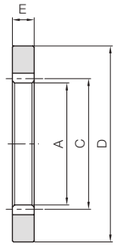
SIR Module 2, 2.5, 3
Internal Ring Gears

Specifications	
Precision grade	JIS grade N9 (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



T1

Catalog Number	Module	No. of teeth	Shape	Outside dia. A	Pitch dia. C	Outside dia. D	Face width E	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)
SIR2-120	***m*2**	120	T1	236	240	286	20	413	68.8	42.1	7.02	0.12~0.28	2.98
SIR2-200		200		396	400	446		677	110	69.0	11.2		4.80
SIR2.5-120	***m*2.5**	120		295	300	355	25	807	138	82.3	14.0	0.14~0.31	5.55
SIR2.5-200		200		495	500	555		1320	220	135	22.5		8.94
SIR3-120	***m*3**	120		354	360	424	30	1390	244	142	24.9	0.15~0.35	9.28
SIR3-160		160		474	480	544		1840	315	188	32.1		12.1

[Caution on Product Characteristics]
① The backlash values shown in the table are the theoretical values for the normal direction for the internal ring in mesh with an SS spur gear.
② The allowable torques shown in the table are calculated values according to the assumed usage conditions. Please see Page 209 for more details.
③ Please check for the involute interference, trochoid interference and trimming interference prior to using internal gears.

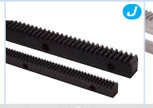
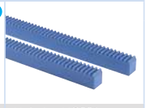
Established equipment and technology
Custom gears are also available.

Module 0.5~4, Tooth diameter ϕ150mm or more
Outside diameter ϕ700mm or less, weight 40kg or less

Gear cutting by CNC Gear Shaper

Racks

MRGF/MRGFD Hardened Ground Racks	KRGF-H/KRGFD-H Hardened Ground Racks	KRG/KRGF/KRGFD Thermal Refined Ground Racks	SRG/SRGF/SRGFD/SRGFK Hardened Ground Racks	KRF-H/KRFD-H Hardened Racks	SRF-H/SRFD-H Hardened Racks	SRF-HL/SRFD-HL Laser Hardened Racks	SRAF-HL/SRAFD-HL/SRAFK-HL Laser Hardened Square Racks
							
Material: SCM415	Material: SCM440	Material: SCM440	Material: S45C	Material: SCM440	Material: S45C	Material: S45C	Material: S45C
***m*1.5~3 Page 224**	***m*1.5~3 Page 226**	***m*1~3 Page 228**	***m*0.5~6 Page 230**	***m*1.5~5 Page 232**	***m*1.5~6 Page 234**	***m*1.5~6 Page 236**	***m*1.5~4 Page 238**

KRF/KRFD Thermal Refined Racks	SRAF/SRAFD/SRAFK Square Racks	SR Racks	SRF Steel Racks with Machined Ends	SRFD/SRFK Steel Racks with Bolt Holes	SUR/SURF/SURFD Stainless Steel Racks	DRF/DRFD/DRFK Plastic Racks	PR/PRF Plastic Racks
							
Material: SCM440	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: SUS304	Material: Polyacetal	Material: MC901
***m*1.5~5 Page 240**	***m*1.5~4 Page 242**	***m*0.5~10 Page 244**	***m*0.5~10 Page 245**	***m*0.5~6 Page 246**	***m*1~4 Page 248**	***m*1~3 Page 250**	***m*1~3 Page 252**

BSR Racks	SRO/SROS Round Racks	SURO Stainless Steel Round Racks	DR Molded Flexible Racks	SSDR/ARL/SRS Rack Clamps for Pinions/Rack Guide Rails	KRHG/KRHGF/KRHGFD Ground Helical Racks	SRHEF-HL Laser Hardened Helical Racks	SRH/SRHF/SRHFD Helical Racks
				For Molded Flexible Racks 			
Material: Free cutting brass (C3604)	Material: S45C	Material: SUS303	Material: Duracon (R) (M25-44)	Material: S45C, etc.	Material: SCM440	Material: S45C	Material: S45C
***m*0.5~1 Page 253**	***m*1~5 Page 254**	***m*1~3 Page 255**	***m*0.8~2 Page 256**	**Page 256**	***m*1~3 Page 258**	***m*3~6 Page 260**	***m*2, 3 Page 262**

SRHEF Helical Racks	SHE-H Hardened Helical Gears	SHE Helical Gears	ZST/ZSTD Hardened Ground Helical Racks	ZSTP Ground Helical Gears	ZST-GL Assembly Gauges
					
Material: S45C	Material: S45C	Material: S45C	Material: DIN C45 (S45C equivalent)	Material: SCM440	Material: S45C
***m*1.5~6 Page 264**	***m*1.5~6 Page 264**	***m*1.5~6 Page 264**	***m*2~6 Page 266**	***m*2~6 Page 266**	***m*1.5~6 Page 268**

M Includes Made to Order

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
H	Helical 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
ZST	Manufactured by Schneeberger

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	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 and both ends.
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.
SRAF-HL/ SRAFD-HL SRAFK-HL	1.5~4	1000	S45C	Gear teeth laser hardened	Cut	4	Racks that have been laser hardened with a good balance of wear resistance and cost. These racks have smaller tooth height and save space in comparison to SRF-HL Racks.
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.
SRHEF-HL	3~6	1000	S45C	Gear teeth laser hardened	Cut	4	Helical racks that have been laser hardened that have excellent strength and wear resistance in comparison to SRHEF Racks. They can be used like CP racks.
SRH/SRHF SRHFD	2~3	100, 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.

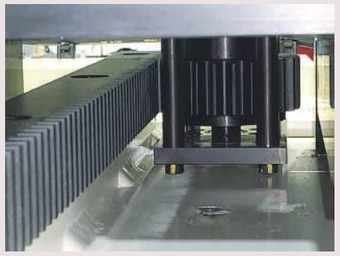
Application Examples

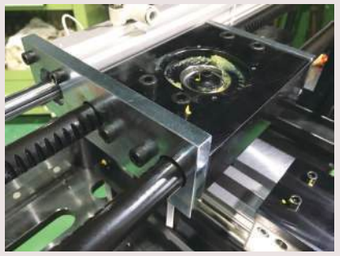
Racks & pinions are adopted in driving devices for linear motion systems, such as transport devices.

■ 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

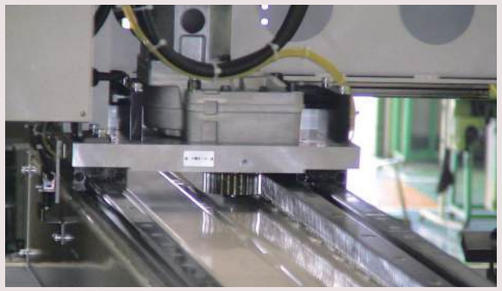
■ Dremax Long Strip Cutter

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

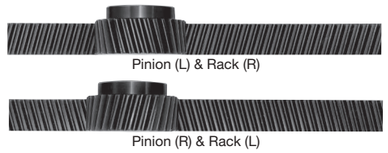
Please select the most suitable products by carefully considering the characteristics of items and contents of the product tables. It is also important to read all applicable “CAUTION” notes shown below before the final selection.

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.

■ Calculation of Bending Strength of Gears

Item \ Catalog Number	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-HL SRAFD-HL SRHEF-HL	SRAF/SRAFD SRAFK/SR/SRF SRFD/SRFK/SRO SROS/SRH/SRHF SRHFD/SRHEF	SUR SURF SURFD SURO	BSR	Pinion SHE	Pinion SHE-H	Pinion ZSTP	Racks DRF DRFD DRFK	Racks PR PRF	Racks 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 10^7 cycles											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	30	29.5	20 NOTE 3			10.5	4	19	19	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	76	90 NOTE 3	80	52.5	41.3	-	49	90	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 273.

When selecting KHK standard gears, glance over the Product Precautions on Page 218 and Cautions on Performing Secondary Operations on each page.

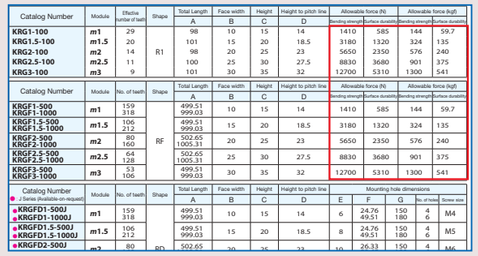
① Products not listed in this catalog or materials, modules, number of teeth and the like not listed in the dimensional tables can be manufactured as custom items. Please see Page 26 for more details about custom-made orders.
② The color and shape of the product images listed on the dimension table page 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 in this catalog based on the load torque.

■ For provisional selection from this catalog



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		98	10	15	14	1410	585	144	59.7
KRG1.5-100	*m*1.5	20		101	15	20	18.5	3180	1320	324	135
KRG2-100	*m*2	14	R1	98	20	25	23	5650	2350	576	240
KRG2.5-100	*m*2.5	11		100	25	30	27.5	8830	3680	901	375
KRG3-100	*m*3	9		101	30	35	32	12700	5310	1300	541

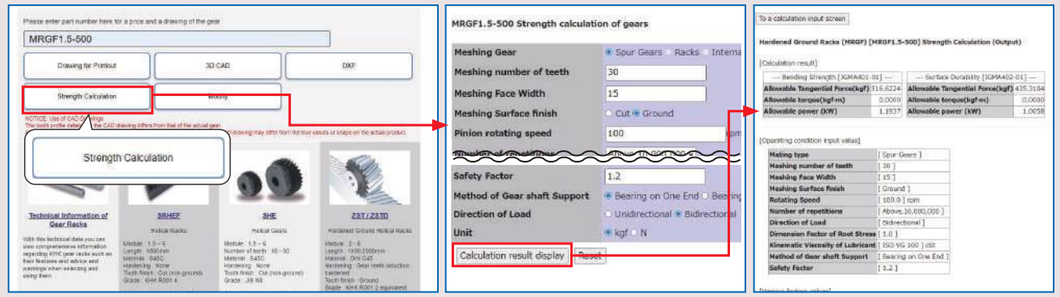
Catalog Number	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability
KRGF1-500 KRGF1-1000	*m*1	159 318		499.51 999.03	10	15	14	1410	585	144	59.7
KRGF1.5-500 KRGF1.5-1000	*m*1.5	106 212		499.51 999.03	15	20	18.5	3180	1320	324	135
KRGF2-500 KRGF2-1000	*m*2	80 160	RF	502.65 1005.31	20	25	23	5650	2350	576	240
KRGF2.5-500 KRGF2.5-1000	*m*2.5	64 128		502.65 1005.31	25	30	27.5	8830	3680	901	375
KRGF3-500 KRGF3-1000	*m*3	53 106		499.51 999.03	30	35	32	12700	5310	1300	541

Catalog Number ● : Items (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		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	*m*2	80	RD	502.65	20	25	23	10	26.33	150	4	M6

Step 3 Calculate the strength under the actual usage conditions.

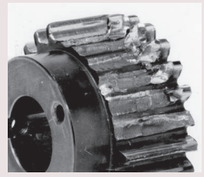
Calculate the strength formally using the various gear strength formulas. Please see our separate technical reference book for more details. We recommend using the Website that allows the strength to be easily calculated.

■ Use the strength calculation function on our website.



■ 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

Product Precautions

Common Notes

[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, fasten with dowel pins. Clamping only with mounting screws could possibly cause the screws to be broken, due to a heavy load.
(4) See page 22 for more details on Hardened Plus (H Series and HJ Series).
● KHK's Specifications for Heat Treatment
Hardened location: Tooth surface, or Tooth surface and Tooth root
Hardness: 50 to 60 HRC
* Hardness and Depth of Gear-teeth Induction Hardening
The hardening method and the state of the hardened teeth area vary depending on the size of gears.
Since different hardening treatment is applied in accordance with the module and number of teeth, the hardness level is referred to as the hardness of the reference diameter.
For some of our products, the hardness at tooth tip / root may not be equal to the hardness you designated.
As to the effective case depth, it is specified by JIS, as "The distance from the surface of the case to the area with hardness HV450." The case depth differs from area to area of a tooth, so the depth cannot be specified.
Due to the gear teeth of racks and gears being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm) and tooth areas at the end face of the rack (approx. 4 to 5 mm).
(5) 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.

[J Series]

(1) Number of pieces we can process for one order is 1 to 20 units. For larger orders, please request a price and delivery quote.
(2) Black oxide is not re-applied to parts undergoing secondary operations.

