ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

KHK KHK CO., LTD.
13-15 Naka-cho, Kawaguchi-shi, Saitama-ken, 332-0022, Japan
TEL: 81-48-254-1744 FAX: 81-48-254-1765
URL https://khkgears.net/new/ E-mail info@khkgears.net

CERTIFIED JQA MANAGEMENT SYSTEM
ISO 9001
ISO 14001
JQA-QMA14416
JQA-EM6717

KHK 2025

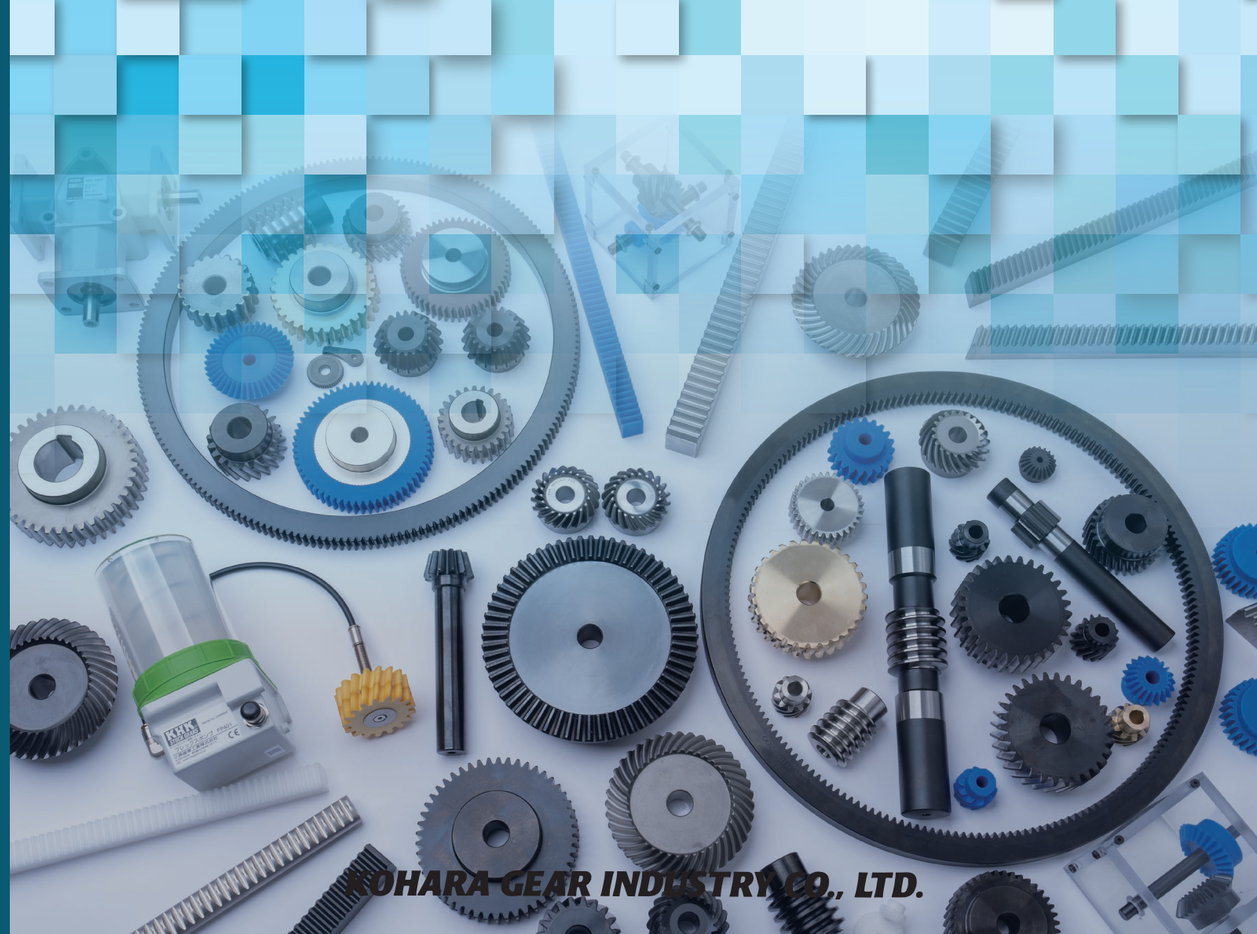
KHK STOCK GEARS

KHK STOCK GEARS
stock gears & custom gears

2025

KHK ALL PRODUCT GUIDE

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz



KOHARA GEAR INDUSTRY CO., LTD.

Your ideal partner in gear selection

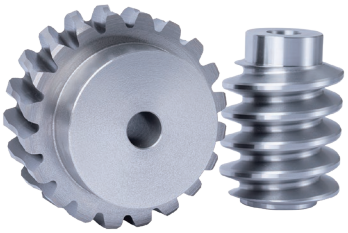
Greetings

Thank you for using KHK gear products.
We appreciate your patronage.
We have issued the Stock Gear Master Catalog "KHK2025".
Our latest products include laser-hardened racks, hardened spur gears and bevel gears, as well as an even wider range of semi-custom gears.
Make use of our new catalog for easy selection.
KHK's mission is to offer quality products that build Customer Trust and Satisfaction.
We look forward to serving you.

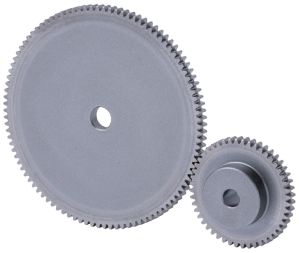
Kohara Gear Industry Co.,Ltd.
Toshiharu Kohara, President

SRAF-HL/SRAFD-HL/SRAFK-HL
Laser Hardened Square Racks

KWGDLS/AGDL
Semi-Custom Duplex Worm Gears



SW/CG
Semi-Custom Worms/Worm Wheels



SSY-H/SSAY-H
Hardened Spur Gears

SH-H
Hardened Helical Gears

SM-H
Hardened Miter Gears

SB-H
Hardened Bevel Gears

ISO 9001
ISO 14001
JQA-QMA14416
JQA-EM6717

Index

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Spur Gears	P45~190
Helical Gears	P191~206
Internal Ring Gears	P207~212
Racks	P213~268
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Miter Gears	P305~338
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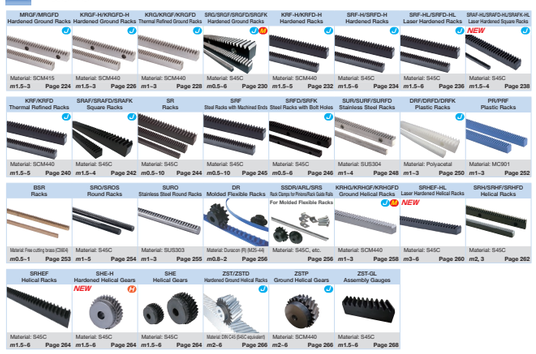
How to use the catalog

Product Index (Pages 6 to 9)

You can search for your desired gears by looking at product photos for each gear type.
It also includes an overview of product specifications such as gear accuracy and material and heat treatment.

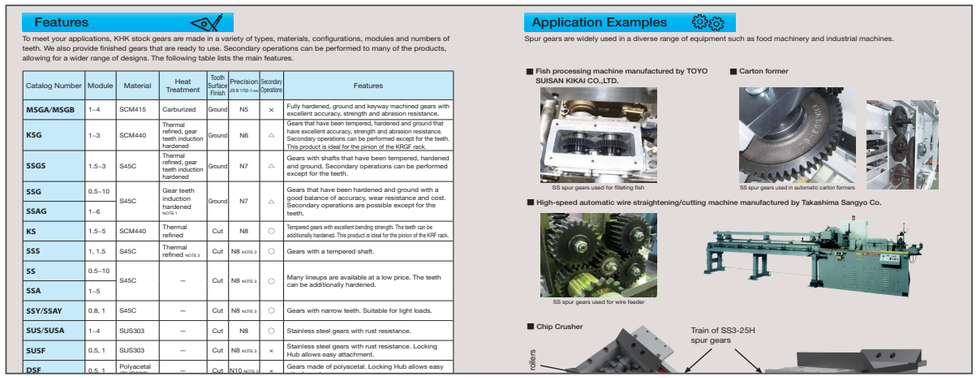
Spur Gears

Racks



Product Technical Information

Technical Information is available for each gear type.
This documentation is essential for using the gears properly, including features of various products, examples of use and precautions on selection.



Features

To meet your applications, KHK stock gears are made in a variety of types, materials, configurations, modules and numbers of teeth. We also provide finished gears that are ready to use. Secondary operations can be performed to many of the products, allowing for a wider range of designs. The following table lists the main features.

Catalog Number	Module	Material	Heat Treatment	Tooth Surface Finish	Precision JIS B 1702-1:1998	Secondary Operations	Features
MSGA/MSGB	1–4	SCM415	Carburized	Ground	N5	×	Fully hardened, ground and keyway machined gears with excellent accuracy, strength and abrasion resistance.
KSG	1–3	SCM440	Thermal refined, gear teeth induction hardened	Ground	N6	△	Gears that have been tempered, hardened and ground that have excellent accuracy, strength and abrasion resistance. Secondary operations can be performed except for the teeth. This product is ideal for the pinion of the KRGF rack.
SSGS	1.5–3	S45C	Thermal refined, gear teeth induction hardened	Ground	N7	△	Gears with shafts that have been tempered, hardened and ground. Secondary operations can be performed except for the teeth.
SSG	0.5–10	S45C	Gear teeth induction hardened NOTE 1	Ground	N7	△	Gears that have been hardened and ground with a good balance of accuracy, wear resistance and cost. Secondary operations are possible except for the teeth.
SSAG	1–6						
KS	1.5–5	SCM440	Thermal refined	Cut	N8	○	Tempered gears with excellent bending strength. The teeth can be additionally hardened. This product is ideal for the pinion of the KRF rack.
SSS	1, 1.5	S45C	Thermal refined NOTE 2	Cut	N8 NOTE 3	○	Gears with a tempered shaft.
SS	0.5–10	S45C	—	Cut	N8 NOTE 3	○	Many lineups are available at a low price. The teeth can be additionally hardened.
SSA	1–5						
SSY/SSAY	0.8, 1	S45C	—	Cut	N8 NOTE 3	○	Gears with narrow teeth. Suitable for light loads.
SUS/SUSA	1–4	SUS303	—	Cut	N8	○	Stainless steel gears with rust resistance.
SUSF	0.5, 1	SUS303	—	Cut	N8 NOTE 3	×	Stainless steel gears with rust resistance. Locking Hub allows easy attachment.
DSF	0.5, 1	Polyacetal (Duracon)	—	Cut	N10 NOTE 3	×	Gears made of polyacetal. Locking Hub allows easy

Application Examples

Spur gears are widely used in a diverse range of equipment such as food machinery and industrial machines.

■ Fish processing machine manufactured by TOYO SUISAN KIKAI CO.,LTD.

SS spur gears used for filleting fish

■ Carton former

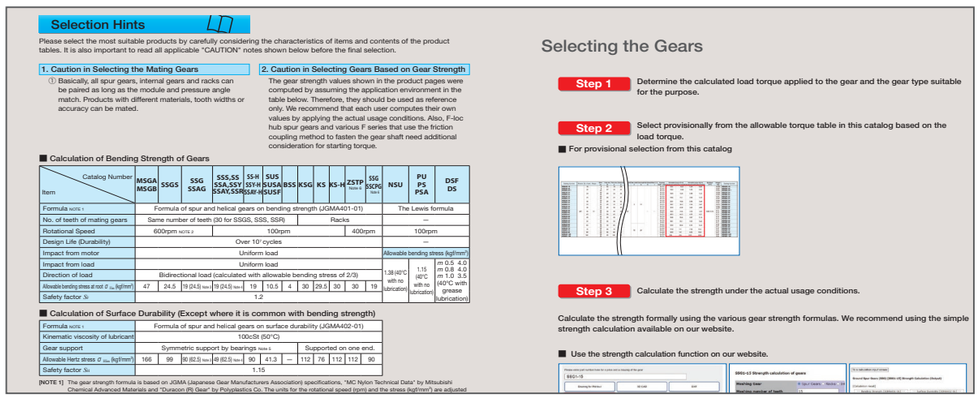
SS spur gears used in automatic carton formers

■ High-speed automatic wire straightening/cutting machine manufactured by Takashima Sangyo Co.

SS spur gears used for wire feeder

■ Chip Crusher

Train of SS3-25H spur gears



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 Basically, all spur gears, internal gears and racks can be paired as long as the module and pressure angle match. Products with different materials, tooth widths or accuracy can be mated.

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. Also, F-face hub spur gears and various F series that use the friction coupling method to fasten the gear shaft need additional consideration for starting torque.

■ Calculation of Bending Strength of Gears

Item \ Catalog Number	MSGA MSGB	SSGS	SSG SSAG	SSS,SS SSA,SSY SSAY,SSR	SS-H SSY-H SSAY-H	SUS SUSA SUSF	BSS	KSG	KS	KS-H	ZSTP Note 6	SSG SSDG Note 6	NSU	PU PS PSA	DSF DS
Formula NOTE 4	Formula of spur and helical gears on bending strength (JGMA401-01)												The Lewis formula		
No. of teeth of mating gears	Same number of teeth (30 for SSGS, SSS, SSR)						Racks						—		
Rotational Speed	600rpm NOTE 2			100rpm			400rpm						100rpm		
Design Life (Durability)	Over 10⁷ cycles												—		
Impact from motor	Uniform load												Allowable bending stress (kgf/mm²)		
Impact from load	Uniform load												1.15 (40°C with no lubrication)	m 0.5 4.0 m 0.8 3.5 m 1.0 3.0 (40°C with grease lubrication)	
Direction of load	Bidirectional load (calculated with allowable bending stress of 2/3)												1.38 (40°C with no lubrication)		
Allowable bending stress at root σ_{Flim} (kgf/mm²)	47	24.5	19 (24.5) Note 5	19 (24.5) Note 5	19	10.5	4	30	29.5	30	19				
Safety factor S_F	1.2														

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

Formula NOTE 4	Formula of spur and helical gears on surface durability (JGMA402-01)											
Kinematic viscosity of lubricant	100cSt (50°C)											
Gear support	Symmetric support by bearings Note 5						Supported on one end.					
Allowable Hertz stress σ_{Hlim} (kgf/mm²)	166	99	80 (82.5) Note 5	49 (52.5) Note 5	90	41.3	—	112	76	112	112	90
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

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

Step 3 Calculate the strength under the actual usage conditions.

Calculate the strength formally using the various gear strength formulas. We recommend using the simple strength calculation available on our website.

■ Use the strength calculation function on our website.

Dimensional Table Pages

Dimensional tables show the product specifications and performance for each gear type at a glance.
Compare the accuracy and strength, and select the appropriate gears while looking at the product photographs.

PRODUCT GROUP ICON

Series

PRODUCT NAME

MODULE

PRODUCT PHOTO

Representative photographs of the series. Actual shape may be different with regards to a particular item. Please confirm the drawing and shape as specified in the table.

DIMENSIONAL TABLE

<Catalog Numbers>
Please order for KHK gears by specifying their catalog numbers.

<Bore>
The bore tolerances are indicated in the column headings.

<Backlash>
Indicates the circular linear backlash when the gears are set to the center distance.

Common Specifications

Series Specifications.

DRAWINGS, SHAPES

Similar to the data shown in the small table on the right, there are several types of configurations in series. Please be sure to check the required shape in the table.

J Series

Products having the letter "J" in their Catalog No.
(F series and E series are also available.)

PRODUCT NAME

J Series dimensional table

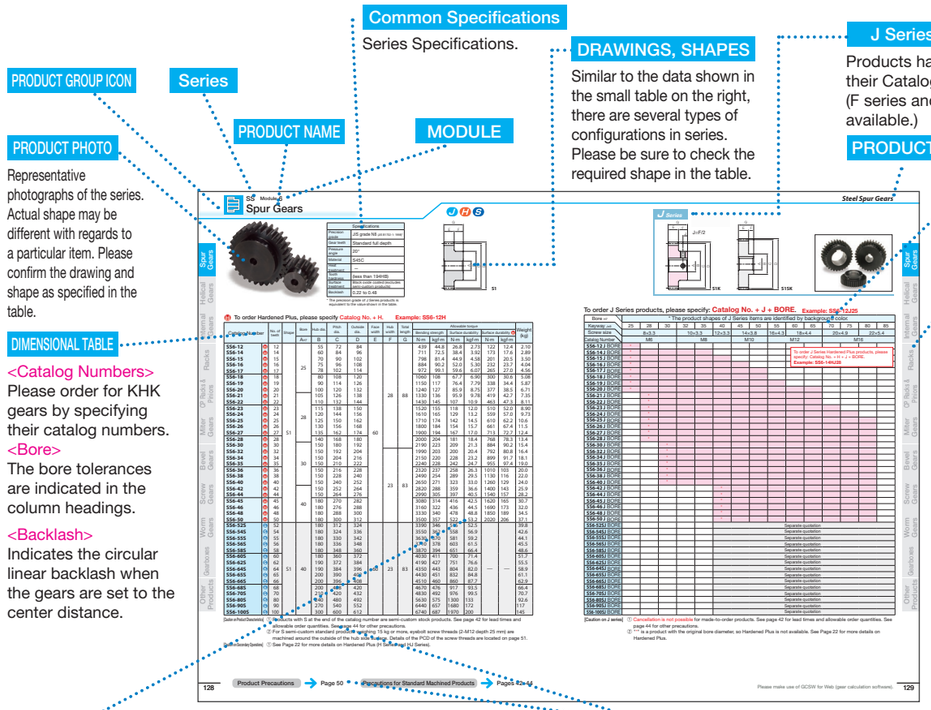
Hole diameter, key groove, and tap are listed.

INDEX

Indexed by type and sorted by colored tags.

TECHNICAL REFERENCES

Technical information will be introduced at various sections in the catalog.



STRENGTH CALCULATION

The allowable torques shown in the table are calculated values according to formulas such as JGMA. The calculations assume certain operating conditions. Therefore, the values should be used as a reference. The assumed conditions are shown on the first page of each product group (for example, Page 48 for spur gears).

NOTES

Contains additional information on precautions for product characteristics and technical hints for secondary operations. Technical hints for J Series are also provided in the J Series section. Please be sure to read first before selecting products.

Selection Hints

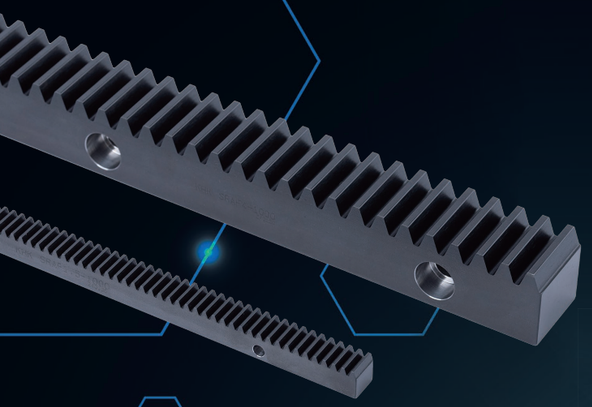
When selecting KHK standard gears, glance over the Cautions on Product Characteristics and Cautions on Performing Secondary Operations in the product technical information and respective dimensional tables.

- 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.
- 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.
  Because black oxide is formed through a chemical reaction, it may appear reddish-black in some cases.

- The details (specifications, dimensions, etc.) listed in the catalog may be changed without prior notice.
- All details recorded in this catalog are copyrighted. Replication without permission is strictly prohibited.
- Changes and corrections to the contents of the catalog 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

New Product Information *New Products*



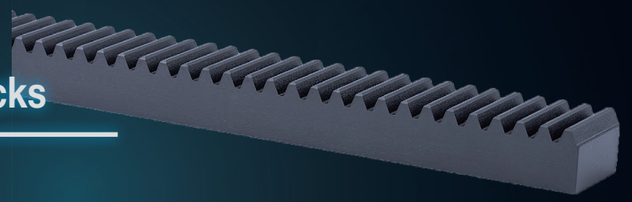
J Series

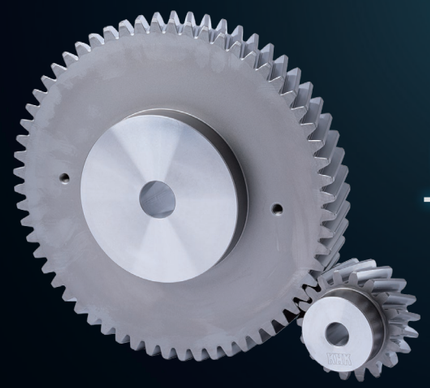
Laser Hardened Square Racks

SRAF-HL/SRAFD-HL/
SRAFK-HL

Laser Hardened Helical Racks

SRHEF-HL





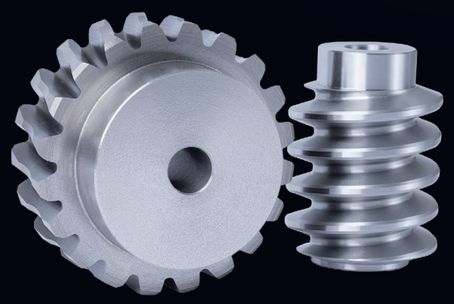
J Series

Semi-Custom Ground Helical Gears

KHG

Semi-Custom Duplex Worm Gears

KWGDLS/AGDL

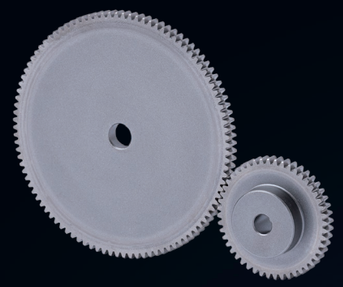


Semi-Custom Worms/ Worm Wheels

SW/CG

Hardened Spur Gears

SSY-H/SSAY-H



Hardened Helical Gears

SH-H

Hardened Helical Gears

SHE-H

Hardened Miter Gears

SM-H

Hardened Angular Miter Gears

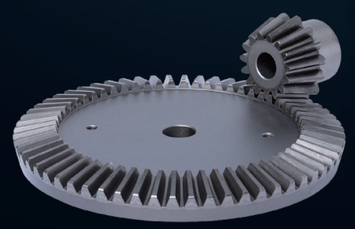
SAM-H

Hardened Bevel Gears

SB-H

Hardened Bevel Gears

SBY-H



Hardened Bevel Pinion Shafts

SB-H

Product Index - *LINEUP* -

Spur Gears

MSGA/MSGB Ground Spur Gears	KSG Ground Spur Gears	SSGS Ground Spur Pinion Shafts	SSG Ground Spur Gears	SSG F Series Ground Spur Gears	SSG E Series Ground Spur Gears	SSG R Series Ground Spur Gears	Pinion Gears for Nabtesco GH Series
Material: SCM415	Material: SCM440	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C/SCM440
*m*1~4 Page 54	*m*1~3 Page 58	*m*1.5~3 Page 60	*m*0.5~10 Page 62	*m*2~3 Page 80	*m*1.5~6 Page 86	*m*1.5~6 Page 96	*m*3~6 (CP10~20) Page 98

SSAG Ground Spur Gears	KS Thermal Refined Spur Gears	SSS Spur Pinion Shafts	SS-H Hardened Spur Gears	SS Spur Gears	SS F Series Spur Gears	SSA-H Hardened Spur Gears	SSA Spur Gears
Material: S45C	Material: SCM440	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C
*m*1~6 Page 100	*m*1.5~5 Page 104	*m*1, 1.5 Page 106	*m*1~10 Page 110	*m*0.5~10 Page 108	*m*1.5~3 Page 134	*m*1~5 Page 142	*m*1~5 Page 142

SSA F Series Spur Gears	SSY-H Hardened Spur Gears	SSY Spur Gears	SSAY-H Hardened Spur Gears	SSAY Spur Gears	SUS/SUSA Stainless Steel Spur Gears	SUSF F-Loc Gears	DSF F-Loc Gears
Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: SUS303	Material: SUS303	Material: Polyacetal (SUS303)
*m*2~3 Page 148	*m*0.8, 1 Page 152	*m*0.8, 1 Page 152	*m*1 Page 154	*m*1 Page 154	*m*1~4 Page 156	*m*0.5, 1 Page 162	*m*0.5, 1 Page 164

NSU Plastic Spur Gears with Steel Core	PU Plastic Spur Gears with Steel Core	PS/PSA Plastic Spur Gears	SUKB Stainless Steel Hubs	PSUKB SUKB Assembled PSA Spur Gear	DS Injection Molded Spur Gears	BB Sintered Metal Bushings	BSS Spur Gears
			PSA Dedicated				
Material: MC602ST (S45C)	Material: MC901(SUS303)	Material: MC901	Material: SUS303	Material: MC901/SUS303	Material: Duracon (R)(M90-44)	Material: Oil-free copper alloy	Material: Free cutting brass (C3604)
*m*1~3 Page 166	*m*1~2 Page 170	*m*1~3 Page 172	*ϕ*30~100 Page 182	*m*2~3 Page 183	*m*0.5~1 Page 184	*ϕ* 5~8 Page 186	*m*0.5~1 Page 188

SSR Steel Ring Gears (Spur Gears)
Material: S45C
*m*2~3 Page 190

Helical Gears

KHG Ground Helical Gears	SH-H Hardened Helical Gears	SH Helical Gears
Material: SCM440	Material: S45C	Material: S45C
*m*1~6 Page 196	*m*2, 3 Page 204	*m*2, 3 Page 204

Internal Gears

SI Steel Internal Gears	SIR Internal Ring Gears
Material: S45C	Material: S45C
*m*0.5~2.5 Page 210	*m*2~3 Page 212

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Index Information

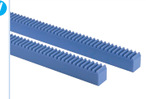
NEW New Products *Additional* Additional Products

M Includes Made to Order H Hardened Plus S Semi-Custom

J J Series F F Series R R Series E E Series

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

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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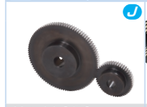
CP Racks & Pinions

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	Material: S45C	Material: SCM415	Material: SCM415	Material: SCM440	Material: SCM440	Material: SCM440	Material: S45C
CP5, 10 Page 278	CP5, 10 Page 278	CP5, 10 Page 280	CP5, 10 Page 280	CP5, 10 Page 282	CP5, 10 Page 282	CP5, 10 Page 284	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	Material: S45C	Material: SCM440	Material: SCM440	Material: SCM440	Material: SCM440	Material: S45C	Material: S45C
CP5~20 Page 286	CP5~20 Page 288	CP5, 10 Page 290	CP5, 10 Page 292	CP5, 10 Page 292	CP5, 10 Page 292	CP2.5~20 Page 294	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	Material: S45C	Material: S45C	Material: SUS303	Material: SUS304	Material: S45C	Material: SS400
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Product Index - *LINEUP* -

Miter Gears

MMSGQ Ground Spiral Miter Gears	MMSG Ground Spiral Miter Gears	SMSG Ground Spiral Miter Gears	MMSA/MMSB Finished Bore Spiral Miter Gears	MMS Spiral Miter Gears	SMS Spiral Miter Gears	SMA/SMB/SMC Finished Bore Miter Gears	MM Miter Gears
Material: SCM415	Material: SCM415	Material: S45C	Material: SCM415	Material: SCM415	Material: S45C	Material: S45C	Material: SCM415
*m*2~4 Page 314	*m*2~4 Page 316	*m*1~4 Page 318	*m*1~10 Page 320	*m*2~5 Page 322	*m*1~8 Page 324	*m*1~5 Page 326	*m*2~5 Page 328

LM Sintered Metal Miter Gears	SM-H Hardened Miter Gears	SM Miter Gears	SAM-H Hardened Angular Miter Gears	SAM Angular Miter Gears	SUM Stainless Steel Miter Gears	SUMA Finished Bore Stainless Steel Miter Gears	PM Plastic Miter Gears
	NEW		NEW				
Material: SMF5040	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: SUS303	Material: SUS303	Material: MC901
*m*0.8~1.5 Page 328	*m*1~8 Page 330	*m*1~8 Page 330	*m*1.5~3 Page 332	*m*1.5~3 Page 332	*m*1~4 Page 334	*m*1~4 Page 334	*m*1~4 Page 336

DM Injection Molded Miter Gears	BB Sintered Metal Bushings	Nissei KSP Ground Spiral Miter
Material: Duracon (R) (M90-44)	Material: Oil-free copper alloy	Material: SCM415
*m*0.5~1.5 Page 336	*ϕ* 5~8 Page 338	*m*1.5~6 Page 374

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Bevel Gears

MHP High-Ratio Hypoid Gears	MBSG Ground Spiral Bevel Gears	SBSG Ground Spiral Bevel Gears	MBSA/MBSB Finished Bore Spiral Bevel Gears	SBS Spiral Bevel Gears	SB-H Hardened Bevel Gears	SB Bevel Gears	SBY-H Hardened Bevel Gears
Gear Ratio 15~60	Gear Ratio 2	Gear Ratio 1.5~3	Gear Ratio 1.5~3	Gear Ratio 1.5~4	Gear Ratio 1.5~4 NEW	Gear Ratio 1.5~4	Gear Ratio 2~4 NEW
Material: SCM415	Material: SCM415	Material: S45C	Material: SCM415	Material: S45C	Material: S45C	Material: S45C	Material: S45C
*m*1, 1.5 Page 346	*m*2~4 Page 350	*m*2~4 Page 352	*m*2~6 Page 354	*m*1~5 Page 358	*m*1~6 Page 362	*m*1~6 Page 362	*m*5~8 Page 362

