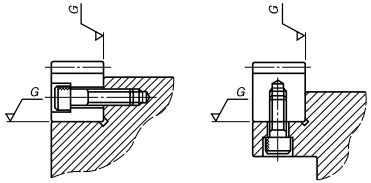
① The recommended assembly distance tolerance of KHK stock racks is H7 for ground racks and H8 for cut racks. Flexible racks need to be adjusted by the customer. The backlash values are given in the table on Page 219. Make sure that the mounting distance stays constant for the length of the rack.

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 The recommended flatness and squareness of the mounting surface of KHK stock racks is 0.01 mm for ground racks and 0.05 mm for cut racks.

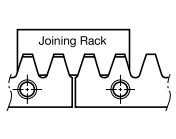


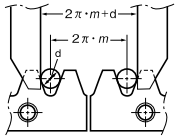
③ If the racks are not secured properly to the base, they could shift during operation and cause unexpected problems.
It is very important to insure firm mounting by the use of dowel pins or similar devices.

④ Machined end type racks such as SRF and SRFD series have smaller pitch tolerance 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 diagrams for assembly on the next page.

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.

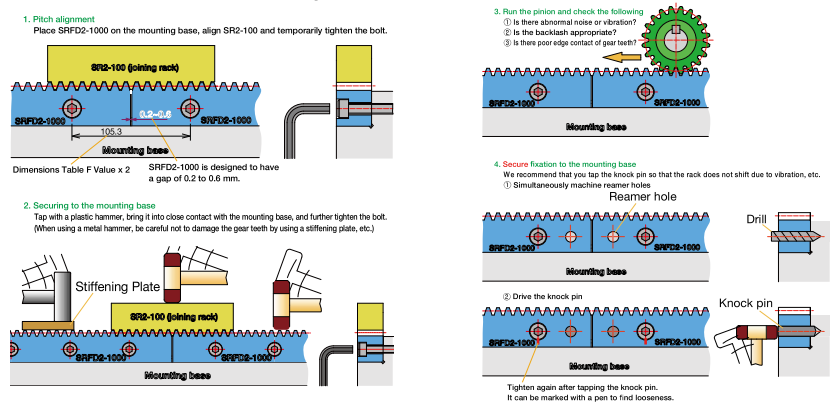
As an example of Rack Joining, we recommend the following method.





[NOTE] Joining gauge racks for helical racks must have the opposite hand from the racks. Please use 100 mm short 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 For more technical information on lubricating gears, please see the section “Gear Lubrication” in our separate technical reference book.

④ If there is any abnormality such as noise or vibration during startup, stop the operation immediately and check the assembly condition such as tooth contact, eccentricity and looseness. For more technical information, please see the section “Gear Noise and Countermeasures” in our separate technical reference book.

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

⚠ Warning: Precautions for preventing physical and property damage

1. When using KHK products, follow relevant safety regulations (Occupational Safety and Health Regulations, etc.).
2. Pay attention to the following items when installing, removing, or performing maintenance and inspection of the product.
   ① Turn off the power switch.
   ② Do not reach or crawl under the product.
   ③ Wear appropriate clothing and protective equipment for the work.

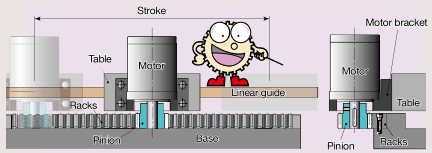
⚠ Caution Cautions in Preventing Accidents

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

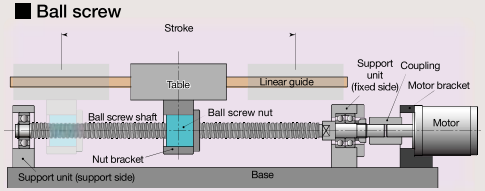
Comparison of Racks & Pinions and Ball Screws

Since racks have 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.

■ Racks & Pinions



■ Ball screw



● Features of Racks & Pinions

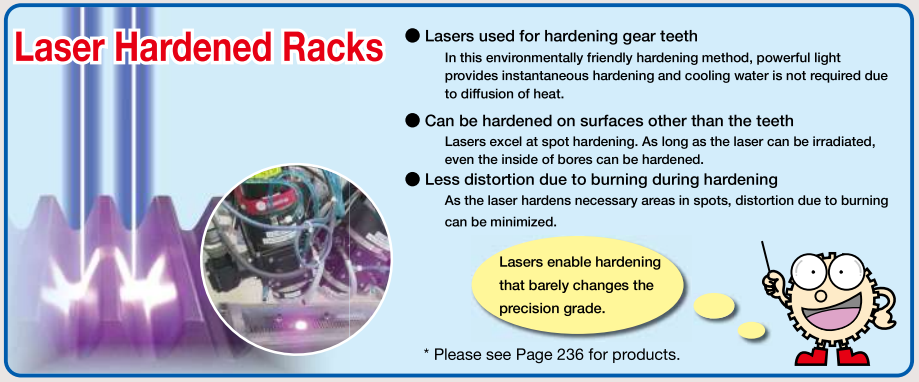
Advantages	Details
Few component parts	Since it does not have parts such as balls and retainers, there is less risk of accidentally falling apart during assembly and disassembly.
Supports heavy loads	Racks with large module can be used for heavy loads.
High transmission efficiency	High transmission efficiency of about 98% (excluding lubrication oil stirring resistance and bearing resistance).
High transport speed	The transport speed can be increased.
No length limit	The racks can be connected and used for a long period of time.
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.
No backlash	The use of pressure eliminates backlash.

Disadvantages	Details
Length is limited	There is a limit to the length due to the deflection of the screws.
Hard to manufacture special products	Since it is hard to manufacture special products, machines must be adjusted to the shape of the ball screw.

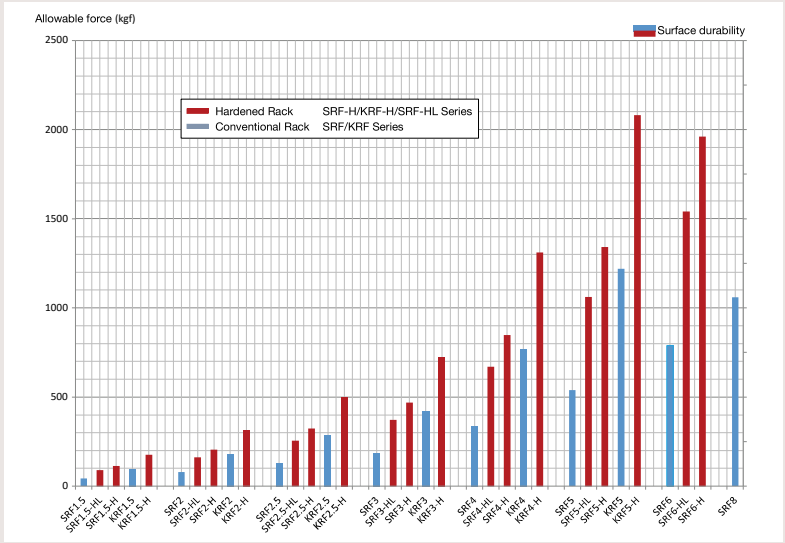


Rack downsizing

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



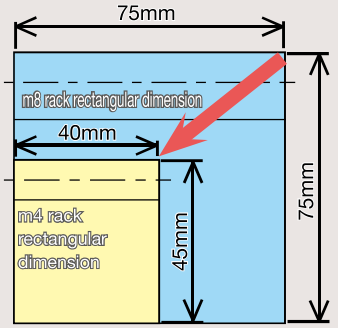
Comparison table per series (module 3, rack length: 1,000 mm)

Catalog Numbers (Comparison Example)	Material	Heat Treatment	Allowable force kgf		Precision KHK R 001	Series nominal total length mm
			Bending strength	Surface durability		
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 rectangular dimensions of modules and racks can be reduced. This helps reduce the cost.

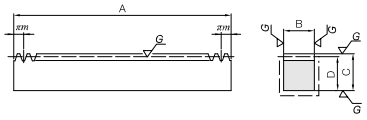
Increased strength leads to smaller size
SRF8-1000 39.7kg
KRF4-1000H 12.9kg
Mass reduced ⇒ 26.8 kg



Hardened Ground Racks

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 to 60HRC

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



RF

Catalog Number	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
MRGF1.5-500	***m*1.5**	106	RF	499.51	15	20	18.5	5070	4620	517	472
MRGF2-500	***m*2**	80		502.65	20	25	23	9010	8240	918	840
MRGF2.5-500	***m*2.5**	64		502.65	25	30	27.5	14100	12900	1440	1310
MRGF3-500	***m*3**	53		499.51	30	35	32	20300	18600	2070	1900

Catalog Number ● : 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 holes	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

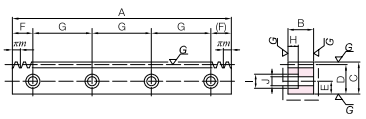
[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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 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.

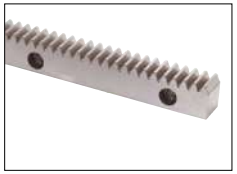
[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details. Also, please allow additional shipping time to get to your local distributor.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.

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

J Series



RD



Backlash (mm)	Weight (kg)	Catalog Number
0.04~0.14	1.09	**MRGF1.5-500**
0.05~0.16	1.82	**MRGF2-500**
0.05~0.16	2.71	**MRGF2.5-500**
0.05~0.16	3.76	**MRGF3-500**

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	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
6	10	6	5070	4620	517	472	0.04~0.14	1.07	●**MRGFD1.5-500J**
7	11	7	9010	8240	918	840	0.05~0.16	1.78	●**MRGFD2-500J**
8.6	14	9	14100	12900	1440	1310	0.05~0.16	2.64	●**MRGFD2.5-500J**
10.8	17.5	11	20300	18600	2070	1900	0.05~0.16	3.63	●**MRGFD3-500J**

Recommended Mating Pinions

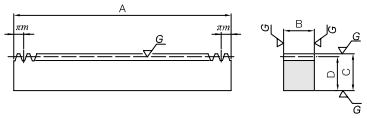
MSGA/MSGB Ground Spur Gears

Please see Page 42 for more details.

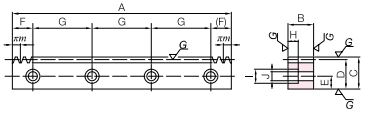
Hardened Ground Racks

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

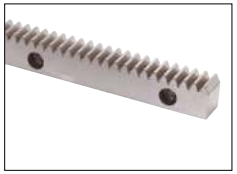
* The precision grade of J Series products is equivalent to the value shown in the table.



RF



RD



Catalog Number	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
KRGF1.5-500H **KRGF1.5-1000H**	***m*1.5**	106 212	RF	499.51 999.03	15	20	18.5	3450	2100	352	215
KRGF2-500H **KRGF2-1000H**	***m*2**	80 160		502.65 1005.31	20	25	23	6130	3750	625	382
KRGF2.5-500H **KRGF2.5-1000H**	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	9580	5870	977	598
KRGF3-500H **KRGF3-1000H**	***m*3**	53 106		499.51 999.03	30	35	32	13800	8470	1410	863

Catalog Number ● : 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 holes	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		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		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		499.51 999.03	30	35	32	14	24.76 49.51	150 180	4 6	M10

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.

[Caution on Secondary Operations] ① Please read “Cautions on Performing Secondary Operations” (Page 220) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm). Please use wire EDM or other carbide tools to modify the length.

[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details. Also, please allow additional shipping time to get to your local distributor.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.