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: μm

Grade	Pitch Error	Over *m*0.4 to 1 CP2.5		Over *m*1 to 1.6 CP5		Over *m*1.6 to 2.5 -		Over *m*2.5 to 4 CP10		Over *m*4 to 6 CP15		Over *m*6 to 10 CP20	
		Rack Length (nominal)											
		1000 or less	1001 up to 2000	1000 or less	1001 up to 2000	1000 or less	1001 up to 2000	1000 or less	1001 up to 2000	1000 or less	1001 up to 2000	1000 or less	1001 up to 2000
1	S.P.E.	10	-	10	12	11	12	11	13	13	14	14	16
	T.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	-	-	-	-	-	-

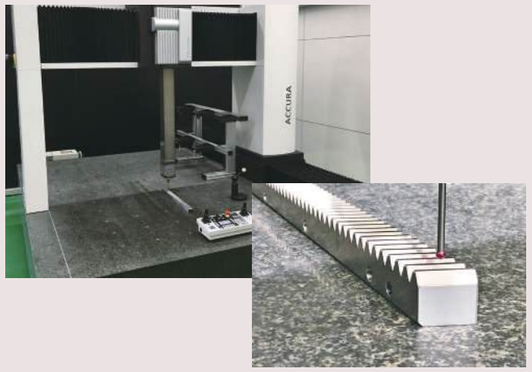
[NOTE] ① Since the pitch accuracy of racks may vary due to humidity, the precision grades are evaluated at the bottom surface of the product, at the temperature of 20°C. The dimensions of the KHK PR Plastic Racks may vary widely due to humidity. Therefore, the total composite error is assumed to be excluded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

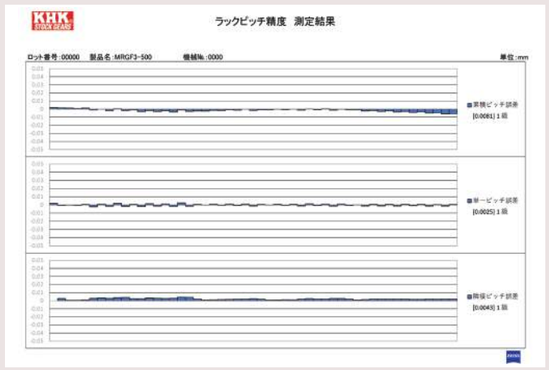
■ Comparison Table of Precision Grades of Racks

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.

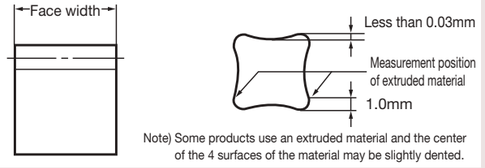
■ Pitch inspection and a sample report using Karl Zeiss ACCURA Coordinate Measuring Machine. (KHK R 001 Grade 1)





② Precision of Rack Blanks

■ Tolerances for Face Width and Height



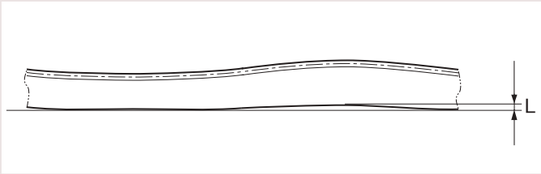
Note) Some products use an extruded material and the center of the 4 surfaces of the material may be slightly dented.

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	$\begin{pmatrix} -0.1 \\ -0.3 \end{pmatrix}$
	*m*0.8(CP2.5)	$\begin{pmatrix} -0.1 \\ -0.5 \end{pmatrix}$
	*m*1 up to 2.5	$\begin{pmatrix} -0.2 \\ -0.6 \end{pmatrix}$
	*m*2.5 or more	$\begin{pmatrix} -0.2 \\ -0.8 \end{pmatrix}$
FRCP and DR Flexible Racks	Uniform	±10
Products other than the above	Uniform	+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

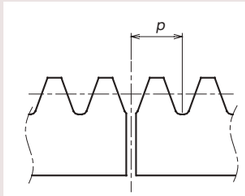
In order to use KHK stock racks safely, carefully read the Application Hints before proceeding. If there are questions or you require clarifications, please contact our technical department or your nearest distributor. E-mail info@khkgears.net
Please read “Cautions on Performing Secondary Operations” below when performing modifications and/or secondary operations for safety concerns.

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.



$p = \pi \cdot m$
p : Reference pitch
π : Pi
m : Module

Unit: mm

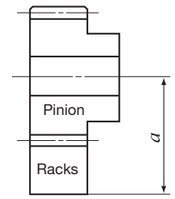
Module	Pitch (p)	Tolerance
*m*0.5	1.57	-0.05 -0.15
*m*0.8	2.51	-0.05 -0.25
*m*1	3.14	-0.1 -0.3
*m*1.5	4.71	
*m*2	6.28	
*m*2.5	7.85	-0.1 -0.4
*m*3	9.42	
*m*4	12.57	
*m*5	15.71	
*m*6	18.85	
*m*8	25.13	
*m*10	31.42	

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

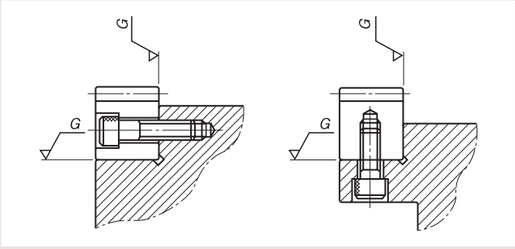
① The recommended assembly distance tolerance of KHK stock racks is H7 for ground racks and H8 for cut racks. Flexible racks need to be adjusted by the customer. The backlash values are given in the table on Page 220. Make sure that the mounting distance stays constant for the length of the rack.

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



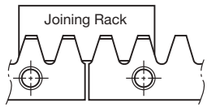
[NOTE] Pinions are assumed to be standard stock spur gears (x=0).

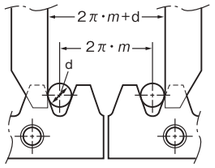
② The recommended flatness and squareness of the mounting surface of KHK stock racks is 0.01 mm for ground racks and 0.05 mm for cut racks.



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.

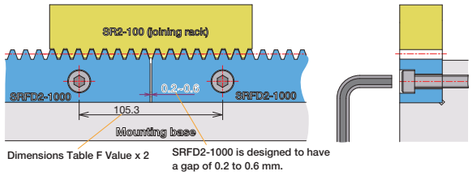




[NOTE] Joining gauge racks for helical racks must have the opposite hand from the racks. Please use 100 mm short racks as a joining gauge rack, or alternatively the rack of the same specifications on hand.

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

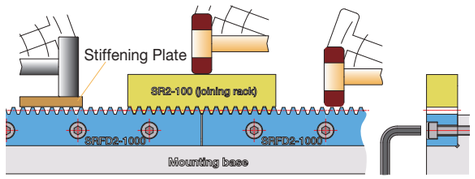
1. Pitch alignment
Place SRFD2-1000 on the mounting base, align SR2-100 and temporarily tighten the bolt.



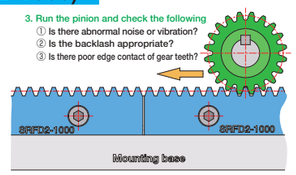
Dimensions Table F Value x 2

SRFD2-1000 is designed to have a gap of 0.2 to 0.6 mm.

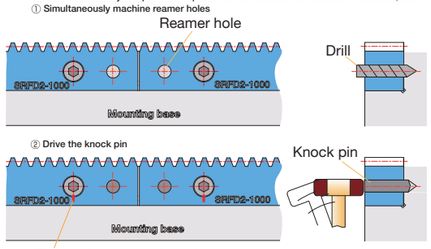
2. Securing to the mounting base
Tap with a plastic hammer, bring it into close contact with the mounting base, and further tighten the bolt. (When using a metal hammer, be careful not to damage the gear teeth by using a stiffening plate, etc.)



3. Run the pinion and check the following
① Is there abnormal noise or vibration?
② Is the backlash appropriate?
③ Is there poor edge contact of gear teeth?



4. Secure fixation to the mounting base
We recommend that you tap the knock pin so that the rack does not shift due to vibration, etc.
① Simultaneously machine reamer holes



② Drive the knock pin

Tighten again after tapping the knock pin.
It can be marked with a pen to find looseness.

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 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.

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.

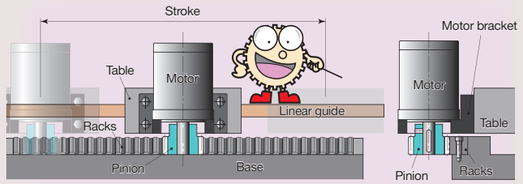
⚠ Caution Cautions in Preventing Accidents

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 ISO9001 quality management system; if you notice any malfunctions upon purchasing a product, please contact the supplier.

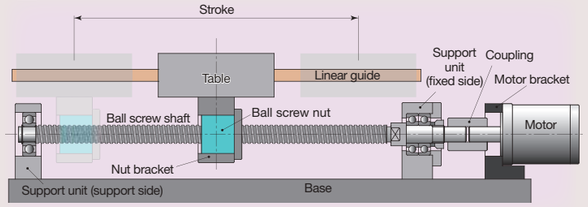
Comparison of Racks & Pinions and Ball Screws

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.

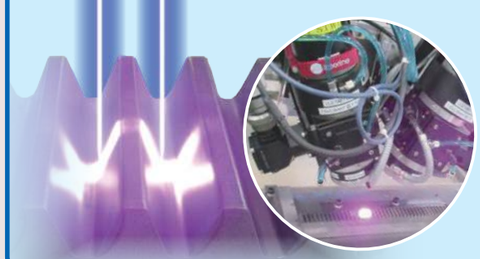
Disadvantages	Details
Backlash is present	Backlash is required for smooth rotation. Backlash may become a problem in forward/reverse rotation positioning.
Lubrication is required	Metal racks require lubrication. Plastic racks do not require lubrication at light loads, but their precision is lower.

● 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.

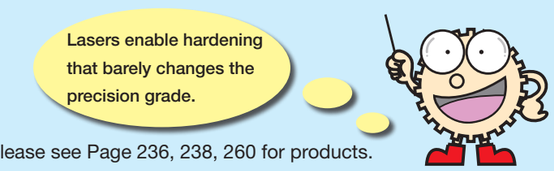
Laser Hardened Racks



● **Lasers used for hardening gear teeth**
In this environmentally friendly hardening method, powerful light provides instantaneous hardening and cooling water is not required due to diffusion of heat.

● **Can be hardened on surfaces other than the teeth**
Lasers excel at spot hardening. As long as the laser can be irradiated, even the inside of bores can be hardened.

● **Less distortion due to burning during hardening**
As the laser hardens necessary areas in spots, distortion due to burning can be minimized.

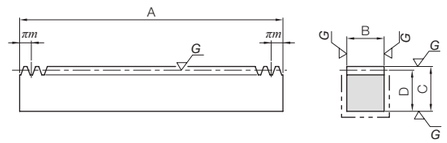


* Please see Page 236, 238, 260 for products.

MRGF/MRGFD Module 1.5~3
Hardened Ground Racks

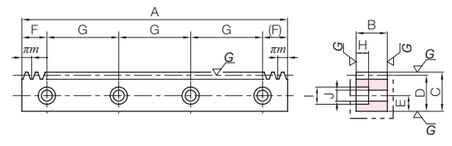
Specifications	
Precision grade	KHK R 001 Grade 1 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM415
Heat treatment	Carburized **
Tooth hardness	55 to 60HRC

* The precision grade of J Series products is equivalent to the value shown in the table.
** In the illustration, the area surrounded with – - - – line is masked during the carburization process (max. HRC40 or so) and can be modified.

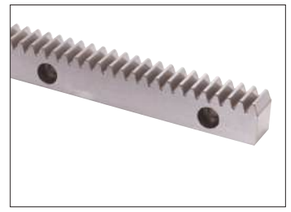


RF

J Series



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
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

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**

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

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**

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

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

Recommended Mating Pinions

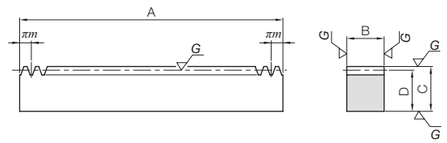
MSGA/MSGB Ground Spur Gears

Please see Page 54 for more details.