SBY Bevel Gears	SB-H Hardened Steel Bevel Gears & Pinion Shafts	SB Steel Bevel Gears & Pinion Shafts	SUB Stainless Steel Bevel Gears	PB Plastic Bevel Gears	DB Injection Molded Bevel Gears	BB Sintered Metal Bushings	Nissei KSP Ground Spiral Bevel Gears
Gear Ratio 2~4	Gear Ratio 5 NEW	Gear Ratio 5	Gear Ratio 1.5~3	Gear Ratio 1.5~3	Gear Ratio 2		Gear Ratio 1~2
Material: S45C	Material: S45C	Material: S45C	Material: SUS303	Material: MC901	Material: Duracon (R) (M90-44)	Material: Oil-free copper alloy	Material: SCM415
*m*5~8 Page 362	*m*1.5~3 Page 366	*m*1.5~3 Page 366	*m*1.5~3 Page 368	*m*1~2 Page 370	*m*0.5~1 Page 372	*ϕ* 5~6 Page 372	*m*1.5~6 Page 374

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NEW New Products *Additional* Additional Products M Includes Made to Order H Hardened Plus

S Semi-Custom J J Series F F Series R R Series E E Series

Screw Gears

SN-H Hardened Screw Gears	SN Screw Gears	SUN Stainless Steel Screw Gears	AN Screw Gears	PN Plastic Screw Gears
Material: S45C	Material: S45C	Material: SUS303	Material: CAC702 (AℓBC2)	Material: MC901
*m*1~4 Page 384	*m*1~4 Page 384	*m*1~2.5 Page 388	*m*1~3 Page 390	*m*1~3 Page 392

Worm Gears

KWGDL/KWGDLS Duplex Worms	AGDL Duplex Worm Wheels	KWG Ground Worm Shafts	AG Worm Wheels	AGF Worm Wheels	SWG Ground Worms	AG Worm Wheels	SW Worms
NEW	Reduction Ratio 20~60 NEW		Reduction Ratio 10~60	Reduction Ratio 10~60		Reduction Ratio 10~60	NEW
Material: SCM440	Material: CAC702(AℓBC2)	Material: SCM440	Material: CAC702(AℓBC2)	Material: CAC702(A ℓ BC2)	Material: S45C	Material: CAC702(AℓBC2)	Material: S45C
*m*1.5~6 Page 406	*m*1.5~6 Page 406	*m*0.5~6 Page 416	*m*0.5~1.5 Page 416	*m*2~6 Page 420	*m*1~6 Page 426	*m*1~6 Page 426	m0.5~10 Page 434

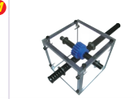
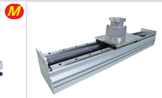
BG Worm Wheels	CG Worm Wheels	SUW Stainless Steel Worms	PG Worm Wheels
Reduction Ratio 10~60	Reduction Ratio 10~120 NEW		Reduction Ratio 10~60
Material: CAC502(PBC2)	Material: FC200	Material: SUS303	Material: MC901
*m*0.5~6 Page 434	*m*1~10 Page 436	*m*0.5~3 Page 454	*m*0.5~3 Page 454

Gearboxes

KBX Bevel Gearboxes	CBX Bevel Gearboxes
Material: -	Material: -
Model L/T Page 462	Model L/T Page 466

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Other Products

SRT/SRT-C Ratchets & Pawls	SRTB/SRT-C Ratchets & Pawls	GC/GC-I Gear Couplings	SV/SVI Involute Spline Shafts, Spline Bushings	HEPCO Ring Rail Gears, Accessories	GCU Gear Assembly Kit	Rack & Pinion Lubrication System	Racks & Pinions Aluminum Frame Transport Device
						Additional	
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Product Series Index

NEW New Product　　*Additional* Additional Products　　(M) Includes Made to Order

(H) Hardened Plus　(S) Semi-Custom　(J) J Series　(F) F Series　(R) R Series　(E) E Series

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A	AG	Worm Wheels	416-419, 426-433	J M
	AGDL *NEW*	Duplex Worm Wheels	406-415	S M
	AGF	Worm Wheels	420-425	
	AN	Screw Gears	390-391	J M
	ARL	DR Rack Guide Rails	257	
B	BB	Sintered Metal Bushings	186, 338, 372	
	BG	Worm Wheels	434-451	J M
	BHJ	HEPCO Bearings	486-487	M
	BSR	Racks	253	
	BSS	Spur Gears	188-189	
C	CBX	Bevel Gearboxes	466-469	
	CG *NEW*	Worm Wheels	436-453	J S M
D	DB	Injection Molded Bevel Gears	372-373	
	DM	Injection Molded Miter Gears	336-337	
	DR	Molded Flexible Racks	256-257	
	DRF	Plastic Racks	250	
	DRFD	Plastic Racks	250-251	J
	DRFK	Plastic Racks	250-251	J
	DS	Injection Molded Spur Gears	184-187	
	DSF	F-Loc Gears	164-165	
F	FP400B	Flex pump	492-493	M
	FP401	Flex pump	492-493	
	FP402	Flex pump	492-493	
	FRCP	CP Metal Flexible Racks	304	
G	GC	Gear Couplings (Inner Hubs)	478-479	J
	GC-F01	Grease cartridge	492-493	
	GC-I	Gear Couplings (Outer Rings)	478-479	
	GJS	Gear Lubricating Spray	496	
	GCU	Gear Assembly Kit	490-491	
K	KBX	Bevel Gearboxes	462-465	
	KHG *NEW*	Ground Helical Gears	196-203	J S
	KRCPF	CP Thermal Refined Racks	292-293	
	KRCPF-H	CP Hardened Racks	290-291	
	KRCPFD	CP Thermal Refined Racks	292-293	J
	KRCPFD-H	CP Hardened Racks	290-291	J
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	KRFD-H	Hardened Racks	232-233	J
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	KWGDLS *NEW*	Duplex Worms	406-415	S
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P	PB	Plastic Bevel Gears	370-371	
	PG	Worm Wheels	454-459	J
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	PUH	Lubricating Helical Gears	494	M
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	RLJ	HEPCO Bearings	486-487	M
	RSJ	HEPCO Bearings	486-487	M
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	SB *NEW*	Bevel Gears	362-367	H
	SB *NEW*	Steel Bevel Gears & Pinion Shafts	366-367	H

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	SBSG	Ground Spiral Bevel Gears	352-353	
	SBY *NEW*	Bevel Gears	362-367	H
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	SHE *NEW*	Helical Gears	264-265	H
	SI	Internal Ring Gears	210	
	SIR	Steel Ring Gears (Spur Gears)	212	
	SM *NEW*	Miter Gears	330-331	J H
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	SMB	Finished Bore Miter Gears	326-327	
	SMC	Finished Bore Miter Gears	326-327	
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	SRAFD	Square Racks	242-243	J
	SRAFK	Square Racks	242-243	J
	SRAF-HL *NEW*	Laser Hardened Square Racks	238-239	
	SRAFD-HL *NEW*	Laser Hardened Square Racks	238-239	J
	SRAFK-HL *NEW*	Laser Hardened Square Racks	238-239	J
	SRCP	CP Racks	300	
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	SRCPFD	CP Racks	300-301	J
	SRCPFK	CP Racks	300-301	J
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	SRGCPF	CP Hardened Ground Racks	288-289	
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	SSA	Spur Gears	142-151	J F H
	SSAG	Ground Spur Gears	100-103	J
	SSAY *NEW*	Spur Gears	154-155	H
	SSCP	CP Spur Gears	294-295	J H
	SSCPG	CP Ground Spur Gears	286-287	J
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	SURCPF	CP Stainless Steel Racks	302-303	
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	SURF	Stainless Steel Racks	248-249	
	SURFD	Stainless Steel Racks	248-249	
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-Anytime, Anywhere, Ready to Use-

KHK Stock Gears

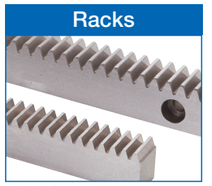
We respond immediately to customer needs with an abundant variety of 200 styles and 27,000 configurations.
As these items are always in stock, they can be used anytime, anywhere, when needed.

Abundant variety of gears

Spur Gears
P45 ~

Helical Gears
P191 ~

Internal Gears
P207 ~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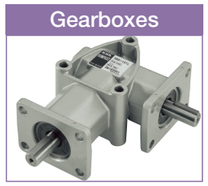
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Other Products
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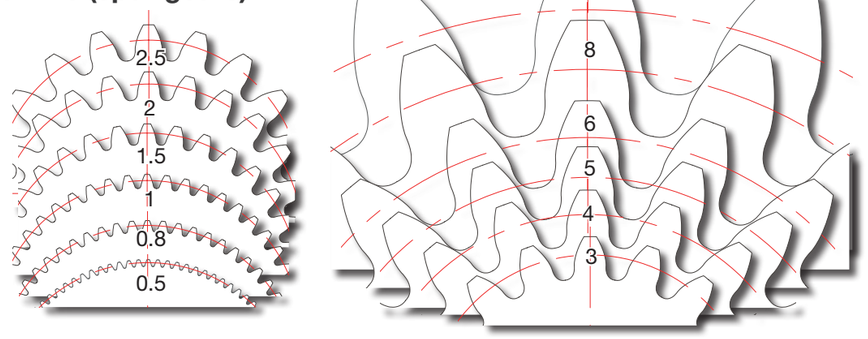
Large variety of sizes and numbers of teeth

Lineup from m0.5 to m10 (spur gears)

m	Minimum No. of teeth	Maximum No. of teeth
0.5	12	120
0.8	12	56
1	10	200
1.5	10	200
2	10	200
2.5	10	200
3	10	160
4	12	120
5	12	120
6	12	100
8	12	60
10	15	50



Full-scale drawing of teeth (spur gear)

Available in many materials

Choose based on your application.
We have a wide variety of standardized stainless steel and plastic products that can be used in places where rust and oil must be avoided, as well as metal products with increased gear strength.

SCM415

S45C

SUS303

MC602ST

MC901

Polyacetal

Free-cutting Brass

Abundant inventory

We stock 3,700 configurations of product at all times in order to deliver them to you quickly.

KHK STOCK GEARS® Stock Gear Fastening Series

Key and screw fastening have been standardized.

J Series　KHK J Series

If you require finished bore gears with keyways and tapped holes, please order the J Series products. Product bore size, keyway dimensions and tap sizes have all been standardized.

Gears can be installed in flexible positions. Gear teeth can be easily aligned.

F Series　KHK F Series

To install using locking hub parts, select from the F and E series to place your order. Locking Hub and bore sizes have been standardized.

Fits perfectly as the speed reducer pinion for servomotor.

R Series　KHK R Series

If you require a flange type reducer pinion, please order R Series.
These products have standardized mounting hole specifications for flange.

Can be easily installed in 19 seconds using a single bolt

E Series　KHK E Series

To install using locking hub parts, select from the F and E series to place your order.
These products are standardized high-precision ground spur gears with hydro-fastening.

The J Series have keyways, the F & E Series have locking hubs, and the R Series have holes for Speed reducers. These 74 styles contain 15,600 configurations of gears that can be used immediately due to their standardized bore and keyway sizes.

Fastening Series / Semi-custom Lineup

Series	Type	Catalog Number	m0.5 (CP2.5)	m0.8	m1 (m1.25)	m1.5 (CP5)	m2	m2.5	m3 (CP10)	m4 (m3.5)	m5 (CP15)	m6 (CP20)	m8	m10
J Series	Spur Gears	KSG			●	●	●	●	●	●	●	●		
		SSG			●	●	●	●	●	●	●	●		
		SSAG			●	●	●	●	●	●	●	●		
		SS				●	●	●	●	●	●	●	●	●
		SSA			●	●	●	●	●	●	●			
		SUS			●	●	●	●	●	●				
		SUSA					●	●	●	●				
		NSU			●	●	●	●	●					
		PU			●	●	●							
		PS			●	●	●	●	●					
		PSA					●	●	●					
		PSUKB					●	●	●					
	Helical Gears	KHG			●	●	●	●	●					
	Racks & Pinions	MRGFD				●	●	●	●					
		KRGFD-H				●	●	●	●					
		KRGFD			●	●	●	●	●					
		SRGFD(K)			●	●	●	●	●	●	●	●		
		KRFD-H				●	●	●	●	●	●			
		SRFD-H				●	●	●	●	●	●	●		
		SRFD-HL				●	●	●	●	●	●	●		
		SRAFD(K)-HL				●	●	●	●	●	●			
		KRFD				●	●	●	●	●	●			
		SRAFD(K)				●	●	●	●	●	●			
		SRFD(K)	●	●	●	●	●	●	●	●	●	●		
		DRFD(K)			●	●	●	●	●					
		KRHGFD			●	●	●	●	●					
		ZSTP					●		●	●	●	●		
		ZSTD					●		●	●	●	●		
	CP Racks & Pinions	MRGCPFD				●			●					
		KSCPG				●			●					
		KRGCPFD-H				●			●					
		KRGCPFD				●			●					
		SSCPG				●			●		●	●		
		SRGCPFD				●			●		●	●		
		KRCPFD-H				●			●					
		KSSCP				●			●					
		KRCPFD				●			●					
		SSCP	●			●			●		●	●		
		SRCPFD-H				●			●		●	●		
		SRCPFD-HL				●			●		●	●		
		SRCPFD(K)	●			●			●					
		SUSCP				●			●					
		SURCPFD				●			●					
	Miter Gears	MMSGQ					●	●	●	●				
		MMSG					●	●	●	●				
		SMSG			●	●	●	●	●	●				
		SMS			●	●	●	●	●	●	●	●	●	
		MM					●	●	●	●	●			
		SM			●	●	●	●	●	●	●	●	●	
	Screw Gears	SN			●	●	●	●	●	●				
		SUN			●	●	●	●						
		AN			●	●	●							
		PN			●	●	●	●	●					
	Worm Gears	SWG				●	●	●	●					
		SW				●	●	●	●					
		SUW				●	●		●					
		AG			●	●	●	●	●					
		BG			●	●	●	●	●					
		CG			●	●	●	●	●					
		PG			●	●	●		●					
	Other Products	SRT		●	●		●		●	●				
		GC					●	●						
F Series	Spur Gears	SSG					●	●	●					
		SS				●	●	●	●					
		SSA					●	●	●					
R Series	Spur Gears	SSG				●	●	●	●		●	●		
		SSCPG				●			●		●	●		
	Helical Gears	ZSTP							●	●	●			
E Series	Spur Gears	SSG				●	●	●	●	●	●	●		
Semi-Custom	Spur Gears	SSG								●	●	●	●	●
		SS								●	●	●	●	●
	Helical Gears	KHG								●	●	●		

ETP-E Plus & KHK STOCK GEARS Standard Product

ETP-EXPRESS®

Definitively shortens the installation time

Bushing Fastening.

E Series

The lead time is 2 business days

Can be easily installed in 19 seconds using a single bolt

Time to mount a gear is reduced to 1/15

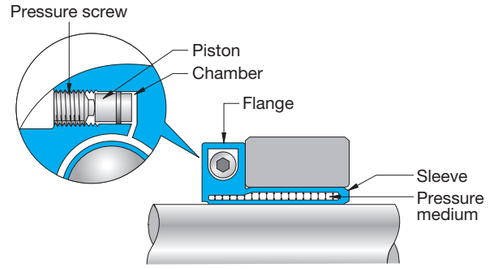
Solves the problems of gear fastening.

- Desire to reduce the time to mount gears.
  When using the conventional wedge method, mounting a gear takes about 5 minutes (according to research by KHK), whereas these products can be easily mounted using one bolt in 19 seconds.
- Desire to reduce the assembly runout of the gears.
- Desire to reduce the backlash between the gear and shaft.
- Desire to lower the decrease in shaft strength due to fretting wear (worn or seized shaft).
- Desire to simplify the phase matching and positioning.

MIKI PULLEY × KHK

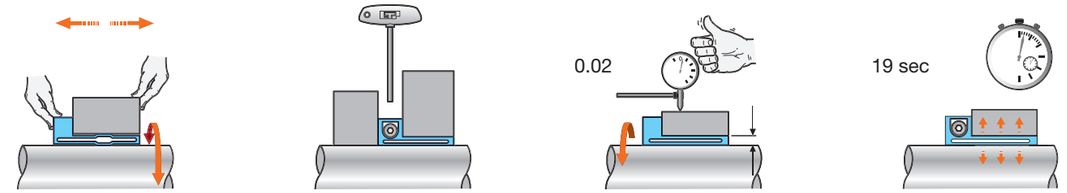
How the ETP-E Plus works

The pressure medium in the chamber is compressed as a result of tightening the screw.
The resulting pressure causes the hub side to expand into the hub and the bore side to expand onto the shaft. Thus allowing the shaft and the hub to be securely fastened.



Effects of ETP-E Plus

Easy and accurate positioning	Helps save space	High concentricity	Secure and speedy installation



KHK Lineup

6 styles, 2,000 configurations

See Page 86

SSG Ground Spur Gears Series

Precision: N7
Material: S45C
Heat Treatment: Gear teeth induction hardened
1000 configurations

m1.5 to 6

Limited release on the Japanese website

KHG Ground Helical Series

Precision: N6
Material: SCM440
Heat Treatment: Thermal refined / gear teeth induction hardened
290 configurations

m1.5 to 3

AGF Worms & Wheels Series

Precision: KHK 2
Material: CAC702 (A ℓ BC2)
150 configurations

m2 to 6

- ZSTP 2 to 6, 110 configurations
- AGDL 1.5 to 4, 130 configurations
- AG 1.5 to 6, 280 configurations

- Allowable Order Sizes
  1 to 20 units for module 3 (CP10) or under and 1 to 4 units for module 4 (CP15) or higher.
  For orders exceeding the supported quantities, please request a price and delivery quote.
- Ordering Method
  Catalog Number + E + Bore Size (Example: SSG2-25E + BORE)
- Production is completed in 2 working days excluding the day ordered.
  As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order.
  Products with module 4 (CP15) or higher require a lead-time for shipping within 7 working days from the order (excludes the day ordered).

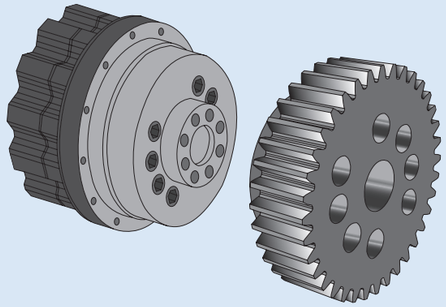
Positive lock is also available at KHK Quick-Mod Gears.

Superior compatibility with servos for speed reducers

KHK STOCK GEARS

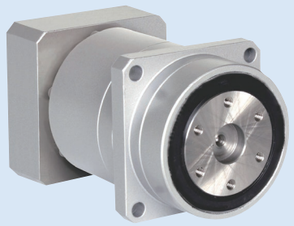
Perfect for Nabtesco Corporation's GH Series Nabtesco + R

RV®
GH Series

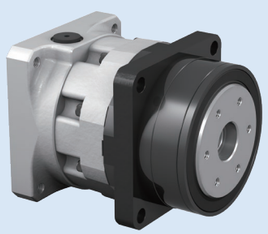


Flange attaching speed reducer pinions RSeries

ニデックドライブテクノロジー株式会社　Sumitomo Heavy Industries, Ltd.　株式会社ハーモニックドライブシステムズ



VRG Series



IB Series

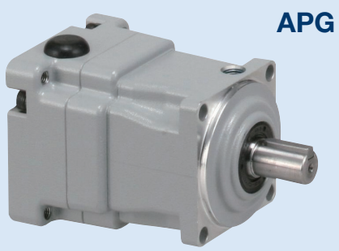
HPG Series

Also perfect for shaft type speed reducers JSeries

Nissei
株式会社 ニッセイ

Inline

APG Series



Right Angle

AFC Series

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Pinion gear applicability table for Nabtesco GH Series Nabtesco + R

Corresponding speed reducer size and pinion gears See Page 98 for more details

Nabtesco GH Series	KHK target products		
	Module Type	CP Type	Helical Type
7	SSG3-30RGH7	SSCPG10-30RGH7	ZSTP3-30LRGH7
17	SSG3-40RGH17	SSCPG10-40RGH17	ZSTP3-30LRGH17
24	SSG4-30RGH24	SSCPG15-30RGH24	ZSTP4-30LRGH24
40	SSG5-30RGH40	SSCPG15-30RGH40	ZSTP5-24LRGH40
100	SSG6-30RGH100	SSCPG20-30RGH100	

■ Series for flange output speed reducers RSeries

Rack and pinion for corresponding flange output speed reducers See Page 96 for more details

Mounting hub dia. H (Common to all speed reducers)	NIDEC DRIVE TECHNOLOGY VRG Series	Sumitomo Heavy Industries IB Series	Harmonic Drive Systems HPG Series	R Series Catalog Numbers		KHK recommended mating rack
24	C90	P120	20	SSG Module - No. of teeth	R24	KRGFSeries SRGFSeries SRFSeries See Page 213
32	D120	P130	32		R32	
47	E170	—	50		R47	
60	—	—	65		R60	

R series catalog numbers are composed as follows :
(Base SSG ground spur gear catalog number) + R + (mounting hub diameter)

■ Series for shaft output speed reducers (with key) JSeries

Pinion gears corresponding to speed reducer sizes

See Page 68 for more details

Nissei APG・AFC Series		KHK target products
Capacity	Frame No.	Catalog Number
100W	12	SSG2-19J12
	15	SSG2.5-19J15
	18	SSG2.5-24J18
200W	12	SSG2-19J12
	15	SSG2.5-19J15
	22	KSG3-25J22
400W	12	SSG2-19J12
	15	SSG2.5-19J15
	22	KSG3-25J22

See Page 58 for more details

Nissei APG・AFC Series		KHK target products
Capacity	Frame No.	Catalog Number
750W	22	KSG3-25J22
1000W	22	KSG3-25J22
1500W	22	KSG3-25J22
2000W	22	KSG3-25J22

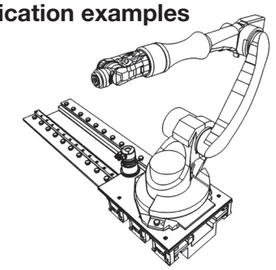
When a key is not needed, try the locking hub series!

KHK FSeries

KHK ESeries

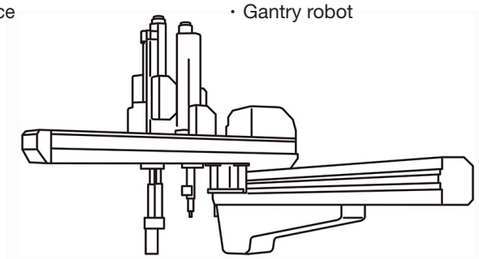
Be sure to calculate the strength under actual usage conditions before use.

Application examples



・Robot transport device

・Gantry robot



Fastening Series Comparison

[Comparison of Features]

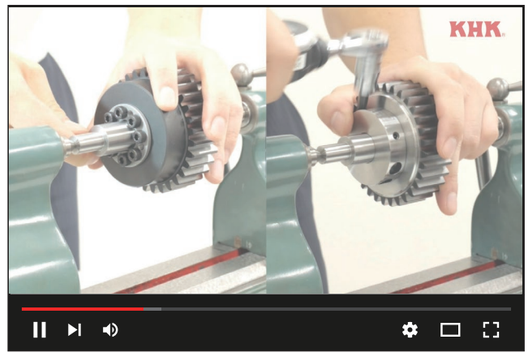
Series	JSeries	FSeries	ESeries
Fastening Method	Key	Friction	Friction
Price*	◎	○	△
Work Time	○	△	◎
Concentricity	○	○	◎
Phase Matching	×	◎	◎
Allowable torque	◎	○	△
Installation Freedom	○	◎	△
Type	◎	△	○
Hardening + available	○	×	×

*Note on price issues: Prices change according to processes (work time).
Find details here ↓

F series and E series comparison video

For details, see here

https://www.khkgears.co.jp/movie/movie_conclusion_e_f.mp4



Mounting image of Fastening Series

Stock Gears

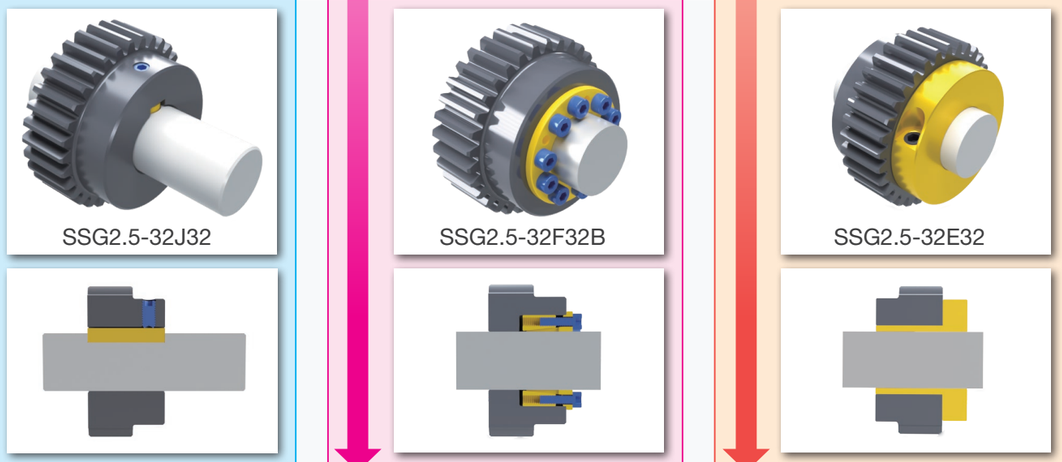
SSG2.5-32

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

JSeries | FSeries | ESeries

Modification shape/parts
Modified to shapes enabling product mounting

Mounting shape/cross-section
Mount product and modified standard gears on shaft



SSG2.5-32J32 | SSG2.5-32F32B | SSG2.5-32E32

Mounting with key fastening | Mounting with wedge friction fastener | Mounting with hydraulic friction fastener

Induction Hardening Service

焼入＋プラス

Hardened Plus

Hardening is provided as an additional service to standard products when ordered. Products with (H) at the end of the Catalog No. support Hardened Plus.

Quick delivery, hardening completed in 4 working days

Induction hardening specification

Area: Tooth surface hardened
Hardness: HRC50 to 60

- **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.
Note that hardening specifications of Hardening Plus above will be near the standard pitch diameter of the gear.

Note: The gear precision decreases after hardening. The original bore dimension tolerance H7 will also be degraded.

What does Hardened Plus mean?

- Induction hardening improves wear resistance.
- Secondary operations are possible in locations unaffected by heat.
- Coils supporting the entire lineup of products are available. Stable supply is enabled by our extensive track record of treatment.

J Series Supported Delivered with bores, keyways, and tapping provided.

New Product Lineup

SSY-H Hardened Spur Gears	SSAY-H Hardened Spur Gears	SH-H Hardened Helical Gears	SHE-H Hardened Helical Gears
NEW (H)	NEW (H)	NEW (H)	NEW (H)
Material: S45C	Material: S45C	Material: S45C	Material: S45C
*m*0.8, 1 Page 152	*m*1 Page 154	*m*2, 3 Page 204	*m*1.5~6 Page 264

SM-H Hardened Miter Gears	SAM-H Hardened Angular Miter Gears	SB-H Hardened Bevel Gears	SBY-H Hardened Bevel Gears	SB-H Hardened Bevel Pinion Shafts
NEW (H)	NEW (H)	Gear Ratio 1.5~4 NEW (H)	Gear Ratio 2~4 NEW (H)	Gear Ratio 5 NEW (H)
Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C
*m*1~8 Page 330	*m*1.5~3 Page 332	*m*1~6 Page 362	*m*5~8 Page 362	*m*1.5~3 Page 366

Target Products

Various Standard Product / J Series

Additional SS/SSA/SSCP/NEW SSY/NEW SSAY Spur Gears
KS/KSSCP Thermal Refined Spur Gears
NEW SB/NEW SBY Bevel Gears
NEW SH/NEW SHE Helical Gears
NEW SM/NEW SAM Miter Gears
SN Screw Gears

Ordering Method and Delivery Date

- **Standard Product**

Please specify: **Catalog No. + H.**
Example: Catalog No.: SS3-30, when hardening is added ⇒ SS3-30H

Production is completed by the manufacturer in 4 working days excluding the day ordered

- **J Series**

Please specify: **Catalog No. + H + J + BORE.**
Example: Catalog No.: SS4-15, when hardening is added ⇒ SS4-15HJ25

m1 to 3 Production is completed by the manufacturer in 6 working days excluding the day ordered

m4 up Production is completed by the manufacturer in 11 working days excluding the day ordered

Precautions

① Because machining starts immediately, we cannot accept cancellations.
② The bore diameter distorts due to hardening. (H Series only)
③ Black oxide treatment cannot be performed after hardening.
④ The surface durability values shown in the table are calculated values according to the assumed usage conditions. Please calculate the actual surface durability on the KHK website.

KHK Quick-Mod Gears

Trusted secondary operations guaranteed by KHK

KHK Quick-Mod Gears is a KHK original custom system which modifies standard gears according to customers' requirements and delivers them as finished products.

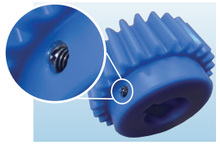
KHK
歯車工房
信頼の追加工

↑ Delivered with this marking

Three benefits of using the KHK Quick-Mod Gears

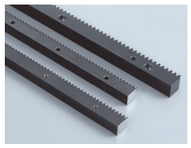
Wide range of secondary operations

We accept various machining including bore and mounting hole machining, Helisert machining, stepped hole machining and hub removal.


Helisert Processing

Stepped Hole Machining

Holes, Hubs, Keyway Machining


Various Mounting Hole Machining

Fast delivery available

We use high-precision machines to quickly machine in-stock "stock gears" on the JIT production line and deliver them with a short turnaround.