J Series

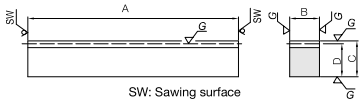
Backlash (mm)	Weight (kg)	Catalog Number
0.04~0.14	1.09 2.18	**KRGF1.5-500H** **KRGF1.5-1000H**
0.05~0.16	1.82 3.63	**KRGF2-500H** **KRGF2-1000H**
0.05~0.16	2.71 5.43	**KRGF2.5-500H** **KRGF2.5-1000H**
0.05~0.16	3.76 7.53	**KRGF3-500H** **KRGF3-1000H**

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	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
6	10	6	3450	2100	352	215	0.04~0.14	1.07 2.14	●**KRGFD1.5-500HJ** ●**KRGFD1.5-1000HJ**
7	11	7	6130	3750	625	382	0.05~0.16	1.78 3.58	●**KRGFD2-500HJ** ●**KRGFD2-1000HJ**
8.6	14	9	9580	5870	977	598	0.05~0.16	2.64 5.31	●**KRGFD2.5-500HJ** ●**KRGFD2.5-1000HJ**
10.8	17.5	11	13800	8470	1410	863	0.05~0.16	3.63 7.32	●**KRGFD3-500HJ** ●**KRGFD3-1000HJ**

Thermal Refined Ground Racks NEW

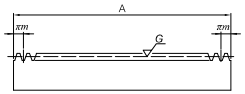
Specifications	
Precision grade	KHK R 001 grade 1
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 to 352HB

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



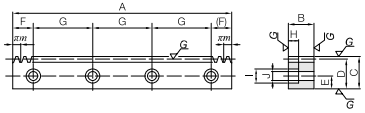
SW: Sawing surface

R1



RF

J Series



RD

Catalog Number	Module	Effective number 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
KRG1-100	***m*1**	29	R1	98	10	15	14	1530	641	156	65.3
KRG1.5-100	***m*1.5**	20		101	15	20	18.5	3450	1440	352	147
KRG2-100	***m*2**	14		98	20	25	23	6130	2560	625	261
KRG2.5-100	***m*2.5**	11		100	25	30	27.5	9580	4010	977	408
KRG3-100	***m*3**	9		101	30	35	32	13800	5770	1410	588

Backlash (mm)	Weight (kg)	Catalog Number
0.04~0.14	0.11	**KRG1-100**
0.04~0.14	0.22	**KRG1.5-100**
0.05~0.16	0.35	**KRG2-100**
0.05~0.16	0.54	**KRG2.5-100**
0.05~0.16	0.76	**KRG3-100**

Catalog Number	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
KRGF1-500 **KRGF1-1000**	***m*1**	159 318	RF	499.51 999.03	10	15	14	1530	641	156	65.3
KRGF1.5-500 **KRGF1.5-1000**	***m*1.5**	106 212		499.51 999.03	15	20	18.5	3450	1440	352	147
KRGF2-500 **KRGF2-1000**	***m*2**	80 160		502.65 1005.31	20	25	23	6130	2560	625	261
KRGF2.5-500 **KRGF2.5-1000**	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	9580	4010	977	408
KRGF3-500 **KRGF3-1000**	***m*3**	53 106		499.51 999.03	30	35	32	13800	5770	1410	588

Backlash (mm)	Weight (kg)	Catalog Number
0.04~0.14	0.55 1.49	KRGF1-500 **KRGF1-1000**
0.04~0.14	1.09 2.18	KRGF1.5-500 **KRGF1.5-1000**
0.05~0.16	1.82 3.63	KRGF2-500 **KRGF2-1000**
0.05~0.16	2.71 5.43	KRGF2.5-500 **KRGF2.5-1000**
0.05~0.16	3.76 7.53	KRGF3-500 **KRGF3-1000**

Catalog Number ● : 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 holes	Screw size
●KRGFD1-500J ●KRGFD1-1000J	***m*1**	159 318	RD	499.51 999.03	10	15	14	6	24.76 49.51	150 180	4 6	M4
●KRGFD1.5-500J ●KRGFD1.5-1000J	***m*1.5**	106 212		499.51 999.03	15	20	18.5	8	24.76 49.51	150 180	4 6	M5
●KRGFD2-500J ●KRGFD2-1000J	***m*2**	80 160		502.65 1005.31	20	25	23	10	26.33 52.65	150 180	4 6	M6
●KRGFD2.5-500J ●KRGFD2.5-1000J	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	12	26.33 52.65	150 180	4 6	M8
●KRGFD3-500J ●KRGFD3-1000J	***m*3**	53 106		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	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
5	8	4.5	1530	641	156	65.3	0.04~0.14	0.54 1.08	●KRGFD1-500J ●KRGFD1-1000J
6	10	6	3450	1440	352	147	0.04~0.14	1.07 2.14	●KRGFD1.5-500J ●KRGFD1.5-1000J
7	11	7	6130	2560	625	261	0.05~0.16	1.78 3.58	●KRGFD2-500J ●KRGFD2-1000J
8.6	14	9	9580	4010	977	408	0.05~0.16	2.64 5.31	●KRGFD2.5-500J ●KRGFD2.5-1000J
10.8	17.5	11	13800	5770	1410	588	0.05~0.16	3.62 7.32	●KRGFD3-500J ●KRGFD3-1000J

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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.

[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details. Also, please allow additional shipping time to get to your local distributor.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.

* Module 10 and ground racks with total lengths up to (A) 1500mm and heights up to (C) 120mm are also available by request as custom-made products.

Recommended Mating Pinions

SSG Ground Spur Gears

Please see Page 56 for more details.

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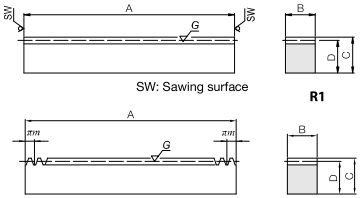
Hardened Ground Racks

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

* The precision grade of J Series products is equivalent to the value shown in the table.
** Products with module less than 0.8 are not gear teeth hardened. It is a tempered product with the teeth hardness of 200 to 270 HB.



Catalog Number	Module	Effective number 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	Backlash (mm)	Weight (kg)
SRG0.5-100	***m*0.5**	61	R1	101	5	12	11.5	293	80.5	29.9	8.21	0~0.11	0.046
SRG0.8-100	***m*0.8**	38		101	8	12.3	11.5	751	206	76.6	21.0	0~0.12	0.073
SRG1-100	***m*1**	29		98	10	12	11	862	514	87.9	52.4	0.04~0.19	0.085
SRG1.5-100	***m*1.5**	20		101	15	20	18.5	2160	1360	220	138	0.04~0.19	0.22
SRG2-100	***m*2**	14		98	20	25	23	3830	2410	391	246	0.05~0.21	0.35
SRG2.5-100	***m*2.5**	11		100	25	30	27.5	5990	3770	611	384	0.05~0.21	0.54
SRG3-100	***m*3**	9		101	30	35	32	8620	5420	879	553	0.05~0.21	0.76
SRG4-100	***m*4**	6		98	40	45	41	15300	9640	1560	983	0.05~0.21	1.26
SRG5-110	***m*5**	5		108	50	50	45	24000	15100	2440	1540	0.05~0.22	1.91
SRG6-110	***m*6**	4		111	60	60	54	34500	21700	3520	2210	0.05~0.22	2.82

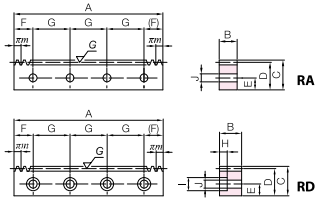
Catalog Number	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)
SRGF0.5-300	***m*0.5**	191	RF	300.02	5	12	11.5	293	80.5	29.9	8.21	0~0.11	0.14
SRGF0.8-300	***m*0.8**	119		299.08	8	12.3	11.5	751	206	76.6	21.0	0~0.12	0.22
SRGF1-300	***m*1**	96		301.59	10	12	11	862	514	87.9	52.4	0.04~0.19	0.26
SRGF1-500		159		499.51									0.43
SRGF1.5-500	***m*1.5**	106		499.51	15	20	18.5	2160	1360	220	138	0.04~0.19	1.09
SRGF1.5-1000		212		999.03									2.18
SRGF2-500	***m*2**	80		502.65	20	25	23	3830	2410	391	246	0.05~0.21	1.82
SRGF2-1000		160		1005.31									3.63
SRGF2.5-500	***m*2.5**	64		502.65	25	30	27.5	5990	3770	611	384	0.05~0.21	2.71
SRGF2.5-1000		128		1005.31									5.43
SRGF3-500	***m*3**	53		499.51	30	35	32	8620	5420	879	553	0.05~0.21	3.76
SRGF3-1000		106		999.03									7.53
SRGF4-500	***m*4**	40		502.65	40	45	41	15300	9640	1560	983	0.05~0.21	6.47
SRGF4-1000		80		1005.31									12.9
SRGF5-500	***m*5**	32		502.65	50	50	45	24000	15100	2440	1540	0.05~0.22	8.88
SRGF5-1000		64		1005.31									17.8
SRGF6-500	***m*6**	26		490.09	60	60	54	34500	21700	3520	2210	0.05~0.22	12.5
SRGF6-1000		53		999.03									25.4

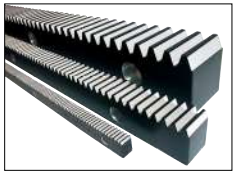
Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of holes	Screw size
●**SRGFK0.5-300J**	***m*0.5**	191	RA	300.02	5	12	11.5	5.5	15.01	90	4	M3
●**SRGFK0.8-300J**	***m*0.8**	119		299.08	8	12.3	11.5	5.5	14.54	90	4	M4
●**SRGFK1-300J**	***m*1**	96		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		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		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		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		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		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		490.09	60	60	54	23	25.04	220	3	M16
●**SRGFD6-1000J**		53		999.03					59.51	220	5	

PUS lubricated spur gear

Please see Page 470 for more details.

J Series





Recommended Mating Pinions

SSG Ground Spur Gears

Please see Page 56 for more details.

SSGS Ground Spur Gears

Please see Page 54 for more details.

*** Module 10 and ground racks with total lengths up to (A) 1500mm and heights up to (C) 120mm are also available by request as custom-made products.**

[Caution on Product Characteristics]
① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ There is a decarburized layer (about 0.5 mm) on the surface of the extruded products. The hardness of the decarburized layer, excluding the tooth surface, is (187 HB or less).

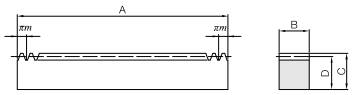
[Caution on Secondary Operations]
① Please read "Cautions on Performing Secondary Operations" (Page 220) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm). Please use wire EDM or other carbide tools to modify the length.

[Caution on J series]
① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Black oxide is NOT re-applied after the secondary operation of adding mounting holes.

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	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
—	—	3.4	293	80.5	29.9	8.21	0~0.11	0.13	●**SRGFK0.5-300J**
—	—	4.5	751	206	76.6	21.0	0~0.12	0.21	●**SRGFK0.8-300J**
—	—	4.5	862	514	87.9	52.4	0.04~0.19	0.26	●**SRGFK1-300J**
—	—							0.43	●**SRGFK1-500J**
6	10	6	2160	1360	220	138	0.04~0.19	1.07	●**SRGFD1.5-500J**
								2.14	●**SRGFD1.5-1000J**
7	11	7	3830	2410	391	246	0.05~0.21	1.78	●**SRGFD2-500J**
								3.58	●**SRGFD2-1000J**
8.6	14	9	5990	3770	611	384	0.05~0.21	2.64	●**SRGFD2.5-500J**
								5.31	●**SRGFD2.5-1000J**
10.8	17.5	11	8620	5420	879	553	0.05~0.21	3.63	●**SRGFD3-500J**
								7.32	●**SRGFD3-1000J**
13	20	14	15300	9640	1560	983	0.05~0.21	6.21	●**SRGFD4-500J**
								12.6	●**SRGFD4-1000J**
15.2	23	16	24000	15100	2440	1540	0.05~0.22	8.56	●**SRGFD5-500J**
								17.2	●**SRGFD5-1000J**
17.5	26	18	34500	21700	3520	2210	0.05~0.22	12.0	●**SRGFD6-500J**
								24.6	●**SRGFD6-1000J**

Hardened Racks

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



RF

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

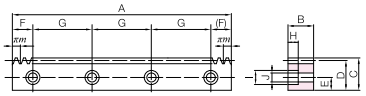
Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Mounting hole dimensions				
				A	B	C	D	E	F	G	No. of holes	Screw size
●**KRFD1.5-1000HJ**	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
●**KRFD2-1000HJ**	***m*2**	160		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

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ The dimensions may vary widely due to hardening. Therefore, the total composite error is assumed to be excluded from this accuracy standard.
④ There is a decarburized layer (about 0.5 mm) on the surface of the extruded products. The hardness of the decarburized layer, excluding the tooth surface, is (187 HB or less).