KRGF-H/KRGFD-H Module 1.5~3
Hardened Ground Racks

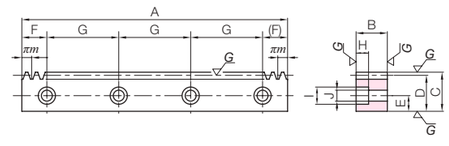
Specifications	
Precision grade	KHK R 001 Grade 1 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened **
Tooth hardness	50 to 60HRC

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

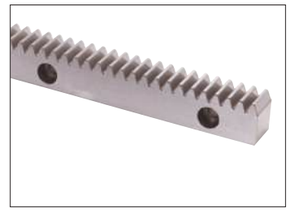


RF

J Series



RD



Catalog Number	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number
				A	B	C	D	Bending strength	Surface durability	Bending strength	Surface durability			
KRGF1.5-500H **KRGF1.5-1000H**	***m*1.5**	106 212	RF	499.51 999.03	15	20	18.5	3230	2100	330	215	0.04~0.14	1.09 2.18	**KRGF1.5-500H** **KRGF1.5-1000H**
KRGF2-500H **KRGF2-1000H**	***m*2**	80 160		502.65 1005.31	20	25	23	5750	3750	586	382	0.05~0.16	1.82 3.63	**KRGF2-500H** **KRGF2-1000H**
KRGF2.5-500H **KRGF2.5-1000H**	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	8980	5870	916	598	0.05~0.16	2.71 5.43	**KRGF2.5-500H** **KRGF2.5-1000H**
KRGF3-500H **KRGF3-1000H**	***m*3**	53 106		499.51 999.03	30	35	32	12900	8470	1320	863	0.05~0.16	3.76 7.53	**KRGF3-500H** **KRGF3-1000H**

Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Mounting hole dimensions					Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
				A	B	C	D	E	F	G	No. of holes	Screw size	H	I	J	Bending strength	Surface durability	Bending strength	Surface durability			
●**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	6	10	6	3230	2100	330	215	0.04~0.14	1.07 2.14	●**KRGFD1.5-500HJ** ●**KRGFD1.5-1000HJ**
●**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	7	11	7	5750	3750	586	382	0.05~0.16	1.78 3.58	●**KRGFD2-500HJ** ●**KRGFD2-1000HJ**
●**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	8.6	14	9	8980	5870	916	598	0.05~0.16	2.64 5.31	●**KRGFD2.5-500HJ** ●**KRGFD2.5-1000HJ**
●**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	10.8	17.5	11	12900	8470	1320	863	0.05~0.16	3.63 7.32	●**KRGFD3-500HJ** ●**KRGFD3-1000HJ**

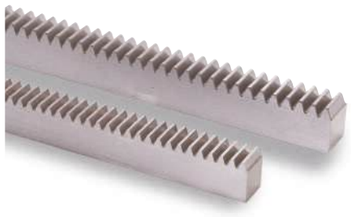
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Recommended Mating Pinions

KSG Ground Spur Gears

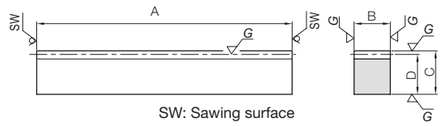
Please see Page 58 for more details.

Thermal Refined Ground Racks



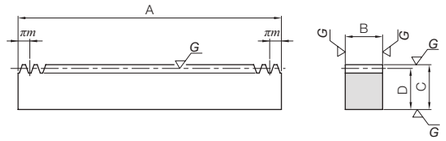
Specifications	
Precision grade	KHK R 001 grade 1 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 to 352HB

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



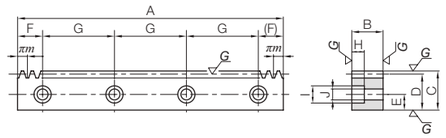
SW: Sawing surface

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	Backlash (mm)	Weight (kg)	Catalog Number
KRG1-100	***m*1**	29	R1	98	10	15	14	1410	585	144	59.7	0.04~0.14	0.11	**KRG1-100**
KRG1.5-100	***m*1.5**	20		101	15	20	18.5	3180	1320	324	135	0.04~0.14	0.22	**KRG1.5-100**
KRG2-100	***m*2**	14		98	20	25	23	5650	2350	576	240	0.05~0.16	0.35	**KRG2-100**
KRG2.5-100	***m*2.5**	11		100	25	30	27.5	8830	3680	901	375	0.05~0.16	0.54	**KRG2.5-100**
KRG3-100	***m*3**	9		101	30	35	32	12700	5310	1300	541	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	Backlash (mm)	Weight (kg)	Catalog Number
KRGF1-500 **KRGF1-1000**	***m*1**	159 318	RF	499.51 999.03	10	15	14	1410	585	144	59.7	0.04~0.14	0.55 1.49	**KRGF1-500** **KRGF1-1000**
KRGF1.5-500 **KRGF1.5-1000**	***m*1.5**	106 212		499.51 999.03	15	20	18.5	3180	1320	324	135	0.04~0.14	1.09 2.18	**KRGF1.5-500** **KRGF1.5-1000**
KRGF2-500 **KRGF2-1000**	***m*2**	80 160		502.65 1005.31	20	25	23	5650	2350	576	240	0.05~0.16	1.82 3.63	**KRGF2-500** **KRGF2-1000**
KRGF2.5-500 **KRGF2.5-1000**	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	8830	3680	901	375	0.05~0.16	2.71 5.43	**KRGF2.5-500** **KRGF2.5-1000**
KRGF3-500 **KRGF3-1000**	***m*3**	53 106		499.51 999.03	30	35	32	12700	5310	1300	541	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	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)
●**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	5	8	4.5	1410	585	144	59.7	0.04~0.14	0.54 1.08	●**KRGFD1-500J** ●**KRGFD1-1000J**
●**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	6	10	6	3180	1320	324	135	0.04~0.14	1.07 2.14	●**KRGFD1.5-500J** ●**KRGFD1.5-1000J**
●**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	7	11	7	5650	2350	576	240	0.05~0.16	1.78 3.58	●**KRGFD2-500J** ●**KRGFD2-1000J**
●**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	8.6	14	9	8830	3680	901	375	0.05~0.16	2.64 5.31	●**KRGFD2.5-500J** ●**KRGFD2.5-1000J**
●**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	10.8	17.5	11	12700	5310	1300	541	0.05~0.16	3.62 7.32	●**KRGFD3-500J** ●**KRGFD3-1000J**

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

* 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

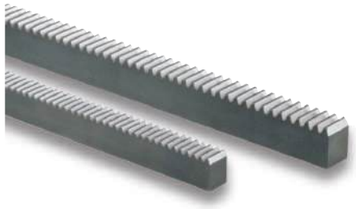
SSG Ground Spur Gears

Please see Page 62 for more details.

Product Precautions → Page 218
Precautions for Standard Machined Products → Pages 42~44

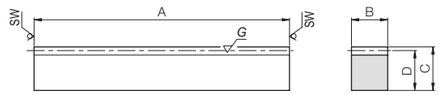
You can download CAD data (DXF format) of KHK Products from the Website.

Hardened Ground Racks



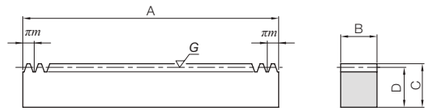
Specifications	
Precision grade	KHK R 001 Grade 3 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened **
Tooth hardness	50 to 60HRC ***
Surface treatment	Black oxide coated except for teeth

* The precision grade of J Series products is equivalent to the value shown in the table.
** 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).
*** Products with modules of 0.8 or under use S45C thermal refined materials, so the surface hardness is 200~270 HB.



SW: Sawing surface

R1



RF

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 (Made to Order)	***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 (Made to Order)	***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	R1	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

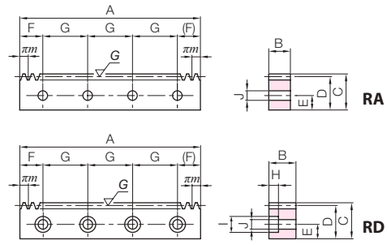
Catalog Number	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)
SRGF0.5-300 (Made to Order)	***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 (Made to Order)	***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	RF	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

● : J Series (Available-on-request) Catalog Number	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
●**SRGFK1-300J**	***m*1**	96	RA	301.59	10	12	11	5	20.80	130	3	M4
●**SRGFK1-500J**		159		499.51					24.76	150	4	
●**SRGFD1.5-500J**	***m*1.5**	106	RD	499.51	15	20	18.5	8	24.76	150	4	M5
●**SRGFD1.5-1000J**		212		999.03					49.51	180	6	
●**SRGFD2-500J**	***m*2**	80		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 494 for more details.

J Series



Recommended Mating Pinions

SSG Ground Spur Gears

Please see Page 62 for more details.

SSGS Ground Spur Gears

Please see Page 60 for more details.

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

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)	● : J Series (Available-on-request) Catalog Number
—	—	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**

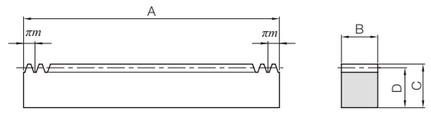
Product Precautions → Page 218
Precautions for Standard Machined Products → Pages 42~44

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

Hardened Racks

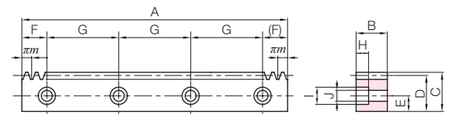
Specifications	
Precision grade	KHK R 001 grade 5 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened **
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* The precision grade is equivalent to the value shown in the table.
** The dimensions may vary due to hardening. Therefore, the total composite error is excluded from the rack accuracy table on Page 219.
** 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).



RF

J Series



RD

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	2940	1710	300	175
KRF2-1000H	***m*2**	160		1005.31	20	25	23	5230	3090	533	315
KRF2.5-1000H	***m*2.5**	128		1005.31	25	30	27.5	8170	4890	833	499
KRF3-1000H	***m*3**	106		999.03	30	35	32	11800	7110	1200	725
KRF4-1000H	***m*4**	80		1005.31	40	45	41	20900	12900	2130	1310
KRF5-1000H	***m*5**	64		1005.31	50	50	45	32700	20400	3330	2080

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**

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

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	2940	1710	300	175	0.05~0.31	2.14	●**KRFD1.5-1000HJ**
7	11	7	5230	3090	533	315	0.07~0.34	3.58	●**KRFD2-1000HJ**
8.6	14	9	8170	4890	833	499	0.09~0.37	5.31	●**KRFD2.5-1000HJ**
10.8	17.5	11	11800	7110	1200	725	0.10~0.41	7.32	●**KRFD3-1000HJ**
13	20	14	20900	12900	2130	1310	0.14~0.48	12.6	●**KRFD4-1000HJ**
15.2	23	16	32700	20400	3330	2080	0.16~0.53	17.2	●**KRFD5-1000HJ**

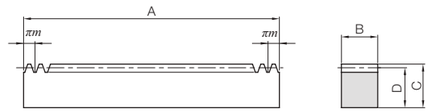
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Spur Gears
Helical Gears
Internal Gears
Racks
CP Racks & Pinions
Miter Gears
Bevel Gears
Screw Gears
Worm Gears
Gearboxes
Other Products

Hardened Racks

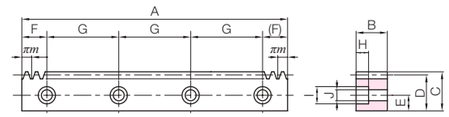
Specifications	
Precision grade	KHK R 001 grade 5 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened **
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* The precision grade is equivalent to the value shown in the table.
** The dimensions may vary due to hardening. Therefore, the total composite error is excluded from the rack accuracy table on Page 219.
** 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).



RF

J Series



RD

Catalog Number	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number
				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	0.05~0.29	2.18	**SRF1.5-1000H**
SRF2-1000H	***m*2**	160		1005.31	20	25	23	3480	2000	355	204	0.07~0.32	3.63	**SRF2-1000H**
SRF2.5-1000H	***m*2.5**	128		1005.31	25	30	27.5	5440	3160	555	322	0.09~0.35	5.43	**SRF2.5-1000H**
SRF3-1000H	***m*3**	106		999.03	30	35	32	7840	4590	799	468	0.10~0.39	7.53	**SRF3-1000H**
SRF4-1000H	***m*4**	80		1005.31	40	45	41	13900	8310	1420	847	0.14~0.46	12.9	**SRF4-1000H**
SRF5-1000H	***m*5**	64		1005.31	50	50	45	21800	13200	2220	1340	0.16~0.51	17.8	**SRF5-1000H**
SRF6-1000H	***m*6**	53		999.03	60	60	54	31400	19200	3200	1960	0.18~0.58	25.4	**SRF6-1000H**

Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Mounting hole dimensions					Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
				A	B	C	D	E	F	G	No. of holes	Screw size	H	I	J	Bending strength	Surface durability	Bending strength	Surface durability			
●**SRFD1.5-1000HJ**	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5	6	10	6	1960	1110	200	113	0.05~0.29	2.14	●**SRFD1.5-1000HJ**
●**SRFD2-1000HJ**	***m*2**	160		1005.31	20	25	23	10	52.65	180	6	M6	7	11	7	3480	2000	355	204	0.07~0.32	3.58	●**SRFD2-1000HJ**
●**SRFD2.5-1000HJ**	***m*2.5**	128		1005.31	25	30	27.5	12	52.65	180	6	M8	8.6	14	9	5440	3160	555	322	0.09~0.35	5.31	●**SRFD2.5-1000HJ**
●**SRFD3-1000HJ**	***m*3**	106		999.03	30	35	32	14	49.51	180	6	M10	10.8	17.5	11	7840	4590	799	468	0.10~0.39	7.32	●**SRFD3-1000HJ**
●**SRFD4-1000HJ**	***m*4**	80		1005.31	40	45	41	18	52.65	180	6	M12	13	20	14	13900	8310	1420	847	0.14~0.46	12.6	●**SRFD4-1000HJ**
●**SRFD5-1000HJ**	***m*5**	64		1005.31	50	50	45	20	62.65	220	5	M14	15.2	23	16	21800	13200	2220	1340	0.16~0.51	17.2	●**SRFD5-1000HJ**
●**SRFD6-1000HJ**	***m*6**	53		999.03	60	60	54	23	59.51	220	5	M16	17.5	26	18	31400	19200	3200	1960	0.18~0.58	24.6	●**SRFD6-1000HJ**

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Recommended Mating Pinions

SS- (H) Hardened Spur Gears

Please see Page 110 for more details.