Warehouse of KHK Stock Gears

JIT Production Line

Inspection and Packaging

Shipping

Surface Treatments Offered

We accept requests for various types of plating. We offer platings that are suitable for rust prevention and various other surface treatments.

■ Electro-galvanizing

A typical plating method for the purpose of preventing rust on iron, with plating thickness of about 2 to 25 μm.

■ Black chromate

Black or slightly reddish plating.
Black trivalent chromate is RoHS compliant.

■ Phosphate treatment

An iron phosphate chemical conversion treatment that forms a thin iron amorphous film.

■ Unichromate

A bluish silver-white plating.
Trivalent chromate is RoHS compliant.

■ Electroless nickel plating

Plating with thickness of 3 to 10 μm with uniform film thickness.

■ Low-temperature black chrome plating

A black chromium film (1 to 2 μm) unlikely to peel away.

■ Black oxide

Chemical change due to a strongly alkaline treatment liquid forms a ferrosoferric oxide film (3 μm or less).

Note: Dimensions change by the amount of the plating thickness. Machining dimensions are controlled pre-plating.

When Placing Orders

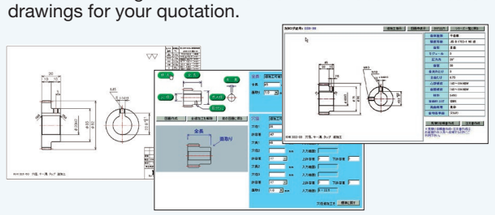
For quotation of secondary operations on standard products (KHK Quick-Mod Gears), please prepare a drawing with desired specifications. We will manufacture to the drawing after discussing prices and lead times.

<Cautions regarding Manufacturing>

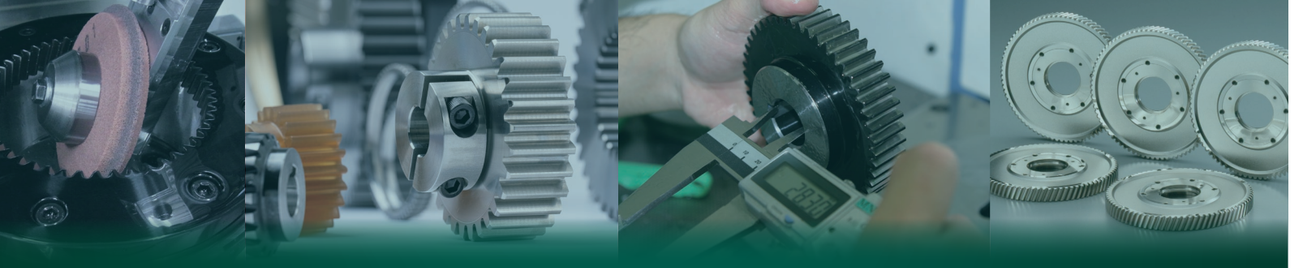
- Please note that we do not perform black oxide processing after additional machining.
- Gear precision may be reduced, depending on the additional machining specifications. Please contact us when requesting a quote for information about post-machining gear precision.

Please include a drawing with your request.

Use the Drawing Creation Tool from the Website to create drawings for your quotation.



URL https://khkgears.net/new/



Custom Gears

KHK has perfected its reception system for made-to-order gears, through unique know-how developed over many years regarding non-standard gear products, modifying technology, and the latest production system.

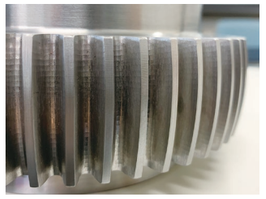
Available Machining Range

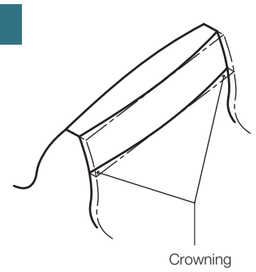
* CP/DP sizes are also supported. Inquire as needed.

Spur/Helical Gears	Racks	Internal Gears	Screw Gears	Miter/Bevel Gears	Worm Gears
Module 0.5~10 Outer diameter ϕ600 mm or less Weight 200 kg or less	Module 0.5~16 Total length 2,000mm or less Weight 60kg or less	Module 0.5~4 Tooth diameter ϕ150mm or more Outer diameter ϕ600 mm or less Weight 40kg or less	Module 1~4 Outer diameter ϕ600 mm or less Weight 200 kg or less	Module 1~10 Outer diameter ϕ300 mm or less Mounting distance 200 mm or less Weight 50kg or less	Module 0.5~10 Mounting distance 350mm or less Worm outer diameter: ϕ100 mm or less Total length 600 mm or less Weight 25kg or less Wheel outer diameter: ϕ600 mm or less Weight 200kg or less

Machining Example

>> Crowning

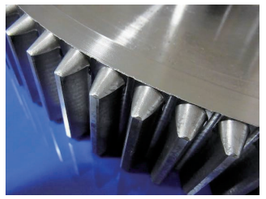




Crowning

>> Chamfering (2)

>> Chamfering (1)



>> Wire Cutting

Gear Specifications	
Shape	Spur Gears
Pitch	m2
Effective No. of teeth	21
Material	S45C
Outside dia.	ϕ104
Remarks	Teeth Wire Cut

When Placing Orders

Please prepare your own drawings.

Quotations for made-to-print gears are limited to the "Available Machining Range" above. When ordering, please prepare a drawing with the details of the "Items described in the product specifications" clearly stated. We will manufacture to the drawing after quoting cost and lead time.

<Cautions regarding Manufacturing>

- Even if an order is within the manufacturing range, it may not be manufacturable depending on the specifications such as accuracy, shape and heat treatment.
- Gears for which we have the technological capacity may be unavailable due to the circumstances of our production processes and capabilities.
- We may provide a quotation with the customer's accuracy requirements changed according to our manufacturing capacity. Please check your quotation before placing an order.
- Designs with no product specifications listed on the drawing or details of quality requirements are manufactured in accordance with KHK stock gears.
- We do not conduct any design work for custom ordered gears. We manufacture only to customer drawings.

■ Items described in the product specifications ● Requirement ○ As required △ Contact us – Not required

Listed Details \ Gear Type	Spur Gears	Helical Gears / Screw Gears	Internal Gears	Helical Inner Gears	Racks	Helical Racks	Bevel Gears	Spiral Bevel Gears	Worm Gears
Gear Accuracy	●	●	●	●	●	●	●	●	●
Pitch (m, CP, DP)	●	●	●	●	●	●	●	●	●
Pressure angle	●	●	●	●	●	●	●	●	●
Material	●	●	●	●	●	●	●	●	●
Shape dimensions / dimensional tolerance	●	●	●	●	●	●	●	●	●
Number of teeth / number of rows	●	●	●	●	●	●	●	●	●
Spiral angle / spiral direction	-	●	-	●	-	●	-	●	●
Teeth depth / backlash	○	○	○	○	○	○	○	○	○
Heat treatment / surface treatment	○	○	○	○	○	○	○	○	○
Surface roughness	△	△	△	△	△	△	△	△	△
Geometric tolerance	△	△	△	△	△	△	△	△	△
Number of teeth/rows of the partner, mounting distance	-	-	-	-	-	-	●	●	●

Note: Tooth thickness or backlash that is not specified will be produced in accordance with KHK stock gears.
If prior discussion is not possible, they will be detailed in the quotation.

J Series supported

Semi-Custom Stock Gears

Standardized Coarse Pitch gears now in the Catalog Streamlining design and selection to shorten lead times

Ⓢ Semi-custom stock gears

- **No effort spent on design**
  Simply select the gears you need from the catalog, eliminating design costs.
- **Fast delivery available**
  Products are delivered with short lead times via our consistent production system.
- **Reliable quality**
  The mark of trust "KHK" guarantees the quality of products listed in the catalog.

◆ Target Products ◆

SSG Ground Spur Gears Ⓙ
m4/5/6/8/10 / No. of Teeth 20 to 120

SS Spur Gears Ⓙ
m4/5/6/8/10 / No. of Teeth 26 to 120

KHG Ground Spur Gears Ⓙ *NEW*
m4/5/6 / No. of Teeth 18 to 60

KWGDLS Duplex Worms *NEW*
m5/6

AGDL Duplex Worm Wheels *NEW*
m5/6 / No. of Teeth 20 to 60

SW Worms *NEW*
m4/5/6/8/10

CG Worm Wheels *NEW*
m4/5/6/8/10 / No. of Teeth 20 to 60

◆ Ordering Method ◆

Please specify the model number below

- **Semi-Custom Stock Gears**
  Semi-Custom Stock Gears Catalog No.
  Example of SS Spur Gears ⇒ SS5-80S
  Example of KHG Ground Helical Gears ⇒ KHG5-30RS
- **Semi-Custom Stock Gear J Series**
  Semi-Custom Stock Gears Catalog No. + J + Bore
  Example of SS Spur Gears ⇒ SS5-80SJ40 ... Bore Φ40
  Example of KHG Ground Helical Gears ⇒ KHG5-30RSJ40 ... Bore Φ40

*For dimensions, refer to the catalog listed page

Semi-custom stock gears are made to order based on catalog products.
The price and delivery date will be estimated separately. For details, please see Page 42~44.

- **Non-standard secondary operations are available at "KHK Quick-Mod Gears"**
  If there are no standards for the semi-custom J Series, the order will be machined separately according to the specifications.

Racks & Pinions Aluminum Frame Transport Device

SUS × KHK

With design support. Easy installation. Labor-saving.

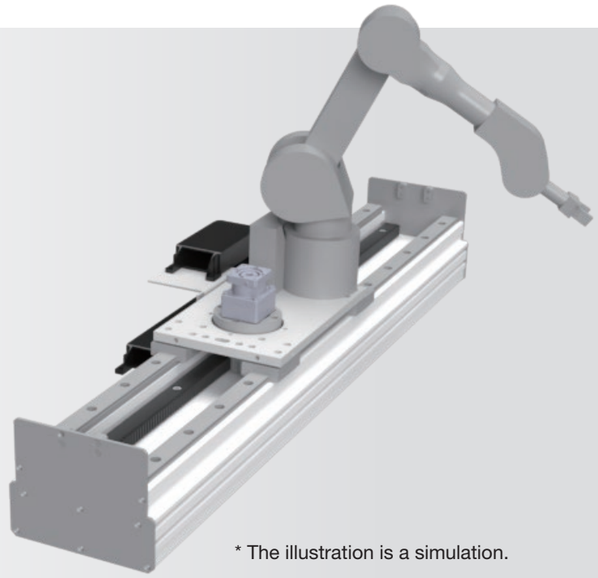
High-speed transfer up to the maximum stroke of 3800 mm.

Transport Device Example

RU-800-H

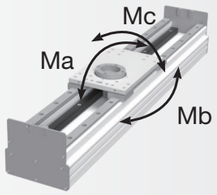
Maximum Payload (Horizontal)	60 kg (reduction ratio: 1/5*)
Stroke	800mm
Repeated Positioning Accuracy	±0.3mm
Max. Speed	1,000 mm/sec
Total Length	1218mm

* Mitsubishi HG-KR43 (400W), acceleration of 0.3G, during operation



* The illustration is a simulation.

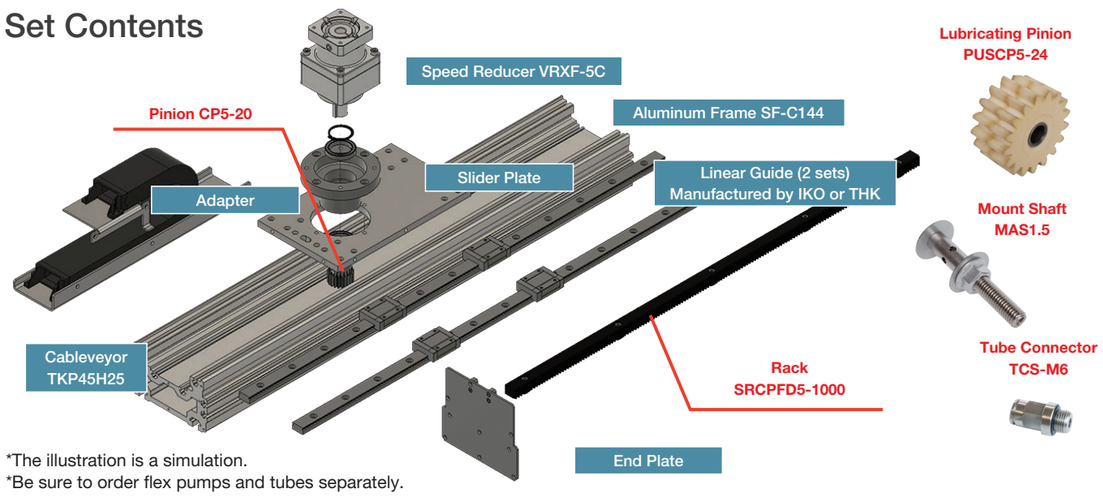
Static Allowable Moment Ma 2107Nm
Static Allowable Moment Mb 2107Nm
Static Allowable Moment Mc 2340Nm
Total Length 1218mm
Frame Length 1200mm



Reduction ratio	Max. Speed (mm/sec)	Max. Payload (kg)
1/3	1666	15
1/5	1000	60

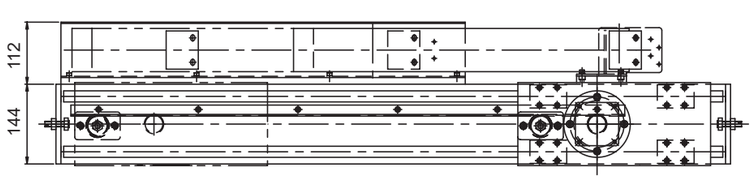
* Robots, motors, controllers, etc. are not included.

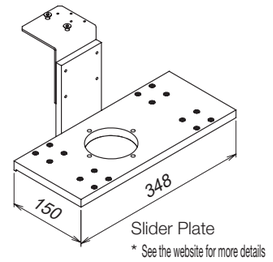
Set Contents

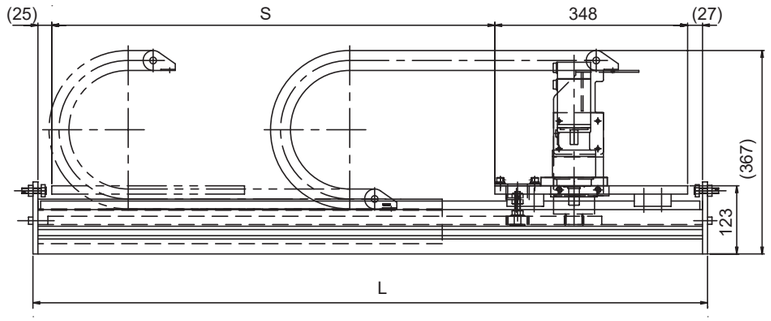


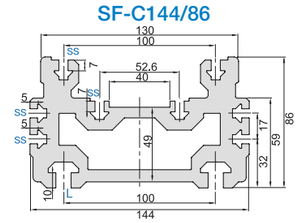
*The illustration is a simulation.
*Be sure to order flex pumps and tubes separately.

■ Product Features
① The maximum stroke can be freely set within 3800 mm.
② Capable of transporting a wide range of light to heavy objects
③ Delivery time for the transport device in the example is 30 business days (discussion required when changing specifications)







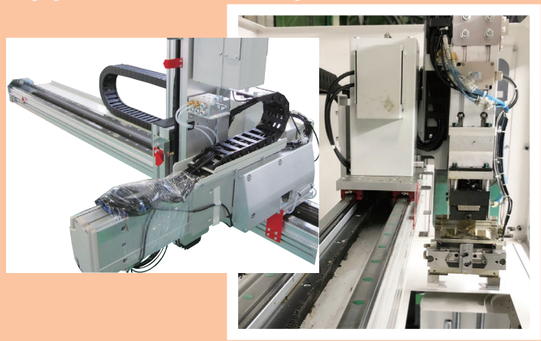


■ Standard specifications

Model	Stroke: S (mm)	Total length: L (mm)
RU-800- □	800	1218
RU-1300- □	1300	1718
RU-1800- □	1800	2218
RU-3800- □	3800	4218

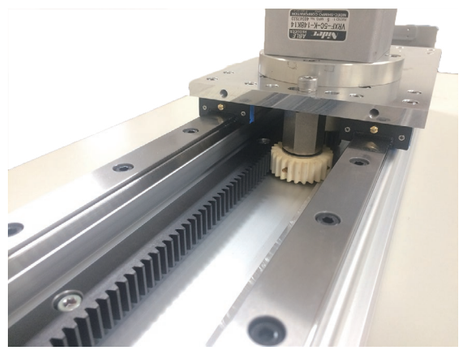
* Can be manufactured within the stroke range of 500 mm to 3,800 mm. The length is adjusted in 100 mm increments.
* □ contains "S" for reduction ratio of 1/3, and "H" for reduction ratio of 1/5.

Application Examples



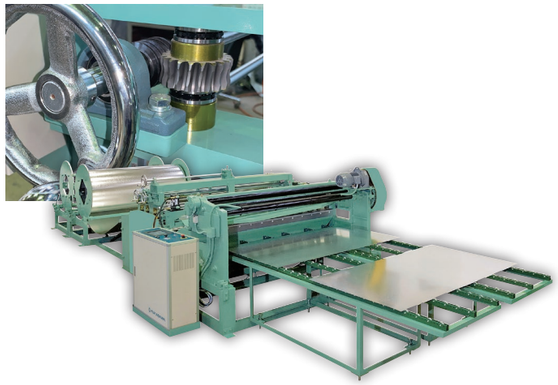
* Image courtesy of Hasegawa Machine Works, Ltd.

Standard equipment includes lubricating pinion



FUKAGAWA 株式会社フカガワ様

Automatic Size Cutting Device NAHC-F10

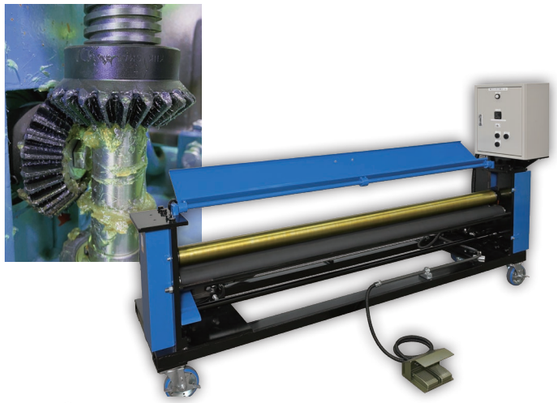


Gears Used
Uses SW worms and CG worm wheels for rib roll feeding

Machine Application
This device provides materials while correcting the bending of coiled material.

Features
Cn automatically perform standard-length straight pipes cutting, stain removal and ribbing simply by entering the duct size

3-Roll for Square Elbow FBR-2000M



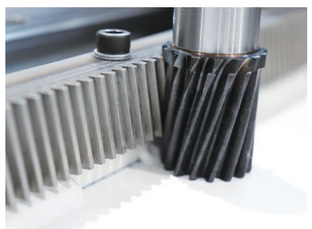
Gears Used
Uses SMA miter gears for bending moving steel plates

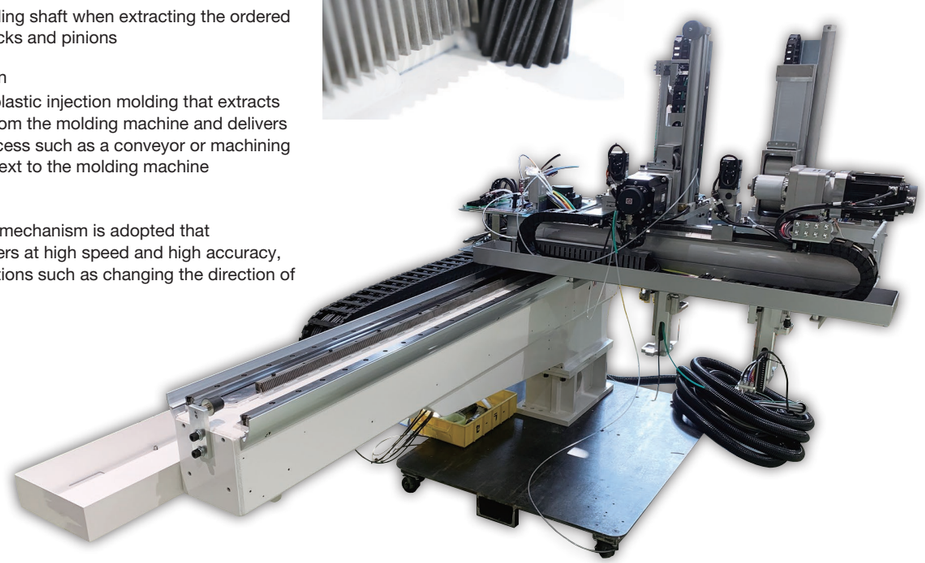
Machine Application
A square elbow forming machine that rolls and bends three iron plates

Features
It has a repeat function that sets the forming roll in the same position

SAILOR セーラー万年筆株式会社様

Injection Molded Product Automatic Extractor sigma5





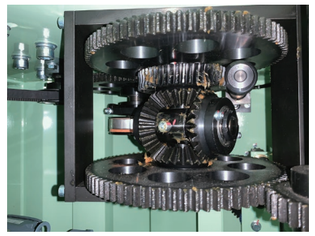
Gears Used
Used for the traveling shaft when extracting the ordered (custom-made) racks and pinions

Machine Application
A device used in plastic injection molding that extracts molded products from the molding machine and delivers them to a post-process such as a conveyor or machining machine installed next to the molding machine

Features
A rack and pinion mechanism is adopted that extracts and delivers at high speed and high accuracy, enabling modifications such as changing the direction of extraction.

株式会社トパック TOPACK 様

Ultra-high-speed Three-way Seal Bag Filling and Packaging Machine R



Gears Used
MM, SM and SMB miters change the motion from the horizontal-shaft drive to the vertical-shaft drive, which is then transmitted to the filling device, and combined with SW worms and CG worm wheels to be used for adjusting the timing of filling while operating the filling device

Machine Application
Makes and fills bags at ultra-high speeds of 300 to 1300 bags per minute
· A top-level automatic filling and packaging machine

Features
Ultra-high-speed filling and packaging is achieved by the use of rotary methods that make, fill and seal bags in the horizontal direction. In addition, the filling time can be extended to reduce the occurrence of biting into the seal, and the sealing time can be extended to achieving stable seal strength. Also, by combining with an integration device, the unit can be connected to carton making machines, horizontal pillow machines, banding machines, bag-feeding packaging machines, etc.

MARUHIDE 株式会社丸秀工機様

Pipe Coaster HID-400MA,650MA, 1000MA,1500MA

Gears Used
Uses custom made-to-order racks and pinions made in the KHK Quick-Mod Gears (standard product given secondary operations) for the running shaft when cutting

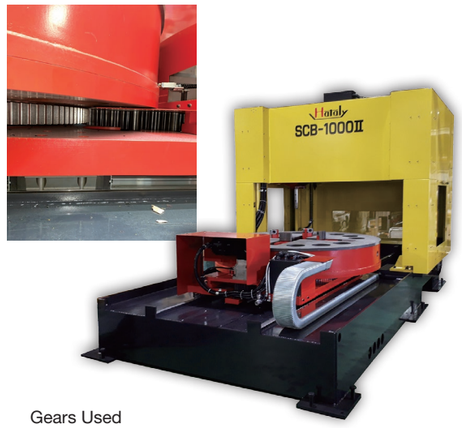
Machine Application
Dimensional cutting, shape cutting (branch cutting / hole cutting), groove cutting and marking of pipes and steel pipe members used in industries such as shipbuilding, pressure vessels, water supply and sewage, steel structures, construction machinery and heavy electric machinery

Features
· Supports small-diameter pipes down to 25A to large-diameter pipes up to 1500A.
· Can be use to cut not only steel pipes but also square steel pipes and other materials.
· Supports various cut shapes and has a groove which enables speedy and highly accurate cutting.
· Facilitates data creation with the adoption of an interactive data input system.

Case Study 2

Hataly 株式会社 ハタリー 様

Short Column Groove Machining Machine SCB-1000Ⅱ



Gears Used
Uses SS Series within machining drive

Machine Application
Short column material, groove machining on both ends

Features
· Machining speed is the fastest in the industry
· Significantly simplifies the setup
· Supports corners of 250 to 1000 mm and a maximum plate thickness of 50 mm

H-section Steel Groove Machining Machine HQB-1055NL

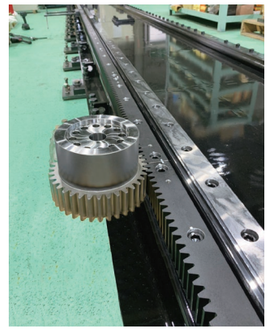
Gears Used
Uses SWG worms and AG worm wheels in machining drive gearboxes

Machine Application
Secondary operations of H-section steel grooves, scallops and driving

Features
· Supports non-scallop machining
· Automated 3 shafts
· High-rigidity frame
· Reliable long-run model

株式会社トーキン 様（広島県呉市）

Robot Slider RS1S



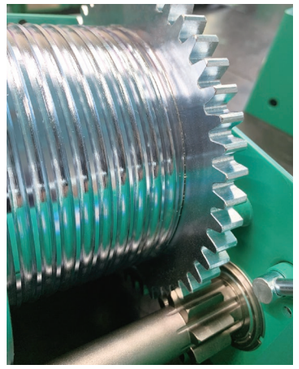
Gears Used
SRCPF racks and custom-order CP spur gears are used for the traveling shaft

Machine Application
As a traveling device for various robots

Features
· Can be extended by 1.2m by combining 3 types of frames
· Allows additional extension to be made to existing devices
· Achieved the maximum track record of 40.8 m

不二産業株式会社様

Lifter for switchboard



Gears Used
Use custom-made spur gears to raise and lower the lifter

Machine Application
Pulls out and stores devices such as circuit breakers and lightning arresters from the switchboard.

Features
Allows raising and lowering heavy luggage with human power.

Masuko 増幸産業株式会社様

Super Mass-Colloider MKZA10-15JIV

Gears Used
Use custom-made spline shafts and spline hubs for the attrition shaft, and SB bevel gears for the manual grinding shaft

Machine Application
Food, spices, industrial raw materials, pharmaceuticals, cosmetics, etc.

Features
Ultra-fine grain grinder. A stone mill type grinder that's capable of ultra-fine granulation that feels like melting.

All KHK stock gears conform to the RoHS2[*1] Directive.

*1 The RoHS2 Directive (2011/65/EU) was revised on July 22, 2019 to a total of 10 substances with 4 phthalates added.

RoHS2 Directive

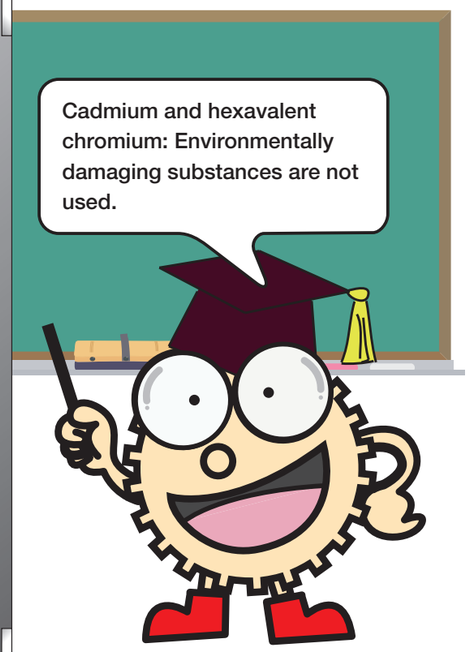
Restriction of Hazardous Substances

Restriction of Hazardous Substances

The RoHS Directive is a law established by the European Union (EU) that restricts the use of certain hazardous substances in electronic and electrical equipment. The use of the 10 environment-related substances specified below is restricted.

Maximum allowable concentration of 10 environment-related substances

- Cadmium: 0.01wt% (100ppm)
- Lead: 0.1 wt% (1000ppm)
  *Exception depending on usage
  Steel 0.35 wt%, Aluminum 0.4 wt%, Copper alloy 4 wt%
- Mercury: 0.1 wt% (1000ppm)
- Hexavalent chromium: 0.1 wt% (1000ppm)
- PBB (Polybrominated biphenyl): 0.1 wt% (1000ppm)
- PBDE (Polybrominated diphenyl ether): 0.1 wt% (1000ppm)
- DEHP (Di-2-EthylHexyl Phthalate): 0.1 wt% (1000 ppm)
- BBP (Butyl Benzyl Phthalate): 0.1 wt% (1000 ppm)
- DBP (DiButyl Phthalate): 0.1 wt% (1000 ppm)
- DIBP (DiIsoButyl Phthalate): 0.1 wt% (1000 ppm)



SDGs

SDGs Initiatives

KHK is working to contribute to the realization of the SDGs.

KHK Environmental Practices

Treatment after use of KHK stock gears and packaging materials

■ Steel Products

Recycle metal products as scrap metal according to the material.

■ Nylon Gears

Nylon gears are plastic waste. Please dispose of as reusable industrial waste.

■ Cardboards

Treat the cardboard used in the packaging as recycled cardboard.

■ Paperboards

Treat the cardboard used in the packaging as recycled paper.

■ Plastics

Packing materials like foamed polyethylene sheets and plastic boxes are plastic waste. Please dispose of as reusable industrial waste.