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm). Please use wire EDM or other carbide tools to modify the length.

[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Black oxide is NOT re-applied after the secondary operation of adding mounting holes.

J Series



RD

Backlash (mm)	Weight (kg)	Catalog Number
0.05~0.31	2.18	**KRF1.5-1000H**
0.07~0.34	3.63	**KRF2-1000H**
0.09~0.37	5.43	**KRF2.5-1000H**
0.10~0.41	7.53	**KRF3-1000H**
0.14~0.48	12.9	**KRF4-1000H**
0.16~0.53	17.8	**KRF5-1000H**

Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
H	I	J	Bending strength	Surface durability	Bending strength	Surface durability			
6	10	6	3140	1710	320	175	0.05~0.31	2.14	●**KRFD1.5-1000HJ**
7	11	7	5570	3090	568	315	0.07~0.34	3.58	●**KRFD2-1000HJ**
8.6	14	9	8710	4890	888	499	0.09~0.37	5.31	●**KRFD2.5-1000HJ**
10.8	17.5	11	12500	7110	1280	725	0.10~0.41	7.32	●**KRFD3-1000HJ**
13	20	14	22300	12900	2270	1310	0.14~0.48	12.6	●**KRFD4-1000HJ**
15.2	23	16	34800	20400	3550	2080	0.16~0.53	17.2	●**KRFD5-1000HJ**

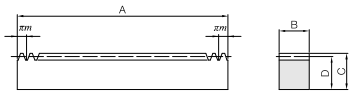
Recommended Mating Pinions

KS- H Hardened Spur Gears

Please see Page 98 for more details.

Hardened Racks

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



RF

Catalog Number	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Allowable force (N)		Allowable force (kgf)	
				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
SRF2-1000H	***m*2**	160		1005.31	20	25	23	3480	2000	355	204
SRF2.5-1000H	***m*2.5**	128		1005.31	25	30	27.5	5440	3160	555	322
SRF3-1000H	***m*3**	106		999.03	30	35	32	7840	4590	799	468
SRF4-1000H	***m*4**	80		1005.31	40	45	41	13900	8310	1420	847
SRF5-1000H	***m*5**	64		1005.31	50	50	45	21800	13200	2220	1340
SRF6-1000H	***m*6**	53		999.03	60	60	54	31400	19200	3200	1960

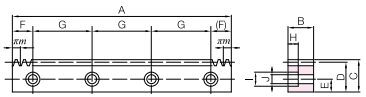
Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Mounting hole dimensions				
				A	B	C	D	E	F	G	No. of holes	Screw size
●**SRFD1.5-1000HJ**	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
●**SRFD2-1000HJ**	***m*2**	160		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**	***m*5**	64		1005.31	50	50	45	20	62.65	220	5	M14
●**SRFD6-1000HJ**	***m*6**	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 calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ The dimensions may vary widely due to hardening. Therefore, the total composite error is assumed to be excluded from this accuracy standard.
④ There is a decarburized layer (about 0.5 mm) on the surface of the extruded products. The hardness of the decarburized layer, excluding the tooth surface, is (187 HB or less).

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm). Please use wire EDM or other carbide tools to modify the length.

[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Black oxide is NOT re-applied after the secondary operation of adding mounting holes.

J Series



RD

Backlash (mm)	Weight (kg)	Catalog Number
0.05~0.29	2.18	**SRF1.5-1000H**
0.07~0.32	3.63	**SRF2-1000H**
0.09~0.35	5.43	**SRF2.5-1000H**
0.10~0.39	7.53	**SRF3-1000H**
0.14~0.46	12.9	**SRF4-1000H**
0.16~0.51	17.8	**SRF5-1000H**
0.18~0.58	25.4	**SRF6-1000H**

Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
H	I	J	Bending strength	Surface durability	Bending strength	Surface durability			
6	10	6	1960	1110	200	113	0.05~0.29	2.14	●**SRFD1.5-1000HJ**
7	11	7	3480	2000	355	204	0.07~0.32	3.58	●**SRFD2-1000HJ**
8.6	14	9	5440	3160	555	322	0.09~0.35	5.31	●**SRFD2.5-1000HJ**
10.8	17.5	11	7840	4590	799	468	0.10~0.39	7.32	●**SRFD3-1000HJ**
13	20	14	13900	8310	1420	847	0.14~0.46	12.6	●**SRFD4-1000HJ**
15.2	23	16	21800	13200	2220	1340	0.16~0.51	17.2	●**SRFD5-1000HJ**
17.5	26	18	31400	19200	3200	1960	0.18~0.58	24.6	●**SRFD6-1000HJ**

Recommended Mating Pinions

SS-H Hardened Spur Gears

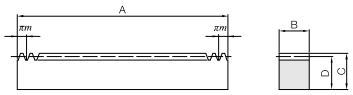
Please see Page 104 for more details.

SRF-HL/SRFD-HL Module 1.5~6

Laser Hardened Racks

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 to 65HRC
Surface treatment	Black oxide coating

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



RF

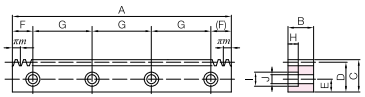
Catalog Number	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)
SRF1.5-1000HL		212		999.03									2.18
SRF1.5-1500HL	***m*1.5**	320		1507.96	15	20	18.5	2160	961	220	98.0	0.09~0.25	3.28
SRF1.5-2000HL		435		2049.88									4.47
SRF2-1000HL		160		1005.31									3.63
SRF2-1500HL	***m*2**	240		1507.96	20	25	23	3830	1730	391	177	0.11~0.28	5.45
SRF2-2000HL		326		2048.31									7.40
SRF2.5-1000HL		128		1005.31									5.43
SRF2.5-1500HL	***m*2.5**	192		1507.96	25	30	27.5	5990	2740	611	280	0.13~0.31	8.14
SRF2.5-2000HL		261		2049.88									11.1
SRF3-1000HL		106		999.03									7.53
SRF3-1500HL	***m*3**	160	RF	1507.96	30	35	32	8620	3990	879	407	0.14~0.35	11.4
SRF3-2000HL		217		2045.17									15.4
SRF4-1000HL		80		1005.31									12.9
SRF4-1500HL	***m*4**	120		1507.96	40	45	41	15300	7220	1560	736	0.18~0.42	19.4
SRF4-2000HL		163		2048.31									26.4
SRF5-1000HL		64		1005.31									17.8
SRF5-1500HL	***m*5**	96		1507.96	50	50	45	24000	11400	2440	1170	0.20~0.47	26.6
SRF5-2000HL		130		2042.04									36.1
SRF6-1000HL		53		999.03									25.4
SRF6-1500HL	***m*6**	80		1507.96	60	60	54	34500	16700	3520	1700	0.22~0.54	38.4
SRF6-2000HL		108		2035.75									51.8

Catalog Number ● : 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 holes	Screw size
●**SRFD1.5-1000HLJ**		212		999.03					49.51	180	6	
●**SRFD1.5-1500HLJ**	***m*1.5**	320		1507.96	15	20	18.5	8	33.98	180	9	M5
●**SRFD1.5-2000HLJ**		435		2049.88					34.94	180	12	
●**SRFD2-1000HLJ**		160		1005.31					52.65	180	6	
●**SRFD2-1500HLJ**	***m*2**	240		1507.96	20	25	23	10	33.98	180	9	M6
●**SRFD2-2000HLJ**		326		2048.31					34.15	180	12	
●**SRFD2.5-1000HLJ**		128		1005.31					52.65	180	6	
●**SRFD2.5-1500HLJ**	***m*2.5**	192		1507.96	25	30	27.5	12	33.98	180	9	M8
●**SRFD2.5-2000HLJ**		261		2049.88					34.94	180	12	
●**SRFD3-1000HLJ**		106		999.03					49.51	180	6	
●**SRFD3-1500HLJ**	***m*3**	160	RD	1507.96	30	35	32	14	33.98	180	9	M10
●**SRFD3-2000HLJ**		217		2045.17					32.58	180	12	
●**SRFD4-1000HLJ**		80		1005.31					52.65	180	6	
●**SRFD4-1500HLJ**	***m*4**	120		1507.96	40	45	41	18	33.98	180	9	M12
●**SRFD4-2000HLJ**		163		2048.31					34.15	180	12	
●**SRFD5-1000HLJ**		64		1005.31					62.65	220	5	
●**SRFD5-1500HLJ**	***m*5**	96		1507.96	50	50	45	20	93.98	220	7	M14
●**SRFD5-2000HLJ**		130		2042.04					31.02	220	10	
●**SRFD6-1000HLJ**		53		999.03					59.51	220	5	
●**SRFD6-1500HLJ**	***m*6**	80		1507.96	60	60	54	23	93.98	220	7	M16
●**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 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ There is a decarburized layer (about 0.5 mm) on the surface of the extruded products. The hardness of the decarburized layer, excluding the tooth surface, is (187 HB or less).

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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



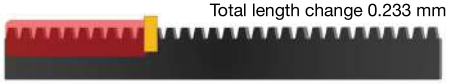
RD

* 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

Total length change 0.233 mm



With laser hardening

Total length change 0.019 mm

* 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 104 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	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
6	10	6	2160	961	220	98.0	0.09~0.25	2.14 3.23 4.40	●**SRFD1.5-1000HLJ** ●**SRFD1.5-1500HLJ** ●**SRFD1.5-2000HLJ**
7	11	7	3830	1730	391	177	0.11~0.28	3.58 5.36 7.29	●**SRFD2-1000HLJ** ●**SRFD2-1500HLJ** ●**SRFD2-2000HLJ**
8.6	14	9	5990	2740	611	280	0.13~0.31	5.31 7.97 10.8	●**SRFD2.5-1000HLJ** ●**SRFD2.5-1500HLJ** ●**SRFD2.5-2000HLJ**
10.8	17.5	11	8620	3990	879	407	0.14~0.35	7.32 11.1 15.0	●**SRFD3-1000HLJ** ●**SRFD3-1500HLJ** ●**SRFD3-2000HLJ**
13	20	14	15300	7220	1560	736	0.18~0.42	12.6 18.8 25.6	●**SRFD4-1000HLJ** ●**SRFD4-1500HLJ** ●**SRFD4-2000HLJ**
15.2	23	16	24000	11400	2440	1170	0.20~0.47	17.2 25.9 35.0	●**SRFD5-1000HLJ** ●**SRFD5-1500HLJ** ●**SRFD5-2000HLJ**
17.5	26	18	34500	16700	3520	1700	0.22~0.54	24.6 37.2 50.2	●**SRFD6-1000HLJ** ●**SRFD6-1500HLJ** ●**SRFD6-2000HLJ**

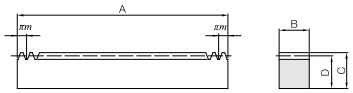
[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Black oxide is NOT re-applied after the secondary operation of adding mounting holes.