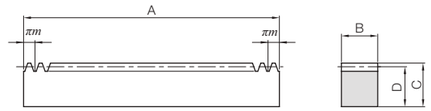
Product Precautions → Page 218

Precautions for Standard Machined Products → Pages 42~44

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

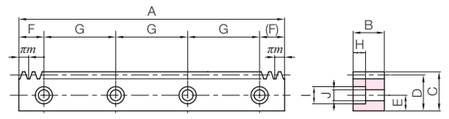
* The precision grade is equivalent to the value shown in the table.
** Due to the gear teeth being laser hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 1 mm).



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	***m*1.5**	212	RF	999.03	15	20	18.5	2160	961	220	98.0	0.09~0.25	2.18
SRF1.5-1500HL		320		1507.96									3.28
SRF1.5-2000HL		435		2049.88									4.47
SRF2-1000HL	***m*2**	160		1005.31	20	25	23	3830	1730	391	177	0.11~0.28	3.63
SRF2-1500HL		240		1507.96									5.45
SRF2-2000HL		326		2048.31									7.40
SRF2.5-1000HL	***m*2.5**	128		1005.31	25	30	27.5	5990	2740	611	280	0.13~0.31	5.43
SRF2.5-1500HL		192		1507.96									8.14
SRF2.5-2000HL		261		2049.88									11.1
SRF3-1000HL	***m*3**	106		999.03	30	35	32	8620	3990	879	407	0.14~0.35	7.53
SRF3-1500HL		160		1507.96									11.4
SRF3-2000HL		217		2045.17									15.4
SRF4-1000HL	***m*4**	80		1005.31	40	45	41	15300	7220	1560	736	0.18~0.42	12.9
SRF4-1500HL		120		1507.96									19.4
SRF4-2000HL		163		2048.31									26.4
SRF5-1000HL	***m*5**	64		1005.31	50	50	45	24000	11400	2440	1170	0.20~0.47	17.8
SRF5-1500HL		96		1507.96									26.6
SRF5-2000HL		130		2042.04									36.1
SRF6-1000HL	***m*6**	53		999.03	60	60	54	34500	16700	3520	1700	0.22~0.54	25.4
SRF6-1500HL		80		1507.96									38.4
SRF6-2000HL		108		2035.75									51.8

J Series



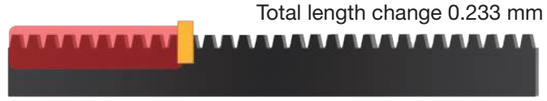
RD

* 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 110 for more details.

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**	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
●**SRFD1.5-1500HLJ**		320		1507.96					33.98	180	9	
●**SRFD1.5-2000HLJ**		435		2049.88					34.94	180	12	
●**SRFD2-1000HLJ**	***m*2**	160		1005.31	20	25	23	10	52.65	180	6	M6
●**SRFD2-1500HLJ**		240		1507.96					33.98	180	9	
●**SRFD2-2000HLJ**		326		2048.31					34.15	180	12	
●**SRFD2.5-1000HLJ**	***m*2.5**	128		1005.31	25	30	27.5	12	52.65	180	6	M8
●**SRFD2.5-1500HLJ**		192		1507.96					33.98	180	9	
●**SRFD2.5-2000HLJ**		261		2049.88					34.94	180	12	
●**SRFD3-1000HLJ**	***m*3**	106		999.03	30	35	32	14	49.51	180	6	M10
●**SRFD3-1500HLJ**		160		1507.96					33.98	180	9	
●**SRFD3-2000HLJ**		217		2045.17					32.58	180	12	
●**SRFD4-1000HLJ**	***m*4**	80		1005.31	40	45	41	18	52.65	180	6	M12
●**SRFD4-1500HLJ**		120		1507.96					33.98	180	9	
●**SRFD4-2000HLJ**		163		2048.31					34.15	180	12	
●**SRFD5-1000HLJ**	***m*5**	64		1005.31	50	50	45	20	62.65	220	5	M14
●**SRFD5-1500HLJ**		96		1507.96					93.98	220	7	
●**SRFD5-2000HLJ**		130		2042.04					31.02	220	10	
●**SRFD6-1000HLJ**	***m*6**	53		999.03	60	60	54	23	59.51	220	5	M16
●**SRFD6-1500HLJ**		80		1507.96					93.98	220	7	
●**SRFD6-2000HLJ**		108		2035.75					27.88	220	10	

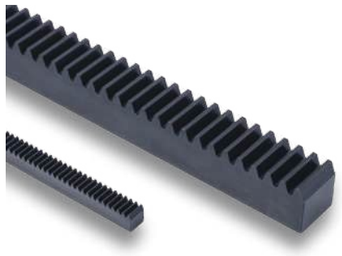
Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Surface durability	Allowable force (kgf) Bending strength	Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
6	10	6	2160	961	220	98.0	0.09~0.25	2.14	●**SRFD1.5-1000HLJ**
								3.23	●**SRFD1.5-1500HLJ**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

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 218

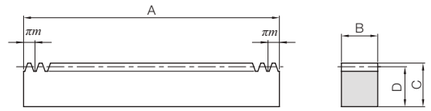
Precautions for Standard Machined Products → Pages 42~44

SRAF-HL/SRAFD-HL/SRAFK-HL Module 1.5~4
Laser Hardened Racks NEW



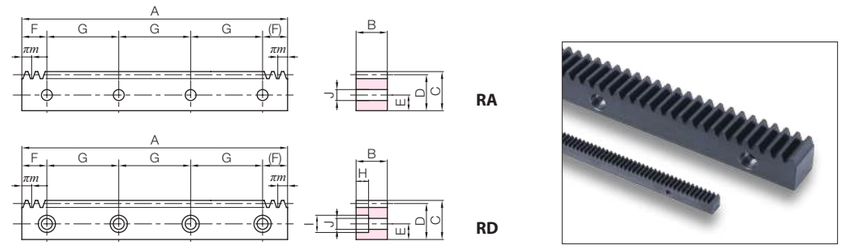
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth laser hardened **
Tooth hardness	55 to 65HRC
Surface treatment	Black oxide coating

* The precision grade is equivalent to the value shown in the table.
** Due to the gear teeth being laser hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 1 mm).



RF

J Series



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
SRAF1.5-1000HL	*m*1.5	212	RF	999.03	15	15	13.5	2160	961	220	98
SRAF2-1000HL	*m*2	160		1005.31	20	20	18	3830	1730	391	177
SRAF2.5-1000HL	*m*2.5	128		1005.31	25	25	22.5	5990	2740	611	280
SRAF3-1000HL	*m*3	106		999.03	30	30	27	8620	3990	879	407
SRAF4-1000HL	*m*4	80		1005.31	40	40	36	15300	7220	1560	736

Backlash (mm)	Weight (kg)	Catalog Number
0.09~0.25	1.59	SRAF1.5-1000HL
0.11~0.28	2.84	SRAF2-1000HL
0.13~0.31	4.44	SRAF2.5-1000HL
0.14~0.35	6.35	SRAF3-1000HL
0.18~0.42	11.4	SRAF4-1000HL

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
●SRAFK1.5-1000HLJ	*m*1.5	212	RA	999.03	15	15	13.5	5	49.51			M5
●SRAFD2-1000HLJ	*m*2	160	RD	1005.31	20	20	18	7	52.65			M6
●SRAFD2.5-1000HLJ	*m*2.5	128	RD	1005.31	25	25	22.5	9	52.65	180	6	M8
●SRAFD3-1000HLJ	*m*3	106	RD	999.03	30	30	27	11	49.51			M10
●SRAFD4-1000HLJ	*m*4	80	RD	1005.31	40	40	36	15	52.65			M12

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	2160	961	220	98	0.09~0.25	1.57	●SRAFK1.5-1000HLJ
7	11	7	3830	1730	391	177	0.11~0.28	2.79	●SRAFD2-1000HLJ
8.6	14	9	5990	2740	611	280	0.13~0.31	4.33	●SRAFD2.5-1000HLJ
10.8	17.5	11	8620	3990	879	407	0.14~0.35	6.14	●SRAFD3-1000HLJ
13	20	14	15300	7220	1560	736	0.18~0.42	11.0	●SRAFD4-1000HLJ

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Recommended Mating Pinions

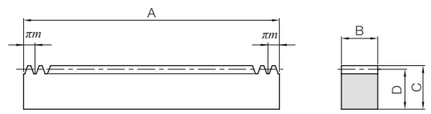
SS- H Hardened Spur Gears

Please see Page 110 for more details.

Thermal Refined Racks

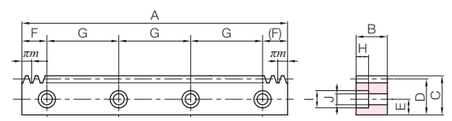
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 to 352HB
Surface treatment	Black oxide coating

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



RF

J Series



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	Backlash (mm)	Weight (kg)	Catalog Number
KRF1.5-500 **KRF1.5-1000**	***m*1.5**	106 212	RF	499.51 999.03	15	20	18.5	3180	811	324	82.7	0.09~0.27	1.09 2.18	**KRF1.5-500** **KRF1.5-1000**
KRF2-500 **KRF2-1000**	***m*2**	80 160		502.65 1005.31	20	25	23	4620	1490	471	152	0.11~0.30	1.82 3.63	**KRF2-500** **KRF2-1000**
KRF2.5-500 **KRF2.5-1000**	***m*2.5**	64 128		502.65 1005.31	25	30	27.5	8830	2390	901	243	0.13~0.33	2.71 5.43	**KRF2.5-500** **KRF2.5-1000**
KRF3-500 **KRF3-1000**	***m*3**	53 106		499.51 999.03	30	35	32	12700	3510	1300	358	0.14~0.37	3.76 7.53	**KRF3-500** **KRF3-1000**
KRF4-500 **KRF4-1000**	***m*4**	40 80		502.65 1005.31	40	45	41	22600	6460	2310	659	0.18~0.44	6.47 12.9	**KRF4-500** **KRF4-1000**
KRF5-500 **KRF5-1000**	***m*5**	32 64		502.65 1005.31	50	50	45	35300	10400	3600	1060	0.20~0.49	8.88 17.8	**KRF5-500** **KRF5-1000**

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	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)
●**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	6	10	6	3180	811	324	82.7	0.09~0.27	1.07 2.14	●**KRFD1.5-500J** ●**KRFD1.5-1000J**
●**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	7	11	7	4620	1490	471	152	0.11~0.30	1.78 3.58	●**KRFD2-500J** ●**KRFD2-1000J**
●**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	8.6	14	9	8830	2390	901	243	0.13~0.33	2.64 5.31	●**KRFD2.5-500J** ●**KRFD2.5-1000J**
●**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	10.8	17.5	11	12700	3510	1300	358	0.14~0.37	3.63 7.32	●**KRFD3-500J** ●**KRFD3-1000J**
●**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	13	20	14	22600	6460	2310	659	0.18~0.44	6.21 12.6	●**KRFD4-500J** ●**KRFD4-1000J**
●**KRFD5-500J** ●**KRFD5-1000J**	***m*5**	32 64		502.65 1005.31	50	50	45	20	31.33 62.65	220	3 5	M14	15.2	23	16	35300	10400	3600	1060	0.20~0.49	8.56 17.2	●**KRFD5-500J** ●**KRFD5-1000J**

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

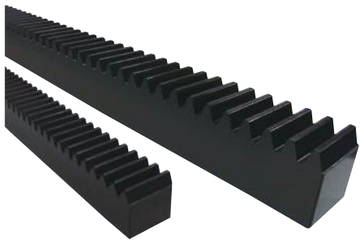
Recommended Mating Pinions

KS Thermal Refined Spur Gears

Please see Page 100 for more details.