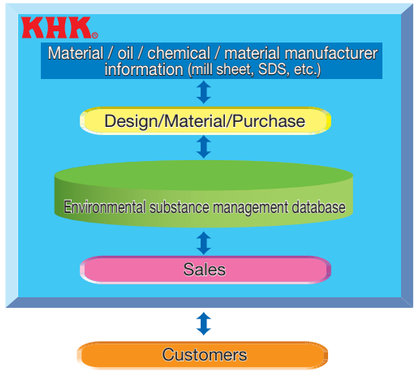
SDS Activities

The materials and products used for KHK stock gears, the rust preventive oil and packaging materials, and the auxiliary materials used in the manufacturing process are managed in the safety data sheet for chemical substances, etc., in consideration of the global environment.

Green Purchasing Activities

90 percent of office supplies we purchase are made of environmentally friendly materials.

The material components of KHK stock gears are managed in a database.

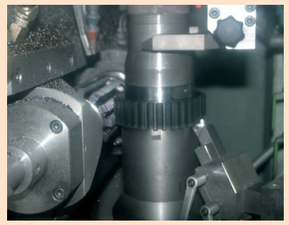


* The mill sheet is an attached document that guarantees the steel material.
* SDS refers to safety data sheets.

We have created a database of materials used in KHK stock gears, black dye, rust preventive oil used in products, mill sheets and SDS for packaging materials in effort to create environmentally friendly products.

Improving environmental (quality, safety, cost) aspects through design, manufacturing and sales activities of KHK stock gears

■ Press ahead with employing “dry-cut” gear cutting methods.



Results

Preventing air pollution due to oil smoke, not using cutting oil (resource-saving), shortening machining time by high-speed gear cutting (saves energy, shortens manufacturing lead time)

■ Adiabatic films covering windows and adiabatic paint applied on the roof of our building

Results

It blocks heat from the outside during summer and insulates heat inside during winter, reducing the amount of electricity used by the air conditioner.

■ The choice of hybrid cars and idling stop cars

Results

We are working to reduce the environmental burden by using hybrid and idling-stop vehicles.

■ Solar panels placed on the roof of our building (10kW-Rated)

Results

60 solar panels on the roof reduced 1.89 tons of CO_2 emission per year. CO_2 emissions are known to be contributors to global warming.

ISO14001 environmental management system certification acquired

KHK has established an integrated management system not only to provide quality assurance to our customers but also to conduct environmentally conscious corporate activities and continuous improvement activities that involve all our employees in order to increase stakeholder satisfaction, as well as to establish and promote a system that provides highly economic results.

CERTIFIED JQA MANAGEMENT SYSTEM
ISO 9001
ISO 14001

JQA-QMA14416
JQA-EM6717

At KHK, we strive to fulfill our motto “to provide quality products that are trusted by customers,” acquiring the international standard quality management system ISO9001 certification and the environmental management system ISO14001 certification. Also, in order to increase customer satisfaction, we have established an integrated management system of “Vision, Plan, Do, Check and Action” cycles to continuously improve the work structure and offer safer and better products speedily and cheaply. We also work hard to further improve our service so that our customers can use KHK products with peace of mind.

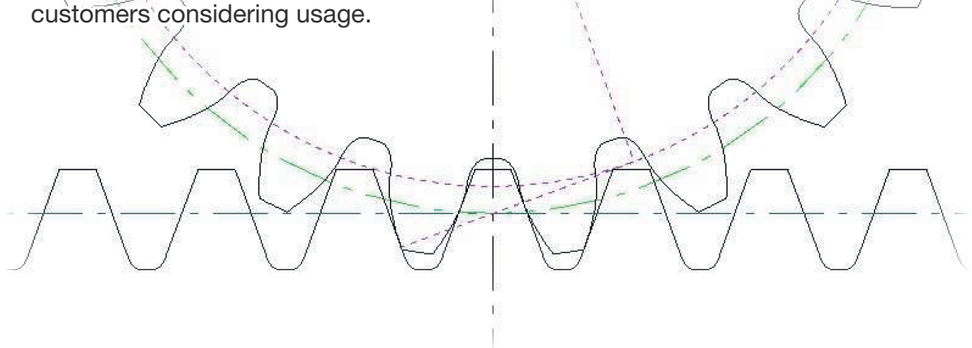
Racks & Pinions Selection Software

GRSW

Limited release on the Japanese website

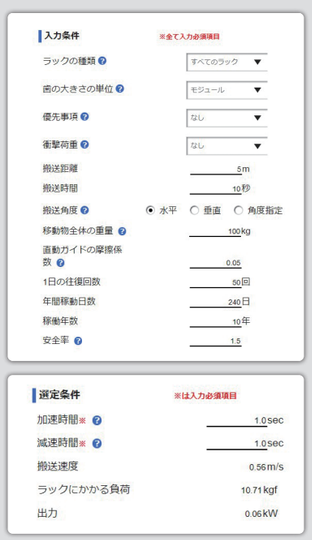
Supporting you through the complex rack & pinion selection process!

Just enter the usage conditions for simple, speedy selection.
This selection software is designed for customers who have struggled with rack & pinion selection before, those hoping to streamline the selection process, and new customers considering usage.

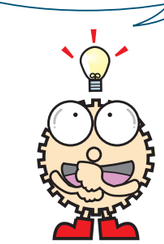


Select the desired rack & pinion from standard products

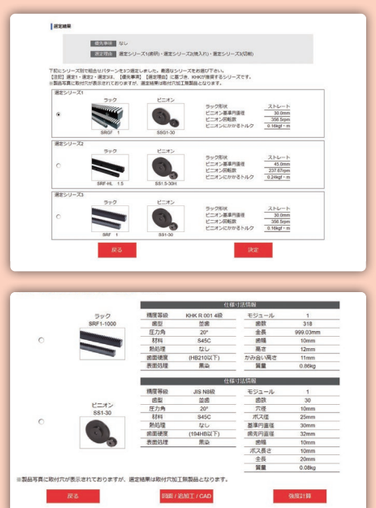
Enter conditions



The software selects model numbers for you from the wide range of stock gears!

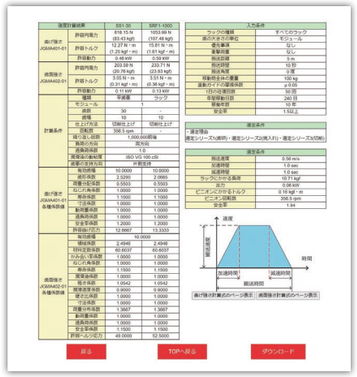


Automatic selection

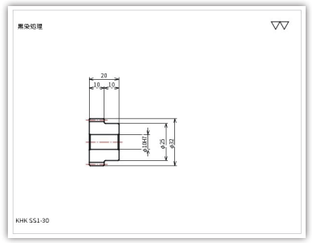


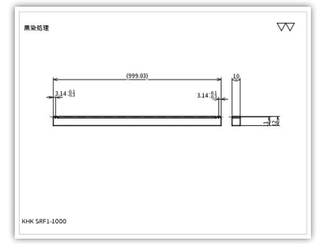
Drawings and strength calculations for the selected rack & pinion can be viewed immediately!

Calculation results

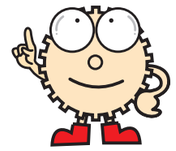


Stock gear drawings



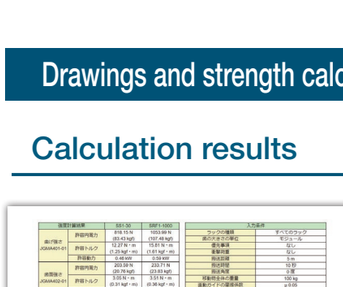


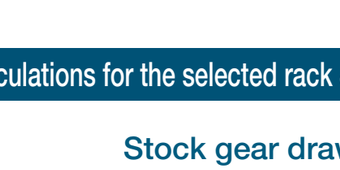
CAD data for standard products can be downloaded from the website



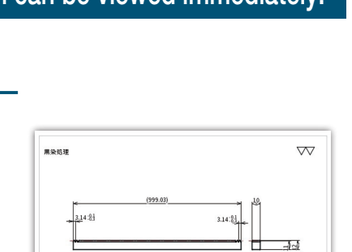
You can also create secondary operation drawings for the selected rack & pinion, incorporating them into the assembly drawings or requesting an estimate as is

Secondary operation drawings





Requesting an estimate



Output to DXF is possible

Usage

Please register as a user.

KHK software can be used for free, but registration is required.
Log in with your GCSW/GDSW ID and password if you have one already.

* We carefully manage customer data based on our personal information protection policy

<Cautions regarding Manufacturing>

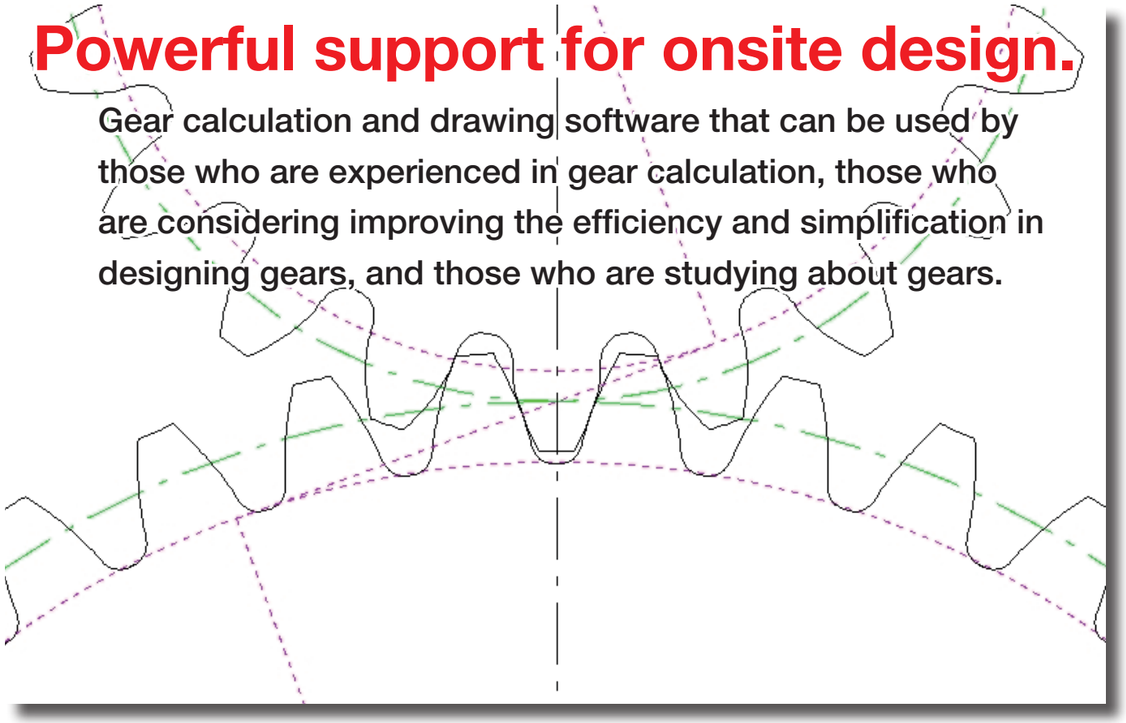
- Software contents and terms of use are subject to change without notice.
- No compensation will be provided for any loss which might be caused by bugs in the software.
- The gear strength formula is based on JGMA (Japanese Gear Manufacturers Association) specifications.
- Drawings drawn may not be manufacturable due to our production capacity.

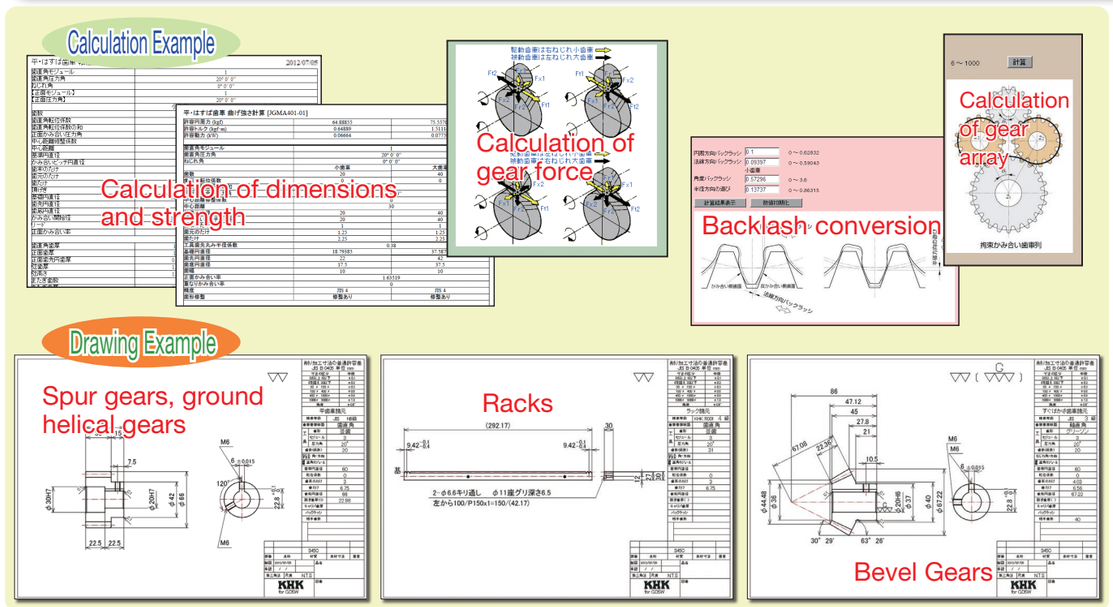
Gear calculation software GCSW Free

& Gear drawing software GDSW for Web

Powerful support for onsite design.

Gear calculation and drawing software that can be used by those who are experienced in gear calculation, those who are considering improving the efficiency and simplification in designing gears, and those who are studying about gears.





Gear calculation software GCSW

Reduce the cost of designing gears with GCSW.

Calculation functions of GCSW	
Gear Type	Parallel axes: Spur/helical gears, internal gears, racks & pinions Intersecting axes: Miters, bevel gears Skewed axes: Screw gears, worms & wheels
Calculation details	Various dimensional calculations (profile shift, tooth thickness, center distance) Strength calculation (bending strength, surface strength) Calculation of gear force (radial direction, thrust direction, radial direction) Gear tooth profile calculation (tooth profile drawing, creation drawing, meshing drawing) Backlash conversion, constraint meshing gear array calculation
Output Details	Printing various calculation results Printing tooth profile drawing, creation drawing and meshing drawing CAD data output of tooth profile drawing

Difficult calculations for gears such as gear shape, strength and tooth profile can be instantly made.
In addition, it can simulate the dimensions and strength of desired gears, allowing the designing cost to be drastically reduced.

Gear drawing software GDSW

Basic gear drawings can be easily made using GDSW.

GDSW drawing functions	
Gear Type	Parallel axes: Spur/helical gears, internal gears, racks & pinions Intersecting axes: Miters, bevel gears Skewed axes: Screw gears, worms & wheels
Drawing contents	Gear specifications (pitch, pressure angle, number of teeth, gear accuracy, material, heat treatment, etc.) Basic shape of various gears Shapes with/without hubs (2-step hub supported) Hole shape (3-step hole supported) Key groove shape (JIS key, optional key supported) Mounting hole shape (tap, drilled hole, counterbored hole)
Output Details	Printing gear drawings CAD data output of drawn gears (ZIP supported)

It can be used to make drawings with basic gear shapes without needing CAD software.
Drawings of spur gears, bevel gears, worm gears and the like can be printed and CAD data can be created.

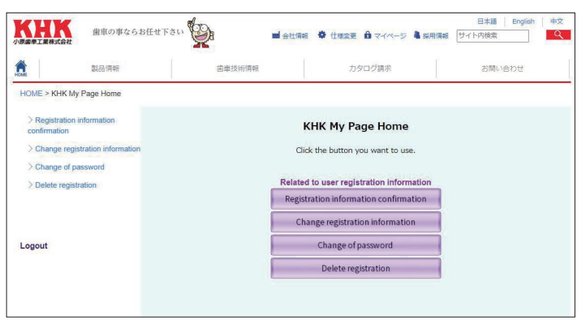
Usage

Please register as a user.

KHK software can be used for free, but registration is required.
When user registration is completed, "KHK My Page" is created and GCSW and GDSW become available.
For details, please see our web site.

* We carefully manage customer data based on our personal information protection policy

KHK gear calculator Search



<Cautions regarding Manufacturing>

- Software contents and terms of use are subject to change without notice.
- No compensation will be provided for any loss which might be caused by bugs in the software.
- The gear strength formula of GCSW is based on JGMA (Japanese Gear Manufacturers Association) specifications.
- Drawings drawn by GDSW may not be manufacturable due to our production capacity.

Product Delivery

Product Name \ Shipping Date	4 days later	6 days later	9 days later	17 days later	30 days later	40 days later
J Series	Order Date → 2 Business Days → Product complete → Shipping Date	Number of products 20 units				
J Series Modules Over 4 (CP15) (except for racks) *Note 1	Order Date → 7 Business Days → Product complete → Shipping Date		Number of products 4 units			
J Series (MMSGQ)	Order Date → 7 Business Days → Product complete → Shipping Date		Number of products 20 units			
J Series MMSGQ (Module Over 4)	Order Date → 7 Business Days → Product complete → Shipping Date		Number of products 4 units			
F Series	Order Date → 2 Business Days → Product complete → Shipping Date	Number of products 20 units				
E Series	Order Date → 2 Business Days → Product complete → Shipping Date	Number of products 20 units				
E Series Module Over 4	Order Date → 7 Business Days → Product complete → Shipping Date		Number of products 4 units			
R Series	Order Date → 2 Business Days → Product complete → Shipping Date	Number of products 20 units				
R Series Modules Over 4 (CP15)	Order Date → 2 Business Days → Product complete → Shipping Date	Number of products 4 units				
焼入十プラス	Order Date → 4 Business Days → Product complete → Shipping Date		Number of products –			
焼入十プラス J Series	Order Date → 6 Business Days → Product complete → Shipping Date			Number of products 20 units		
焼入十プラス J Series Modules Over 4 (CP15) (except for racks)	Order Date → 11 Business Days → Product complete → Shipping Date			Number of products 4 units		
Semi-Custom Standard Product SS/SW/CG	Order Date → About 15 Business Days → Product complete → Shipping Date			Number of products 4 units		
Semi-Custom Standard Product SSG/KHG	Order Date → About 30 Business Days → Product complete → Shipping Date				Number of products 4 units	
Semi-Custom Standard Product KWGDLS AGDL	Order Date → About 40 Business Days → Product complete → Number of products 4 units → Shipping Date					
Semi-Custom J Series SS	Order Date → About 25 Business Days → Product complete → Shipping Date				Number of products 4 units	
Semi-Custom J Series SSG/KHG	Order Date → About 40 Business Days → Product complete → Number of products 4 units → Shipping Date					

*The delivery date excludes the day ordered, and shipping takes place on the next business day. Because machining starts immediately, we cannot accept cancellations for the products above.

*Note 1 Allowable order sizes for module 4 (CP15) or higher are up to 4 units; for racks of module 4 or higher, up to 20 units.

Series Common

(1) For allowable order sizes, see the table on the lefthand page. Cancellation is not possible for made-to-order products. Please allow additional shipping time to get to your local distributor.

J Series

[J Series lead time]

(1) As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order.
(2) Products with module 4 (CP15) or higher require a lead-time for shipping within 7 working days (excludes the day ordered).
(3) Racks, regardless of module, require a lead-time for shipping within 2 working days (excludes the day ordered).
(4) MMSGQ J Series, regardless of module, require a lead-time for shipping within 7 working days (excludes the day ordered).

F Series

[F Series lead time]

(1) As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order.

E Series

[E Series lead time]

(1) As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order.
(2) Products with module 4 or higher require a lead-time for shipping within 7 working days (excludes the day ordered).

R Series

[R Series lead time]

(1) As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order.

Hardened Plus (H Series)/Hardened Plus J Series (HJ Series)

[Hardened Plus (H Series) lead time]

(1) As available-on-request products, these require a lead-time for shipping of 4 working days (excludes the day ordered), after placing an order.

[Hardened Plus J Series (HJ Series) lead time]

(1) As available-on-request products, these require a lead-time for shipping of 6 working days (excludes the day ordered), after placing an order.
(2) Products with module 4 (CP15) or higher require a lead-time for shipping within 11 working days (excludes the day ordered).

Semi-custom order / Semi-custom order J series

[Semi-custom lead time]

(1) In the SS/SW/CG Series, products with S at the end of the Catalog No. are semi-custom stock products. The delivery will take about 15 business days after the order is received.
(2) In the SSG/KHG Series, products with S at the end of the Catalog No. are semi-custom stock products. The delivery will take about 30 business days after the order is received.
(3) In the KWGDLS/AGDL Series, products with S at the end of the Catalog No. are semi-custom stock products. The delivery will take about 40 business days after the order is received.

[Semi-custom J Series lead time]

(1) SS type semi-custom J series products take about 25 working days after the order is received.
(2) SSG/KHG type semi-custom J series products take about 40 working days after the order is received.

Prices/Changes/Cancellations/Out of Stock

Prices

① Made-to-order products, semi-custom orders, and semi-custom order J Series products are estimated separately. Contact your dealer.
② Since the prices are per unit (excluding SRS), the total unit price of miters and the like is the set price.
③ Product prices may be changed without prior notice.

Changes and Cancellations

[Standard Machined Products *Note 1, Made to Order Products, Semi-custom Products, Semi-custom J Series Products]
Because production begins upon ordering, cancellations and changes cannot be made.

[KHK Quick-Mod Products, Custom Gears]
Because production begins upon ordering, cancellations and changes are difficult.
Changes may be possible in some cases, depending on modification status, but a further estimate will be required. Contact your dealer for details.
As the product is manufactured to customer-specified dimensions, it cannot be used elsewhere; therefore, returns are not possible.

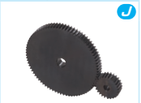
Out of Stock

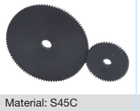
[Standard Gears (gears in stock), Standard Machined Products *Note 1, KHK Quick-Mod Gears]
Production takes place according to stock status, so there may not be sufficient quantities available as ordered.
Some time may be required for production after orders.
Lead times may be longer depending on material acquisition status and modification processes.

*Note 1 Standard machined products: J Series, F Series, R Series, E Series, Hardened Plus, Hardened Plus J Series

Spur Gears

MSGA/MSGB Ground Spur Gears	KSG Ground Spur Gears	SSGS Ground Spur Pinion Shafts	SSG Ground Spur Gears	SSG F Series Ground Spur Gears	SSG E Series Ground Spur Gears	SSG R Series Ground Spur Gears	Pinion Gears for Nabtesco GH Series
Material: SCM415	Material: SCM440	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C/SCM440
*m*1~4 Page 54	*m*1~3 Page 58	*m*1.5~3 Page 60	*m*0.5~10 Page 62	*m*2~3 Page 80	*m*1.5~6 Page 86	*m*1.5~6 Page 96	*m*3~6 (CP10~20) Page 98

SSAG Ground Spur Gears	KS Thermal Refined Spur Gears	SSS Spur Pinion Shafts	SS-H Hardened Spur Gears	SS Spur Gears	SS F Series Spur Gears	SSA-H Hardened Spur Gears	SSA Spur Gears
			Additional				
Material: S45C	Material: SCM440	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C
*m*1~6 Page 100	*m*1.5~5 Page 104	*m*1, 1.5 Page 106	*m*1~10 Page 110	*m*0.5~10 Page 108	*m*1.5~3 Page 134	*m*1~5 Page 142	*m*1~5 Page 142

SSA F Series Spur Gears	SSY-H Hardened Spur Gears	SSY Spur Gears	SSAY-H Hardened Spur Gears	SSAY Spur Gears	SUS/SUSA Stainless Steel Spur Gears	SUSF F-Loc Gears	DSF F-Loc Gears
	NEW		NEW				
Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: SUS303	Material: SUS303	Material: Polyacetal (SUS303)
*m*2~3 Page 148	*m*0.8, 1 Page 152	*m*0.8, 1 Page 152	*m*1 Page 154	*m*1 Page 154	*m*1~4 Page 156	*m*0.5, 1 Page 162	*m*0.5, 1 Page 164

NSU Plastic Spur Gears with Steel Core	PU Plastic Spur Gears with Steel Core	PS/PSA Plastic Spur Gears	SUKB Stainless Steel Hubs	PSUKB SUKB Assembled PSA Spur Gear	DS Injection Molded Spur Gears	BB Sintered Metal Bushings	BSS Spur Gears
			PSA Dedicated				
Material: MC602ST (S45C)	Material: MC901(SUS303)	Material: MC901	Material: SUS303	Material: MC901/SUS303	Material: Duracon (R)(M90-44)	Material: Oil-free copper alloy	Material: Free cutting brass (C3604)
*m*1~3 Page 166	*m*1~2 Page 170	*m*1~3 Page 172	*ϕ*30~100 Page 182	*m*2~3 Page 183	*m*0.5~1 Page 184	*ϕ* 5~8 Page 186	*m*0.5~1 Page 188

SSR Steel Ring Gears (Spur Gears)
Material: S45C
*m*2~3 Page 190

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) Spur Gears

S S G 1 - 15

- No. of Teeth (15)
- Module (1)
- Other Products (Ground Gears)
- Type (Spur Gear)
- Material (S45C)

Material		Type	
M	SCM415	S	Spur Gears
K	SCM440		
S	S45C	**Other Information**	
SU	Stainless Steel	A	Without Hub
P	MC901	G	Ground Gears
N	MC602ST	F	F-loc Hub Gears
D	Polyacetal	R	Ring Gears
BS	Brass	S	Pinion Shafts
L	Sintered Metal Alloy	U	Plastic Gears with Steel Core
		Y	Thin Face Gears
		H	Gear Teeth Induction Hardened

Features

To meet your applications, KHK stock gears are made in a variety of types, materials, configurations, modules and numbers of teeth. We also provide finished gears that are ready to use. Secondary operations can be performed to many of the products, allowing for a wider range of designs. The following table lists the main features.

Catalog Number	Module	Material	Heat Treatment	Tooth Surface Finish	Precision JIS B 1702-1:1998	Secondary Operations	Features
MSGA/MSGB	1~4	SCM415	Carburized	Ground	N5	×	Fully hardened, ground and keyway machined gears with excellent accuracy, strength and abrasion resistance.
KSG	1~3	SCM440	Thermal refined, gear teeth induction hardened	Ground	N6	△	Gears that have been tempered, hardened and ground that have excellent accuracy, strength and abrasion resistance. Secondary operations can be performed except for the teeth. This product is ideal for the pinion of the KRGF rack.
SSGS	1.5~3	S45C	Thermal refined, gear teeth induction hardened	Ground	N7	△	Gears with shafts that have been tempered, hardened and ground. Secondary operations can be performed except for the teeth.
SSG	0.5~10	S45C	Gear teeth induction hardened NOTE 1	Ground	N7	△	Gears that have been hardened and ground with a good balance of accuracy, wear resistance and cost. Secondary operations are possible except for the teeth.
SSAG	1~6						
KS	1.5~5	SCM440	Thermal refined	Cut	N8	○	Tempered gears with excellent bending strength. The teeth can be additionally hardened. This product is ideal for the pinion of the KRF rack.
SSS	1, 1.5	S45C	Thermal refined NOTE 2	Cut	N8 NOTE 3	○	Gears with a tempered shaft.
SS	0.5~10	S45C	—	Cut	N8 NOTE 3	○	Many lineups are available at a low price. The teeth can be additionally hardened.
SSA	1~5						
SSY/SSAY	0.8, 1	S45C	—	Cut	N8 NOTE 3	○	Gears with narrow teeth. Suitable for light loads.
SUS/SUSA	1~4	SUS303	—	Cut	N8	○	Stainless steel gears with rust resistance.
SUSF	0.5, 1	SUS303	—	Cut	N8 NOTE 3	×	Stainless steel gears with rust resistance. Locking Hub allows easy attachment.
DSF	0.5, 1	Polyacetal (SUS303)	—	Cut	N10 NOTE 3	×	Gears made of polyacetal. Locking Hub allows easy attachment.
NSU	1~3	MC602ST (S45C)	—	Cut	N9	○	Steel hubs are fused and fixed to reinforced nylon gears for secure fastening.
PU	1~2	MC901 (SUS303)	—	Cut	N9	○	Stainless steel hubs are fused and fixed to nylon gears for secure fastening.
PS/PSA	1~3	MC901	—	Cut	N9	○	Nylon gears can be used with no lubrication.
DS	0.5~1	Duracon (R) (M90-44) NOTE 4	—	Injection Molded	N12 equivalent	△	Low-priced gears made through injection molding. Suitable for light loads.
BSS	0.5~1	Free-cutting Brass (C3604)	—	Cut	N8 NOTE 3	○	Brass gears with excellent machinability.
SSR	2~3	S45C	—	Cut	N9	○	They have a ring shape with a large number of teeth.

○ Possible △ Partly possible × Not possible

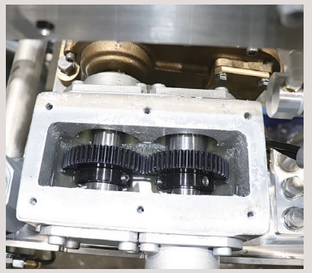
[NOTE 1] Products with module under 1 are thermal refined. Gear teeth are not hardened.
[NOTE 2] SA-shaped products with module 1 have no material thermal refinement treatment.
[NOTE 3] The product accuracy class having a module under 1 corresponds to 'equivalent' as shown in the table.
[NOTE 4] "Duracon (R)" is a registered trademark of Polyplastics Co., Ltd. in Japan as well as other countries.