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

Thermal Refined Racks

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 to 352HB
Surface treatment	Black oxide coating

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



RF

Catalog Number	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
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
KRF2-500 **KRF2-1000**	***m*2**	80 160		502.65 1005.31	20	25	23	6130	1760	625	179
KRF2.5-500 **KRF2.5-1000**	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	9580	2810	977	287
KRF3-500 **KRF3-1000**	***m*3**	53 106		499.51 999.03	30	35	32	13800	4120	1410	421
KRF4-500 **KRF4-1000**	***m*4**	40 80		502.65 1005.31	40	45	41	24500	7530	2500	768
KRF5-500 **KRF5-1000**	***m*5**	32 64		502.65 1005.31	50	50	45	38300	12000	3910	1220

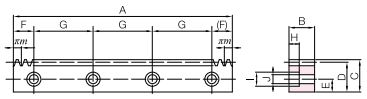
Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of holes	Screw size
●**KRFD1.5-500J** ●**KRFD1.5-1000J**	***m*1.5**	106 212	RD	499.51 999.03	15	20	18.5	8	24.76 49.51	150 180	4 6	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

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ There is a decarburized layer (about 0.5 mm) on the surface of the extruded products. The hardness of the decarburized layer, excluding the tooth surface, is (187 HB or less).

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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 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, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Black oxide is NOT re-applied after the secondary operation of adding mounting holes.

J Series



RD

Backlash (mm)	Weight (kg)	Catalog Number
0.09~0.27	1.09 2.18	**KRF1.5-500** **KRF1.5-1000**
0.11~0.30	1.82 3.63	**KRF2-500** **KRF2-1000**
0.13~0.33	2.71 5.43	**KRF2.5-500** **KRF2.5-1000**
0.14~0.37	3.76 7.53	**KRF3-500** **KRF3-1000**
0.18~0.44	6.47 12.9	**KRF4-500** **KRF4-1000**
0.20~0.49	8.88 17.8	**KRF5-500** **KRF5-1000**

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	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
6	10	6	3450	953	352	97.2	0.09~0.27	1.07 2.14	●**KRFD1.5-500J** ●**KRFD1.5-1000J**
7	11	7	6130	1760	625	179	0.11~0.30	1.78 3.58	●**KRFD2-500J** ●**KRFD2-1000J**
8.6	14	9	9580	2810	977	287	0.13~0.33	2.64 5.31	●**KRFD2.5-500J** ●**KRFD2.5-1000J**
10.8	17.5	11	13800	4120	1410	421	0.14~0.37	3.63 7.32	●**KRFD3-500J** ●**KRFD3-1000J**
13	20	14	24500	7530	2500	768	0.18~0.44	6.21 12.6	●**KRFD4-500J** ●**KRFD4-1000J**
15.2	23	16	38300	12000	3910	1220	0.20~0.49	8.56 17.2	●**KRFD5-500J** ●**KRFD5-1000J**

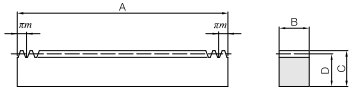
Recommended Mating Pinions

KS Thermal Refined Spur Gears

Please see Page 98 for more details.

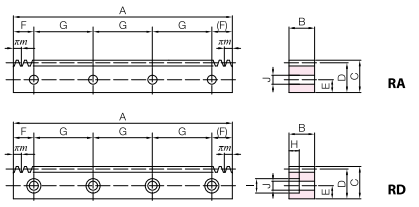
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than HB210)
Surface treatment	Black oxide coating

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



RF

J Series



Catalog Number	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	Backlash (mm)	Weight (kg)	Catalog Number
SRAF1.5-1000	***m*1.5**	212	RF	999.03	15	15	13.5	2160	421	220	42.9	0.09~0.25	1.59	**SRAF1.5-1000**
SRAF2-1000	***m*2**	160		1005.31	20	20	18	3830	775	391	79.0	0.11~0.28	2.84	**SRAF2-1000**
SRAF2.5-1000	***m*2.5**	128		1005.31	25	25	22.5	5990	1240	611	127	0.13~0.31	4.44	**SRAF2.5-1000**
SRAF3-1000	***m*3**	106		999.03	30	30	27	8620	1820	879	186	0.14~0.35	6.35	**SRAF3-1000**
SRAF4-1000	***m*4**	80		1005.31	40	40	36	15300	3330	1560	339	0.18~0.42	11.4	**SRAF4-1000**
SRAF1.5-2000	***m*1.5**	435		2049.88	17	17	15.5	2443	421	249	43	0.09~0.25	4.24	**SRAF1.5-2000**
SRAF2-2000	***m*2**	326		2048.31	20	20	18	3833	775	391	79	0.11~0.28	5.79	**SRAF2-2000**
SRAF2.5-2000	***m*2.5**	261		2049.88	25	25	22.5	5989	1241	611	127	0.13~0.31	9.05	**SRAF2.5-2000**
SRAF3-2000	***m*3**	217		2045.17	30	30	27	8624	1821	879	186	0.14~0.35	13.0	**SRAF3-2000**

Catalog Number ● : 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 holes	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	Backlash (mm)	Weight (kg)	Catalog Number ● : 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	0.09~0.25	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	0.11~0.28	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	0.13~0.31	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	0.14~0.35	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	0.18~0.42	11.0	●**SRAFD4-1000J**

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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 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, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Black oxide is NOT re-applied after the secondary operation of adding mounting holes.

Recommended Mating Pinions

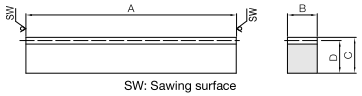
SS Spur Gears

Please see Page 102 for more details.

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

SR Module 0.5~10 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 HB210)
Surface treatment	Black oxide coating



SW: Sawing surface

R1

Catalog Number	Module	Effective number 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	Backlash (mm)	Weight (kg)
SR0.5-100	***m*0.5**	62	R1	101	5	12	11.5	240	39.6	24.4	4.04	0.00~0.13	0.046
SR0.8-100	***m*0.8**	38		101	8	12.3	11.5	613	108	62.5	11.0	0.00~0.14	0.073
SR1-100		29		98									0.085
SR1-300	***m*1**	94		303	10	12	11	958	177	97.7	18.0	0.04~0.21	0.26
SR1-500		159		505									0.44
SR1.5-100		20		101									0.22
SR1.5-300	***m*1.5**	62		303	15	20	18.5	2160	421	220	42.9	0.09~0.25	0.66
SR1.5-500		105		505									1.10
SR2-100		14		98									0.35
SR2-300	***m*2**	46		303	20	25	23	3830	775	391	79.0	0.11~0.28	1.09
SR2-500		79		505									1.82
SR2.5-100		11		100									0.54
SR2.5-300	***m*2.5**	37		303	25	30	27.5	5990	1240	611	127	0.13~0.31	1.64
SR2.5-500		63		505									2.73
SR3-100		9		101									0.76
SR3-300	***m*3**	30		303	30	35	32	8620	1820	879	186	0.14~0.35	2.28
SR3-500		52		505									3.81
SR4-100	***m*4**	6		98	40	45	41	15300	3330	1560	339	0.18~0.42	1.26
SR4-500		39		505									6.50
SR5-110	***m*5**	5		108	50	50	45	24000	5300	2440	540	0.20~0.47	1.91
SR5-500		31		505									8.92
SR6-110	***m*6**	4		111	60	60	54	34500	7740	3520	789	0.22~0.54	2.82
SR6-500		25		505									12.8
SR8-130	***m*8**	3		123	75	75	67	44200	10400	4510	1060	0.28~0.63	4.85
SR10-160	***m*10**	3		155	90	80	70	66300	16100	6770	1640	0.33~0.70	7.67

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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 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.

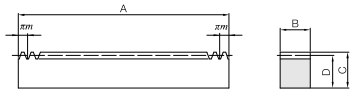
Recommended Mating Pinions

SS Spur Gears

Please see Page 102 for more details.

SRF Module 0.5~10 Steel 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 HB210)
Surface treatment	Black oxide coating



RF

Catalog Number	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	Backlash (mm)	Weight (kg)
SRF0.5-300	***m*0.5**	191	RF	300.02	5	12	11.5	240	39.6	24.4	4.04	0.00~0.13	0.14
SRF0.8-300	***m*0.8**	119		299.08	8	12.3	11.5	613	108	62.5	11.0	0.00~0.14	0.22
SRF1-300		96		301.59									0.26
SRF1-500	***m*1**	159		499.51	10	12	11	958	177	97.7	18.0	0.04~0.21	0.43
SRF1-1000		318		999.03									0.86
SRF1.5-300		64		301.59									0.66
SRF1.5-500		106		499.51									1.09
SRF1.5-1000	***m*1.5**	212		999.03	15	20	18.5	2160	421	220	42.9	0.09~0.25	2.18
SRF1.5-1500		320		1507.96									3.28
SRF1.5-2000		435		2049.88									4.47
SRF2-300		48		301.59									1.09
SRF2-500		80		502.65									1.82
SRF2-1000	***m*2**	160		1005.31	20	25	23	3830	775	391	79.0	0.11~0.28	3.63
SRF2-1500		240		1507.96									5.45
SRF2-2000		326		2048.31									7.40
SRF2.5-300		38		298.45									1.61
SRF2.5-500		64		502.65									2.71
SRF2.5-1000	***m*2.5**	128		1005.31	25	30	27.5	5990	1240	611	127	0.13~0.31	5.43
SRF2.5-1500		192		1507.96									8.14
SRF2.5-2000		261		2049.88									11.1
SRF3-300		32		301.59									2.27
SRF3-500		53		499.51									3.76
SRF3-1000	***m*3**	106		999.03	30	35	32	8620	1820	879	186	0.14~0.35	7.53
SRF3-1500		160		1507.96									11.4
SRF3-2000		217		2045.17									15.4
SRF4-500		40		502.65									6.47
SRF4-1000	***m*4**	80		1005.31	40	45	41	15300	3330	1560	339	0.18~0.42	12.9
SRF4-1500		120		1507.96									19.4
SRF4-2000		163		2048.31									26.4
SRF5-500		32		502.65									8.88
SRF5-1000	***m*5**	64		1005.31	50	50	45	24000	5300	2440	540	0.20~0.47	17.8
SRF5-1500		96		1507.96									26.6
SRF5-2000		130		2042.04									36.1
SRF6-500		26		490.09									12.5
SRF6-1000	***m*6**	53		999.03	60	60	54	34500	7740	3520	789	0.22~0.54	25.4
SRF6-1500		80		1507.96									38.4
SRF6-2000		108		2035.75									51.8
SRF8-500	***m*8**	20		502.66	75	75	67	44200	10400	4510	1060	0.28~0.63	19.8
SRF8-1000		40		1005.31									39.7
SRF10-1000	***m*10**	32		1005.31	90	80	70	66300	16100	6770	1640	0.33~0.70	49.7

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.

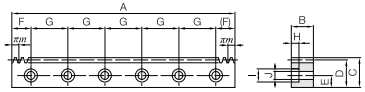
[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② If gear tooth hardening, or thermal refining, is applied, the decarburization layer (approx. 0.5 mm thickness) on the rectangular surfaces cannot have the hardness you designate.