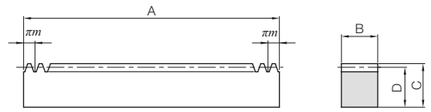
Product Precautions → Page 218 Precautions for Standard Machined Products → Pages 42~44

SRAF/SRAFD/SRAFK Square Racks



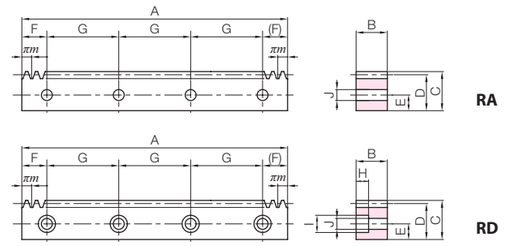
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 210HB)
Surface treatment	Black oxide coating

* 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
SRAF1.5-1000	***m*1.5**	212	RF	999.03	15	15	13.5	2160	421	220	42.9
SRAF2-1000	***m*2**	160		1005.31	20	20	18	3830	775	391	79.0
SRAF2.5-1000	***m*2.5**	128		1005.31	25	25	22.5	5990	1240	611	127
SRAF3-1000	***m*3**	106		999.03	30	30	27	8620	1820	879	186
SRAF4-1000	***m*4**	80		1005.31	40	40	36	15300	3330	1560	339
SRAF1.5-2000	***m*1.5**	435		2049.88	17	17	15.5	2443	421	249	43
SRAF2-2000	***m*2**	326		2048.31	20	20	18	3833	775	391	79
SRAF2.5-2000	***m*2.5**	261		2049.88	25	25	22.5	5989	1241	611	127
SRAF3-2000	***m*3**	217		2045.17	30	30	27	8624	1821	879	186

Backlash (mm)	Weight (kg)	Catalog Number
0.09~0.25	1.59	**SRAF1.5-1000**
0.11~0.28	2.84	**SRAF2-1000**
0.13~0.31	4.44	**SRAF2.5-1000**
0.14~0.35	6.35	**SRAF3-1000**
0.18~0.42	11.4	**SRAF4-1000**
0.09~0.25	4.24	**SRAF1.5-2000**
0.11~0.28	5.79	**SRAF2-2000**
0.13~0.31	9.05	**SRAF2.5-2000**
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
●**SRAFK1.5-1000J**	***m*1.5**	212	RA	999.03	15	15	13.5	5	49.51			M5
●**SRAFD2-1000J**	***m*2**	160	RD	1005.31	20	20	18	7	52.65			M6
●**SRAFD2.5-1000J**	***m*2.5**	128	RD	1005.31	25	25	22.5	9	52.65	180	6	M8
●**SRAFD3-1000J**	***m*3**	106	RD	999.03	30	30	27	11	49.51			M10
●**SRAFD4-1000J**	***m*4**	80	RD	1005.31	40	40	36	15	52.65			M12

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
—	—	6	2160	421	220	42.9	0.09~0.25	1.57	●**SRAFK1.5-1000J**
7	11	7	3830	775	391	79.0	0.11~0.28	2.79	●**SRAFD2-1000J**
8.6	14	9	5990	1240	611	127	0.13~0.31	4.33	●**SRAFD2.5-1000J**
10.8	17.5	11	8620	1820	879	186	0.14~0.35	6.14	●**SRAFD3-1000J**
13	20	14	15300	3330	1560	339	0.18~0.42	11.0	●**SRAFD4-1000J**

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Recommended Mating Pinions

SS Spur Gears

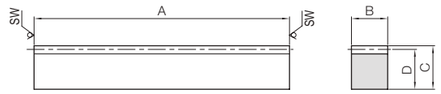
Please see Page 108 for more details.

Product Precautions → Page 218

Precautions for Standard Machined Products → Pages 42~44

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 210HB)
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	***m*1**	29		98	10	12	11	958	177	97.7	18.0	0.04~0.21	0.085
SR1-300		94		303									0.26
SR1-500		159		505									0.43
SR1.5-100	***m*1.5**	20		101	15	20	18.5	2160	421	220	42.9	0.09~0.25	0.44
SR1.5-300		62		303									0.22
SR1.5-500		105		505									0.66
SR2-100	***m*2**	14		98	20	25	23	3830	775	391	79.0	0.11~0.28	1.10
SR2-300		46		303									0.35
SR2-500		79		505									1.09
SR2.5-100	***m*2.5**	11		100	25	30	27.5	5990	1240	611	127	0.13~0.31	1.82
SR2.5-300		37		303									0.54
SR2.5-500		63		505									1.64
SR3-100	***m*3**	9		101	30	35	32	8620	1820	879	186	0.14~0.35	2.73
SR3-300		30		303									0.76
SR3-500		52		505									2.28
SR4-100	***m*4**	6		98	40	45	41	15300	3330	1560	339	0.18~0.42	3.81
SR4-500		39		505									1.26
SR5-110	***m*5**	5		108	50	50	45	24000	5300	2440	540	0.20~0.47	6.50
SR5-500		31		505									1.91
SR6-110	***m*6**	4		111	60	60	54	34500	7740	3520	789	0.22~0.54	8.92
SR6-500		25		505									2.82
SR8-130	***m*8**	3		123	75	75	67	44200	10400	4510	1060	0.28~0.63	12.8
SR10-160	***m*10**	3		155	90	80	70	66300	16100	6770	1640	0.33~0.70	4.85
													7.67

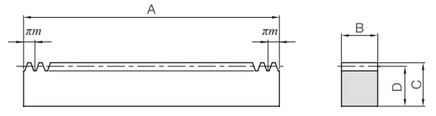
Recommended Mating Pinions

SS Spur Gears

Please see Page 108 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 210HB)
Surface treatment	Black oxide coating



RF

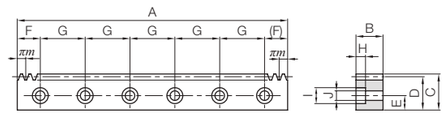
Catalog Number	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)
SRF0.5-300	***m*0.5**	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	***m*1**	96		301.59	10	12	11	958	177	97.7	18.0	0.04~0.21	0.26
SRF1-500		159		499.51									0.43
SRF1-1000		318		999.03									0.86
SRF1.5-300	***m*1.5**	64		301.59	15	20	18.5	2160	421	220	42.9	0.09~0.25	0.66
SRF1.5-500		106		499.51									1.09
SRF1.5-1000		212		999.03									2.18
SRF1.5-1500		320		1507.96									3.28
SRF1.5-2000		435		2049.88									4.47
SRF2-300	***m*2**	48		301.59	20	25	23	3830	775	391	79.0	0.11~0.28	1.09
SRF2-500		80		502.65									1.82
SRF2-1000		160		1005.31									3.63
SRF2-1500		240		1507.96									5.45
SRF2-2000		326		2048.31									7.40
SRF2.5-300	***m*2.5**	38		298.45	25	30	27.5	5990	1240	611	127	0.13~0.31	1.61
SRF2.5-500		64		502.65									2.71
SRF2.5-1000		128		1005.31									5.43
SRF2.5-1500		192		1507.96									8.14
SRF2.5-2000		261		2049.88									11.1
SRF3-300	***m*3**	32		301.59	30	35	32	8620	1820	879	186	0.14~0.35	2.27
SRF3-500		53		499.51									3.76
SRF3-1000		106		999.03									7.53
SRF3-1500		160		1507.96									11.4
SRF3-2000		217		2045.17									15.4
SRF4-500	***m*4**	40		502.65	40	45	41	15300	3330	1560	339	0.18~0.42	6.47
SRF4-1000		80		1005.31									12.9
SRF4-1500		120		1507.96									19.4
SRF4-2000		163		2048.31									26.4
SRF5-500	***m*5**	32		502.65	50	50	45	24000	5300	2440	540	0.20~0.47	8.88
SRF5-1000		64		1005.31									17.8
SRF5-1500		96		1507.96									26.6
SRF5-2000		130		2042.04									36.1
SRF6-500	***m*6**	26		490.09	60	60	54	34500	7740	3520	789	0.22~0.54	12.5
SRF6-1000		53		999.03									25.4
SRF6-1500		80		1507.96									38.4
SRF6-2000		108		2035.75									51.8
SRF8-500	***m*8**	20		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

SRFD/SRFK Module 0.5~6

Steel Racks with Bolt Holes

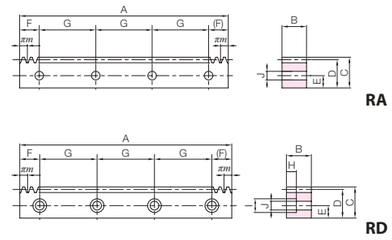
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 210HB)
Surface treatment	Black oxide coating

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



RD

J Series



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	*m*0.5	191	RA	300.02	5	12	11.5	5.5	15.01	90	4	M3
●SRFK0.8-300J	*m*0.8	119		299.08	8	12.3	11.5	5.5	14.54	90	4	M4
●SRFK1-300J	*m*1	96		301.59	10	12	11	5	20.80	130	3	M4
●SRFK1-500J		159		499.51					24.76	150	4	
●SRFD1.5-300J	*m*1.5	64	RD	301.59	15	20	18.5	8	20.80	130	3	M5
●SRFD1.5-500J		106		499.51					24.76	150	4	
SRFD1.5-1000		212		999.03					49.51	180	6	
SRFD1.5-1500		320		1507.96					33.98	180	9	
SRFD1.5-2000		435		2049.88					34.94	180	12	
●SRFD2-300J	*m*2	48		301.59	20	25	23	10	20.80	130	3	M6
●SRFD2-500J		80		502.65					26.33	150	4	
SRFD2-1000		160		1005.31					52.65	180	6	
SRFD2-1500		240		1507.96					33.98	180	9	
SRFD2-2000		326		2048.31					34.15	180	12	
●SRFD2.5-300J	*m*2.5	38		298.45	25	30	27.5	12	19.23	130	3	M8
●SRFD2.5-500J		64		502.65					26.33	150	4	
SRFD2.5-1000		128		1005.31					52.65	180	6	
SRFD2.5-1500		192		1507.96					33.98	180	9	
SRFD2.5-2000		261		2049.88					34.94	180	12	
●SRFD3-300J	*m*3	32		301.59	30	35	32	14	20.80	130	3	M10
●SRFD3-500J		53		499.51					24.76	150	4	
SRFD3-1000		106		999.03					49.51	180	6	
SRFD3-1500		160		1507.96					33.98	180	9	
SRFD3-2000		217		2045.17					32.58	180	12	
●SRFD4-500J	*m*4	40		502.65	40	45	41	18	26.33	150	4	M12
SRFD4-1000		80		1005.31					52.65	180	6	
SRFD4-1500		120		1507.96					33.98	180	9	
SRFD4-2000		163		2048.31					34.15	180	12	
●SRFD5-500J	*m*5	32		502.65	50	50	45	20	31.33	220	3	M14
SRFD5-1000		64		1005.31					62.65	220	5	
SRFD5-1500		96		1507.96					93.98	220	7	
SRFD5-2000		130		2042.04					31.02	220	10	
●SRFD6-500J	*m*6	26		490.09	60	60	54	23	25.04	220	3	M16
SRFD6-1000		53		999.03					59.51	220	5	
SRFD6-1500		80		1507.96					93.98	220	7	
SRFD6-2000		108		2035.75					27.88	220	10	

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Surface durability	Allowable force (kgf) Bending strength	Surface durability	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

[Caution on Secondary Operations] ① Avoid hardening racks with bolt holes, due to mounting hole deformation.

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Recommended Mating Pinions

SS Spur Gears

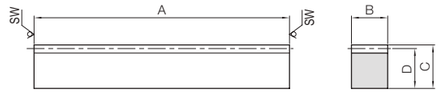
Please see Page 104 for more details.

Product Precautions → Page 218

Precautions for Standard Machined Products → Pages 42~44

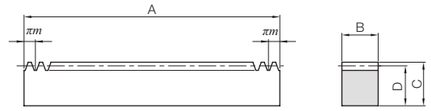
Stainless Steel Racks

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)

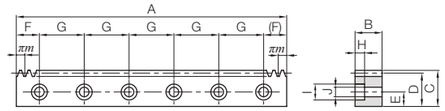


SW: Sawing surface

R1



RF



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
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

Backlash (mm)	Weight (kg)	Catalog Number
0.04~0.23	0.44	**SUR1-500**
0.09~0.27	1.11	**SUR1.5-500**
0.11~0.30	1.84	**SUR2-500**
0.13~0.33	2.75	**SUR2.5-500**
0.14~0.37	3.84	**SUR3-500**
0.18~0.44	6.57	**SUR4-500**

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
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

Backlash (mm)	Weight (kg)	Catalog Number
0.09~0.27	2.20	**SURF1.5-1000**
0.11~0.30	3.67	**SURF2-1000**
0.13~0.33	5.48	**SURF2.5-1000**
0.14~0.37	7.61	**SURF3-1000**
0.18~0.44	13.1	**SURF4-1000**

Catalog Number	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
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

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
6	10	6	1030	237	105	24.2	0.09~0.27	2.16	**SURFD1.5-1000**
7	11	7	1830	436	187	44.5	0.11~0.30	3.61	**SURFD2-1000**
8.6	14	9	2860	698	292	71.2	0.13~0.33	5.37	**SURFD2.5-1000**
10.8	17.5	11	4120	1030	420	105	0.14~0.37	7.40	**SURFD3-1000**
13	20	14	7320	1870	746	191	0.18~0.44	12.7	**SURFD4-1000**

[Caution on Product Characteristics] ① The stainless steel material is given *solution 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.

* Solution treatment
Heat treatment by melting the carbide generated on the surface into the material when manufacturing the material

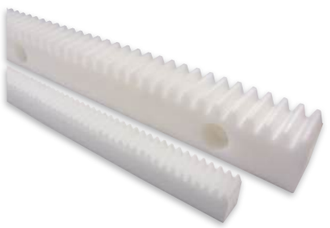
** Passivation
Pickled (nitric hydrofluoric acid) to make it more rust resistant

Recommended Mating Pinions

SUS/SUSA Stainless Steel Spur Gears

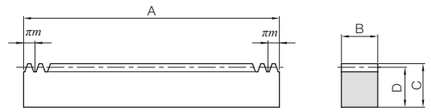
Please see Page 156 for more details.