● **KHK stock spur gears (m1.5 and higher) have semi-topping on the tooth tips.**
● **Black products are KHK stock gears that have an applied black oxide coating for rust resistance.**

Application Examples

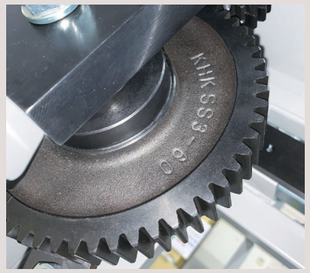
Spur gears are widely used in a diverse range of equipment such as food machinery and industrial machines.

■ **Fish processing machine manufactured by TOYO SUISAN KIKAI CO.,LTD.**



SS spur gears used for filleting fish

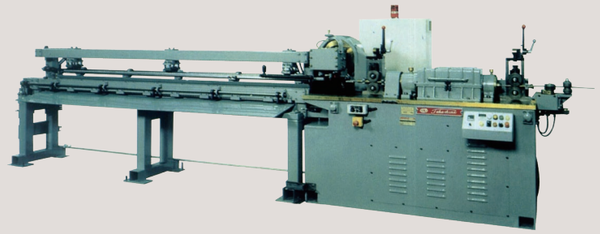
■ **Carton former**



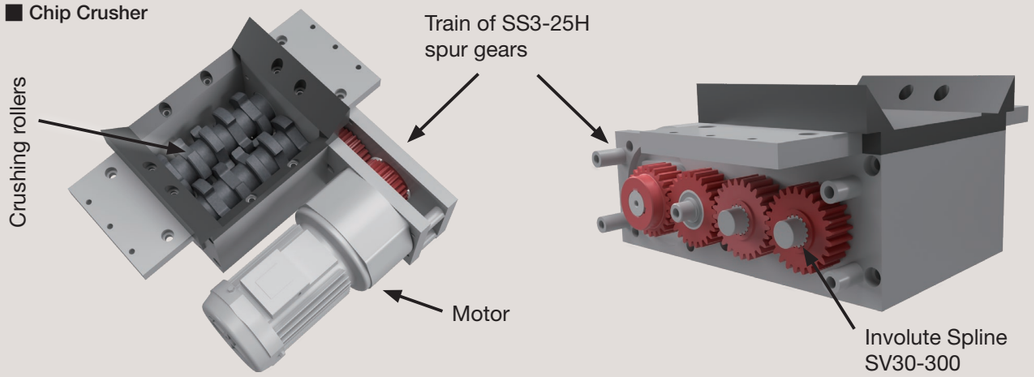
SS spur gears used in automatic carton formers

■ **High-speed automatic wire straightening/cutting machine manufactured by Takashima Sangyo Co.**

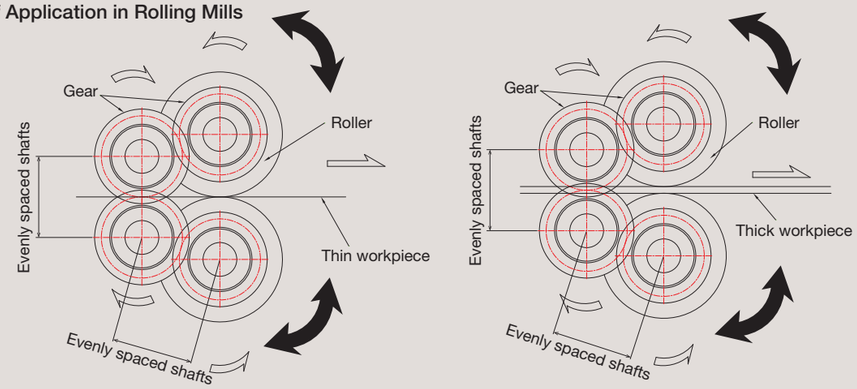
SS spur gears used for wire feeder



■ **Chip Crusher**



■ **Example of Application in Rolling Mills**



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 Basically, all spur gears, internal gears and racks can be paired as long as the module and pressure angle match. Products with different materials, tooth widths or accuracy can be mated.

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. Also, F-loc hub spur gears and various F series that use the friction coupling method to fasten the gear shaft need additional consideration for starting torque.

■ Calculation of Bending Strength of Gears

Item \ Catalog Number	MSGA MSGB	SSGS	SSG SSAG	SSS,SS SSA,SSY SSAY,SSR	SS-H SSY-H SSAY-H	SUS SUSA SUSF	BSS	KSG	KS	KS-H	ZSTP Note 6	SSG SSCPG Note 6	NSU	PU PS PSA	DSF DS
Formula NOTE 1	Formula of spur and helical gears on bending strength (JGMA401-01)												The Lewis formula		
No. of teeth of mating gears	Same number of teeth (30 for SSGS, SSS, SSR)							Racks					—		
Rotational Speed	600rpm NOTE 2			100rpm							400rpm		100rpm		
Design Life (Durability)	Over 10^7 cycles												—		
Impact from motor	Uniform load												Allowable bending stress (kgf/mm²)		
Impact from load	Uniform load												1.38 (40°C with no lubrication)	1.15 (40°C with no lubrication)	*m* 0.5 4.0 *m* 0.8 4.0 *m* 1.0 3.5 (40°C with grease lubrication)
Direction of load	Bidirectional load (calculated with allowable bending stress of 2/3)														
Allowable bending stress at root σ_{Flim} (kgf/mm²)	47	24.5	19 (24.5) Note 3	19 (24.5) Note 4	19	10.5	4	30	29.5	30	30	19			
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	Symmetric support by bearings Note 5							Supported on one end.					
Allowable Hertz stress σ_{Hlim} (kgf/mm²)	166	99	90 (62.5) Note 3	49 (62.5) Note 4	90	41.3	—	112	76	112	112	90	
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] For semi-custom gears, the rotation speed is based on 300rpm.
[NOTE 3] For SSG Ground Spur Gears, with module under 1, thermal refining is applied. Allowable bending stress and allowable hertz stress values are shown in parentheses.
[NOTE 4] For SSS Spur Pinion Shafts, with module over 1.5, tooth induction hardening is not applied. Allowable bending stress and allowable hertz stress values are shown in parentheses.
[NOTE 5] SSS Spur Pinion Shafts with module 1 or less (SA configuration) are set to cantilever support as they are single shaft types.
[NOTE 6] For Nabtesco GH Series.

When selecting KHK standard gears, glance over the Product Precautions on Page 50 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.
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.

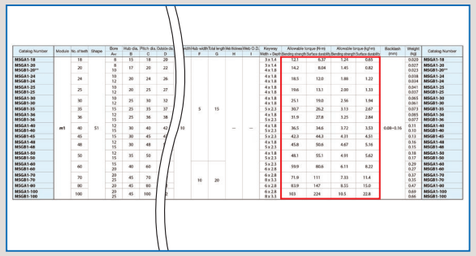
Website URL: https://khkgears.net/new/
Overseas Sales Department: Phone: +81-48-254-1744 Fax: +81-48-254-1765
E-mail: info@khkgears.net

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.

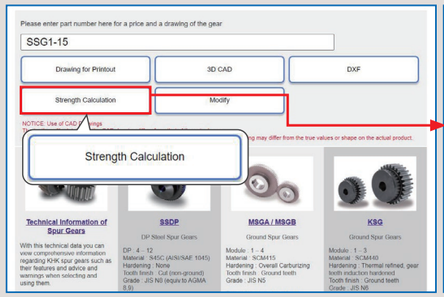
■ For provisional selection from this catalog

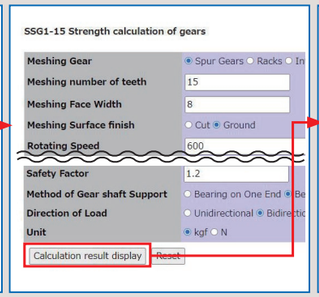


Step 3 Calculate the strength under the actual usage conditions.

Calculate the strength formally using the various gear strength formulas. We recommend using the simple strength calculation available on our website.

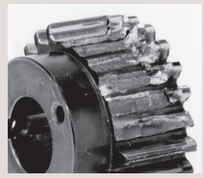
■ Use the strength calculation function on our website.





■ 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]

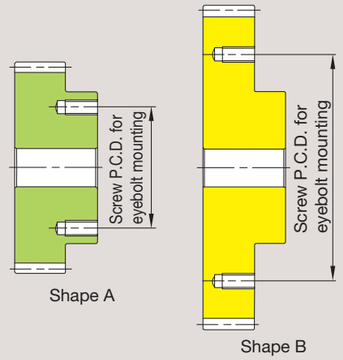
(1) The allowable torque shown in the table are calculated values according to the assumed usage conditions. Please see page 48 for more details.
(2) The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.
(3) For hole lengths 3.5x the bore or more, the hole center is out of H7 tolerance.
(4) For bores of ϕ4 or below, the bore tolerance is H8. As well, the tolerance is H8 for ϕ5 or ϕ6 bores with hole length (total length) 3x the bore or more.
(5) Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.
(6) For products having a tapped hole, a set screw is included.
(7) Variations in temperature or humidity can cause dimensional changes in plastic gears, including tooth diameter, bore, and backlash.
The accuracy and tolerances shown in the catalog are values obtained when machining is performed.
(8) To reduce heat generation, it is recommended to mate plastic gears with steel gears.
(9) 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 being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

[J Series]

(1) Certain products which would otherwise have a very long tapped hole are counterbored. For details, please see the KHK website.
(2) Black oxide is not re-applied to parts undergoing secondary operations.
(3) For bores over ϕ50, the bore tolerance is H8.

Tapped Holes in Semi-Custom Standard Products



Catalog Number	Shape	Screw P.C.D. for eyebolt mounting
SSG4-62S	B	180
SSG4-64S	B	190
SSG4-65S	B	190
SSG4-66S	B	190
SSG4-68S	B	200
SSG4-70S	B	200
SSG4-80S	B	220
SSG4-90S	B	240
SSG4-100S	B	260
SSG4-110S	B	280
SSG4-120S	B	300
SSG5-32S	A	95
SSG5-35S	A	105
SSG5-36S	A	105
SSG5-40S	A	115
SSG5-42S	A	115
SSG5-44S	A	125
SSG5-45S	A	125
SSG5-48S	A	125
SSG5-50S	A	125
SSG5-55S	B	210
SSG5-56S	B	210
SSG5-60S	B	210
SSG5-62S	B	220
SSG5-64S	B	220
SSG5-65S	B	220
SSG5-66S	B	230
SSG5-68S	B	230
SSG5-70S	B	240
SSG5-80S	B	260
SSG5-90S	B	290
SSG6-32S	A	125
SSG6-35S	A	135
SSG6-36S	A	135
SSG6-40S	A	145
SSG6-42S	A	145
SSG6-44S	A	145
SSG6-45S	A	155
SSG6-48S	A	155
SSG6-50S	A	155
SSG6-55S	B	240
SSG6-56S	B	240
SSG6-60S	B	240
SSG6-62S	B	250
SSG6-64S	B	250
SSG6-65S	B	260
SSG6-66S	B	260

Catalog Number	Shape	Screw P.C.D. for eyebolt mounting
SSG6-68S	B	260
SSG6-70S	B	270
SSG6-80S	B	300
SSG8-20S	A	105
SSG8-25S	A	135
SSG8-30S	A	165
SSG8-32S	A	175
SSG8-35S	A	185
SSG8-36S	A	185
SSG8-40S	A	195
SSG8-42S	A	205
SSG8-44S	A	205
SSG8-45S	B	290
SSG8-48S	B	300
SSG8-50S	B	300
SSG8-55S	B	300
SSG8-56S	B	300
SSG8-60S	B	300
SSG10-20S	A	135
SSG10-25S	A	175
SSG10-30S	A	215
SSG10-32S	A	225
SSG10-35S	A	235
SSG10-36S	A	245
SSG10-40S	A	255

Catalog Number	Shape	Screw P.C.D. for eyebolt mounting
SS4-90S	B	240
SS4-100S	B	260
SS4-110S	B	280
SS4-120S	B	300
SS5-62S	B	220
SS5-64S	B	220
SS5-65S	B	220
SS5-66S	B	230
SS5-68S	B	230
SS5-70S	B	240
SS5-80S	B	260
SS5-90S	B	290
SS5-100S	B	310
SS5-110S	B	340
SS5-120S	B	360
SS6-52S	B	240
SS6-54S	B	240
SS6-55S	B	240
SS6-56S	B	240
SS6-58S	B	240
SS6-60S	B	240
SS6-62S	B	250
SS6-64S	B	250
SS6-65S	B	260
SS6-66S	B	260
SS6-68S	B	260
SS6-70S	B	270
SS6-80S	B	300
SS6-90S	B	330
SS6-100S	B	360
SS8-32S	A	175
SS8-34S	A	185
SS8-35S	A	185
SS8-36S	A	185
SS8-38S	A	195
SS8-40S	A	195
SS8-42S	A	205
SS8-44S	A	205
SS8-45S	B	290
SS8-46S	B	215
SS8-48S	B	300
SS8-50S	B	300
SS8-52S	B	300
SS8-54S	B	300
SS8-55S	B	300
SS8-56S	B	300
SS8-58S	B	300

Catalog Number	Shape	Screw P.C.D. for eyebolt mounting
SS8-59S	B	300
SS8-60S	B	300
SS10-26S	A	185
SS10-27S	A	195
SS10-28S	A	195
SS10-29S	A	205
SS10-30S	A	215
SS10-32S	A	225
SS10-34S	A	235
SS10-35S	A	235
SS10-36S	A	245
SS10-38S	A	245
SS10-40S	A	255
SS10-42S	A	265
SS10-44S	B	350
SS10-45S	B	350
SS10-46S	B	350
SS10-48S	B	360
SS10-50S	B	360

Application Hints

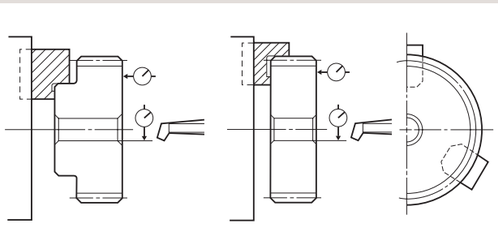
In order to use KHK stock gears safely, carefully read the Application Hints before proceeding.
If there are questions or you require clarifications, please contact your nearest distributor. E-mail: info@khkgears.net
Please read "Cautions on Performing Secondary Operations" below when performing modifications 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. Plastic gears and ring gears deform particularly easily, so please handle with care.

2. Caution on Performing Secondary Operations

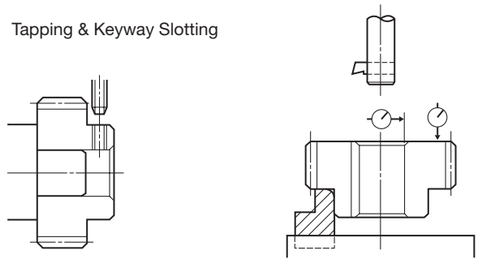
① If reboring, it is important to pay special attention to locating the center in order to avoid runout.
② The reference datum for gear machining is the bore. Therefore, use the bore for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface.
③ If reworking using scroll chucks, we recommend the use of new or rebored jaws for improved precision. Please exercise caution not to crush the teeth.



Lathe Operations

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

Tapping & Keyway Slotting



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

Induction Hardening

If you apply induction hardening to the gear teeth of S45C products, you need to designate the hardness and where to apply the heat treatment. Below is an example of common specifications and KHK's specifications for hardening:

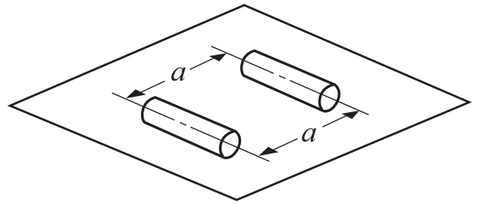
● Common Specifications for Heat Treatment
Hardened location: Tooth surface, or Tooth surface and Tooth root
Hardness: Within 10 HRC in the range from 45 to 60 HRC
(Example: 48 to 58 HRC)

● 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 you designate 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 for S45C, 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.

3. Points of Caution during Assembly

① The recommended center distance tolerance of KHK stock spur gears is H7 for ground gears and H8 for cut gears. Backlash may be adjusted by changing the center distance of mating gears. For the connection between center distance change amount and peripheral direction backlash amount, use the gear calculation software.



$a=m(Z_1+Z_2)/2$

Where
a : Center distance
m : Module
Z_1 : No. of teeth of pinion
Z_2 : No. of teeth of gear

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

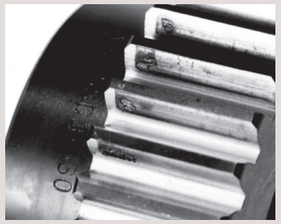
■ Total Length Tolerance for Spur and Helical Gears

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

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

③ Spur gears produce no thrust forces; however, be sure to fasten them firmly with stepped shafts, or collars, to prevent shifting toward the shaft.
Keyways are generally used in fastening gears to a shaft, and they should be fastened by applying drilled holes for set screws, or applying flats to the shaft, in case of fastening only with set screws.
There are also methods of secure settings using parts for engaging the hole and the axis.
④ Verify that the two shafts are parallel. Incorrect assembly will lead to uneven teeth contact which will cause noise and wear. (After assembly, check the tooth contact by painting a thin layer of red lead primer or the like on the gear teeth, meshing them together and rotating them.)

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



Poor tooth contact and pitting

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

4. Cautions on Starting

① Check the following items before starting.
- Are the gears fastened 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

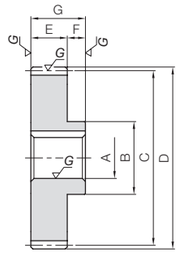
1. When using KHK products, follow relevant safety regulations (Occupational Safety and Health Regulations, etc.).
2. Pay attention to the following items when installing, removing, or performing maintenance and inspection of the product.
   ① Turn off the power switch.
   ② Do not reach or crawl under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

Specifications	
Precision grade	JIS grade N5 (JIS B1702-1: 1998)
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM415
Heat treatment	Carburized*
Tooth hardness	55 to 60HRC

* No secondary operations can be performed on these finished gears due to the applied carburizing process.



S1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
				A_{H7}	B	C	D	E	F	G
MSGA1-18	***m*1**	18	S1	8	15	18	20	10	5	15
MSGA1-20 **MSGB1-20****		20		8 10	17	20	22			
MSGB1-24		24		12	20	24	26			
MSGA1-25 **MSGB1-25**		25		10 12	20	25	27			
MSGA1-30 **MSGB1-30**		30		10 12	25	30	32			
MSGB1-40		40		15	30	40	42			
MSGA1-48 **MSGB1-48**		48		12 15	30	48	50			
MSGA1-50		50		12	35	50	52			
MSGB1-60		60		20	40	60	62		10	20
MSGA1-70		70		20	45	70	72			
MSGA1-80		80		20	45	80	82			
MSGA1-100		100		20	45	100	102			
MSGA1.5-15**	***m*1.5**	15	S1	10	18	22.5	25.5	15	10	25
MSGA1.5-18 **MSGB1.5-18**		18		10 12	22	27	30			
MSGA1.5-20 **MSGB1.5-20**		20		12 15	25	30	33			
MSGB1.5-24		24		15	28	36	39			
MSGB1.5-25		25		16	30	37.5	40.5			
MSGB1.5-30		30		18	30	45	48			
MSGB1.5-36		36		18	32	54	57			
MSGA1.5-40		40		16	35	60	63			
MSGA1.5-50 **MSGB1.5-50**		50		18 22	40	75	78			
MSGB1.5-60		60		25	45	90	93			
MSGA1.5-70		70		20	45	105	108			
MSGA1.5-80 **MSGB1.5-80**		80		20 25	45	120	123			
MSGA1.5-100		100		25	50	150	153			
MSGB2-15**	***m*2**	15	S1	15	24	30	34	20	10	30
MSGA2-18 **MSGB2-18**		18		12 15	30	36	40			
MSGA2-20 **MSGB2-20**		20		15 18	32	40	44			
MSGB2-24		24		18	35	48	52			
MSGA2-25 **MSGB2-25**		25		16 20	35	50	54			
MSGB2-30		30		22	40	60	64			
MSGA2-35		35		18	40	70	74			
MSGA2-40 **MSGB2-40**		40		20 25	45	80	84			
MSGA2-60		60		25	55	120	124			

Keyway	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash	Weight	Catalog Number
Width × Depth	Bending strength	Surface durability	Bending strength	Surface durability	(mm)	(kg)	
3 x 1.4	12.1	6.37	1.24	0.65	0.08~0.16	0.020	**MSGA1-18**
3 x 1.4 4 x 1.8	14.2	8.04	1.45	0.82		0.027 0.023	**MSGA1-20** **MSGB1-20****
4 x 1.8	18.5	12.0	1.88	1.22		0.034	**MSGB1-24**
4 x 1.8 4 x 1.8	19.6	13.1	2.00	1.33		0.041 0.037	**MSGA1-25** **MSGB1-25**
4 x 1.8 4 x 1.8	25.1	19.0	2.56	1.94		0.065 0.061	**MSGA1-30** **MSGB1-30**
5 x 2.3	36.5	34.6	3.72	3.53		0.10	**MSGB1-40**
4 x 1.8 5 x 2.3	45.8	50.6	4.67	5.16		0.16 0.15	**MSGA1-48** **MSGB1-48**
4 x 1.8	48.1	55.1	4.91	5.62		0.18	**MSGA1-50**
6 x 2.8	59.9	80.6	6.11	8.22		0.27	**MSGB1-60**
6 x 2.8	71.9	111	7.33	11.4		0.37	**MSGA1-70**
6 x 2.8	83.9	147	8.55	15.0		0.47	**MSGA1-80**
6 x 2.8	103	224	10.5	22.8		0.69	**MSGA1-100**
4 x 1.8	30.8	14.8	3.15	1.51	0.08~0.16	0.050	**MSGA1.5-15****
4 x 1.8 4 x 1.8	41.0	22.1	4.18	2.26		0.080 0.074	**MSGA1.5-18** **MSGB1.5-18**
4 x 1.8 5 x 2.3	48.0	27.9	4.89	2.84		0.098 0.085	**MSGA1.5-20** **MSGB1.5-20**
5 x 2.3	62.4	41.5	6.36	4.24		0.13	**MSGB1.5-24**
5 x 2.3	66.0	45.4	6.73	4.63		0.14	**MSGB1.5-25**
6 x 2.8	84.7	66.4	8.63	6.77		0.19	**MSGB1.5-30**
6 x 2.8	108	97.1	11.0	9.90		0.28	**MSGB1.5-36**
5 x 2.3	123	121	12.6	12.3		0.37	**MSGA1.5-40**
6 x 2.8 6 x 2.8	162	193	16.6	19.7		0.57 0.54	**MSGA1.5-50** **MSGB1.5-50**
8 x 3.3	202	283	20.6	28.8		0.77	**MSGB1.5-60**
6 x 2.8	231	372	23.6	38.0		1.08	**MSGA1.5-70**
6 x 2.8 8 x 3.3	270	494	27.5	50.3		1.39 1.36	**MSGA1.5-80** **MSGB1.5-80**
8 x 3.3	347	787	35.4	80.2		2.13	**MSGA1.5-100**
5 x 2.3	73.1	35.7	7.46	3.64	0.10~0.20	0.10	**MSGB2-15****
4 x 1.8 5 x 2.3	97.2	53.5	9.91	5.46		0.19 0.17	**MSGA2-18** **MSGB2-18**
5 x 2.3 6 x 2.8	114	67.6	11.6	6.89		0.22 0.20	**MSGA2-20** **MSGB2-20**
6 x 2.8	148	101	15.1	10.3		0.30	**MSGB2-24**
5 x 2.3 6 x 2.8	157	110	16.0	11.2		0.33 0.31	**MSGA2-25** **MSGB2-25**
6 x 2.8	201	161	20.5	16.5		0.45	**MSGB2-30**
6 x 2.8	246	223	25.1	22.7		0.64	**MSGA2-35**
6 x 2.8 8 x 3.3	292	294	29.7	30.0		0.84 0.79	**MSGA2-40** **MSGB2-40**
8 x 3.3	457	658	46.6	67.1		1.84	**MSGA2-60**

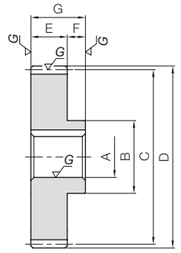
[Caution on Product Characteristics] ① The keyway tolerance is the value before hardening.
② Products marked with "**" have a thin wall section between the keyway and the tooth, so please consider the strength of the thick part when using them. For details, please refer to the web catalog.

Product Precautions → Page 50

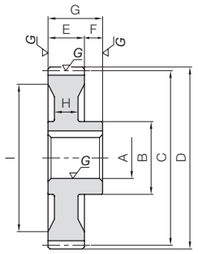
Ground Spur Gears

Specifications	
Precision grade	JIS grade N5 (JIS B1702-1: 1998)
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM415
Heat treatment	Carburized*
Tooth hardness	55 to 60HRC

* No secondary operations can be performed on these finished gears due to the applied carburizing process.



S1



S2

Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Web thickness	Web O.D.
				A_{H7}	B	C	D	E	F	G	H	I
MSGA2.5-15 **MSGB2.5-15****	***m*2.5**	15	S1	15 18	30	37.5	42.5	25	12	37	—	—
MSGB2.5-20		20		22	40	50	55					
MSGB2.5-24		24		22	40	60	65					
MSGB2.5-25		25		25	45	62.5	67.5					
MSGB2.5-36		36		30	55	90	95					
MSGA2.5-40 **MSGB2.5-40**		40		25 32	55	100	105					
MSGA2.5-55		55		30	70	137.5	142.5					
MSGB2.5-60		60		40	70	150	155					
MSGA2.5-70		70	S2	40	85	175	180				17	150
MSGA3-15 **MSGB3-15****	***m*3**	15	S1	18 22	36	45	51	30	15	45	—	—
MSGB3-20		20		25	45	60	66					
MSGB3-25		25		30	55	75	81					
MSGA3-30 **MSGB3-30**		30		28 35	60	90	96					
MSGA3-40 **MSGB3-40**		40		30 40	70	120	126					
MSGA3-45		45		30	70	135	141					
MSGA3-60		60	S2	35	80	180	186				20	156
MSGB4-15**	***m*4**	15	S1	30	48	60	68	40	20	60	—	—
MSGA4-20 **MSGB4-20**		20		28 32	60	80	88					
MSGA4-24		24		28	60	96	104					
MSGA4-25 **MSGB4-25**		25		30 35	60	100	108					
MSGA4-30 **MSGB4-30**		30		35 40	70	120	128					
MSGA4-40 **MSGB4-40**		40		40 45	80	160	168					
MSGB4-45		45		45	80	180	188					
MSGB4-50		50	S2	50	85	200	208				26	168

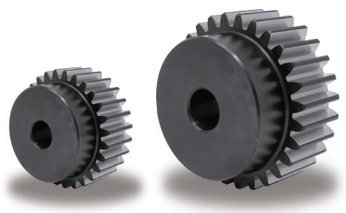
Keyway	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash	Weight	Catalog Number
Width × Depth	Bending strength	Surface durability	Bending strength	Surface durability	(mm)	(kg)	
5 x 2.3 6 x 2.8	143	71.0	14.6	7.24	0.10~0.20	0.23 0.20	**MSGA2.5-15** **MSGB2.5-15****
6 x 2.8	222	134	22.7	13.7		0.39	**MSGB2.5-20**
6 x 2.8	289	201	29.4	20.5		0.56	**MSGB2.5-24**
8 x 3.3	306	220	31.2	22.4		0.60	**MSGB2.5-25**
8 x 3.3	498	471	50.8	48.0		1.26	**MSGB2.5-36**
8 x 3.3 10 x 3.3	543	560	55.3	57.1		1.61 1.52	**MSGA2.5-40** **MSGB2.5-40**
8 x 3.3	804	1090	82.0	112		3.06	**MSGA2.5-55**
12 x 3.3	892	1310	90.9	134		3.45	**MSGB2.5-60**
12 x 3.3	1020	1730	104	176		4.24	**MSGA2.5-70**
6 x 2.8 6 x 2.8	247	124	25.2	12.7	0.10~0.20	0.40 0.35	**MSGA3-15** **MSGB3-15****
8 x 3.3	384	236	39.1	24.1		0.67	**MSGB3-20**
10 x 3.3	528	386	53.9	39.3		1.06	**MSGB3-25**
8 x 3.3 10 x 3.3	677	565	69.1	57.7		1.60 1.48	**MSGA3-30** **MSGB3-30**
8 x 3.3 12 x 3.3	938	988	95.6	101		2.86 2.66	**MSGA3-40** **MSGB3-40**
8 x 3.3	1090	1260	111	129		3.57	**MSGA3-45**
10 x 3.3	1470	2200	150	224		5.31	**MSGA3-60**
8 x 3.3	585	302	59.7	30.8	0.10~0.20	0.83	**MSGB4-15****
8 x 3.3 10 x 3.3	910	574	92.8	58.6		1.72 1.63	**MSGA4-20** **MSGB4-20**
8 x 3.3	1130	819	115	83.5		2.41	**MSGA4-24**
8 x 3.3 10 x 3.3	1190	896	122	91.4		2.56 2.44	**MSGA4-25** **MSGB4-25**
10 x 3.3 12 x 3.3	1530	1320	156	134		3.69 3.54	**MSGA4-30** **MSGB4-30**
12 x 3.3 14 x 3.8	2120	2290	216	234		6.49 6.33	**MSGA4-40** **MSGB4-40**
14 x 3.8	2460	2930	251	299		8.01	**MSGB4-45**
14 x 3.8	2800	3650	285	372		8.37	**MSGB4-50**

[Caution on Product Characteristics] ① The keyway tolerance is the value before hardening.
② Products marked with "**" have a thin wall section between the keyway and the tooth, so please consider the strength of the thick part when using them. For details, please refer to the web catalog.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Product Precautions → Page 50

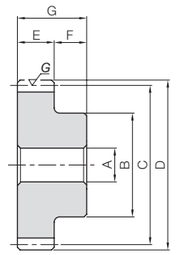
Ground Spur Gears



Specifications	
Precision grade	JIS grade N6 (JIS B1702-1: 1998)*
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 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).