SRFD/SRFK Module 0.5~6

Steel Racks with Bolt Holes

Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	–
Tooth hardness	(less than HB210)
Surface treatment	Black oxide coating

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



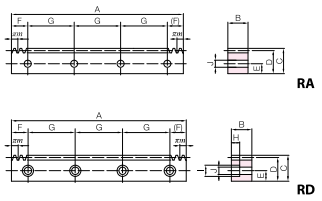
Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of holes	Screw size
●SRFK0.5-300J	m0.5	191	RA	300.02	5	12	11.5	5.5	15.01	90	4	M3
●SRFK0.8-300J	m0.8	119	RA	299.08	8	12.3	11.5	5.5	14.54	90	4	M4
●SRFK1-300J	m1	96	RA	301.59	10	12	11	5	20.80	130	3	M4
●SRFK1-500J	m1	159	RA	499.51	10	12	11	5	24.76	150	4	M4
●SRFD1.5-300J	m1.5	64	RD	301.59	15	20	18.5	8	20.80	130	3	M5
●SRFD1.5-500J	m1.5	106	RD	499.51	15	20	18.5	8	24.76	150	4	M5
SRFD1.5-1000	m1.5	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
SRFD1.5-1500	m1.5	320	RD	1507.96	15	20	18.5	8	33.98	180	9	M5
SRFD1.5-2000	m1.5	435	RD	2049.88	15	20	18.5	8	34.94	180	12	M5
●SRFD2-300J	m2	48	RD	301.59	20	25	23	10	20.80	130	3	M6
●SRFD2-500J	m2	80	RD	502.65	20	25	23	10	26.33	150	4	M6
SRFD2-1000	m2	160	RD	1005.31	20	25	23	10	52.65	180	6	M6
SRFD2-1500	m2	240	RD	1507.96	20	25	23	10	33.98	180	9	M6
SRFD2-2000	m2	326	RD	2048.31	20	25	23	10	34.15	180	12	M6
●SRFD2.5-300J	m2.5	38	RD	298.45	25	30	27.5	12	19.23	130	3	M8
●SRFD2.5-500J	m2.5	64	RD	502.65	25	30	27.5	12	26.33	150	4	M8
SRFD2.5-1000	m2.5	128	RD	1005.31	25	30	27.5	12	52.65	180	6	M8
SRFD2.5-1500	m2.5	192	RD	1507.96	25	30	27.5	12	33.98	180	9	M8
SRFD2.5-2000	m2.5	261	RD	2049.88	25	30	27.5	12	34.94	180	12	M8
●SRFD3-300J	m3	32	RD	301.59	30	35	32	14	20.80	130	3	M10
●SRFD3-500J	m3	53	RD	499.51	30	35	32	14	24.76	150	4	M10
SRFD3-1000	m3	106	RD	999.03	30	35	32	14	49.51	180	6	M10
SRFD3-1500	m3	160	RD	1507.96	30	35	32	14	33.98	180	9	M10
SRFD3-2000	m3	217	RD	2045.17	30	35	32	14	32.58	180	12	M10
●SRFD4-500J	m4	40	RD	502.65	40	45	41	18	26.33	150	4	M12
SRFD4-1000	m4	80	RD	1005.31	40	45	41	18	52.65	180	6	M12
SRFD4-1500	m4	120	RD	1507.96	40	45	41	18	33.98	180	9	M12
SRFD4-2000	m4	163	RD	2048.31	40	45	41	18	34.15	180	12	M12
●SRFD5-500J	m5	32	RD	502.65	50	50	45	20	31.33	220	3	M14
SRFD5-1000	m5	64	RD	1005.31	50	50	45	20	62.65	220	5	M14
SRFD5-1500	m5	96	RD	1507.96	50	50	45	20	93.98	220	7	M14
SRFD5-2000	m5	130	RD	2042.04	50	50	45	20	31.02	220	10	M14
●SRFD6-500J	m6	26	RD	490.09	60	60	54	23	25.04	220	3	M16
SRFD6-1000	m6	53	RD	999.03	60	60	54	23	59.51	220	5	M16
SRFD6-1500	m6	80	RD	1507.96	60	60	54	23	93.98	220	7	M16
SRFD6-2000	m6	108	RD	2035.75	60	60	54	23	27.88	220	10	M16

[Caution on Product Characteristics]
① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
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 221.

[Caution on Secondary Operations]
① Please read "Cautions on Performing Secondary Operations" (Page 220) 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 hardening Racks with bolt holes, due to deformation occurring at the mounting hole and the difficulty of straightening the rack after hardening.

[Caution on J series]
① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Black oxide is NOT re-applied after the secondary operation of adding mounting holes.

J Series



Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Surface durability	Allowable force (kgf) Bending strength	Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
—	—	3.4	240	39.6	24.4	4.04	0.00~0.13	0.13	●SRFK0.5-300J
—	—	4.5	613	108	62.5	11.0	0.00~0.14	0.21	●SRFK0.8-300J
—	—	4.5	958	177	97.7	18.0	0.04~0.21	0.26	●SRFK1-300J
								0.43	●SRFK1-500J
6	10	6	2160	421	220	42.9	0.09~0.25	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	0.11~0.28	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	0.13~0.31	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	0.14~0.35	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	0.18~0.42	6.21	●SRFD4-500J
								12.6	SRFD4-1000
								18.8	SRFD4-1500
								25.6	SRFD4-2000
15.2	23	16	24000	5300	2440	540	0.20~0.47	8.56	●SRFD5-500J
								17.2	SRFD5-1000
								25.9	SRFD5-1500
								35.0	SRFD5-2000
17.5	26	18	34500	7740	3520	789	0.22~0.54	12.0	●SRFD6-500J
								24.6	SRFD6-1000
								37.2	SRFD6-1500
								50.2	SRFD6-2000

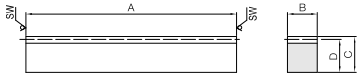
Recommended Mating Pinions

SS Spur Gears

Please see Page 102 for more details.

Stainless Steel Racks

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



SW: Sawing surface

R1

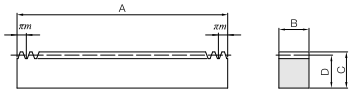
Catalog Number	Module	Effective number of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Allowable force (N)		Allowable force (kgf)	
				A	B	C	D	Bending strength	Surface durability	Bending strength	Surface durability
SUR1-500	***m*1**	159	R1	505	10	12	11	457	99.4	46.6	10.1
SUR1.5-500	***m*1.5**	105			15	20	18.5	1030	237	105	24.2
SUR2-500	***m*2**	79			20	25	23	1830	436	187	44.5
SUR2.5-500	***m*2.5**	63			25	30	27.5	2860	698	292	71.2
SUR3-500	***m*3**	52			30	35	32	4120	1030	420	105
SUR4-500	***m*4**	39			40	45	41	7320	1870	746	191

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

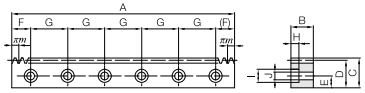
Catalog Number	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Mounting hole dimensions				
				A	B	C	D	E	F	G	No. of holes	Screw size
SURFD1.5-1000	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
SURFD2-1000	***m*2**	160		1005.31	20	25	23	10	52.65			M6
SURFD2.5-1000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

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ The stainless steel material is given ˋsolution treatment and ¨passivation. Passivation improves the anti-rust performance, but it is not effective on the processed surface of the product. Note that this product is not completely rustproof.
ˋSolution treatment
Heat treatment required to maintain the corrosion resistance of austenitic stainless steel
¨Passivation
Pickled (nitric hydrofluoric acid) 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 “Cautions on Performing Secondary Operations” (Page 220) 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.



RF



RD

Backlash (mm)	Weight (kg)	Catalog Number
0.04~0.23	0.43	**SUR1-500**
0.09~0.27	1.09	**SUR1.5-500**
0.11~0.30	1.81	**SUR2-500**
0.13~0.33	2.71	**SUR2.5-500**
0.14~0.37	3.79	**SUR3-500**
0.18~0.44	6.47	**SUR4-500**

Backlash (mm)	Weight (kg)	Catalog Number
0.09~0.27	2.17	**SURF1.5-1000**
0.11~0.30	3.61	**SURF2-1000**
0.13~0.33	5.40	**SURF2.5-1000**
0.14~0.37	7.49	**SURF3-1000**
0.18~0.44	12.9	**SURF4-1000**

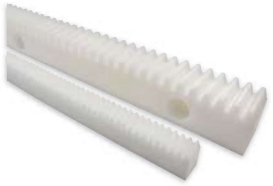
Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number
H	I	J	Bending strength	Surface durability	Bending strength	Surface durability			
6	10	6	1030	237	105	24.2	0.09~0.27	2.13	**SURFD1.5-1000**
7	11	7	1830	436	187	44.5	0.11~0.30	3.56	**SURFD2-1000**
8.6	14	9	2860	698	292	71.2	0.13~0.33	5.29	**SURFD2.5-1000**
10.8	17.5	11	4120	1030	420	105	0.14~0.37	7.28	**SURFD3-1000**
13	20	14	7320	1870	746	191	0.18~0.44	12.5	**SURFD4-1000**

Recommended Mating Pinions

SUS/SUSA Stainless Steel Spur Gears

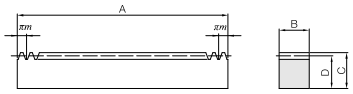
Please see Page 154 for more details.

Plastic Racks



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

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



RF

Catalog Number	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	Backlash (mm)	Weight (kg)
DRF1-500	***m*1**	159	RF	499.51	10	12	11	80.7	8.23	0.15~0.36	0.077
DRF1.5-500 **DRF1.5-1000**	***m*1.5**	106 212		499.51 999.03	15	20	18.5	182	18.5	0.18~0.39	0.20 0.39
DRF2-500 **DRF2-1000**	***m*2**	80 160		502.65 1005.31	20	25	23	323	32.9	0.21~0.42	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	0.23~0.46	0.49 0.98
DRF3-500 **DRF3-1000**	***m*3**	53 106		499.51 999.03	30	35	32	726	74.1	0.28~0.52	0.68 1.35

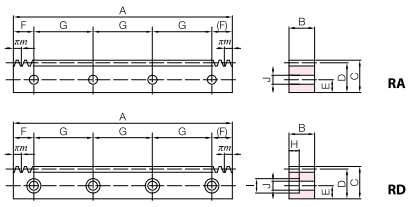
Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of holes	Screw size
●**DRFK1-500J**	***m*1**	159	RA	499.51	10	12	11	5	24.76	150	4	M4
●**DRFD1.5-500J** ●**DRFD1.5-1000J**	***m*1.5**	106 212	RD	499.51 999.03	15	20	18.5	8	24.76 49.51	150 180	4 6	M5
●**DRFD2-500J** ●**DRFD2-1000J**	***m*2**	80 160		502.65 1005.31	20	25	23	10	26.33 52.65	150 180	4 6	M6
●**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
●**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

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ Boiling sterilization is not required when using this product in food machines. Note that POM plastic complies with the Food Sanitation Law of the US Food and Drug Administration (FDA), and boiling or exposing it to steam will cause the material to be damaged.

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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 Plastic racks 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 machine the mounting holes at the same time as the mounting sections when connecting several racks together.

[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.

J Series



Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (kgf) Bending strength	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
—	—	4.5	80.7	8.23	0.15~0.36	0.077	●**DRFK1-500J**
6	10	6	182	18.5	0.18~0.39	0.19 0.38	●**DRFD1.5-500J** ●**DRFD1.5-1000J**
7	11	7	323	32.9	0.21~0.42	0.32 0.64	●**DRFD2-500J** ●**DRFD2-1000J**
8.6	14	9	504	51.4	0.23~0.46	0.47 0.95	●**DRFD2.5-500J** ●**DRFD2.5-1000J**
10.8	17.5	11	726	74.1	0.28~0.52	0.65 1.31	●**DRFD3-500J** ●**DRFD3-1000J**

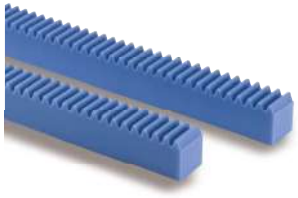
Recommended Mating Pinions

SUS/SUSA Stainless Steel Spur Gears

Please see Page 154 for more details.