Product Precautions → Page 218



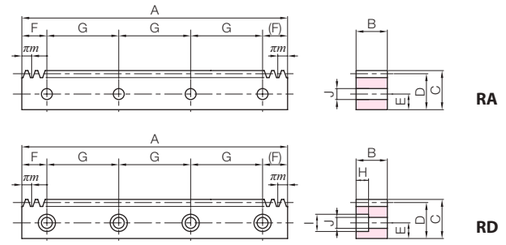
Specifications	
Precision grade	KHK R 001 Grade 5 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	Polyacetal
Heat treatment	—
Tooth hardness	(115 to 120HRR)

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



RF

J Series



Catalog Number	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Allowable force (N)	Allowable force (kgf)	Backlash (mm)	Weight (kg)
				A	B	C	D	Bending strength	Bending strength		
DRF1-500	***m*1**	159	RF	499.51	10	12	11	80.7	8.23	0.15~0.36	0.077
DRF1.5-1000	***m*1.5**	212		999.03	15	20	18.5	182	18.5	0.18~0.39	0.39
DRF2-1000	***m*2**	160		1005.31	20	25	23	323	32.9	0.21~0.42	0.65
DRF2.5-1000	***m*2.5**	128		1005.31	25	30	27.5	504	51.4	0.23~0.46	0.98
DRF3-1000	***m*3**	106		999.03	30	35	32	726	74.1	0.28~0.52	1.35

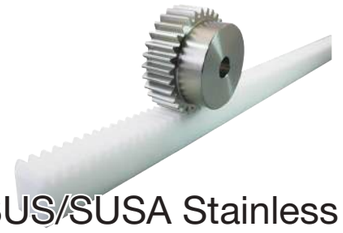
Catalog Number ● : J Series (Available-on-request)	Module	No. of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Mounting hole dimensions				
				A	B	C	D	E	F	G	No. of holes	Screw size
●**DRFK1-500J**	***m*1**	159	RA	499.51	10	12	11	5	24.76	150	4	M4
●**DRFD1.5-1000J**	***m*1.5**	212	RD	999.03	15	20	18.5	8	49.51	180	6	M5
●**DRFD2-1000J**	***m*2**	160		1005.31	20	25	23	10	52.65	180	6	M6
●**DRFD2.5-1000J**	***m*2.5**	128		1005.31	25	30	27.5	12	52.65	180	6	M8
●**DRFD3-1000J**	***m*3**	106		999.03	30	35	32	14	49.51	180	6	M10

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

[Caution on Product Characteristics] ① 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 J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

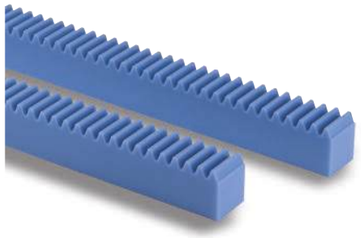
Recommended Mating Pinions



SUS/SUSA Stainless Steel Spur Gears

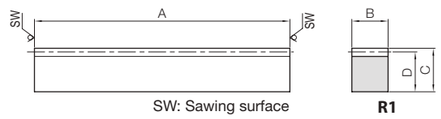
Please see Page 156 for more details.

Product Precautions → Page 218
Precautions for Standard Machined Products → Pages 42~44



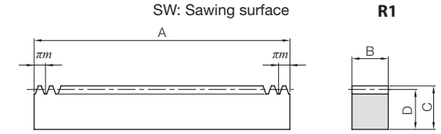
Specifications	
Precision grade	KHK R 001 Grade 5 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	MC901
Heat treatment	—
Tooth hardness	(115 to 120HRR)

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



SW: Sawing surface

R1



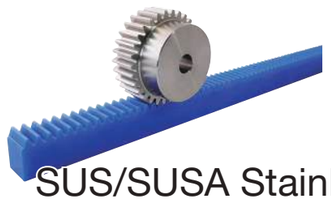
RF

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

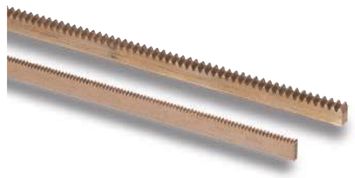
[Caution on Product Characteristics] ① These plastic racks expand and contract depending on the temperature and humidity. The length per 1m changes by 0.45 mm when the temperature changes by 10°C, and about 5 mm with water absorption of 2%. The bending is 5 mm or less per 1 m, but may exceed 5 mm over time in products with total length 1000 mm. Mount for use while correcting along the gear cutting reference surface (bottom).

Recommended Mating Pinions

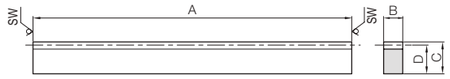


SUS/SUSA Stainless Steel Spur Gears

Please see Page 156 for more details.



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)



SW: Sawing surface

R1

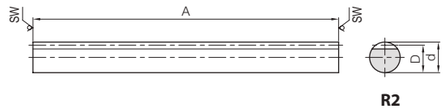
Catalog Number	Module	Effective number of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)
BSR0.5-300	***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

Recommended Mating Pinions

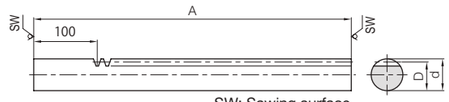
BSS Spur Gears

Please see Page 188 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 210HB)
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			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	R7	505	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 Because this is extruded material, the outer diameter may be out of H9 tolerance in sections.

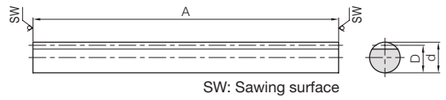
[Caution on Secondary Operations] ① Avoid hardening round racks, due to twisting and deformation occurring and the difficulty of straightening the rack after hardening.

Recommended Mating Pinions

SS Spur Gears

Please see Page 108 for more details.

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)



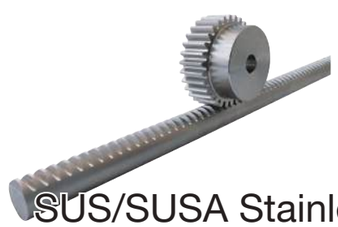
SW: Sawing surface

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	0.66
SURO2-500	***m*2**	79		505	20	18	1530	298	156	30.4	0.11~0.30	1.17
SURO2-1000		159		1010								2.33
SURO2.5-500	***m*2.5**	63		505	25	22.5	2390	477	243	48.7	0.13~0.33	1.82
SURO2.5-1000		127		1010								3.65
SURO3-500	***m*3**	52		505	30	27	3440	700	351	71.4	0.14~0.37	2.63
SURO3-1000		105		1010								5.25

[Caution on Product Characteristics] ① Because this is extruded material, the outer diameter may be out of H9 tolerance in sections.

Recommended Mating Pinions



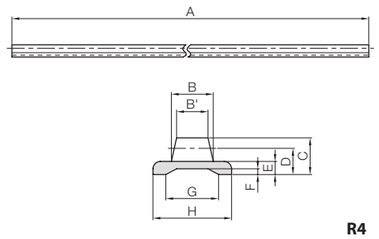
SUS/SUSA Stainless Steel Spur Gears

Please see Page 156 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

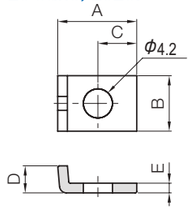
Catalog Number	Module	Shape	Total Length	Face width	Face width	Height	Height to pitch line	Base thickness	Base groove depth	Base groove width	Base width
			A	B	B'	C	D	E	F	G	H
DR0.8-2000	***m*0.8**	R4	2000	3.8	3	3.3	2.5	1.5	0.7	3.7	8
DR1-2000	***m*1**			5	4	4.3	3.3	2	0.9	4.9	10
DR1.5-2000	***m*1.5**			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 When using the DR flexible rack in an arc, the minimum bending radius (R) is 150 mm for both the external and internal teeth. Reducing the radius increase 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.
② It cannot be used where positioning accuracy is required.
③ For the dimensional accuracy of each part, see the dimensional tolerance of molded items in the separate table.

DR dedicated SRS Rack Clamps

◎ Note that products with an asterisk (*) after the catalog number will no longer be manufactured after 20 June, 2026.

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 set includes a rack clamp 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

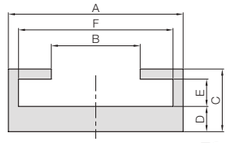
List of Products for DR Molded Flexible Racks

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



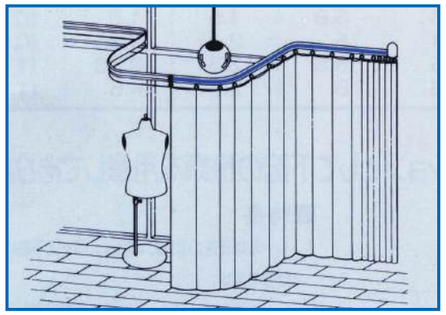
T6

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

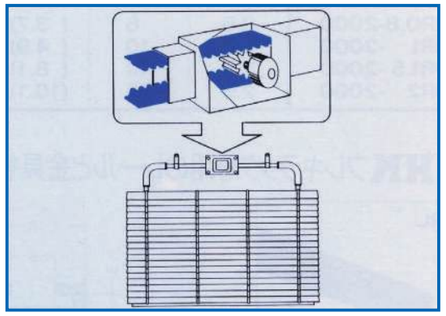
Catalog Number	Shape	A	B	C	D	E	F	Weight (kg)
ARL-0.8	T6	10.3	4.4	4.7	2	1.7	8.3	0.081
ARL-1		12.3	5.6	5.2	2	2.2	10.3	0.096
ARL-1.5		14.3	7.2	5.5	2	2.5	12.3	0.11
ARL-2		17.3	8.8	6.2	2.5	2.7	15.3	0.15

Applications for DR Molded Flexible Racks

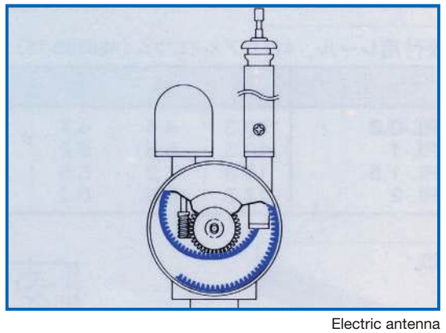
As it is possible to fix the position of the pinion and bend the DR molded flexible racks into any shape, they can be used for special purposes.



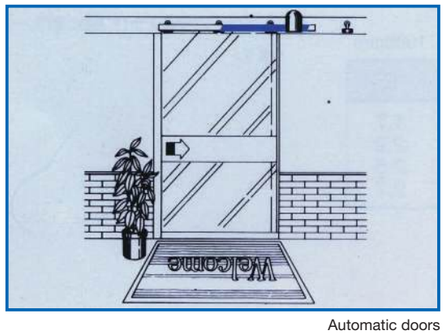
Electric curtain



Electric blinds



Electric antenna

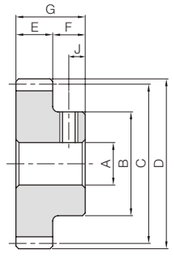


Automatic doors

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

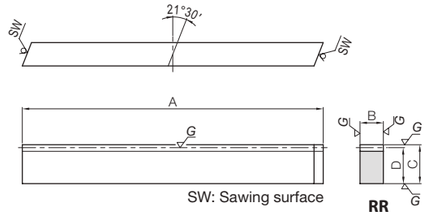
Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Socket head screw	
				A_{H7}	B	C	D	E	F	G	Size	J
SSDR0.8-35	***m*0.8**	35	S1T	5	16	28	29.6	3	7	10	M4	3.5
SSDR1-30	***m*1**	30		6	20	30	32	4	8	12	M4	4
SSDR1.5-20	***m*1.5**	20		6	20	30	33	5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

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**

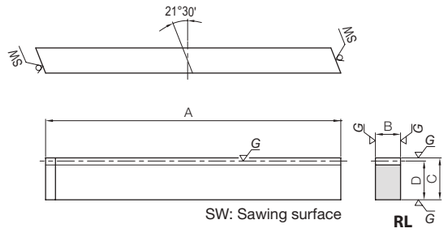
Product Precautions → Page 218

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

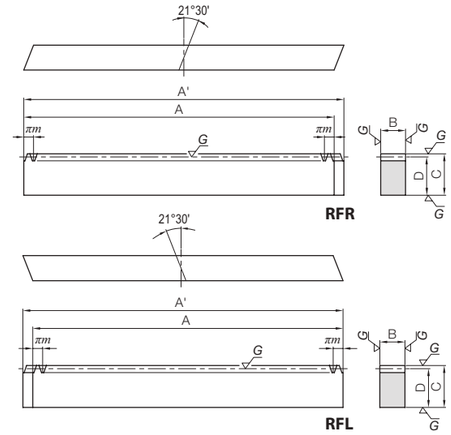
* The precision grade of J Series products is equivalent to the value shown in the table.