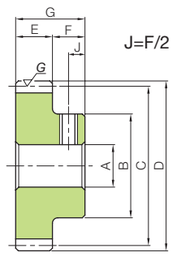
J



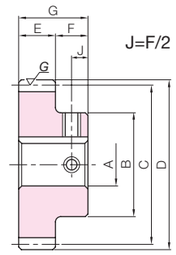
S1

Catalog Number	Module	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
KSG1-30	***m*1**	30	S1	8	25	30	32	10	10	20	17.6	14.0	1.80	1.43	0.08~0.16	0.086
KSG1-40		40		10	35	40	42				25.1	27.0	2.56	2.75		0.16
KSG1.5-25	***m*1.5**	25	S1	10	30	37.5	40.5	15	14	29	47.0	31.0	4.80	3.16	0.08~0.16	0.19
KSG1.5-30		30		15	35	45	48				59.5	47.4	6.06	4.83		0.25
KSG1.5-32		32		15	40	48	51				64.5	55.0	6.57	5.60		0.31
KSG1.5-40		40		15	50	60	63				84.7	91.3	8.64	9.31		0.51
KSG2-30	***m*2**	30	S1	15	50	60	64	20	16	36	141	112	14.4	11.5	0.10~0.20	0.64
KSG2-40		40		18	70	80	84				201	217	20.5	22.1		1.20
KSG2.5-20	***m*2.5**	20	S1	15	40	50	55	25	18	43	161	86.0	16.5	8.77	0.10~0.20	0.50
KSG2.5-25		25		20	50	62.5	67.5				218	144	22.2	14.7		0.77
KSG2.5-30		30		20	65	75	80				275	220	28.1	22.4		1.23
KSG2.5-40		40		20	90	100	105				392	425	40.0	43.3		2.33
KSG3-25	***m*3**	25	S1	20	65	75	81	30	20	50	376	249	38.4	25.4	0.10~0.20	1.44
KSG3-30		30		20	80	90	96				476	381	48.5	38.9		2.16
KSG3-40		40		25	110	120	126				678	736	69.1	75.0		3.96

J Series



S1T



S1K

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

Bore H7	* The product shapes of J Series items are identified by background color.																		
Keyway Js9	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	—	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M5	M4						M5				M6			M8			M10	
KSG1-30J BORE																			
KSG1-40J BORE																			
KSG1.5-25J BORE																			
KSG1.5-30J BORE																			
KSG1.5-32J BORE																			
KSG1.5-40J BORE																			
KSG2-30 J BORE																			
KSG2-40 J BORE																			
KSG2.5-20J BORE																			
KSG2.5-25J BORE																			
KSG2.5-30J BORE																			
KSG2.5-40J BORE																			
KSG3-25J BORE																			
KSG3-30J BORE																			
KSG3-40J 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.

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info@zahnrad24.com
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Recommended mating rack

KRGF-H/KRGFD-H
Hardened Ground Racks

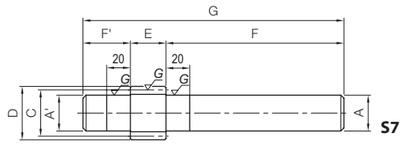
Please see Page 226 for more details.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Ground Spur Pinion Shafts

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



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Catalog Number	Module	No. of teeth	Profile shift coefficient	Shape	Shaft diameter (L) A'	Shaft length (L) F'	Pitch dia. C	Outside dia. D	Face width E	Shaft diameter (R) A	Shaft length (R) F	Total Length G
SSGS1.5-10	***m*1.5**	10	+0.5	S7	12.2	25	15	19.35	15	12.2	100	140
SSGS1.5-12		12	0		13.7		18	21		13.7		
SSGS1.5-13		13	0		15.2		19.5	22.5		15.2		
SSGS2-10	***m*2**	10	+0.5	S7	16.2	30	20	25.8	20	16.2	120	170
SSGS2-12		12	0		18.2		24	28		18.2		
SSGS2-13		13	0		20.2		26	30		20.2		
SSGS2.5-10	***m*2.5**	10	+0.5	S7	20.2	35	25	32.25	25	20.2	135	195
SSGS2.5-12		12	0		22.7		30	35		22.7		
SSGS2.5-13		13	0		25.2		32.5	37.5		25.2		
SSGS3-10	***m*3**	10	+0.5	S7	24.2	40	30	38.7	30	24.2	150	220
SSGS3-12		12	0		27.2		36	42		27.2		
SSGS3-13		13	0		30.2		39	45		30.2		

Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
Bending strength	Surface durability	Bending strength	Surface durability			
12.7	3.76	1.30	0.38	0.08~0.16	0.14	**SSGS1.5-10**
9.97	4.70	1.02	0.48		0.17	**SSGS1.5-12**
12.1	5.51	1.23	0.56		0.21	**SSGS1.5-13**
30.2	9.07	3.08	0.93	0.10~0.20	0.30	**SSGS2-10**
23.6	11.3	2.41	1.15		0.38	**SSGS2-12**
28.6	13.3	2.92	1.35		0.46	**SSGS2-13**
58.9	17.9	6.01	1.83	0.10~0.20	0.54	**SSGS2.5-10**
46.2	22.4	4.71	2.28		0.68	**SSGS2.5-12**
46.6	21.9	4.75	2.23		0.83	**SSGS2.5-13**
102	31.3	10.4	3.19	0.10~0.20	0.89	**SSGS3-10**
66.5	32.6	6.78	3.32		1.11	**SSGS3-12**
80.4	38.3	8.20	3.91		1.35	**SSGS3-13**

[Caution on Product Characteristics] ① For the center distance of the profile shifted gear, please refer to "Center distance of stock spur gear meshing with profile shifted gear" below.
② The backlash values shown in the table are the theoretical values for the normal direction for the internal ring in mesh with an SSG spur gear.

■ Center distance of stock spur gear meshing with profile shifted gear

The center distance of the stock gear (x = 0) that meshes with profile shifted gear (x = +0.5) of m = 1 is shown in the table at right. Please multiply by the module of the gear to be used.

■ Center distance where number of teeth is 12 to 30 (unit: mm)

Number of teeth (x = +0.5) / Number of teeth (x = 0)	10
12	11.4410
13	11.9428
14	12.4446
15	12.9462
16	13.4477
17	13.9492
18	14.4505
19	14.9518
20	15.4530
21	15.9542
22	16.4553
23	16.9564
24	17.4574
25	17.9583
26	18.4592
27	18.9601
28	19.4610
29	19.9618
30	20.4625

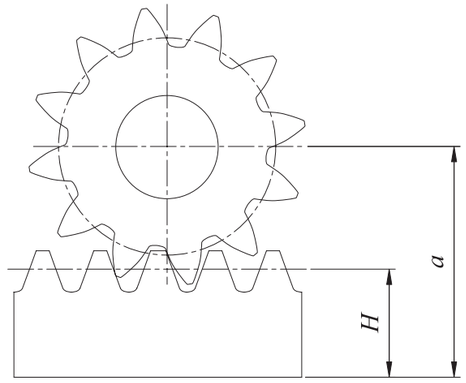
■ Center distance where number of teeth is 32 to 62 (unit: mm)

Number of teeth (x = +0.5) / Number of teeth (x = 0)	10
32	21.4640
34	22.4653
35	22.9660
36	23.4666
38	24.4677
40	25.4688
42	26.4698
44	27.4707
45	27.9712
46	28.4716
48	29.4725
50	30.4733
52	31.4740
54	32.4747
55	32.9750
56	33.4754
58	34.4760
60	35.4766
62	36.4772

■ Center distance where number of teeth is 64 to 200 (unit: mm)

Number of teeth (x = +0.5) / Number of teeth (x = 0)	10
64	37.4777
65	37.9780
66	38.4782
68	39.4787
70	40.4792
72	41.4796
75	42.9803
76	43.4805
80	45.4813
84	47.4820
85	47.9822
88	49.4826
90	50.4830
95	52.9837
100	55.4844
120	65.4866
150	80.4890
200	105.4915

■ Mounting distance of a profile shifted gear and the meshing rack



$$a = \frac{zm}{2} + H + xm$$

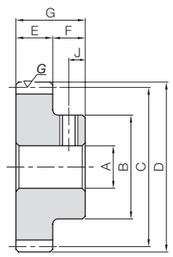
Where
a : Mounting distance
H : Pitch line height
m : Module
z : No. of teeth
x : Profile shift coefficient

Product Precautions → Page 50

Made to Order

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C*
Heat treatment	—*
Tooth hardness	200 to 270HB
Surface treatment	Black oxide coated except for teeth

* Products with modules of 0.8 or under use S45C thermal refined materials, so the surface hardness is 200~270 HB.



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info@zahnrad24.com
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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
SSG0.5-30A (Made to Order) **SSG0.5-30B** (Made to Order)	***m*0.5**	30	S1T	5 6	13	15	16	5	7	12	M4	3.5
SSG0.5-32A (Made to Order)		32		5	14	16	17					
SSG0.5-40B (Made to Order)		40		6	18	20	21					
SSG0.5-50B (Made to Order)		50		6	22	25	26					
SSG0.5-60A (Made to Order) **SSG0.5-60B** (Made to Order)		60		6 8	28	30	31				M4 M5	
SSG0.5-70B (Made to Order)		70		8	28	35	36				M5	
SSG0.5-80A (Made to Order)		80		8	28	40	41				M4	
SSG0.8-20A (Made to Order) **SSG0.8-20B** (Made to Order)	***m*0.8**	20	S1T	5 6	13	16	17.6	8	8	16	M4	4
SSG0.8-25A (Made to Order)		25		6	16	20	21.6					
SSG0.8-30A (Made to Order)		30		5	20	24	25.6				M4	
SSG0.8-34A (Made to Order)		34		6	22	27.2	28.8				M4	
SSG0.8-40B (Made to Order)		40		8	28	32	33.6				M5	
SSG0.8-50A (Made to Order)		50		6	28	40	41.6				M4	
SSG0.8-60A (Made to Order) **SSG0.8-60B** (Made to Order)		60		6 8	28	48	49.6				M4 M5	
SSG0.8-70A (Made to Order)		70		6	28	56	57.6				M4	
SSG0.8-80A (Made to Order)		80		6	28	64	65.6				M4	

Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
Bending strength	Surface durability	Bending strength	Surface durability			
1.63	0.29	0.17	0.030	0~0.08	0.012 0.011	**SSG0.5-30A** (Made to Order) **SSG0.5-30B** (Made to Order)
1.78	0.34	0.18	0.035		0.014	**SSG0.5-32A** (Made to Order)
2.38	0.55	0.24	0.056		0.023	**SSG0.5-40B** (Made to Order)
3.14	0.89	0.32	0.091		0.037	**SSG0.5-50B** (Made to Order)
3.91	1.32	0.40	0.13		0.058 0.056	**SSG0.5-60A** (Made to Order) **SSG0.5-60B** (Made to Order)
3.90	1.53	0.40	0.16		0.066	**SSG0.5-70B** (Made to Order)
4.55	2.04	0.46	0.21		0.080	**SSG0.5-80A** (Made to Order)
3.79	0.53	0.39	0.054	0~0.08	0.018 0.017	**SSG0.8-20A** (Made to Order) **SSG0.8-20B** (Made to Order)
5.22	0.88	0.53	0.090		0.029	**SSG0.8-25A** (Made to Order)
6.70	1.30	0.68	0.13		0.045	**SSG0.8-30A** (Made to Order)
7.90	1.71	0.81	0.17		0.056	**SSG0.8-34A** (Made to Order)
8.11	2.02	0.83	0.21		0.082	**SSG0.8-40B** (Made to Order)
10.7	3.26	1.09	0.33		0.11	**SSG0.8-50A** (Made to Order)
13.3	4.83	1.36	0.49		0.15 0.14	**SSG0.8-60A** (Made to Order) **SSG0.8-60B** (Made to Order)
16.0	6.73	1.63	0.69		0.19	**SSG0.8-70A** (Made to Order)
18.7	8.97	1.90	0.91		0.24	**SSG0.8-80A** (Made to Order)

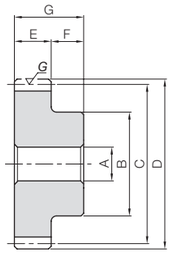
[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

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

Product Precautions → Page 50

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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).



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ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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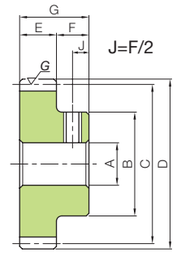

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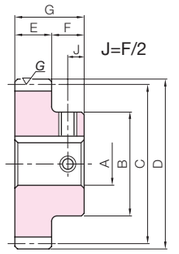

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Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSG1-15	15	S1	6	12	15	17	8	10	18	2.96	1.03	0.30	0.11	0.08~0.16	0.016
SSG1-16	16			13	16	18				3.28	1.19	0.33	0.12		0.019
SSG1-17	17			14	17	19				3.60	1.36	0.37	0.14		0.022
SSG1-18	18			15	18	20				3.93	1.54	0.40	0.16		0.026
SSG1-20	20			17	20	22				4.60	1.94	0.47	0.20		0.034
SSG1-21	21		8	18	21	23				4.94	2.14	0.50	0.22		0.035
SSG1-22	22			18	22	24				5.28	2.36	0.54	0.24		0.037
SSG1-23	23			20	23	25				5.63	2.59	0.57	0.26		0.044
SSG1-24	24			20	24	26				5.98	2.83	0.61	0.29		0.046
SSG1-25	25			20	25	27				6.33	3.07	0.65	0.31		0.048
SSG1-26	26			20	26	28				6.68	3.33	0.68	0.34		0.051
SSG1-27	27			20	27	29				7.04	3.60	0.72	0.37		0.054
SSG1-28	28			20	28	30				7.39	3.89	0.75	0.40		0.056
SSG1-29	29			25	29	31				7.75	4.18	0.79	0.43		0.073
SSG1-30	30			25	30	32				8.11	4.48	0.83	0.46		0.072
SSG1-32	32		10	25	32	34				7.37	4.27	0.75	0.43		0.078
SSG1-34	34			25	34	36				7.98	4.84	0.81	0.49		0.084
SSG1-35	35			25	35	37				8.28	5.14	0.84	0.52		0.088
SSG1-36	36			25	36	38				8.59	5.45	0.88	0.56		0.091
SSG1-38	38			30	38	40				9.21	6.10	0.94	0.62		0.12
SSG1-40	40			30	40	42				9.83	6.79	1.00	0.69		0.12
SSG1-45	45			30	45	47				11.4	8.67	1.16	0.88		0.14
SSG1-48	48			30	48	50				12.3	9.92	1.26	1.01		0.16
SSG1-50	50		12	35	50	52				13.0	10.8	1.32	1.10		0.18
SSG1-55	55			35	55	57				14.6	13.2	1.48	1.34		0.21
SSG1-56	56			35	56	58				14.9	13.7	1.52	1.40		0.21
SSG1-60	60			40	60	62				16.2	15.8	1.65	1.61		0.26
SSG1-70	70			40	70	72				19.4	21.8	1.97	2.22		0.32
SSG1-75	75			40	75	77				21.0	25.2	2.14	2.57		0.36
SSG1-80	80		15	50	80	82				22.6	28.8	2.30	2.94		0.44
SSG1-90	90			50	90	92				25.8	36.9	2.64	3.77		0.53
SSG1-100	100			50	100	102				26.9	42.5	2.74	4.34		0.62
SSG1-120	120			50	120	122				32.9	62.5	3.36	6.37		0.84

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

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

Bore H_7	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30
Keyway Js9															
Screw size	—		4×1.8		5×2.3				6×2.8				8×3.3		
Catalog Number	M4	M5	M4						M5				M6		
SSG1-15 J BORE															
SSG1-16 J BORE															
SSG1-17 J BORE															
SSG1-18 J BORE															
SSG1-20 J BORE															
SSG1-21 J BORE															
SSG1-22 J BORE															
SSG1-23 J BORE															
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SSG1-28 J BORE															
SSG1-29 J BORE															
SSG1-30 J BORE															
SSG1-32 J BORE															
SSG1-34 J BORE															
SSG1-35 J BORE															
SSG1-36 J BORE															
SSG1-38 J BORE															
SSG1-40 J BORE															
SSG1-45 J BORE															
SSG1-48 J BORE															
SSG1-50 J BORE															
SSG1-55 J BORE															
SSG1-56 J BORE															
SSG1-60 J BORE															
SSG1-70 J BORE															
SSG1-75 J BORE															
SSG1-80 J BORE															
SSG1-90 J BORE															
SSG1-100 J BORE															
SSG1-120 J 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.

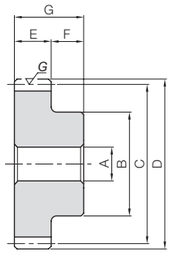
Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

SSG Module 1.5
Ground Spur Gears

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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).

J



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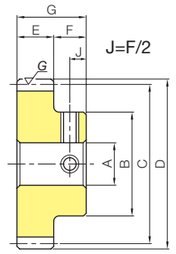
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSG1.5-15	15			18	22.5	25.5				12.5	4.35	1.27	0.44		0.057
SSG1.5-16	16			20	24	27				13.8	5.02	1.41	0.51		0.070
SSG1.5-18	18		10	22	27	30				16.6	6.51	1.69	0.66		0.091
SSG1.5-20	20			24	30	33				19.4	8.20	1.98	0.84		0.12
SSG1.5-21	21			25	31.5	34.5				20.8	9.12	2.12	0.93		0.13
SSG1.5-22	22			26	33	36				18.6	8.41	1.89	0.86		0.13
SSG1.5-23	23			27	34.5	37.5				19.8	9.27	2.02	0.95		0.15
SSG1.5-24	24		12	28	36	39				21.0	10.2	2.14	1.04		0.16
SSG1.5-25	25			30	37.5	40.5				22.2	11.1	2.27	1.13		0.18
SSG1.5-26	26			32	39	42				23.5	12.1	2.39	1.23		0.20
SSG1.5-27	27			34	40.5	43.5				24.7	13.1	2.52	1.33		0.21
SSG1.5-28	28			36	42	45				26.0	14.1	2.65	1.44		0.23
SSG1.5-30	30			38	45	48				28.5	16.3	2.91	1.66		0.27
SSG1.5-32	32			40	48	51				31.1	18.6	3.17	1.90		0.31
SSG1.5-34	34			42	51	54				33.6	21.1	3.43	2.15		0.35
SSG1.5-35	35		15	42	52.5	55.5				34.9	22.4	3.56	2.29		0.37
SSG1.5-36	36	S1		45	54	57	15	14	29	36.2	23.8	3.70	2.43	0.08~0.16	0.40
SSG1.5-38	38			45	57	60				38.8	26.6	3.96	2.71		0.44
SSG1.5-40	40			50	60	63				41.5	29.6	4.23	3.02		0.51
SSG1.5-42	42			50	63	66				44.1	32.8	4.50	3.35		0.54
SSG1.5-44	44			50	66	69				46.7	36.2	4.77	3.69		0.58
SSG1.5-45	45		18	50	67.5	70.5				48.1	37.9	4.90	3.86		0.58
SSG1.5-48	48			50	72	75				52.0	43.4	5.31	4.42		0.64
SSG1.5-50	50			60	75	78				54.7	47.2	5.58	4.82		0.77
SSG1.5-55	55			60	82.5	85.5				61.4	57.7	6.26	5.88		0.88
SSG1.5-56	56			60	84	87				62.8	59.9	6.40	6.11		0.91
SSG1.5-60	60			60	90	93				68.1	69.2	6.95	7.06		0.99
SSG1.5-64	64			60	96	99				67.9	73.2	6.92	7.46		1.09
SSG1.5-70	70			60	105	108				75.4	88.4	7.69	9.01		1.26
SSG1.5-75	75		20	60	112.5	115.5				81.7	102	8.33	10.4		1.41
SSG1.5-80	80			70	120	123				88.0	117	8.97	12.0		1.68
SSG1.5-90	90			70	135	138				101	150	10.3	15.3		2.04
SSG1.5-100	100			70	150	153				113	187	11.6	19.1		2.43

J Series



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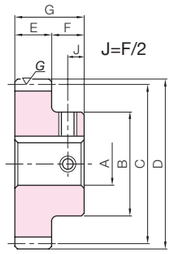

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To order J Series products, please specify: Catalog No. + J + BORE.

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

Bore H7	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40
Keyway Js9	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3
Screw size	M4						M5				M6			M8		
Catalog Number																
SSG1.5-15 J BORE																
SSG1.5-16 J BORE																
SSG1.5-18 J BORE																
SSG1.5-20 J BORE																
SSG1.5-21 J BORE																
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SSG1.5-100 J 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.

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

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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).

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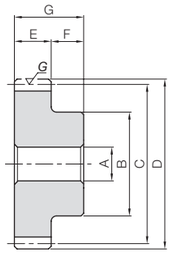

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ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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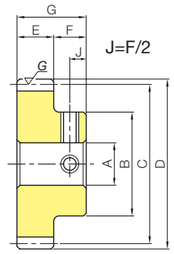

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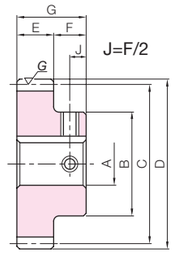

S1K

Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSG2-14	14	S1	12	22	28	32	20	16	36	26.3	9.01	2.69	0.92	0.10~0.20	0.11
SSG2-15	15			24	30	34				29.6	10.5	3.01	1.07		0.14
SSG2-16	16			26	32	36				27.3	10.1	2.78	1.03		0.16
SSG2-17	17			28	34	38				30.0	11.6	3.06	1.18		0.19
SSG2-18	18			30	36	40				32.7	13.1	3.34	1.34		0.22
SSG2-19	19		15	31	38	42				35.5	14.8	3.62	1.51		0.24
SSG2-20	20			32	40	44				38.3	16.6	3.91	1.69		0.25
SSG2-21	21			34	42	46				41.1	18.4	4.20	1.88		0.28
SSG2-22	22			36	44	48				44.0	20.4	4.49	2.08		0.32
SSG2-23	23			37	46	50				46.9	22.5	4.78	2.30		0.35
SSG2-24	24			38	48	52				49.8	24.7	5.08	2.52		0.38
SSG2-25	25			40	50	54				52.7	27.0	5.38	2.75		0.42
SSG2-26	26			42	52	56				55.7	29.3	5.68	2.99		0.46
SSG2-27	27			44	54	58				58.6	31.7	5.98	3.23		0.50
SSG2-28	28			45	56	60				61.6	34.2	6.28	3.49		0.54
SSG2-29	29		18	48	58	62				64.6	36.8	6.59	3.75		0.59
SSG2-30	30			50	60	64				67.6	39.5	6.89	4.03		0.62
SSG2-32	32			50	64	68				73.7	45.2	7.51	4.61		0.68
SSG2-34	34			50	68	72				79.8	51.3	8.13	5.23		0.74
SSG2-35	35			50	70	74				82.8	54.5	8.45	5.56		0.78
SSG2-36	36			50	72	76				85.9	57.8	8.76	5.90		0.81
SSG2-38	38			50	76	80				92.1	64.8	9.39	6.60		0.89
SSG2-40	40		20	60	80	84				98.3	72.1	10.0	7.35		1.06
SSG2-42	42			60	84	88				105	79.9	10.7	8.15		1.14
SSG2-44	44			60	88	92				111	88.1	11.3	8.98		1.22
SSG2-45	45			60	90	94				114	92.3	11.6	9.41		1.27
SSG2-48	48			60	96	100				114	97.6	11.6	9.95		1.40
SSG2-50	50		25	60	100	104				120	106	12.2	10.8		1.45
SSG2-55	55			60	110	114				134	130	13.7	13.3		1.71
SSG2-56	56			60	112	116				137	135	14.0	13.8		1.76
SSG2-60	60			65	120	124				149	156	15.2	15.9		2.05
SSG2-64	64			65	128	132				161	179	16.4	18.3		2.30
SSG2-70	70			70	140	144				179	216	18.2	22.0		2.76
SSG2-75	75			70	150	154				194	249	19.7	25.4		3.12
SSG2-80	80			80	160	164				194	265	19.8	27.0		3.65
SSG2-90	90			80	180	184				222	338	22.6	34.5		4.49
SSG2-100	100			80	200	204				250	421	25.4	43.0		5.42

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

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

Bore H7	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45
Keyway Js9	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8
Screw size	M4					M5				M6			M8			M10
Catalog Number																
SSG2-14 J BORE																
SSG2-15 J BORE																
SSG2-16 J BORE																
SSG2-17 J BORE																
SSG2-18 J BORE																
SSG2-19 J BORE																
SSG2-20 J BORE																
SSG2-21 J BORE																
SSG2-22 J BORE																
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SSG2-36 J BORE																
SSG2-38 J BORE																
SSG2-40 J BORE																
SSG2-42 J BORE																
SSG2-44 J BORE																
SSG2-45 J BORE																
SSG2-48 J BORE																
SSG2-50 J BORE																
SSG2-55 J BORE																
SSG2-56 J BORE																
SSG2-60 J BORE																
SSG2-64 J BORE																
SSG2-70 J BORE																
SSG2-75 J BORE																
SSG2-80 J BORE																
SSG2-90 J BORE																
SSG2-100 J BORE																

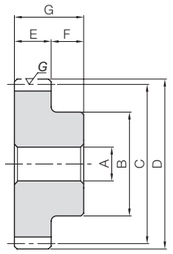
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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).

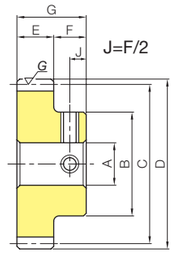
J



S1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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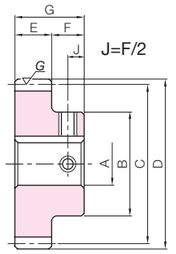


S1K

Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSG2.5-14	14			28	35	40				42.9	14.9	4.37	1.52		0.22
SSG2.5-15	15			30	37.5	42.5				48.1	17.4	4.91	1.77		0.26
SSG2.5-16	16		15	32	40	45				53.3	20.1	5.44	2.05		0.30
SSG2.5-17	17			35	42.5	47.5				58.6	23.0	5.97	2.34		0.35
SSG2.5-18	18			38	45	50				63.9	26.1	6.52	2.66		0.41
SSG2.5-19	19			39	47.5	52.5				69.4	29.4	7.07	3.00		0.46
SSG2.5-20	20			40	50	55				74.8	32.9	7.63	3.36		0.48
SSG2.5-21	21			42	52.5	57.5				80.4	36.7	8.20	3.74		0.53
SSG2.5-22	22		18	44	55	60				86.0	40.6	8.77	4.14		0.60
SSG2.5-23	23			46	57.5	62.5				91.6	44.8	9.34	4.57		0.66
SSG2.5-24	24			48	60	65				97.3	49.2	9.92	5.02		0.72
SSG2.5-25	25			50	62.5	67.5				103	53.8	10.5	5.48		0.77
SSG2.5-26	26			54	65	70				109	58.4	11.1	5.95		0.87
SSG2.5-27	27			56	67.5	72.5				115	63.2	11.7	6.44		0.94
SSG2.5-28	28			60	70	75				120	68.2	12.3	6.95		1.05
SSG2.5-30	30		20	65	75	80				132	78.7	13.5	8.03		1.23
SSG2.5-32	32	S1		70	80	85	25	18	43	144	90.1	14.7	9.19	0.10~0.20	1.42
SSG2.5-34	34			70	85	90				156	102	15.9	10.4		1.55
SSG2.5-35	35			70	87.5	92.5				162	109	16.5	11.1		1.62
SSG2.5-36	36			70	90	95				168	115	17.1	11.8		1.69
SSG2.5-38	38			70	95	100				180	129	18.3	13.2		1.83
SSG2.5-40	40		25	70	100	105				177	133	18.1	13.6		1.92
SSG2.5-42	42			75	105	110				188	147	19.2	15.0		2.16
SSG2.5-44	44			75	110	115				200	163	20.4	16.6		2.32
SSG2.5-45	45			75	112.5	117.5				205	170	20.9	17.4		2.41
SSG2.5-48	48			75	120	125				222	195	22.7	19.9		2.68
SSG2.5-50	50			80	125	130				234	213	23.8	21.7		2.95
SSG2.5-55	55			80	137.5	142.5				262	260	26.8	26.5		3.46
SSG2.5-56	56			80	140	145				268	270	27.3	27.5		3.57
SSG2.5-60	60			80	150	155				291	311	29.7	31.8		4.01
SSG2.5-70	70			80	175	180				324	399	33.1	40.7		5.26
SSG2.5-75	75			90	187.5	192.5				351	461	35.8	47.0		6.15
SSG2.5-80	80			90	200	205				378	527	38.6	53.7		6.90

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

Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	5×2.3			6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M4			M5				M6			M8			M10	
SSG2.5-14 J BORE															
SSG2.5-15 J BORE															
SSG2.5-16 J BORE															
SSG2.5-17 J BORE															
SSG2.5-18 J BORE															
SSG2.5-19 J BORE															
SSG2.5-20 J BORE															
SSG2.5-21 J BORE															
SSG2.5-22 J BORE															
SSG2.5-23 J BORE															
SSG2.5-24 J BORE															
SSG2.5-25 J BORE															
SSG2.5-26 J BORE															
SSG2.5-27 J BORE															
SSG2.5-28 J BORE															
SSG2.5-30 J BORE															
SSG2.5-32 J BORE															
SSG2.5-34 J BORE															
SSG2.5-35 J BORE															
SSG2.5-36 J BORE															
SSG2.5-38 J BORE															
SSG2.5-40 J BORE															
SSG2.5-42 J BORE															
SSG2.5-44 J BORE															
SSG2.5-45 J BORE															
SSG2.5-48 J BORE															
SSG2.5-50 J BORE															
SSG2.5-55 J BORE															
SSG2.5-56 J BORE															
SSG2.5-60 J BORE															
SSG2.5-70 J BORE															
SSG2.5-75 J BORE															
SSG2.5-80 J BORE															

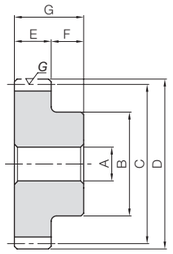
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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).