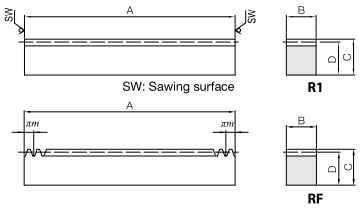
PR/PRF Module 1~3

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 to 120HRR)

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



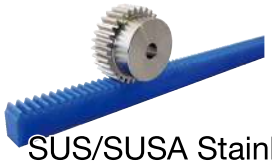
Catalog Number	Module	Effective number of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (kgf) Bending strength	Backlash (mm)	Weight (kg)
PR1-500	***m*1**	159	R1	505	10	12	11	92.8	9.46	0.18~0.39	0.064
PR1.5-500	***m*1.5**	105			15	20	18.5	209	21.3	0.21~0.42	0.16
PR2-500	***m*2**	79			20	25	23	371	37.9	0.24~0.45	0.27
PR2.5-500	***m*2.5**	63			25	30	27.5	580	59.2	0.26~0.49	0.40
PR3-500	***m*3**	52			30	35	32	835	85.2	0.32~0.56	0.56

Catalog Number	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	Backlash (mm)	Weight (kg)
PRF1.5-1000	***m*1.5**	212	RF	999.03	15	20	18.5	209	21.3	0.21~0.42	0.32
PRF2-1000	***m*2**	160		1005.31	20	25	23	371	37.9	0.24~0.45	0.54
PRF2.5-1000	***m*2.5**	128		1005.31	25	30	27.5	580	59.2	0.26~0.49	0.80
PRF3-1000	***m*3**	106		999.03	30	35	32	835	85.2	0.32~0.56	1.11

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ These plastic racks expand and contract depending on the temperature and humidity. The total length changes by 0.45 mm per 1 m when the temperature changes by 10°C, and about 5 mm with water absorption of 2%.
Please see the section “Design of Plastic Gears” in our separate technical reference book.
④ The product may bend by several millimeters due to aging, but if it is attached with the gear cutting reference face (tooth root) in close contact with the mounting surface, it can be used with the gear accuracy of gear cutting.

[Caution on Secondary Operations] ① Please read “Cautions on Performing Secondary Operations” (Page 220) 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 Plastic racks 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 machine the mounting holes at the same time as the mounting sections when connecting several racks together.

Recommended Mating Pinions



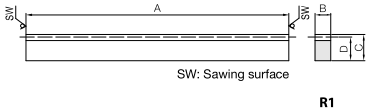
SUS/SUSA Stainless Steel Spur Gears

Please see Page 154 for more details.

BSR Module 0.5, 0.8, 1

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	(80HV or more)



Catalog Number	Module	Effective number 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	Backlash (mm)	Weight (kg)
BSR0.5-300	***m*0.5**	190	R1	303	3	9	8.5	28.7	—	2.93	—	0.00~0.13	0.066
BSR0.8-300	***m*0.8**	118			4	10	9.2	61.3	—	6.25	—	0.00~0.14	0.095
BSR1-300	***m*1**	94			6	10	9	115	—	11.7	—	0.04~0.21	0.14

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.

[Caution on Secondary Operations] ① Please read “Cautions on Performing Secondary Operations” (Page 220) 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.

Recommended Mating Pinions

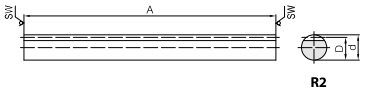
BSS Spur Gears

Please see Page 186 for more details.

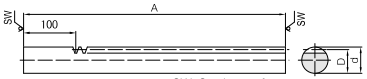
SRO/SROS Module 1~5

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 HB210)
Surface treatment	Black oxide coating



R2



SW: Sawing surface

R7

Catalog Number	Module	Effective number 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	Backlash (mm)	Weight (kg)
SRO1-500	***m*1**	159	R2	505	10	9	800	121	81.6	12.3	0.04~0.21	0.29
SRO1.5-500	***m*1.5**	105		505	15	13.5	1800	288	184	29.3	0.09~0.25	0.65
SRO2-500	***m*2**	79		505	20	18	3200	530	326	54.0	0.11~0.28	1.16
SRO2-1000		159		1010								2.31
SRO2.5-500	***m*2.5**	63		505	25	22.5	5000	848	510	86.5	0.13~0.31	1.81
SRO2.5-1000		127		1010								3.61
SRO3-500	***m*3**	52		505	30	27	7200	1240	735	127	0.14~0.35	2.60
SRO3-1000		105		1010								5.20
SRO4-500	***m*4**	39		505	40	36	12800	2270	1310	232	0.18~0.42	4.62
SRO4-1000		79		1010								9.24
SRO5-1000	***m*5**	63		1010	50	45	20000	3620	2040	369	0.20~0.47	14.4

Catalog Number	Module	Effective number 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	Backlash (mm)	Weight (kg)
SROS1-500	***m*1**	128	R7	505	10	9	800	121	81.6	12.3	0.04~0.21	0.29
SROS1.5-500	***m*1.5**	85			15	13.5	1800	288	184	29.3	0.09~0.25	0.66
SROS2-500	***m*2**	64			20	18	3200	530	326	54.0	0.11~0.28	1.17
SROS2.5-500	***m*2.5**	51			25	22.5	5000	848	510	86.5	0.13~0.31	1.83
SROS3-500	***m*3**	42			30	27	7200	1240	735	127	0.14~0.35	2.64

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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 hardening round racks, due to twisting and deformation occurring and the difficulty of straightening the rack after hardening.

Recommended Mating Pinions

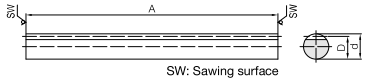
SS Spur Gears

Please see Page 102 for more details.

SURO Module 1~3

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

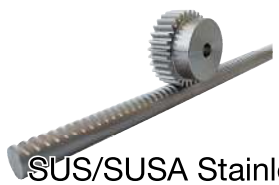
R2

Catalog Number	Module	Effective number 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	Backlash (mm)	Weight (kg)
SURO1-500	***m*1**	159	R2	505	10	9	382	67.9	39.0	6.93	0.04~0.23	0.29
SURO1.5-500	***m*1.5**	105		505	15	13.5	859	162	87.6	16.5	0.09~0.27	0.65
SURO2-500	***m*2**	79		505	20	18	1530	298	156	30.4	0.11~0.30	1.15
SURO2-1000		159		1010								2.30
SURO2.5-500	***m*2.5**	63		505	25	22.5	2390	477	243	48.7	0.13~0.33	1.79
SURO2.5-1000		127		1010								3.59
SURO3-500	***m*3**	52		505	30	27	3440	700	351	71.4	0.14~0.37	2.58
SURO3-1000		105		1010								5.17

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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.

Recommended Mating Pinions



SUS/SUSA Stainless Steel Spur Gears

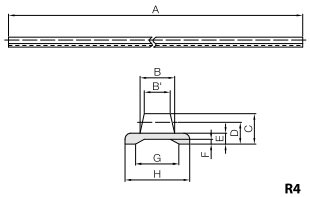
Please see Page 154 for more details.

DR Module 0.8, 1, 1.5, 2

Molded Flexible Racks

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

* "Duracon (R)" is a registered trademark of Polyplastics Co., Ltd. in Japan as well as other countries.



R4

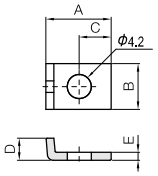
Catalog Number	Module	Shape	Total Length	Face width	Face width	Height	Height to pitch line	Base thickness	Base groove depth	Base groove width	Base width
			A	B	B'	C	D	E	F	G	H
DR0.8-2000	***m*0.8**	R4	2000	3.8	3	3.3	2.5	1.5	0.7	3.7	8
DR1-2000	***m*1**			5	4	4.3	3.3	2	0.9	4.9	10
DR1.5-2000	***m*1.5**			6.5	5	5.7	4.2	2.3	1	8	12
DR2-2000	***m*2**			8	6	7	5	2.5	1.1	10.1	15

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② When using the nylon flexible rack in an arc, the minimum bending radius (R) is 150 mm for both the external and internal teeth. This increases the pitch errors and tooth profile errors which prevent the teeth from meshing at the normal center distance, so be sure to make adjustments before use.
③ It cannot be used where positioning accuracy is required.
④ For the dimensional accuracy of each part, see the dimensional tolerance of molded items in the separate table. For total length, the dimensional accuracy is ±10 mm.

DR dedicated SRS

Rack Clamps

Installation image



T7

■ Material: SPCC trivalent chromate finish

Catalog Number	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		11.4		5.6	3.9	1.4		2.52

[Caution on Product Characteristics] ① M4 x 12 pan head machine screws with cross holes are included.
② The listed price includes 10 clamps and 10 machine screws.

■ Dimensional tolerance of DR / molded item (unit: mm)

Dimensional classification \ Grade	Rough grade
3 or less	±0.20
4 to 6	±0.25
7 to 10	±0.30
11 to 18	±0.35
19 to 30	±0.40
Over 30	±0.50

■ SRS/ARL / Normal dimensional tolerance of bending and drawing (unit: mm)

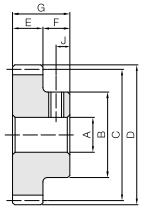
Dimensional classification \ Grade	Grade B
6 or less	±0.30
7 to 30	±0.50
31 to 120	±0.80
120 to 400	±1.20
400 to 1000	±2.00
1000 to 2000	±3.00

SSDR Module 0.8, 1, 1.5, 2

DR 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 Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Socket head 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		6	20	30	32	4	8	12	M4	4
SSDR1.5-20	***m*1.5**	20		6	20	30	33	5	10	15	M4	5
SSDR2-15	***m*2**	15		8	22	30	34	6	10	16	M5	5

[Caution on Product Characteristics] ① For products having a tapped hole, a set screw is included.
② The allowable torques shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 (NOTE 4) for more details.

List of Products for DR Molded Flexible Racks

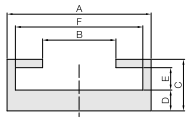
Molded Flexible Racks	Rack Clamps	Slide Rails	Dedicated Pinions
DR0.8-2000	**SRS-1**	**ARL-0.8**	**SSDR0.8-35**
DR1-2000	**SRS-1**	**ARL-1**	**SSDR1-30**
DR1.5-2000	**SRS-2**	**ARL-1.5**	**SSDR1.5-20**
DR2-2000	**SRS-2**	**ARL-2**	**SSDR2-15**

Allowable force (N) Bending strength	Allowable force (kgf) Bending strength	Weight (kg)	Catalog Number
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**

* Molded flexible racks of 2 meters or longer are also available by request as custom-made products.
(Only the length can be changed, up to 50 m)

DR dedicated ARL

Slide Rails



T6

■ Material: Aluminum (A6063S-T5) Overall length: 1,000 mm

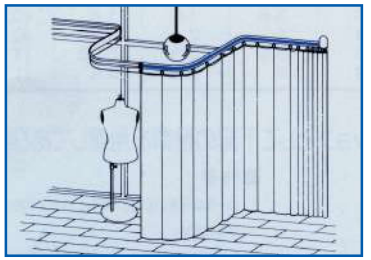
Catalog Number	Shape	A	B	C	D	E	F	Weight (kg)
ARL-0.8	T6	10.3	4.4	4.7	2	1.7	8.3	0.081
ARL-1		12.3	5.6	5.2	2	2.2	10.3	0.096
ARL-1.5		14.3	7.2	5.5	2	2.5	12.3	0.11
ARL-2		17.3	8.8	6.2	2.5	2.7	15.3	0.15

Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Weight (g)	Catalog Number
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**

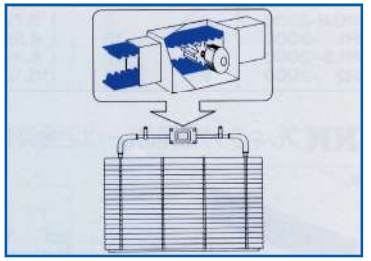
[Caution on Secondary Operations] ① Please read "Caution on Performing Secondary Operations" (Page 40) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.

Applications for DR Molded Flexible Racks

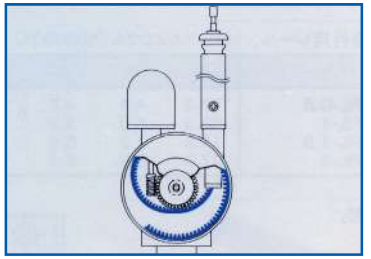
As it is possible to fix the position of the pinion and bend the DR molded flexible racks into any shape, they can be used for special purposes.