SW: Sawing surface
RR



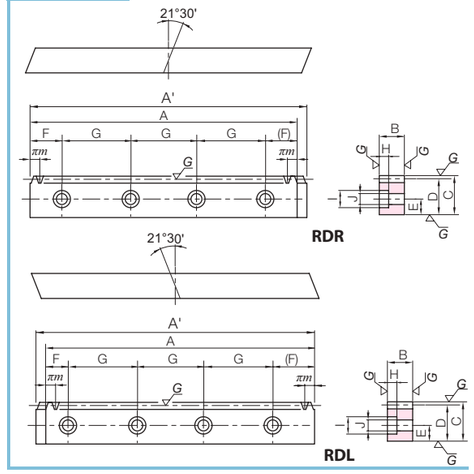
SW: Sawing surface
RL



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)	Weight (kg)	Catalog Number
KRHG1-100R **KRHG1-100L**	***m*1**	28	R L	RR RL	98	8	15	14	1180	966	121	98.5	0.05~0.15	0.086	**KRHG1-100R** **KRHG1-100L**
KRHG1.5-100R **KRHG1.5-100L**	***m*1.5**	19	R L	RR RL	101	12	20	18.5	2670	2180	272	222	0.05~0.15	0.18	**KRHG1.5-100R** **KRHG1.5-100L**
KRHG2-100R (Made to Order) **KRHG2-100L** (Made to Order)	***m*2**	13	R L	RR RL	98	16	25	23	4740	3880	483	396	0.06~0.17	0.28	**KRHG2-100R** (Made to Order) **KRHG2-100L** (Made to Order)
KRHG2.5-100R (Made to Order) **KRHG2.5-100L** (Made to Order)	***m*2.5**	10	R L	RR RL	100	20	30	27.5	7400	6070	755	619	0.06~0.17	0.43	**KRHG2.5-100R** (Made to Order) **KRHG2.5-100L** (Made to Order)
KRHG3-100R (Made to Order) **KRHG3-100L** (Made to Order)	***m*3**	8	R L	RR RL	102	25	35	32	11100	9030	1130	921	0.06~0.17	0.64	**KRHG3-100R** (Made to Order) **KRHG3-100L** (Made to Order)

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	Backlash (mm)	Weight (kg)	Catalog Number
KRHGF1-500R **KRHGF1-500L**	***m*1**	159	R L	RFR RFL	499.51	502.66	8	15	14	1180	966	121	98.5	0.05~0.15	0.44	**KRHGF1-500R** **KRHGF1-500L**
KRHGF1.5-500R **KRHGF1.5-500L**	***m*1.5**	106	R L	RFR RFL	499.51	504.23	12	20	18.5	2670	2180	272	222	0.05~0.15	0.87	**KRHGF1.5-500R** **KRHGF1.5-500L**
KRHGF2-1000R **KRHGF2-1000L**	***m*2**	160	R L	RFR RFL	1005.31	1011.61	16	25	23	4740	3880	483	396	0.06~0.17	2.90	**KRHGF2-1000R** **KRHGF2-1000L**
KRHGF2.5-1000R **KRHGF2.5-1000L**	***m*2.5**	128	R L	RFR RFL	1005.31	1013.19	20	30	27.5	7400	6070	755	619	0.06~0.17	4.34	**KRHGF2.5-1000R** **KRHGF2.5-1000L**
KRHGF3-1000R **KRHGF3-1000L**	***m*3**	106	R L	RFR RFL	999.03	1008.88	25	35	32	11100	9030	1130	921	0.06~0.17	6.27	**KRHGF3-1000R** **KRHGF3-1000L**

J Series



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	Mounting hole dimensions F	Mounting hole dimensions G	Mounting hole dimensions 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

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	1180	966	121	98.5	0.05~0.15	0.43	●**KRHGFD1-500RJ** ●**KRHGFD1-500LJ**
M5	6	10	6	2670	2180	272	222	0.05~0.15	0.85	●**KRHGFD1.5-500RJ** ●**KRHGFD1.5-500LJ**
M6	7	11	7	4740	3880	483	396	0.06~0.17	2.86	●**KRHGFD2-1000RJ** ●**KRHGFD2-1000LJ**
M8	8.6	14	9	7400	6070	755	619	0.06~0.17	4.24	●**KRHGFD2.5-1000RJ** ●**KRHGFD2.5-1000LJ**
M10	10.8	17.5	11	11100	9030	1130	921	0.06~0.17	6.09	●**KRHGFD3-1000RJ** ●**KRHGFD3-1000LJ**

[Caution on Product Characteristics] ① For the proper helical pinions for these racks, see the Mating Gear Selection Chart on Page 192.
② These gears produce axial thrust forces. Please see Page 195 for more details.
[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Recommended Mating Pinions

KHG Ground Helical Gears

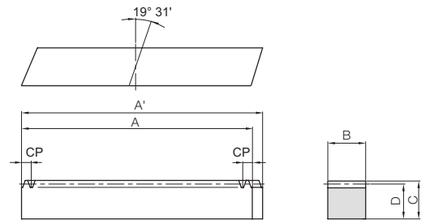
Please see Page 196 for more details.

Product Precautions → Page 218
Precautions for Standard Machined Products → Pages 42~44

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

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	Gear teeth laser hardened *
Tooth hardness	55 to 65HRC
Surface treatment	Black oxide coating

* Due to the gear teeth being laser hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 1 mm).



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
SRHEF3-1000RHL	***m*3** (CP10)	100	RFR	1000	1010.29	29	29	26
SRHEF4-1000RHL	***m*4** (CP13.333)	75			1013.83	39	39	35
SRHEF5-1000RHL	***m*5** (CP16.667)	60			1017.38	49	39	34
SRHEF6-1000RHL	***m*6** (CP20)	50			1020.93	59	49	43

Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number
Bending strength	Surface durability	Bending strength	Surface durability			
7200	3540	735	361	0.15~0.39	5.91	**SRHEF3-1000RHL**
13400	5800	1370	591	0.19~0.47	10.7	**SRHEF4-1000RHL**
20100	8750	2050	892	0.21~0.52	13.1	**SRHEF5-1000RHL**
29800	15200	3040	1550	0.23~0.57	19.9	**SRHEF6-1000RHL**

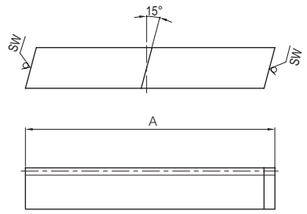
[Caution on Product Characteristics]
① For the helical gear series combinations, see the Mating Gear Selection Chart on Page 192.
② These gears produce axial thrust forces. Please see Page 195 for more details.
③ For the assembly joining gauge, use ZST-GL on Page 268.

Recommended Mating Pinions

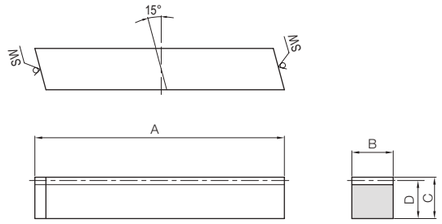
SHE-H Hardened Helical Gears

Please see Page 264 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 210HB)
Surface treatment	Black oxide coating



SW: Sawing surface
RR



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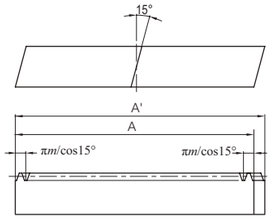
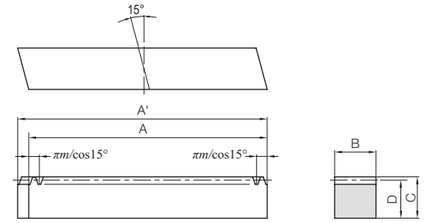


RFR



RFL

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)	Weight (kg)
SRH2-100R SRH2-100L	***m*2**	12	R L	RR RL	95	25	25	23	4710	1570	481	160	0.12~0.31	0.43
SRH3-100R SRH3-100L	***m*3**	7	R L	RR RL	95	35	35	32	9910	3520	1010	359	0.15~0.38	0.84

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	***m*2**	153	R L	RFR RFL	995.24	1001.94	25	25	23	4710	1570	481	160
SRHF3-1000R SRHF3-1000L	***m*3**	102	R L	RFR RFL	995.24	1004.62	35	35	32	9910	3520	1010	359

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**

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	***m*2**	153	R L	RDR RDL	995.24	1001.94	25	25	23	10	47.62	180	6	M6
SRHFD3-1000R SRHFD3-1000L	***m*3**	102	R L	RDR RDL	995.24	1004.62	35	35	32	14	47.62	180	6	M10

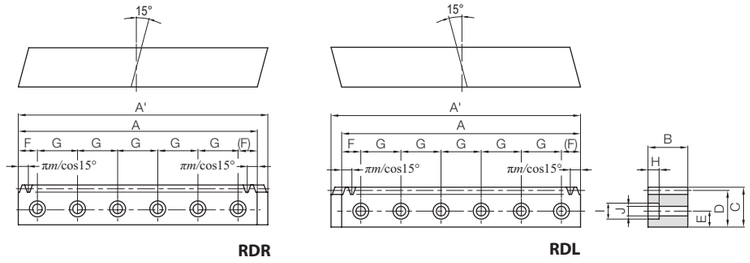
Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number
7	11	7	4710	1570	481	160	0.12~0.31	4.43	**SRHFD2-1000R SRHFD2-1000L**
10.8	17.5	11	9910	3520	1010	359	0.15~0.38	8.52	**SRHFD3-1000R SRHFD3-1000L**

[Caution on Product Characteristics] ① For the proper helical pinions for these racks, see the Mating Gear Selection Chart on Page 192.
② These gears produce axial thrust forces. Please see Page 195 for more details.
[Caution on Secondary Operations] ① Avoid hardening racks with bolt holes, due to mounting hole deformation.

Recommended Mating Pinions

SH Helical Gears

Please see Page 204 for more details.

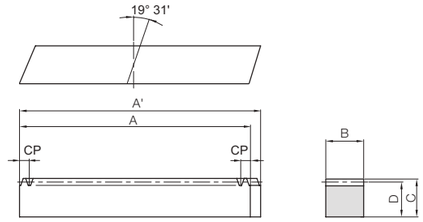


RDR **RDL**

Product Precautions → Page 218

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 210HB)
Surface treatment	Black oxide coating



RFR

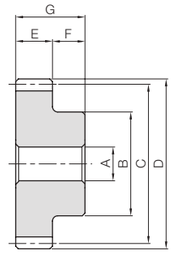
Catalog Number	Module (front pitch mm)	No. of teeth	Shape	Total Length A	Total Length A’	Face width B	Height C	Height to pitch line D
SRHEF1.5-1000R	***m*1.5** (CP5)	200	RFR	1000	1006.03	17	17	15.5
SRHEF2-1000R	***m*2** (CP6.667)	150			1008.51	24	24	22
SRHEF3-1000R	***m*3** (CP10)	100			1010.29	29	29	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 For the proper helical pinions for these racks, see the Mating Gear Selection Chart on Page 192.
② These gears produce axial thrust forces. Please see Page 195 for more details.
③ For the assembly joining gauge, use ZST-GL on Page 268.

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**

SHE Module 1.5~6 EU Specification Helical Gears *NEW*

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

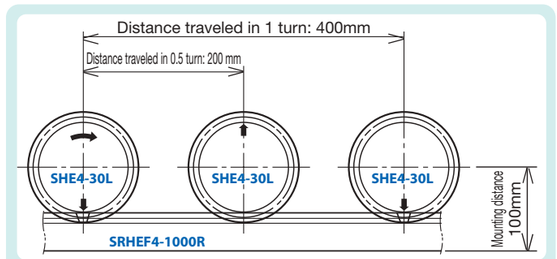


S1

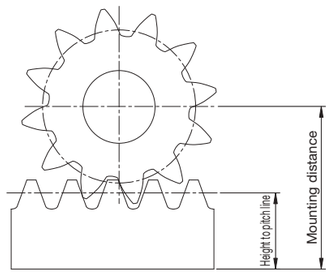
To order Hardened Plus, please specify Catalog No. + H. **Example: SHE1.5-20LH**

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 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.
[Caution on Secondary Operations] ① See Page 22 for more details on Hardened Plus (H Series and HJ Series).