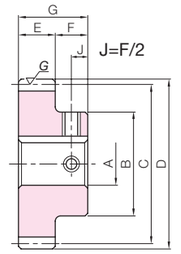
J



S1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



S1K

Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N-m) Bending strength	Allowable torque (N-m) Surface durability	Allowable torque (kgf-m) Bending strength	Allowable torque (kgf-m) Surface durability	Backlash (mm)	Weight (kg)
SSG3-14	14	S1	16	34	42	48	30	20	50	74.1	26.1	7.55	2.66	0.10~0.20	0.39
SSG3-15	15			36	45	51				83.1	30.5	8.48	3.11		0.46
SSG3-16	16			38	48	54				92.1	35.2	9.39	3.59		0.53
SSG3-17	17			37	51	57				101	40.3	10.3	4.11		0.57
SSG3-18	18			40	54	60				110	45.8	11.3	4.67		0.66
SSG3-19	19		20	45	57	63				120	51.6	12.2	5.26		0.77
SSG3-20	20			50	60	66				129	57.8	13.2	5.90		0.85
SSG3-21	21			52	63	69				139	64.4	14.2	6.57		0.94
SSG3-22	22			54	66	72				149	71.3	15.1	7.28		1.04
SSG3-24	24			58	72	78				168	86.4	17.1	8.81		1.25
SSG3-25	25			60	75	81				178	94.5	18.1	9.64		1.36
SSG3-26	26			62	78	84				188	103	19.2	10.5		1.48
SSG3-27	27			65	81	87				198	111	20.2	11.3		1.61
SSG3-28	28			70	84	90				208	120	21.2	12.2		1.79
SSG3-29	29			70	87	93				218	129	22.2	13.2		1.88
SSG3-30	30			75	90	96				228	138	23.3	14.1		2.00
SSG3-32	32			75	96	102				229	146	23.4	14.9		2.21
SSG3-34	34			75	102	108				248	166	25.3	17.0		2.43
SSG3-35	35			80	105	111				258	177	26.3	18.0		2.64
SSG3-36	36			80	108	114				268	188	27.3	19.1		2.75
SSG3-38	38		25	80	114	120				287	210	29.2	21.4		3.00
SSG3-40	40			80	120	126				306	234	31.2	23.9		3.26
SSG3-42	42			80	126	132				326	260	33.2	26.5		3.53
SSG3-44	44			80	132	138				345	286	35.2	29.2		3.82
SSG3-45	45			80	135	141				355	300	36.2	30.6		3.97
SSG3-48	48			85	144	150				384	343	39.2	35.0		4.53
SSG3-50	50			85	150	156				404	374	41.2	38.1		4.78
SSG3-55	55			90	165	171				421	423	42.9	43.2		5.76
SSG3-56	56			90	168	174				430	439	43.9	44.8		5.94
SSG3-60	60		30	100	180	186				467	508	47.6	51.8		6.95
SSG3-70	70			100	210	216				560	699	57.1	71.3		9.11
SSG3-75	75			100	225	231				607	806	61.9	82.2		10.3
SSG3-80	80			100	240	246				654	921	66.7	93.9		11.6

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

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

Bore H7	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Keyway Js9	5×2.3		6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Screw size	M4		M5				M6			M8			M10	
Catalog Number														
SSG3-14 J BORE														
SSG3-15 J BORE														
SSG3-16 J BORE														
SSG3-17 J BORE														
SSG3-18 J BORE														
SSG3-19 J BORE														
SSG3-20 J BORE														
SSG3-21 J BORE														
SSG3-22 J BORE														
SSG3-24 J BORE														
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SSG3-56 J BORE														
SSG3-60 J BORE														
SSG3-70 J BORE														
SSG3-75 J BORE														
SSG3-80 J 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.

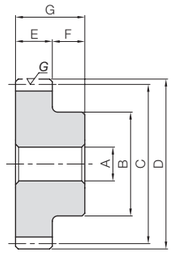
Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Ground Spur Gears

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 (excludes semi-custom products)

* 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).

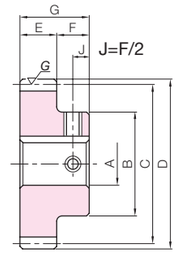
J S



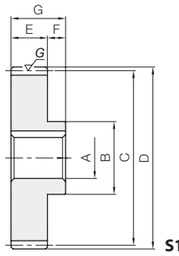
S1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



S1K



S1SK

Catalog Number		No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSG4-14		14	S1	20	40	56	64	40	25	65	176	63.4	17.9	6.47	0.10~0.20	0.86
SSG4-15		15			45	60	68				197	74.1	20.1	7.55		1.04
SSG4-16		16			50	64	72				218	85.6	22.3	8.73		1.24
SSG4-18		18			60	72	80				262	111	26.7	11.4		1.67
SSG4-20		20			65	80	88				307	141	31.3	14.3		2.07
SSG4-22		22			70	88	96				352	174	35.9	17.7		2.50
SSG4-24		24			75	96	104				368	194	37.5	19.8		2.98
SSG4-25		25			80	100	108				389	213	39.7	21.7		3.29
SSG4-28		28			85	112	120				455	270	46.4	27.5		4.05
SSG4-30		30			90	120	128				499	313	50.9	31.9		4.64
SSG4-32		32		25	90	128	136				544	358	55.5	36.5		5.04
SSG4-35		35			90	140	148				612	432	62.4	44.0		5.83
SSG4-36		36			90	144	152				634	458	64.7	46.7		6.11
SSG4-40		40			90	160	168				674	529	68.7	54.0		7.31
SSG4-42		42			90	168	176				717	586	73.1	59.7		7.96
SSG4-44		44		30	90	176	184				760	646	77.5	65.8		8.53
SSG4-45		45			90	180	188				781	677	79.6	69.0		8.88
SSG4-48		48			100	192	200				846	774	86.3	79.0		10.3
SSG4-50		50			100	200	208				889	842	90.7	85.9		11.0
SSG4-55		55			100	220	228				998	1030	102	105		13.1
SSG4-56		56			110	224	232				1020	1060	104	109		13.9
SSG4-60		60			110	240	248				1110	1230	113	125		15.7
SSG4-62S	S	62	S1	40	120	248	256	40	25	65	1240	1360	127	138	0.10~0.20	16.8
SSG4-64S	S	64			130	256	264				1290	1450	131	148		18.1
SSG4-65S	S	65			130	260	268				1310	1500	134	153		18.6
SSG4-66S	S	66			130	264	272				1340	1550	136	158		19.2
SSG4-68S	S	68			140	272	280				1380	1650	141	168		20.6
SSG4-70S	S	70			140	280	288				1430	1750	146	178		21.7
SSG4-80S	S	80			160	320	328				1550	2150	158	219		28.6
SSG4-90S	S	90			180	360	368				1770	2750	181	281		36.3
SSG4-100S	S	100			200	400	408				2000	3440	204	351		45.0
SSG4-110S	S	110			220	440	448				2220	4190	226	427		54.6
SSG4-120S	S	120			240	480	488				2450	5010	249	511		65.1

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

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	20	22	25	28	30	32	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110		
Screw size	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		25×5.4		28×6.4				
Catalog Number	M5		M6			M8			M10		M12			M16		—								
SSG4-14 J BORE																								
SSG4-15 J BORE																								
SSG4-16 J BORE																								
SSG4-18 J BORE																								
SSG4-20 J BORE																								
SSG4-22 J BORE																								
SSG4-24 J BORE																								
SSG4-25 J BORE																								
SSG4-28 J BORE																								
SSG4-30 J BORE																								
SSG4-32 J BORE																								
SSG4-35 J BORE																								
SSG4-36 J BORE																								
SSG4-40 J BORE																								
SSG4-42 J BORE																								
SSG4-44 J BORE																								
SSG4-45 J BORE																								
SSG4-48 J BORE																								
SSG4-50 J BORE																								
SSG4-55 J BORE																								
SSG4-56 J BORE																								
SSG4-60 J BORE																								
SSG4-62SJ BORE						Ask for Quote																		
SSG4-64SJ BORE						Ask for Quote																		
SSG4-65SJ BORE						Ask for Quote																		
SSG4-66SJ BORE						Ask for Quote																		
SSG4-68SJ BORE						Ask for Quote																		
SSG4-70SJ BORE						Ask for Quote																		
SSG4-80SJ BORE						Ask for Quote																		
SSG4-90SJ BORE						Ask for Quote																		
SSG4-100SJ BORE						Ask for Quote																		
SSG4-110SJ BORE						Ask for Quote																		
SSG4-120SJ BORE						Ask for Quote																		

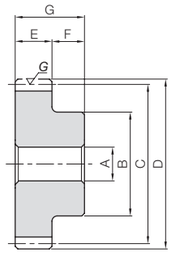
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 (excludes semi-custom products)

* 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).

J S



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ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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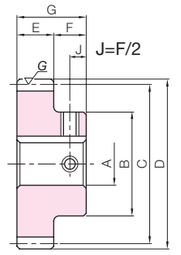
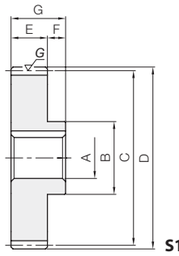


S1K



S1SK

Catalog Number		No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSG5-20		20	S1	25	82	100	110	50	25	75	553	259	56.4	26.5	0.10~0.22	3.83
SSG5-25		25			105	125	135				760	426	77.5	43.4		6.23
SSG5-30		30			120	150	160				975	623	99.4	63.5		8.87
SSG5-32S	S	32	S1	30	120	160	170	50	25	75	1150	735	117	74.9	0.10~0.22	9.70
SSG5-35S	S	35			130	175	185				1300	886	132	90.3		11.6
SSG5-36S	S	36			130	180	190				1340	939	137	95.8		12.1
SSG5-40S	S	40			140	200	210				1420	1080	145	110		14.9
SSG5-42S	S	42			140	210	220				1510	1200	154	122		16.2
SSG5-44S	S	44			150	220	230				1600	1320	163	135		18.0
SSG5-45S	S	45			150	225	235				1640	1380	168	141		18.7
SSG5-48S	S	48			150	240	250				1780	1580	182	161		20.8
SSG5-50S	S	50			150	250	260				1870	1720	191	176		22.3
SSG5-55S	S	55			150	275	285				2100	2110	214	215		26.4
SSG5-56S	S	56			150	280	290				2150	2190	219	223		27.2
SSG5-60S	S	60			150	300	310				2330	2530	238	258		30.8
SSG5-62S	S	62		40	160	310	320				2420	2710	247	276		32.8
SSG5-64S	S	64			160	320	330				2340	2690	238	274		34.8
SSG5-65S	S	65			160	325	335				2380	2780	243	283		35.8
SSG5-66S	S	66			170	330	340				2420	2870	247	292		37.3
SSG5-68S	S	68			170	340	350				2510	3050	256	311		39.4
SSG5-70S	S	70			180	350	360				2590	3250	265	331		42.0
SSG5-80S	S	80			200	400	410				3030	4300	309	438		54.8
SSG5-90S	S	90			230	450	460				3460	5480	353	559		69.8
SSG6-20		20	S1	25	100	120	132	60	28	88	955	457	97.4	46.6	0.10~0.22	6.71
SSG6-25		25		30	125	150	162				1310	747	134	76.2		10.5
SSG6-30		30		30	150	180	192				1560	1020	160	104		15.4
SSG6-32S	S	32	S1	30	150	192	204	60	28	88	1840	1190	187	121	0.10~0.22	17.0
SSG6-35S	S	35			160	210	222				2070	1440	211	146		20.2
SSG6-36S	S	36			160	216	228				2140	1520	218	155		21.2
SSG6-40S	S	40			170	240	252				2450	1900	250	194		25.8
SSG6-42S	S	42			170	252	264				2610	2100	266	215		27.6
SSG6-44S	S	44			170	264	276				2760	2320	282	237		29.9
SSG6-45S	S	45			180	270	282				2840	2430	290	248		31.7
SSG6-48S	S	48			180	288	300				3080	2780	314	284		35.4
SSG6-50S	S	50			180	300	312				3230	3030	330	309		38.0
SSG6-55S	S	55			180	330	342				3370	3440	344	351		45.0
SSG6-56S	S	56			180	336	348				3440	3570	351	364		46.5
SSG6-60S	S	60			180	360	372				3740	4130	381	421		52.7
SSG6-62S	S	62		40	190	372	384				3890	4430	397	451		56.6
SSG6-64S	S	64			190	384	396				4040	4730	412	483		59.9
SSG6-65S	S	65			200	390	402				4110	4890	419	499		62.3
SSG6-66S	S	66			200	396	408				4190	5050	427	515		64.1
SSG6-68S	S	68			200	408	420				4330	5380	442	548		67.6
SSG6-70S	S	70			210	420	432				4480	5710	457	582		72.0
SSG6-80S	S	80			240	480	492				5230	7520	534	766		94.3

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

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	25	28	30	32	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	120	130	140
Screw size	8×3.3			10×3.3		12×3.3	14×3.8		16×4.3	18×4.4		20×4.9		22×5.4				28×6.4			32×7.4		36×8.4
Catalog Number	M6			M8			M10		M12			M16				M20		—						
SSG5-20 J BORE																									
SSG5-25 J BORE																									
SSG5-30 J BORE																									
SSG5-32 SJ BORE			Ask for Quote																						
SSG5-35 SJ BORE			Ask for Quote																						
SSG5-36 SJ BORE			Ask for Quote																						
SSG5-40 SJ BORE			Ask for Quote																						
SSG5-42 SJ BORE			Ask for Quote																						
SSG5-44 SJ BORE			Ask for Quote																						
SSG5-45 SJ BORE			Ask for Quote																						
SSG5-48 SJ BORE			Ask for Quote																						
SSG5-50 SJ BORE			Ask for Quote																						
SSG5-55 SJ BORE			Ask for Quote																						
SSG5-56 SJ BORE			Ask for Quote																						
SSG5-60 SJ BORE			Ask for Quote																						
SSG5-62 SJ BORE						Ask for Quote																			
SSG5-64 SJ BORE						Ask for Quote																			
SSG5-65 SJ BORE						Ask for Quote																			
SSG5-66 SJ BORE						Ask for Quote																			
SSG5-68 SJ BORE						Ask for Quote																			
SSG5-70 SJ BORE						Ask for Quote																			
SSG5-80 SJ BORE						Ask for Quote																			
SSG5-90 SJ BORE						Ask for Quote																			
SSG6-20 J BORE																									
SSG6-25 J BORE																									
SSG6-30 J BORE																									
SSG6-32 SJ BORE			Ask for Quote																						
SSG6-35 SJ BORE			Ask for Quote																						
SSG6-36 SJ BORE			Ask for Quote																						
SSG6-40 SJ BORE			Ask for Quote																						
SSG6-42 SJ BORE						Ask for Quote																			
SSG6-44 SJ BORE						Ask for Quote																			
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SSG6-48 SJ BORE						Ask for Quote																			
SSG6-50 SJ BORE						Ask for Quote																			
SSG6-55 SJ BORE						Ask for Quote																			
SSG6-56 SJ BORE						Ask for Quote																			
SSG6-60 SJ BORE						Ask for Quote																			
SSG6-62 SJ BORE							Ask for Quote																		
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SSG6-66 SJ BORE							Ask for Quote																		
SSG6-68 SJ BORE							Ask for Quote																		
SSG6-70 SJ BORE							Ask for Quote																		
SSG6-80 SJ BORE							Ask for Quote																		

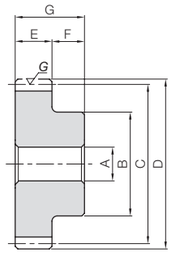
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Ground Spur Gears

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened**
Tooth hardness	50 to 60HRC
Surface treatment	—

* 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).



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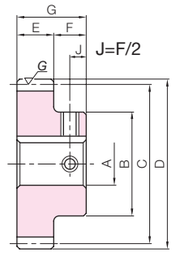
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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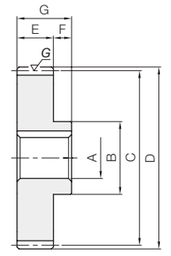


S1SK

Catalog Number		No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSG8-20S	S	20	S1	30	130	160	176	75	35	110	2300	1080	235	110	0.10~0.22	14.9
SSG8-25S	S	25			160	200	216				2920	1620	298	165		23.4
SSG8-30S	S	30			190	240	256				3750	2370	382	242		33.8
SSG8-32S	S	32		40	200	256	272				4080	2720	416	277		37.9
SSG8-35S	S	35			210	280	296				4590	3280	468	335		44.7
SSG8-36S	S	36			210	288	304				4760	3480	486	355		46.8
SSG8-40S	S	40			220	320	336				5060	4030	516	411		56.7
SSG8-42S	S	42			230	336	352				5380	4470	548	456		62.5
SSG8-44S	S	44			230	352	368				5700	4930	581	502		67.6
SSG8-45S	S	45			230	360	376				5860	5170	598	527		70.3
SSG8-48S	S	48			240	384	400				6350	5920	647	603		79.5
SSG8-50S	S	50			240	400	416				6670	6450	680	657		85.3
SSG8-55S	S	55			240	440	456				7490	7850	764	801		101
SSG8-56S	S	56			240	448	464				7650	8150	780	831		104
SSG8-60S	S	60			240	480	496				8310	9390	848	958		118
SSG10-20S	S	20	S1	40	160	200	220	90	40	130	3980	1920	406	196	0.10~0.22	27.2
SSG10-25S	S	25			200	250	270				5480	3100	559	317		43.3
SSG10-30S	S	30			240	300	320				7030	4550	717	464		62.1
SSG10-32S	S	32		50	250	320	340				7110	4840	725	493		70.2
SSG10-35S	S	35			260	350	370				7990	5840	815	596		82.6
SSG10-36S	S	36			270	360	380				8290	6200	845	632		87.9
SSG10-40S	S	40			280	400	420				9480	7740	967	789		106

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

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	30	32	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	120	130	140	150	160	170	180
Screw size	8×3.3	10×3.3		12×3.3	14×3.8		16×4.3	18×4.4		20×4.9		22×5.4		25×5.4		28×6.4			32×7.4		36×8.4		40×9.4		45×10.4
Catalog Number	M6	M8			M10		M12			M16				M20					—					
SSG8-20 SJ BORE	Ask for Quote																							
SSG8-25 SJ BORE	Ask for Quote																							
SSG8-30 SJ BORE	Ask for Quote																							
SSG8-32 SJ BORE				Ask for Quote																				
SSG8-35 SJ BORE				Ask for Quote																				
SSG8-36 SJ BORE				Ask for Quote																				
SSG8-40SJ BORE				Ask for Quote																				
SSG8-42 SJ BORE				Ask for Quote																				
SSG8-44 SJ BORE				Ask for Quote																				
SSG8-45 SJ BORE				Ask for Quote																				
SSG8-48 SJ BORE				Ask for Quote																				
SSG8-50 SJ BORE				Ask for Quote																				
SSG8-55 SJ BORE				Ask for Quote																				
SSG8-56 SJ BORE				Ask for Quote																				
SSG8-60 SJ BORE				Ask for Quote																				
SSG10-20 SJ BORE				Ask for Quote																				
SSG10-25 SJ BORE				Ask for Quote																				
SSG10-30 SJ BORE					Ask for Quote																			
SSG10-32 SJ BORE					Ask for Quote																			
SSG10-35 SJ BORE					Ask for Quote																			
SSG10-36 SJ BORE					Ask for Quote																			
SSG10-40 SJ BORE					Ask for Quote																			

[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 50
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 and portions given secondary operation

* The precision grade of F Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

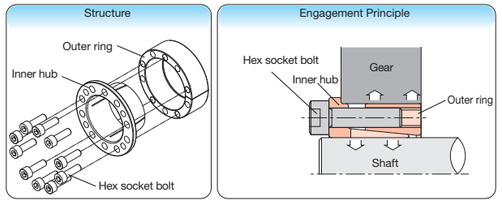
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Features of F Series

- No rattling of shaft and gear when fastening
- Freely positionable mounting for easy meshing of teeth
- Easily mounted and removed for repeated use
- The bushing slips when overloaded to reduce damage to the gears.

■ Structure and Engagement Principles

The structure consists of an outer ring and inner ring with split grooves in the tapered part, and hexagon socket head cap screws that convert the force into tightening strength.
In principle, the tightening strength of hexagon socket head cap screws spreads the outer and inner rings by taper engagement, and the gear and shaft become fastened by surface pressure.



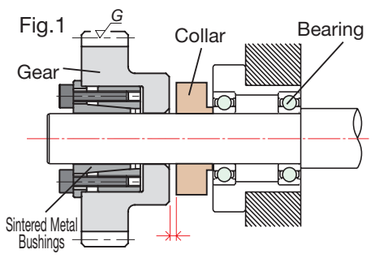
Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Allowable torque (N·m) Bending strength	Surface durability
SSG2-25	25	40	50	54	20	16	52.7	27.0
SSG2-26	26	42	52	56			55.7	29.3
SSG2-27	27	44	54	58			58.6	31.7
SSG2-28	28	45	56	60			61.6	34.2
SSG2-29	29	48	58	62			64.6	36.8
SSG2-30	30	50	60	64			67.6	39.5
SSG2-32	32	50	64	68			73.7	45.2
SSG2-34	34	50	68	72			79.8	51.3
SSG2-35	35	50	70	74			82.8	54.5
SSG2-36	36	50	72	76			85.9	57.8
SSG2-38	38	50	76	80			92.1	64.8
SSG2-40	40	60	80	84			98.3	72.1
SSG2-42	42	60	84	88			105	79.9
SSG2-44	44	60	88	92			111	88.1
SSG2-45	45	60	90	94			114	92.3
SSG2-48	48	60	96	100			114	97.6
SSG2-50	50	60	100	104			120	106
SSG2-55	55	60	110	114			134	130
SSG2-56	56	60	112	116			137	135
SSG2-60	60	65	120	124			149	156
SSG2-64	64	65	128	132			161	179
SSG2-70	70	70	140	144			179	216
SSG2-75	75	70	150	154			194	249
SSG2-80	80	80	160	164			194	265
SSG2-90	90	80	180	184			222	338
SSG2-100	100	80	200	204			250	421

* For the backlash of each product, please refer to the dimension table of the original product.

■ Mounting Method and Precautions

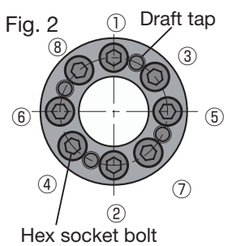
① Shaft diameter recommended tolerance is h7. The limit is h8, but we recommend h6 when minimizing runout.
Use 1.6a as reference for the surface roughness of the shaft diameter.
② Wipe away any debris, dirt or oil on the shaft surface and hole of the fastened section with thinner or the like, and lightly apply hydraulic oil #68. Do not apply molybdenum-based oil or oil with additives, as this may cause reduced fastening torque or slippage.
③ Pass completely through the shaft while pressing the bushing flange against the gear before tightening. Removal will not be possible, so be sure to leave a clearance of 1mm or more on the gear rear surface side. (Fig.1)
④ Use a torque wrench to fasten bolts on opposite sides when tightening.
First tighten at 1/4 of the regulated torque, then at 1/2 of the regulated torque, before finally tightening up to the regulated torque. Do not tighten without passing through the shaft, or fasten the bolts after insertion on the draft tap side. (Fig.2)
⑤ If the shaft has a keyway, the fastened section contact area is reduced and the transmission rate is decreased by 15 to 20%.

Fig.1



Clearance (Assembly conditions require clearance of 1 mm or more)

Fig. 2



■ Removal Method and Precautions

① Turn off the power source (supply), check that no load is applied to the gear, and confirm that there is no danger due to falling, etc.
② Insert removed bolts into all draft taps, and gradually and evenly tighten each bolt in diagonal order until removal is complete.
③ The washer and thread surfaces will be roughened, compromising tightening strength, if the bolts are reused. Consequently, we recommend using new bolts of the same size.

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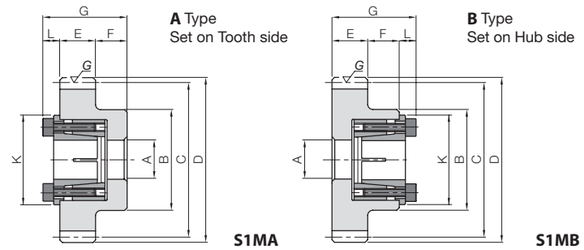
F Series



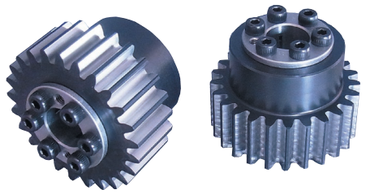
To order F Series products, please specify: **Catalog Number + F + BORE + Type.**

A Type Only
A/B Types

Bore A / Catalog Number	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
SSG2-25 F Bore Type															
SSG2-26 F Bore Type															
SSG2-27 F Bore Type															
SSG2-28 F Bore Type															
SSG2-29 F Bore Type															
SSG2-30 F Bore Type															
SSG2-32 F Bore Type															
SSG2-34 F Bore Type															
SSG2-35 F Bore Type															
SSG2-36 F Bore Type															
SSG2-38 F Bore Type															
SSG2-40 F Bore Type															
SSG2-42 F Bore Type															
SSG2-44 F Bore Type															
SSG2-45 F Bore Type															
SSG2-48 F Bore Type															
SSG2-50 F Bore Type															
SSG2-55 F Bore Type															
SSG2-56 F Bore Type															
SSG2-60 F Bore Type															
SSG2-64 F Bore Type															
SSG2-70 F Bore Type															
SSG2-75 F Bore Type															
SSG2-80 F Bore Type															
SSG2-90 F Bore Type															
SSG2-100 F Bore Type															
Bore A	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Ref. slipping torque N·m	70	75	110	115	120	220	290	350	380	410	440	720	810	1200	1500
Ref. thrust load kN	9.46	9.46	12.6	12.6	12.6	21.6	26	27.2	27	27	27	41.1	40.2	52.9	56.3
Sintered Metal Bushings L			6.5				8			8.5			10		10.5
Sintered Metal Bushings K	31.5	33	33.5	34.5	35.5	42	44	47	50	52	54	62	67	72	77
Total Length G			42.5				44			44.5			46		46.5
Hex socket bolt Qty		6				8				10		8	10		14
Hex socket bolt Size			M4×15				M5×18						M6×20		
Hex socket bolt Tightening torque N·m			3.9				8.8						15.7		
Bushing weight (g)	66	75	75	80	81	144	165	188	195	208	219	325	380	435	485

Ground Spur Gears

F Series



Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 and portions given secondary operation

* The precision grade of F Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

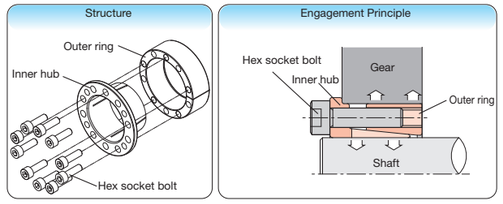
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Features of F Series

- No rattling of shaft and gear when fastening
- Freely positionable mounting for easy meshing of teeth
- Easily mounted and removed for repeated use
- The bushing slips when overloaded to reduce damage to the gears.

■ Structure and Engagement Principles

The structure consists of an outer ring and inner ring with split grooves in the tapered part, and hexagon socket head cap screws that convert the force into tightening strength.
In principle, the tightening strength of hexagon socket head cap screws spreads the outer and inner rings by taper engagement, and the gear and shaft become fastened by surface pressure.



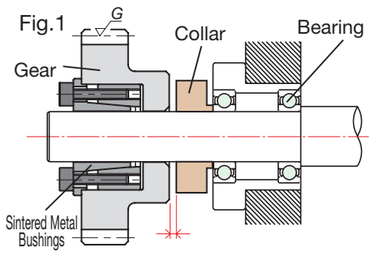
Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Allowable torque (N·m) Bending strength	Surface durability
SSG2.5-30	30	65	75	80	25	18	132	78.7
SSG2.5-32	32	70	80	85			144	90.1
SSG2.5-34	34	70	85	90			156	102
SSG2.5-35	35	70	87.5	92.5			162	109
SSG2.5-36	36	70	90	95			168	115
SSG2.5-38	38	70	95	100			180	129
SSG2.5-40	40	70	100	105			177	133
SSG2.5-42	42	75	105	110			188	147
SSG2.5-44	44	75	110	115			200	163
SSG2.5-45	45	75	112.5	117.5			205	170
SSG2.5-48	48	75	120	125			222	195
SSG2.5-50	50	80	125	130			234	213
SSG2.5-55	55	80	137.5	142.5			262	260
SSG2.5-56	56	80	140	145			268	270
SSG2.5-60	60	80	150	155			291	311
SSG2.5-70	70	80	175	180			324	399
SSG2.5-75	75	90	187.5	192.5			351	461
SSG2.5-80	80	90	200	205			378	527

* For the backlash of each product, please refer to the dimension table of the original product.