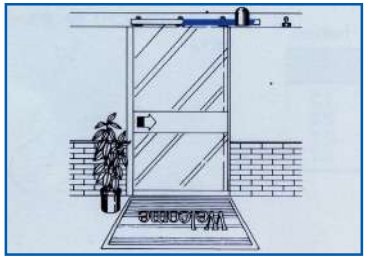
Electric curtain



Electric blinds



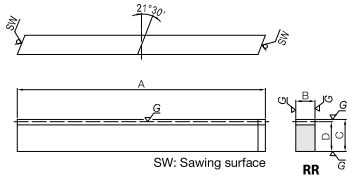
Electric antenna

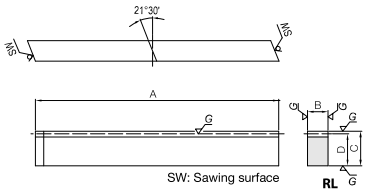


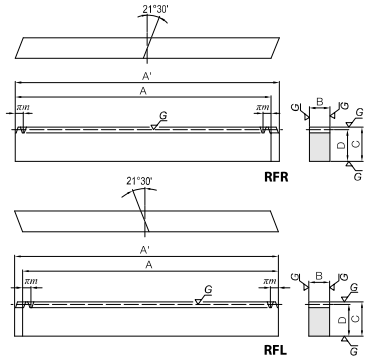
Automatic doors

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 to 352HB

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







Catalog Number	Module	Effective number of teeth	Direction of spiral	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

Catalog Number	Module	No. of teeth	Direction of spiral	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	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability
KRHGF1-500R KRHGF1-500L	***m*1**	159	R L	RFR RFL	499.51	502.66	8	15	14	1290	955	131	97.4
KRHGF1.5-500R KRHGF1.5-500L	***m*1.5**	106	R L	RFR RFL	499.51	504.23	12	20	18.5	2890	2380	295	243
KRHGF2-1000R KRHGF2-1000L	***m*2**	160	R L	RFR RFL	1005.31	1011.61	16	25	23	5140	4230	524	432
KRHGF2.5-1000R KRHGF2.5-1000L	***m*2.5**	128	R L	RFR RFL	1005.31	1013.19	20	30	27.5	8030	6610	819	674
KRHGF3-1000R KRHGF3-1000L	***m*3**	106	R L	RFR RFL	999.03	1008.88	25	35	32	12000	9810	1230	1000

Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Direction of spiral	Shape	Total Length A	Total Length A'	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of 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

[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ Please use the KHG ground helical gear as the mating pinion.
④ These gears produce axial thrust forces. Please see Page 193 for more details.

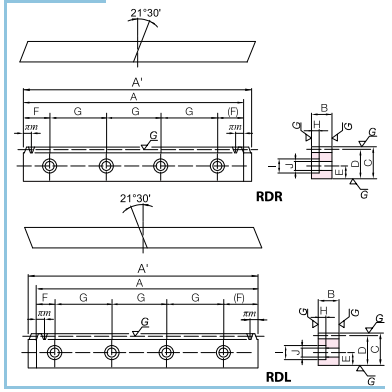
[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) when performing modifications and/or secondary operations for safety concerns.
KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.

[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details. Also, please allow additional shipping time to get to your local distributor.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.

Backlash (mm)	Weight (kg)	Catalog Number
0.05~0.15	0.086	**KRHG1-100R KRHG1-100L**
0.05~0.15	0.18	**KRHG1.5-100R KRHG1.5-100L**
0.06~0.17	0.28	**KRHG2-100R KRHG2-100L**
0.06~0.17	0.43	**KRHG2.5-100R KRHG2.5-100L**
0.06~0.17	0.64	**KRHG3-100R KRHG3-100L**

Backlash (mm)	Weight (kg)	Catalog Number
0.05~0.15	0.44	**KRHGF1-500R KRHGF1-500L**
0.05~0.15	0.87	**KRHGF1.5-500R KRHGF1.5-500L**
0.06~0.17	2.90	**KRHGF2-1000R KRHGF2-1000L**
0.06~0.17	4.34	**KRHGF2.5-1000R KRHGF2.5-1000L**
0.06~0.17	6.27	**KRHGF3-1000R KRHGF3-1000L**

J Series



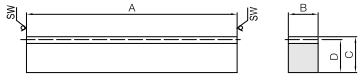
Counterbore dimensions Screw size	H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
M4	4.4	8	4.5	1290	955	131	97.4	0.05~0.15	0.43	●**KRHGFD1-500RJ ●KRHGFD1-500LJ**
M5	6	10	6	2890	2380	295	243	0.05~0.15	0.85	●**KRHGFD1.5-500RJ ●KRHGFD1.5-500LJ**
M6	7	11	7	5140	4230	524	432	0.06~0.17	2.86	●**KRHGFD2-1000RJ ●KRHGFD2-1000LJ**
M8	8.6	14	9	8030	6610	819	674	0.06~0.17	4.24	●**KRHGFD2.5-1000RJ ●KRHGFD2.5-1000LJ**
M10	10.8	17.5	11	12000	9810	1230	1000	0.06~0.17	6.09	●**KRHGFD3-1000RJ ●KRHGFD3-1000LJ**

Recommended Mating Pinions

KHG Ground Helical Gears

Please see Page 194 for more details.

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 HB210)
Surface treatment	Black oxide coating



SW: Sawing surface

R1

Catalog Number	Module	Effective number of teeth	Direction of spiral	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	Backlash (mm)
SRH2-100R SRH2-100L	***m2***	12	R L	RR RL	95	25	25	23	4710	1570	481	160	0.12~0.31
SRH2-500R SRH2-500L		75	R L	R1	505								
SRH2-1000R SRH2-1000L		152	R L		1010								
SRH3-100R SRH3-100L	***m3***	7	R L	RR RL	95	35	35	32	9910	3520	1010	359	0.15~0.38
SRH3-500R SRH3-500L		49	R L	R1	505								
SRH3-1000R SRH3-1000L		101	R L		1010								

Catalog Number	Module	No. of teeth	Direction of spiral	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	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability
SRHF2-1000R SRHF2-1000L	***m2***	153	R L	RFR RFL	995.24	1001.94	25	25	23	4710	1570	481	160
SRHF3-1000R SRHF3-1000L	***m3***	102	R L	RFR RFL	995.24	1004.62	35	35	32	9910	3520	1010	359

Catalog Number	Module	No. of teeth	Direction of spiral	Shape	Total Length A	Total Length A'	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of holes	Screw size
SRHFD2-1000R SRHFD2-1000L	***m2***	153	R L	RDR RDL	995.24	1001.94	25	25	23	10	47.62	180	6	M6
SRHFD3-1000R SRHFD3-1000L	***m3***	102	R L	RDR RDL	995.24	1004.62	35	35	32	14	47.62	180	6	M10

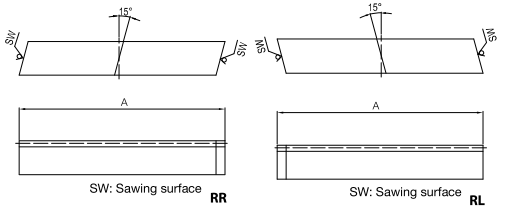
[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended pinions with the same pitch.
③ Please use the SH Helical Gear for the mating pinion.
④ These gears produce axial thrust forces. Please see Page 193 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 "Cautions on Performing Secondary Operations" (Page 220) 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 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 the rack after hardening.

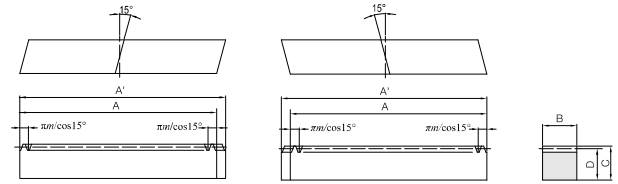
Recommended Mating Pinions

SH Helical Gears

Please see Page 204 for more details.

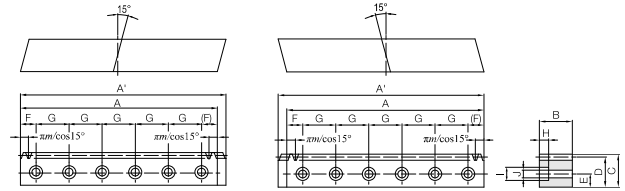


Weight (kg)	Catalog Number
0.43	**SRH2-100R SRH2-100L**
2.28	**SRH2-500R SRH2-500L**
4.56	**SRH2-1000R SRH2-1000L**
0.84	**SRH3-100R SRH3-100L**
4.44	**SRH3-500R SRH3-500L**
8.88	**SRH3-1000R SRH3-1000L**



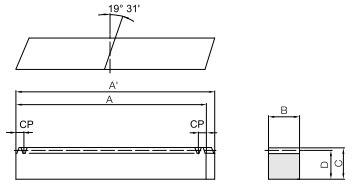
Backlash (mm)	Weight (kg)	Catalog Number
0.12~0.31	4.49	**SRHF2-1000R SRHF2-1000L**
0.15~0.38	8.75	**SRHF3-1000R SRHF3-1000L**

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	Backlash (mm)	Weight (kg)	Catalog Number
7	11	7	4710	1570	481	160	0.12~0.31	4.43	**SRHFD2-1000R SRHFD2-1000L**
10.8	17.5	11	9910	3520	1010	359	0.15~0.38	8.52	**SRHFD3-1000R SRHFD3-1000L**



SRHEF Module 1.5~6
EU Specification Helical Racks

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 HB210)
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

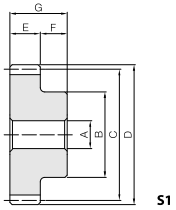
[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② For the assembly joining gauge, please use ZST-GL (Page 264) .
③ After attaching the racks to the base, please fasten 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 193 for more details.

Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number
2410	425	245	43.3	0.10~0.28	2.06	**SRHEF1.5-1000R**
4410	675	450	68.8	0.12~0.32	4.14	**SRHEF2-1000R**
8210	1650	837	168	0.15~0.39	5.91	**SRHEF3-1000R**
15200	2700	1550	275	0.19~0.47	10.7	**SRHEF4-1000R**
22500	4110	2300	419	0.21~0.52	13.1	**SRHEF5-1000R**
33400	7240	3410	738	0.23~0.57	19.9	**SRHEF6-1000R**

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) 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 Module 1.5~6
EU Specification Helical Gears

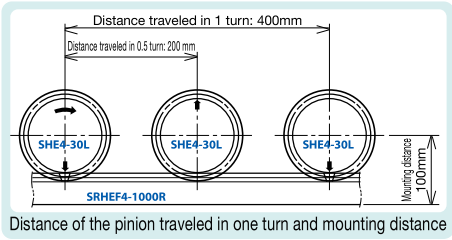
Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle/ direction	19° 31' 41" left helix
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide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



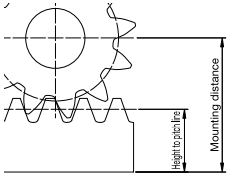
S1

Catalog Number	Module (front pitch mm)	No. of teeth	Profile shift 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	32	S1	10	25	31.83	36	18	14
SHE1.5-25L		25	+0.404	36		12	35	39.79	44	18	14
SHE1.5-30L		30	+0.418	40		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 216 for more details.
② The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of SRHEF Helical Racks with the same pitch.
③ These gears produce axial thrust forces. Please see Page 193 for more details.



Distance of the pinion traveled in one turn and mounting distance



Mounting distance of profile helix gear and meshing rack

Total Length G	Distance traveled in one turn / Distance traveled (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	0.10~0.28	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	0.12~0.32	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	0.15~0.39	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	0.19~0.47	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	0.21~0.52	3.91	**SHE5-18L**
75	400	1380	354	141	36.1		6.95	**SHE5-24L**
88	400	1900	402	194	40.9	0.23~0.57	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 220) 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.