Distance of the pinion traveled in one turn and mounting distance

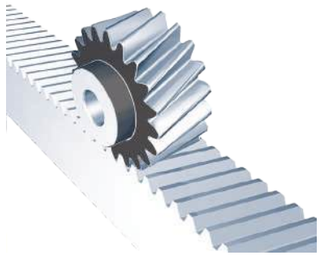


Mounting distance of profile helix gear and meshing rack

Total Length G	Distance traveled in one turn Distance traveled (mm)	Allowable torque Bending strength N·m	Allowable torque Bending strength kgf·m	Allowable torque Surface durability N·m	Allowable torque Surface durability kgf·m	Allowable torque Surface durability (H) N·m	Allowable torque Surface durability (H) kgf·m	Backlash (mm)	Weight (kg)	Catalog Number
32	100	35.6	3.63	5.89	0.60	20.1	2.05	0.10~0.28	0.16	**SHE1.5-20L**
32	125	46.5	4.75	10.3	1.05	34.9	3.56		0.26	**SHE1.5-25L**
32	150	57.6	5.87	16.3	1.66	54.7	5.57		0.36	**SHE1.5-30L**
41	120	78.2	7.98	11.2	1.15	38.1	3.88	0.12~0.32	0.30	**SHE2-18L**
41	160	107	10.9	24.4	2.48	81.3	8.29		0.56	**SHE2-24L**
41	200	136	13.8	43.8	4.46	144	14.7		0.85	**SHE2-30L**
50	200	238	24.2	45.7	4.66	150	15.3	0.15~0.39	1.06	**SHE3-20L**
50	250	310	31.6	80.1	8.17	260	26.5		1.72	**SHE3-25L**
50	300	384	39.2	127	12.9	405	41.3		2.47	**SHE3-30L**
65	240	474	48.3	89.8	9.16	292	29.8	0.19~0.47	1.99	**SHE4-18L**
65	320	687	70.0	183	18.6	582	59.3		3.76	**SHE4-24L**
65	400	902	92.0	317	32.3	992	101		5.78	**SHE4-30L**
75	300	978	99.7	171	17.4	547	55.8	0.21~0.52	3.91	**SHE5-18L**
75	400	1380	141	354	36.1	1110	113		6.95	**SHE5-24L**
88	400	1900	194	402	40.9	1260	128	0.23~0.57	8.05	**SHE6-20L**
88	500	2480	253	705	71.9	2160	221		12.8	**SHE6-25L**

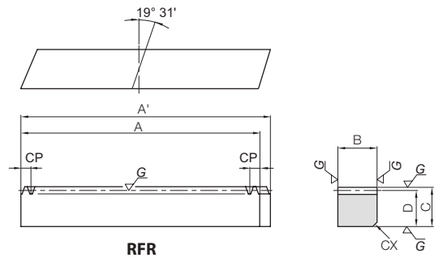
Product Precautions → Page 218
Precautions for Standard Machined Products → Pages 42~44

ZST/ZSTD EU Specification Hardened Ground Helical Racks



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	55 to 60HRC

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



RFR

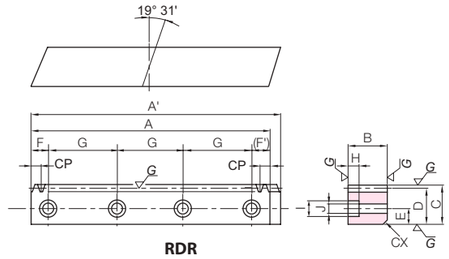
Catalog Number	Module (front pitch mm)	No. of teeth	Shape	Total Length A	Total Length A'	Face width B	Height C	Height to pitch line D	C Chamfer Amount CX	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)
ZST2-1000R	***m*2** (CP6.667)	150	RFR	1000	1008.51	24	24	22	2	4410	2140	450	219	0.06~0.14	4.13
ZST2-2000R	***m*2** (CP6.667)	300		2000	2008.52										8.26
ZST3-1000R	***m*3** (CP10)	100		1000	1010.29	29	29	26		8210	5580	837	569		5.90
ZST3-2000R	***m*3** (CP10)	200		2000	2010.29										11.8
ZST4-1000R	***m*4** (CP13.333)	75		1000	1013.83	39	39	35	3	15200	8960	1550	914		10.7
ZST4-2000R	***m*4** (CP13.333)	150		2000	2013.83										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**	***m*2** (CP6.667)	150	RDR	1000	1008.51	24	24	22	2	8	71.01	53.99	125	8	M6
●**ZSTD2-2000RJ**	***m*2** (CP6.667)	300		2000	2008.52									16	
●**ZSTD3-1000RJ**	***m*3** (CP10)	100		1000	1010.29	29	29	26		9	72.79	52.21		8	M8
●**ZSTD3-2000RJ**	***m*3** (CP10)	200		2000	2010.29									16	
●**ZSTD4-1000RJ**	***m*4** (CP13.333)	75		1000	1013.83	39	39	35	3	12	76.33	48.67		8	
●**ZSTD4-2000RJ**	***m*4** (CP13.333)	150		2000	2013.83									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

PUH Lubricated Helical Gears

Please see Page 494 for more details.

J Series



RDR

ZST-GL Assembly Gauges

Material: S45C
Accuracy: KHK R 001 Grade 2

Please see Page 268 in the Master Catalog for more details.

[Caution on Product Characteristics] ① For the proper helical pinions for these racks, see the Mating Gear Selection Chart on Page 192.
② These gears produce axial thrust forces. Please see Page 195 for more details.

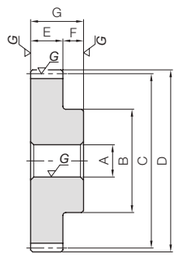
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

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	●**ZSTD2-1000RJ**
								8.09	●**ZSTD2-2000RJ**
8.6	14	9	8210	5580	837	569		5.70	●**ZSTD3-1000RJ**
								11.4	●**ZSTD3-2000RJ**
8.6	14	9	15200	8960	1550	914		10.4	●**ZSTD4-1000RJ**
								20.9	●**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**

ZSTP EU Specification Ground Helical Gears

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	50 to 60HRC
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.
** 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).



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)
ZSTP2-18L	***m*2** (CP6.667)	18	+0.451	42	12	30	38.20	44	25	16	41	120	124	71.4	12.6	7.28	0.06~0.14
ZSTP2-24L		24	+0.268	48	15	45	50.93	56				160	169	162	17.3	16.5	
ZSTP2-30L		30	+0.085	54	18	55	63.66	68				200	214	263	21.8	26.9	
ZSTP3-20L	***m*3** (CP10)	20	+0.390	59	20	55	63.66	72	30	20	50	200	375	275	38.3	28.0	
ZSTP3-25L		25	+0.404	67	20	70	79.58	88				250	490	471	50.0	48.0	
ZSTP3-30L		30	+0.418	75	25	85	95.49	104				300	606	729	61.8	74.4	
ZSTP4-18L	***m*4** (CP13.333)	18	+0.201	74	20	65	76.39	86	40	25	65	240	748	530	76.3	54.0	
ZSTP4-24L		24	+0.268	87	20	90	101.86	112				320	1080	1050	111	107	
ZSTP4-30L		30	+0.335	100	25	110	127.32	138				400	1420	1910	145	195	
ZSTP5-18L	***m*5** (CP16.667)	18	+0.451	84	25	85	95.49	110	50	25	75	300	1540	985	157	100	0.06~0.15
ZSTP5-24L		24	+0.468	100		110	127.32	142				400	2180	1980	222	202	
ZSTP6-20L	***m*6** (CP20)	20	+0.390	109	30	110	127.32	144	60	28	88	400	3000	2240	306	229	
ZSTP6-25L		25	+0.404	125		140	159.15	176				500	3920	3850	400	392	

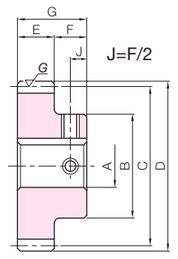
[Caution on Product Characteristics] ① The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of ZST Helical Racks with the same pitch.

[Caution on Secondary Operations] ① Because of the influence of hardening residual stress, avoid removing the entire boss, as it may cause the gears to deform.

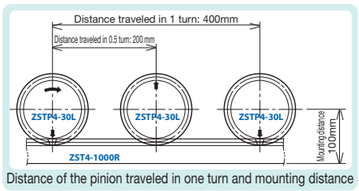
Product Precautions → Page 218

Precautions for Standard Machined Products → Pages 42~44

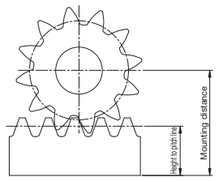
J Series



S1K



Distance of the pinion traveled in one turn and mounting distance



Mounting distance of profile helix gear and meshing rack

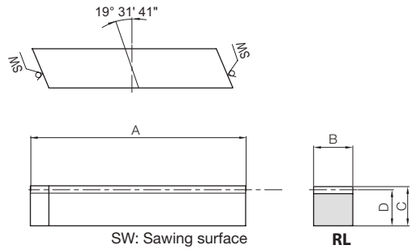
To order J Series products, please specify: Catalog No. + J + BORE.

Bore H7	* The product shapes of J Series items are identified by background color.																							
Keyway Js9	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	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																								
ZSTP2-24LJ BORE																								
ZSTP2-30LJ BORE																								
ZSTP3-20LJ BORE																								
ZSTP3-25LJ BORE																								
ZSTP3-30LJ BORE																								
ZSTP4-18LJ BORE																								
ZSTP4-24LJ BORE																								
ZSTP4-30LJ BORE																								
ZSTP5-18LJ BORE																								
ZSTP5-24LJ BORE																								
ZSTP6-20LJ BORE																								
ZSTP6-25LJ BORE																								

[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

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 210HB)
Surface treatment	Black oxide coating



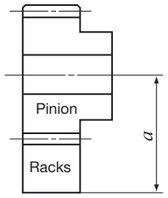
SW: Sawing surface

RL

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

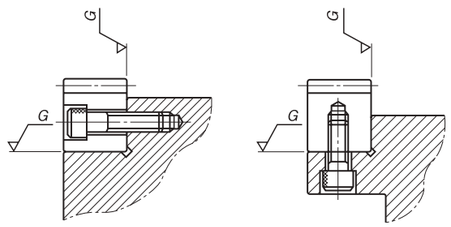
Points of Caution in Assembling

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 266). Make sure that the mounting distance stays constant for the length of the rack.

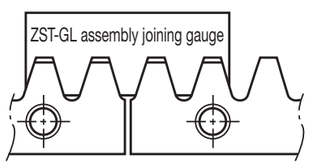


② Machined end type racks such as the ZST and ZSTD Series have pitch tolerance of -0.05 to -0.4mm at the end face. If you try to connect the racks without any space, the pitch at the connection will be too small and will cause problems. Please follow the following diagrams, “Connecting the Racks,” for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

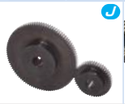


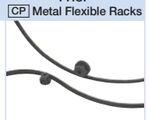
[NOTE] Please use the ZST-GL assembly gauge for the joining rack.

Product Precautions → Page 218

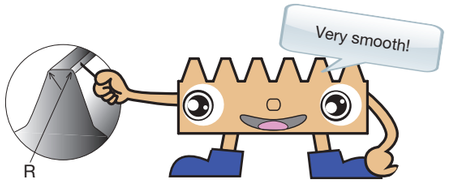
CP Racks & Pinions

KTSCP CP Tapered Pinions	STRCPF/STRCPFD CP Tapered Racks	MSCPG CP Ground Spur Gears	MRGCPF/MRGCPFD CP Hardened Ground Racks	KSCPG CP Ground Spur Gears	KRGCPF-H/KRGCPFD-H CP Hardened Ground Racks	KRGCP/KRGCPF/KRGCPFD CP Thermal Refined Ground Rack	SSCPGS CP Ground Spur Pinion Shafts
							
Material: SCM440 **CP5, 10 Page 278**	Material: S45C **CP5, 10 Page 278**	Material: SCM415 **CP5, 10 Page 280**	Material: SCM415 **CP5, 10 Page 280**	Material: SCM440 **CP5, 10 Page 282**	Material: SCM440 **CP5, 10 Page 282**	Material: SCM440 **CP5, 10 Page 284**	Material: S45C **CP5, 10 Page 286**

SSCPG CP Ground Spur Gears	SRGCP/SRGCPF/SRGCPFD CP Hardened Ground Racks	KRCPF-H/KRCPFD-H CP Hardened Racks	KSSCP-H CP Hardened Thermal Refined Spur Gears	KSSCP CP Thermal Refined Spur Gears	KRCPF/KRCPFD CP Thermal Refined Racks	SSCP-H CP Hardened Spur Gears	SSCP CP Spur Gears
							
Material: S45C **CP5~20 Page 286**	Material: S45C **CP5~20 Page 288**	Material: SCM440 **CP5, 10 Page 290**	Material: SCM440 **CP5, 10 Page 292**	Material: SCM440 **CP5, 10 Page 292**	Material: SCM440 **CP5, 10 Page 292**	Material: S45C **CP2.5~20 Page 294**	Material: S45C **CP2.5~20 Page 294**

SRCPF-H/SRCPFD-H CP Hardened Racks	SRCPF-HL/SRCPFD-HL CP Laser hardened	SRCP/SRCPF/SRCPFD/SRCPFK CP Racks	SUSCP CP Stainless Steel Spur Gears	SURCPF/SURCPFD CP Stainless Steel Racks	SROCP CP Round Racks	FRCP CP Metal Flexible Racks
						
Material: S45C **CP5~20 Page 296**	Material: S45C **CP5~20 Page 298**	Material: S45C **CP2.5~20 Page 300**	Material: SUS303 **CP5, 10 Page 302**	Material: SUS304 **CP5, 10 Page 302**	Material: S45C **CP2.5~10 Page 304**	Material: SS400 **CP5 Page 304**

Ⓜ Includes Made to Order



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) CP Racks

S R CP 5 - 100

- S — Material (S45C)
- R — Type (Rack)
- CP — Circular pitch (5)
- 5 — Circular pitch (5)
- 100 — Total Length (100mm)

Material

M	SCM415
K	SCM440
S	S45C
SU	Stainless Steel
F	SS400

Type

R	Racks
RO	Round Racks
S	Spur Gears
TR(TS)	Tapered Racks (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
S	Pinion Shafts
HL	Laser hardened