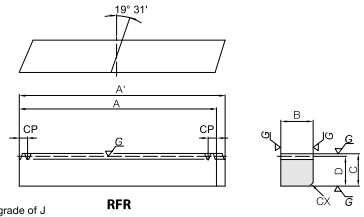
ZST/ZSTD

EU Specification Hardened Ground Helical Racks

Modules 2 to 6 (CP6.667 to 20)

Specifications	
Precision grade	DIN3962, 3963, 3967 Grade Q6*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Pressure angle	20°
Helix angle/ direction	19° 31' 41" right helix
Material	DIN C45 (JIS S45C equivalent)
Heat Treatment	Gear teeth induction hardened
Tooth hardness	HRC55 to 60

* Equivalent to KHK R 001 Grade 2. The precision grade of J Series products is equivalent to the value shown in the table.



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	C Chamfer Amount CX	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)
ZST2-1000R **ZST2-2000R**	***m*2** (CP6.667) ***m*2** (CP6.667)	150 300	RFR	1000 2000	1008.51 2008.52	24	24	22	2	4410	2140	450	219	0.06~0.14	4.13 8.26
ZST3-1000R **ZST3-2000R**	***m*3** (CP10) ***m*3** (CP10)	100 200		1000 2000	1010.29 2010.29	29	29	26		8210	5580	837	569		5.90 11.8
ZST4-1000R **ZST4-2000R**	***m*4** (CP13.333) ***m*4** (CP13.333)	75 150		1000 2000	1013.83 2013.83	39	39	35	3	15200	8960	1550	914		10.7 21.4
ZST5-1000R	***m*5** (CP16.667)	60		1000	1017.38	49		34		22500	13300	2300	1360	0.06~0.15	13.0
ZST6-1000R	***m*6** (CP20)	50			1020.93	59	49	43		33400	22800	3410	2320		19.9

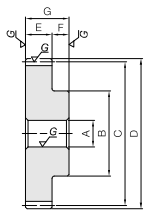
Catalog Number ● : J Series (Available-on-request)	Module (front pitch mm)	No. of teeth	Shape	Total Length A	Total Length A'	Face width B	Height C	Height to pitch line D	C Chamfer Amount CX	Mounting hole dimensions E	F	(F')	G	No. of holes	Screw size
●**ZSTD2-1000RJ** ●**ZSTD2-2000RJ**	***m*2** (CP6.667)	150 300	RDR	1000 2000	1008.51 2008.52	24	24	22	2	8	71.01	53.99	125	8 16	M6
●**ZSTD3-1000RJ** ●**ZSTD3-2000RJ**	***m*3** (CP10)	100 200		1000 2000	1010.29 2010.29	29	29	26		9	72.79	52.21		8 16	M8
●**ZSTD4-1000RJ** ●**ZSTD4-2000RJ**	***m*4** (CP13.333)	75 150		1000 2000	1013.83 2013.83	39	39	35	3	12	76.33	48.67		8 16	
●**ZSTD5-1000RJ**	***m*5** (CP16.667)	60		1000	1017.38	49		34			79.88	45.12		8	M12
●**ZSTD6-1000RJ**	***m*6** (CP20)	50			1020.93	59	49	43		16	83.43	41.57			M16

ZSTP Modules 2~6 (CP6.667~20)

EU Specification Ground Helical Gears *NEW*

Specifications	
Precision grade	JIS B 1702-1:1998 Grade N6
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Pressure angle	20°
Helix angle/ direction	19° 31' 41" left helix
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened
Tooth hardness	HRC50 to 60
Surface treatment	Black oxide coated except for ground part
Shape	S1

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



S1

Catalog Number	Module (front pitch mm)	No. of teeth	Profile shift coefficient	Mounting Distance	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Distance traveled in one turn (Distance traveled) (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)
ZSTP2-18L **ZSTP2-24L** **ZSTP2-30L**	***m*2** (CP6.667)	18 24 30	+0.451 +0.268 +0.085	42 48 54	12 15 18	30 45 55	38.20 50.93 63.66	44 56 68	25	16	41	120 160 200	124 169 214	71.4 162 263	12.6 17.3 21.8	7.28 16.5 26.9	0.06~0.14	0.30 0.56 0.85
ZSTP3-20L **ZSTP3-25L** **ZSTP3-30L**	***m*3** (CP10)	20 25 30	+0.390 +0.404 +0.418	59 67 75	20 20 25	55 70 85	63.66 79.58 95.49	72 88 104	30	20	50	200 250 300	375 490 606	275 471 729	38.3 50.0 61.8	28.0 48.0 74.4		1.06 1.72 2.47
ZSTP4-18L **ZSTP4-24L** **ZSTP4-30L**	***m*4** (CP13.333)	18 24 30	+0.201 +0.268 +0.335	74 87 100	20 20 25	65 90 110	76.39 101.86 127.32	86 112 138	40	25	65	240 320 400	748 1080 1420	530 1050 1910	76.3 111 145	54.0 107 195		1.99 3.76 5.78
ZSTP5-18L **ZSTP5-24L**	***m*5** (CP16.667)	18 24	+0.451 +0.468	84 100	25	85 110	95.49 127.32	110 142	50	25	75	300 400	1540 2180	985 1980	157 222	100 202	0.06~0.15	3.91 6.95
ZSTP6-20L **ZSTP6-25L**	***m*6** (CP20)	20 25	+0.390 +0.404	109 125	30	110 140	127.32 159.15	144 176	60	28	88	400 500	3000 3920	2240 3850	306 400	229 392		8.05 12.8

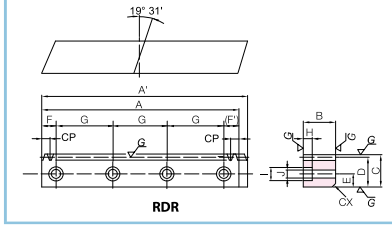
[Caution on Product Characteristics] ① The allowable torques shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② It cannot be used for other helical racks such as the KRHG ground helical rack.
③ These gears produce axial thrust forces. Please see Page 193 for more details.

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).
③ While cutting off the entire hub may cause curvature deformation by residual stress, some products are straightened and annealed after refining the material.

PUH Lubricated Helical Gears

Please see Page 470 for more details.

J Series



RDR

ZST-GL Assembly Gauges

Material: S45C
Accuracy: KHK R 001 Grade 2
Please see Page 264 in the Master Catalog for more details.

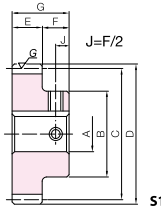
[Caution on Product Characteristics] ① The allowable forces shown in the table are calculated values according to the assumed usage conditions. Please see Page 216 for more details.
② Please use the ZSTP ground helical gear as the mating pinion.
③ These gears produce axial thrust forces. Please see Page 193 for more details.

[Caution on Secondary Operations] ① Please read "Cautions on Performing Secondary Operations" (Page 220) when performing modifications and/or secondary operations for safety concerns. KHK Quick-Mod Gears, the KHK system for quick modification of KHK stock gears, is also available.
② Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm). Please use wire EDM or other carbide tools to modify the length.

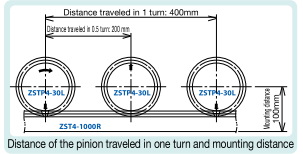
[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations.
Please see Page 34 for more details. Also, please allow additional shipping time to get to your local distributor.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.

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	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
7	11	7	4410	2140	450	219	0.06~0.14	4.05 8.09	●**ZSTD2-1000RJ** ●**ZSTD2-2000RJ**
8.6	14	9	8210	5580	837	569		5.70 11.4	●**ZSTD3-1000RJ** ●**ZSTD3-2000RJ**
8.6	14	9	15200	8960	1550	914		10.4 20.9	●**ZSTD4-1000RJ** ●**ZSTD4-2000RJ**
13	20	14	22500	13300	2300	1360	0.06~0.15	12.4	●**ZSTD5-1000RJ**
17.5	26	18	33400	22800	3410	2320		18.6	●**ZSTD6-1000RJ**

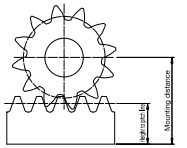
J Series



S1K



Distance of the pinion traveled in one turn and mounting distance



Mounting distance of profile helix gear and meshing rack

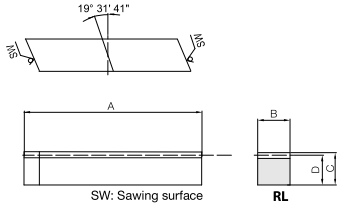
To order J Series products, please specify: **Catalog No. + J + BORE.**

Bore H_7	* The product shapes of J Series items are identified by background color.																											
Keyway Js9	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	55	60	65	70	75	80					
Screw size	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8		16×4.3		18×4.4		20×4.9		22×5.4				
Catalog Number	M4					M5				M6			M8			M10		M12				M16						
ZSTP2-18LJ BORE	S1K	S1K	S1K	S1K	S1K																							
ZSTP2-24LJ BORE			S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K																		
ZSTP2-30LJ BORE						S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K															
ZSTP3-20LJ BORE								S1K	S1K	S1K	S1K	S1K	S1K															
ZSTP3-25LJ BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K													
ZSTP3-30LJ BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K											
ZSTP4-18LJ BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K													
ZSTP4-24LJ BORE								S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K										
ZSTP4-30LJ BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K							
ZSTP5-18LJ BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K											
ZSTP5-24LJ BORE										S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K							
ZSTP6-20LJ BORE												S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K							
ZSTP6-25LJ BORE												S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K	S1K					

[Caution on J series] ① Production is completed by the manufacturer in 2 working days excluding the day ordered for products with module 3 or under, and 7 days for products with module 4 or higher. Because the machining starts immediately, we cannot accept cancellations. Please see Page 34 for more details.
② Number of products is 1 to 20 units for products with module 3 or under, and up to 5 units for products with module 4 or higher.
③ Keyways are made according to JIS B1301 standards, Js9 tolerance.
④ Certain products which would otherwise have a very long tapped hole are counterbored to reduce the length of the tap. For details, please see the KHK Web Catalog.
⑤ For products having a tapped hole, a set screw is included.
⑥ When using S1T set screws for fastening gears to a shaft, only use this method for applications with light load usage. For secure fastening, please use dowel pins in combination.

Assembly Gauges

Specifications	
Precision grade	KHK R 001 grade 2
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 HB210)
Surface treatment	Black oxide coating

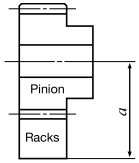


Catalog Number	Normal module (front pitch mm)	Effective No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Weight (kg)
ZST1.5-GL	***m*1.5** (CP5)	9	RL	59	17	17	15.5	0.11
ZST2-GL	***m*2** (CP6.667)	7		66	25	25	23	0.26
ZST3-GL	***m*3**(CP10)	8		108	30	30	27	0.62
ZST4-GL	***m*4**(CP13.333)	6		118	40	40	36	1.17
ZST5-GL	***m*5**(CP16.667)	4		115	50	50	45	1.72
ZST6-GL	***m*6**(CP20)	3		119	60	60	54	2.49

[Caution on Product Characteristics] ① A gauge for assembling ZST/ZSTD/SRHEF helical racks.

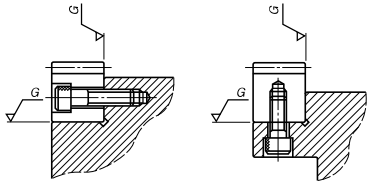
Points of Caution in Assembling

① ZST/ZSTD ground racks are designed to give the proper backlash when assembled using the mounting distance (tolerance of H7 to H8 required) given by the ZSTP Mating Pinion Dimension Table (Page 262). Make sure that the mounting distance stays constant for the length of the rack.

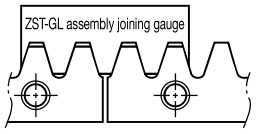


② Machined end type racks such as the ZST and ZSTD Series have pitch tolerance of -0.05 to -0.4mm at the end face. If you try to connect the racks without any space, the pitch at the connection will be too small and will cause problems. Please follow the following diagrams, "Connecting the Racks," for assembly.

③ The ZST/ZSTD 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 10 μ m 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. 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. Please see Page 221 for more details.



Connecting the Racks



[NOTE] Please use the ZST-GL assembly gauge for the joining rack.