■ Mounting Method and Precautions

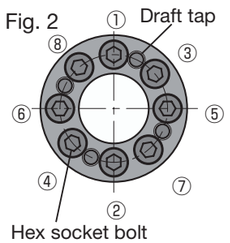
① Shaft diameter recommended tolerance is h7. The limit is h8, but we recommend h6 when minimizing runout.
Use 1.6a as reference for the surface roughness of the shaft diameter.
② Wipe away any debris, dirt or oil on the shaft surface and hole of the fastened section with thinner or the like, and lightly apply hydraulic oil #68. Do not apply molybdenum-based oil or oil with additives, as this may cause reduced fastening torque or slippage.
③ Pass completely through the shaft while pressing the bushing flange against the gear before tightening. Removal will not be possible, so be sure to leave a clearance of 1mm or more on the gear rear surface side. (Fig.1)
④ Use a torque wrench to fasten bolts on opposite sides when tightening.
First tighten at 1/4 of the regulated torque, then at 1/2 of the regulated torque, before finally tightening up to the regulated torque. Do not tighten without passing through the shaft, or fasten the bolts after insertion on the draft tap side. (Fig.2)
⑤ If the shaft has a keyway, the fastened section contact area is reduced and the transmission rate is decreased by 15 to 20%.

Fig.1



Clearance (Assembly conditions require clearance of 1 mm or more)

Fig. 2



■ Removal Method and Precautions

① Turn off the power source (supply), check that no load is applied to the gear, and confirm that there is no danger due to falling, etc.
② Insert removed bolts into all draft taps, and gradually and evenly tighten each bolt in diagonal order until removal is complete.
③ The washer and thread surfaces will be roughened, compromising tightening strength, if the bolts are reused. Consequently, we recommend using new bolts of the same size.

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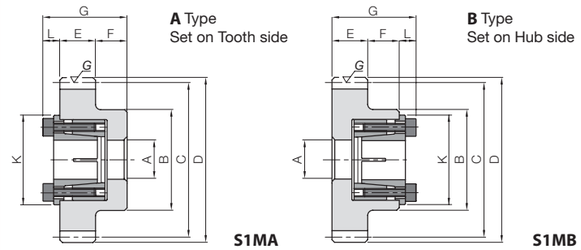
F Series



To order F Series products, please specify: **Catalog Number + F + BORE + Type.**

A Type Only
A/B Types

Bore A	* The product shapes of F Series items are identified by background color.									
Catalog Number	20	22	25	28	30	32	35	40	45	50
SSG2.5-30 F Bore Type										
SSG2.5-32 F Bore Type										
SSG2.5-34 F Bore Type										
SSG2.5-35 F Bore Type										
SSG2.5-36 F Bore Type										
SSG2.5-38 F Bore Type										
SSG2.5-40 F Bore Type										
SSG2.5-42 F Bore Type										
SSG2.5-44 F Bore Type										
SSG2.5-45 F Bore Type										
SSG2.5-48 F Bore Type										
SSG2.5-50 F Bore Type										
SSG2.5-55 F Bore Type										
SSG2.5-56 F Bore Type										
SSG2.5-60 F Bore Type										
SSG2.5-70 F Bore Type										
SSG2.5-75 F Bore Type										
SSG2.5-80 F Bore Type										
Bore A	20	22	25	28	30	32	35	40	45	50
Ref. slipping torque N·m	220	290	350	380	410	440	720	810	1200	1500
Ref. thrust load kN	21.6	26	27.2	27	27	27	41.1	40.2	52.9	56.3
Sintered Metal Bushings L		8			8.5			10		10.5
Sintered Metal Bushings K	42	44	47	50	52	54	62	67	72	77
Total Length G		51			51.5			53		53.5
Hex socket bolt Qty		8			10		8	10		14
Hex socket bolt Size		M5×18						M6×20		
Hex socket bolt Tightening torque N·m		8.8						15.7		
Bushing weight (g)	144	165	188	195	208	219	325	380	435	485

For updated data, please see the KHK Website.

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 and portions given secondary operation

* The precision grade of F Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

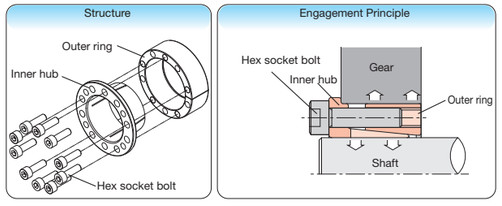
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Features of F Series

- No rattling of shaft and gear when fastening
- Freely positionable mounting for easy meshing of teeth
- Easily mounted and removed for repeated use
- The bushing slips when overloaded to reduce damage to the gears.

■ Structure and Engagement Principles

The structure consists of an outer ring and inner ring with split grooves in the tapered part, and hexagon socket head cap screws that convert the force into tightening strength.
In principle, the tightening strength of hexagon socket head cap screws spreads the outer and inner rings by taper engagement, and the gear and shaft become fastened by surface pressure.



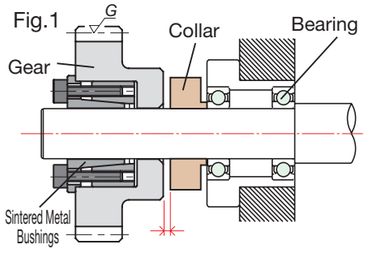
Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Allowable torque (N·m) Bending strength	Surface durability
SSG3-25	25	60	75	81			178	94.5
SSG3-26	26	62	78	84			188	103
SSG3-27	27	65	81	87			198	111
SSG3-28	28	70	84	90			208	120
SSG3-29	29	70	87	93			218	129
SSG3-30	30	75	90	96			228	138
SSG3-32	32	75	96	102			229	146
SSG3-34	34	75	102	108			248	166
SSG3-35	35	80	105	111			258	177
SSG3-36	36	80	108	114			268	188
SSG3-38	38	80	114	120			287	210
SSG3-40	40	80	120	126	30	20	306	234
SSG3-42	42	80	126	132			326	260
SSG3-44	44	80	132	138			345	286
SSG3-45	45	80	135	141			355	300
SSG3-48	48	85	144	150			384	343
SSG3-50	50	85	150	156			404	374
SSG3-55	55	90	165	171			421	423
SSG3-56	56	90	168	174			430	439
SSG3-60	60	100	180	186			467	508
SSG3-70	70	100	210	216			560	699
SSG3-75	75	100	225	231			607	806
SSG3-80	80	100	240	246			654	921

* For the backlash of each product, please refer to the dimension table of the original product.

■ Mounting Method and Precautions

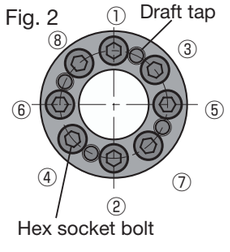
① Shaft diameter recommended tolerance is h7. The limit is h8, but we recommend h6 when minimizing runout.
Use 1.6a as reference for the surface roughness of the shaft diameter.
② Wipe away any debris, dirt or oil on the shaft surface and hole of the fastened section with thinner or the like, and lightly apply hydraulic oil #68. Do not apply molybdenum-based oil or oil with additives, as this may cause reduced fastening torque or slippage.
③ Pass completely through the shaft while pressing the bushing flange against the gear before tightening. Removal will not be possible, so be sure to leave a clearance of 1mm or more on the gear rear surface side. (Fig.1)
④ Use a torque wrench to fasten bolts on opposite sides when tightening.
First tighten at 1/4 of the regulated torque, then at 1/2 of the regulated torque, before finally tightening up to the regulated torque. Do not tighten without passing through the shaft, or fasten the bolts after insertion on the draft tap side. (Fig.2)
⑤ If the shaft has a keyway, the fastened section contact area is reduced and the transmission rate is decreased by 15 to 20%.

Fig.1



Clearance (Assembly conditions require clearance of 1 mm or more)

Fig. 2



■ Removal Method and Precautions

① Turn off the power source (supply), check that no load is applied to the gear, and confirm that there is no danger due to falling, etc.
② Insert removed bolts into all draft taps, and gradually and evenly tighten each bolt in diagonal order until removal is complete.
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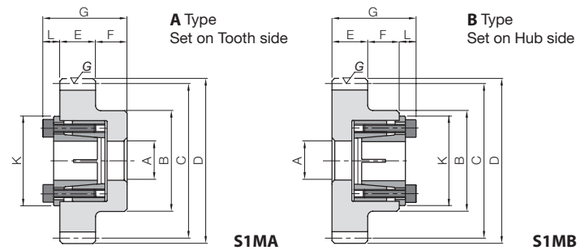
F Series



To order F Series products, please specify: **Catalog Number + F + BORE + Type.**

A Type Only
A/B Types

Bore A / Catalog Number	20	22	25	28	30	32	35	40	45	50
	* The product shapes of F Series items are identified by background color.									
SSG3-25 F Bore Type										
SSG3-26 F Bore Type										
SSG3-27 F Bore Type										
SSG3-28 F Bore Type										
SSG3-29 F Bore Type										
SSG3-30 F Bore Type										
SSG3-32 F Bore Type										
SSG3-34 F Bore Type										
SSG3-35 F Bore Type										
SSG3-36 F Bore Type										
SSG3-38 F Bore Type										
SSG3-40 F Bore Type										
SSG3-42 F Bore Type										
SSG3-44 F Bore Type										
SSG3-45 F Bore Type										
SSG3-48 F Bore Type										
SSG3-50 F Bore Type										
SSG3-55 F Bore Type										
SSG3-56 F Bore Type										
SSG3-60 F Bore Type										
SSG3-70 F Bore Type										
SSG3-75 F Bore Type										
SSG3-80 F Bore Type										
Bore A	20	22	25	28	30	32	35	40	45	50
Ref. slipping torque N·m	220	290	350	380	410	440	720	810	1200	1500
Ref. thrust load kN	21.6	26	27.2	27	27	27	41.1	40.2	52.9	56.3
Sintered Metal Bushings L		8			8.5			10		10.5
Sintered Metal Bushings K	42	44	47	50	52	54	62	67	72	77
Total Length G		58			58.5			60		60.5
Hex socket bolt Qty		8			10		8	10		14
Hex socket bolt Size	M5×18						M6×20			
Hex socket bolt Tightening torque N·m	8.8						15.7			
Bushing weight (g)	144	165	188	195	208	219	325	380	435	485

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 and portions given secondary operation

* The precision grade of E Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

E

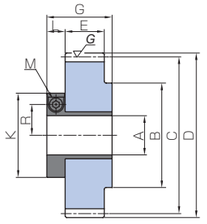
KHK E Series

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

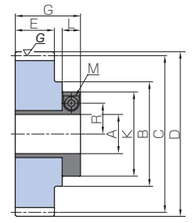
Delivered with this marking.

Please see Page 16 for more details.

E Series



S1EA



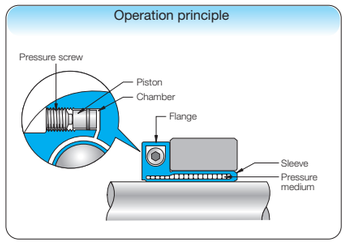
S1EB

■ Features of E Series

- Can be easily installed with one bolt (shortens work time)
- Concentricity 0. 02mm
- Zero backlash between the gear and shaft
- No decrease in shaft strength due to fretting wear (worn or seized shaft)
- No need to machine keyways on the shaft, reducing the number of parts such as keyway materials and set screws
- Does not take up mounting space and easy to position and match the phase
- Finished by the manufacturer in 2 working days (excluding the day ordered)
  For products with a pitch of module 4 or higher, manufacture is completed in 7 working days (excluding the day ordered)

■ Operation principle of ETP-E Plus

The pressure medium enclosed in the chamber is pressurized due to the tightening of the pressure screw and moves into the sleeve. The pressure of this pressure medium causes the sleeve to receive pressure from the inside, which causes the shaft side sleeve to contract, the hub side sleeve to expand, allowing the shaft and hub to be fastened via the sleeve.



Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m) Bending strength	Surface durability
SSG1.5-22	22	26	33	36	15	18.6	8.41
SSG1.5-23	23	27	34.5	37.5		19.8	9.27
SSG1.5-24	24	28	36	39		21.0	10.2
SSG1.5-25	25	30	37.5	40.5		22.2	11.1
SSG1.5-26	26	32	39	42		23.5	12.1
SSG1.5-27	27	34	40.5	43.5		24.7	13.1
SSG1.5-28	28	36	42	45		26.0	14.1
SSG1.5-30	30	38	45	48		28.5	16.3
SSG1.5-32	32	40	48	51		31.1	18.6
SSG1.5-34	34	42	51	54		33.6	21.1
SSG1.5-35	35	42	52.5	55.5		34.9	22.4
SSG1.5-36	36	45	54	57		36.2	23.8
SSG1.5-38	38	45	57	60		38.8	26.6
SSG1.5-40	40	50	60	63		41.5	29.6
SSG1.5-42	42	50	63	66		44.1	32.8
SSG1.5-44	44	50	66	69		46.7	36.2
SSG1.5-45	45	50	67.5	70.5		48.1	37.9
SSG1.5-48	48	50	72	75		52.0	43.4
SSG1.5-50	50	60	75	78		54.7	47.2
SSG1.5-55	55	60	82.5	85.5		61.4	57.7
SSG1.5-56	56	60	84	87		62.8	59.9
SSG1.5-60	60	60	90	93		68.1	69.2
SSG1.5-64	64	60	96	99		67.9	73.2
SSG1.5-70	70	60	105	108		75.4	88.4
SSG1.5-75	75	60	112.5	115.5		81.7	102
SSG1.5-80	80	70	120	123		88.0	117
SSG1.5-90	90	70	135	138		101	150
SSG1.5-100	100	70	150	153		113	187

* For the backlash of each product, please refer to the dimension table of the original product.

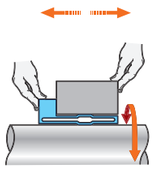
To order E Series products, please specify: Catalog Number + E + BORE.

Bore A / Catalog Number	* The product shapes of E Series items are identified by background color. 15	19	20	22
SSG1.5-22 E Bore				
SSG1.5-23 E Bore				
SSG1.5-24 E Bore				
SSG1.5-25 E Bore				
SSG1.5-26 E Bore				
SSG1.5-27 E Bore				
SSG1.5-28 E Bore				
SSG1.5-30 E Bore				
SSG1.5-32 E Bore				
SSG1.5-34 E Bore				
SSG1.5-35 E Bore				
SSG1.5-36 E Bore				
SSG1.5-38 E Bore				
SSG1.5-40 E Bore				
SSG1.5-42 E Bore				
SSG1.5-44 E Bore				
SSG1.5-45 E Bore				
SSG1.5-48 E Bore				
SSG1.5-50 E Bore				
SSG1.5-55 E Bore				
SSG1.5-56 E Bore				
SSG1.5-60 E Bore				
SSG1.5-64 E Bore				
SSG1.5-70 E Bore				
SSG1.5-75 E Bore				
SSG1.5-80 E Bore				
SSG1.5-90 E Bore				
SSG1.5-100 E Bore				
Bore A	15	19	20	22
K	50	55	56	61
G	37	39	41	43
R	15.1	17.4	18	19.3
L	14			
Screw M	1-M10			
Recommended fastening torque of screw M (N·m)	7			
ETP allowable fastening torque (N·m)	46	85	110	130
ETP allowable thrust force N	5100	7300	9100	9600
ETP allowable radial load N	500	1000	1000	1200
Bushing weight (kg)	0.16	0.2	0.21	0.25

* Allowable torque is the value when the thrust force is 0, and allowable thrust force is when the torque is 0.
* Allowable torque and allowable thrust force are the values at 20°C.
* Tolerance of the target shaft diameter is h7 (g6, h6).

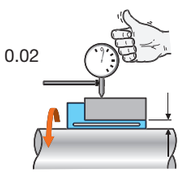
■ Effects of ETP-E Plus

Easy and accurate positioning

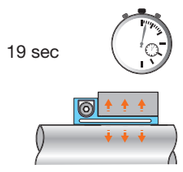


Helps save space

High concentricity



Secure and speedy installation



Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 and portions given secondary operation

* The precision grade of E Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

E

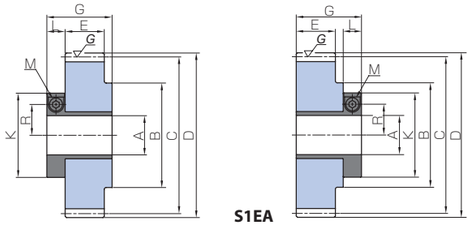
KHK E Series

Delivered with this marking.

Please see Page 16 for more details.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

E Series



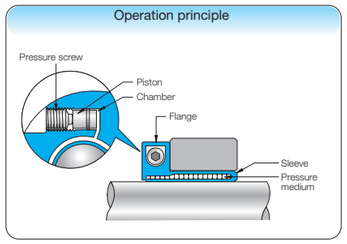
S1EA S1EB

■ Features of E Series

- Can be easily installed with one bolt (shortens work time)
- Concentricity 0. 02mm
- Zero backlash between the gear and shaft
- No decrease in shaft strength due to fretting wear (worn or seized shaft)
- No need to machine keyways on the shaft, reducing the number of parts such as keyway materials and set screws
- Does not take up mounting space and easy to position and match the phase
- Finished by the manufacturer in 2 working days (excluding the day ordered)
  For products with a pitch of module 4 or higher, manufacture is completed in 7 working days (excluding the day ordered)

■ Operation principle of ETP-E Plus

The pressure medium enclosed in the chamber is pressurized due to the tightening of the pressure screw and moves into the sleeve. The pressure of this pressure medium causes the sleeve to receive pressure from the inside, which causes the shaft side sleeve to contract, the hub side sleeve to expand, allowing the shaft and hub to be fastened via the sleeve.

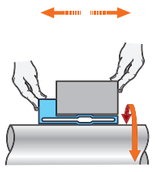


Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m) Bending strength	Surface durability
SSG2-18	18	30	36	40		32.7	13.1
SSG2-19	19	31	38	42		35.5	14.8
SSG2-20	20	32	40	44		38.3	16.6
SSG2-21	21	34	42	46		41.1	18.4
SSG2-22	22	36	44	48		44.0	20.4
SSG2-23	23	37	46	50		46.9	22.5
SSG2-24	24	38	48	52		49.8	24.7
SSG2-25	25	40	50	54		52.7	27.0
SSG2-26	26	42	52	56		55.7	29.3
SSG2-27	27	44	54	58		58.6	31.7
SSG2-28	28	45	56	60		61.6	34.2
SSG2-29	29	48	58	62		64.6	36.8
SSG2-30	30	50	60	64		67.6	39.5
SSG2-32	32	50	64	68		73.7	45.2
SSG2-34	34	50	68	72		79.8	51.3
SSG2-35	35	50	70	74		82.8	54.5
SSG2-36	36	50	72	76	20	85.9	57.8
SSG2-38	38	50	76	80		92.1	64.8
SSG2-40	40	60	80	84		98.3	72.1
SSG2-42	42	60	84	88		105	79.9
SSG2-44	44	60	88	92		111	88.1
SSG2-45	45	60	90	94		114	92.3
SSG2-48	48	60	96	100		114	97.6
SSG2-50	50	60	100	104		120	106
SSG2-55	55	60	110	114		134	130
SSG2-56	56	60	112	116		137	135
SSG2-60	60	65	120	124		149	156
SSG2-64	64	65	128	132		161	179
SSG2-70	70	70	140	144		179	216
SSG2-75	75	70	150	154		194	249
SSG2-80	80	80	160	164		194	265
SSG2-90	90	80	180	184		222	338
SSG2-100	100	80	200	204		250	421

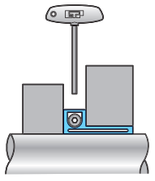
* For the backlash of each product, please refer to the dimension table of the original product.

■ Effects of ETP-E Plus

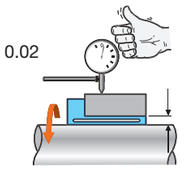
Easy and accurate positioning



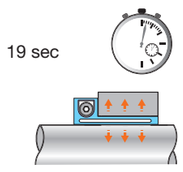
Helps save space



High concentricity



Secure and speedy installation



Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

To order E Series products, please specify: Catalog Number + E + BORE.

Bore A / Catalog Number	* The product shapes of E Series items are identified by background color. 15	19	20	22	24	25	28	30
SSG2-18 E BORE	■							
SSG2-19 E BORE	■							
SSG2-20 E BORE	■							
SSG2-21 E BORE	■	■						
SSG2-22 E BORE	■	■	■					
SSG2-23 E BORE	■	■	■					
SSG2-24 E BORE	■	■	■	■				
SSG2-25 E BORE	■	■	■	■	■			
SSG2-26 E BORE	■	■	■	■	■	■		
SSG2-27 E BORE	■	■	■	■	■	■		
SSG2-28 E BORE	■	■	■	■	■	■	■	
SSG2-29 E BORE	■	■	■	■	■	■	■	
SSG2-30 E BORE	■	■	■	■	■	■	■	■
SSG2-32 E BORE	■	■	■	■	■	■	■	■
SSG2-34 E BORE	■	■	■	■	■	■	■	■
SSG2-35 E BORE	■	■	■	■	■	■	■	■
SSG2-36 E BORE	■	■	■	■	■	■	■	■
SSG2-38 E BORE	■	■	■	■	■	■	■	■
SSG2-40 E BORE		■	■	■	■	■	■	■
SSG2-42 E BORE		■	■	■	■	■	■	■
SSG2-44 E BORE		■	■	■	■	■	■	■
SSG2-45 E BORE		■	■	■	■	■	■	■
SSG2-48 E BORE		■	■	■	■	■	■	■
SSG2-50 E BORE				■	■	■	■	■
SSG2-55 E BORE				■	■	■	■	■
SSG2-56 E BORE				■	■	■	■	■
SSG2-60 E BORE				■	■	■	■	■
SSG2-64 E BORE				■	■	■	■	■
SSG2-70 E BORE				■	■	■	■	■
SSG2-75 E BORE				■	■	■	■	■
SSG2-80 E BORE				■	■	■	■	■
SSG2-90 E BORE				■	■	■	■	■
SSG2-100 E BORE				■	■	■	■	■
Bore A	15	19	20	22	24	25	28	30
K	50	55	56	61	63	63	70	71
G	37	39	41	43	44	46	48	50
R	15.1	17.4	18	19.3	20.3	20.8	22.6	23.6
L	14							
Screw M	1-M10							
Recommended fastening torque of screw M (N·m)	7							
ETP allowable fastening torque (N·m)	46	85	110	130	190	230	280	380
ETP allowable thrust force N	5100	7300	9100	9600	13000	15000	16000	21000
ETP allowable radial load N	500	1000	1000	1200	1400	1500	1800	2000
Bushing weight (kg)	0.16	0.2	0.21	0.25	0.26	0.27	0.33	0.35

* Allowable torque is the value when the thrust force is 0, and allowable thrust force is when the torque is 0.
* Allowable torque and allowable thrust force are the values at 20°C.
* Tolerance of the target shaft diameter is h7 (g6, h6).

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 and portions given secondary operation

* The precision grade of E Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

E

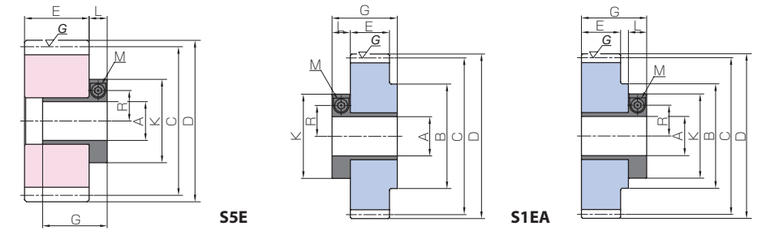
KHK E Series

Delivered with this marking.

Please see Page 16 for more details.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

E Series

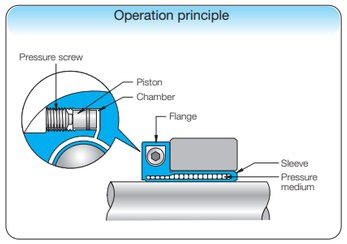


■ Features of E Series

- Can be easily installed with one bolt (shortens work time)
- Concentricity 0. 02mm
- Zero backlash between the gear and shaft
- No decrease in shaft strength due to fretting wear (worn or seized shaft)
- No need to machine keyways on the shaft, reducing the number of parts such as keyway materials and set screws
- Does not take up mounting space and easy to position and match the phase
- Finished by the manufacturer in 2 working days (excluding the day ordered)
  For products with a pitch of module 4 or higher, manufacture is completed in 7 working days (excluding the day ordered)

■ Operation principle of ETP-E Plus

The pressure medium enclosed in the chamber is pressurized due to the tightening of the pressure screw and moves into the sleeve. The pressure of this pressure medium causes the sleeve to receive pressure from the inside, which causes the shaft side sleeve to contract, the hub side sleeve to expand, allowing the shaft and hub to be fastened via the sleeve.



Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m) Bending strength	Surface durability
SSG2.5-16	16	32	40	45		53.3	20.1
SSG2.5-17	17	35	42.5	47.5		58.6	23.0
SSG2.5-18	18	38	45	50		63.9	26.1
SSG2.5-19	19	39	47.5	52.5		69.4	29.4
SSG2.5-20	20	40	50	55		74.8	32.9
SSG2.5-21	21	42	52.5	57.5		80.4	36.7
SSG2.5-22	22	44	55	60		86.0	40.6
SSG2.5-23	23	46	57.5	62.5		91.6	44.8
SSG2.5-24	24	48	60	65		97.3	49.2
SSG2.5-25	25	50	62.5	67.5		103	53.8
SSG2.5-26	26	54	65	70		109	58.4
SSG2.5-27	27	56	67.5	72.5		115	63.2
SSG2.5-28	28	60	70	75		120	68.2
SSG2.5-30	30	65	75	80		132	78.7
SSG2.5-32	32	70	80	85		144	90.1
SSG2.5-34	34	70	85	90	25	156	102
SSG2.5-35	35	70	87.5	92.5		162	109
SSG2.5-36	36	70	90	95		168	115
SSG2.5-38	38	70	95	100		180	129
SSG2.5-40	40	70	100	105		177	133
SSG2.5-42	42	75	105	110		188	147
SSG2.5-44	44	75	110	115		200	163
SSG2.5-45	45	75	112.5	117.5		205	170
SSG2.5-48	48	75	120	125		222	195
SSG2.5-50	50	80	125	130		234	213
SSG2.5-55	55	80	137.5	142.5		262	260
SSG2.5-56	56	80	140	145		268	270
SSG2.5-60	60	80	150	155		291	311
SSG2.5-70	70	80	175	180		324	399
SSG2.5-75	75	90	187.5	192.5		351	461
SSG2.5-80	80	90	200	205		378	527

* For the backlash of each product, please refer to the dimension table of the original product.

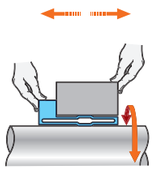
To order E Series products, please specify: **Catalog Number + E + BORE.**

Bore A / Catalog Number	* The product shapes of E Series items are identified by background color. 15	19	20	22	24	25	28	30	32	35
SSG2.5-16 E Bore										
SSG2.5-17 E Bore										
SSG2.5-18 E Bore	*									
SSG2.5-19 E Bore										
SSG2.5-20 E Bore	*	*								
SSG2.5-21 E Bore										
SSG2.5-22 E Bore										
SSG2.5-23 E Bore										
SSG2.5-24 E Bore										
SSG2.5-25 E Bore		*								
SSG2.5-26 E Bore										
SSG2.5-27 E Bore										
SSG2.5-28 E Bore										
SSG2.5-30 E Bore		*								
SSG2.5-32 E Bore		*								
SSG2.5-34 E Bore										
SSG2.5-35 E Bore										
SSG2.5-36 E Bore		*								
SSG2.5-38 E Bore										
SSG2.5-40 E Bore										
SSG2.5-42 E Bore										
SSG2.5-44 E Bore										
SSG2.5-45 E Bore										
SSG2.5-48 E Bore										
SSG2.5-50 E Bore										
SSG2.5-55 E Bore										
SSG2.5-56 E Bore										
SSG2.5-60 E Bore										
SSG2.5-70 E Bore										
SSG2.5-75 E Bore										
SSG2.5-80 E Bore										
Bore A	15	19	20	22	24	25	28	30	32	35
K	50	55	56	61	63	63	70	71	78	86
G	37	39	41	43	44	46	48	50	52	55
R	15.1	17.4	18	19.3	20.3	20.8	22.6	23.6	24.8	26.4
L	14									
Screw M	1-M10									
Recommended fastening torque of screw M (N·m)	7									
ETP allowable fastening torque (N·m)	46	85	110	130	190	230	280	380	440	640
ETP allowable thrust force N	5100	7300	9100	9600	13000	15000	16000	21000	22000	30000
ETP allowable radial load N	500	1000	1000	1200	1400	1500	1800	2000	2200	2500
Bushing weight (kg)	0.16	0.2	0.21	0.25	0.26	0.27	0.33	0.35	0.41	0.47

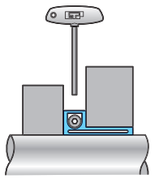
* Allowable torque is the value when the thrust force is 0, and allowable thrust force is when the torque is 0.
* Allowable torque and allowable thrust force are the values at 20°C.
* Tolerance of the target shaft diameter is h7 (g6, h6).
"*" is an SSAG product that's given secondary operations.

■ Effects of ETP-E Plus

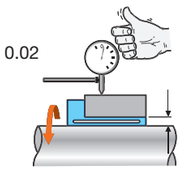
Easy and accurate positioning



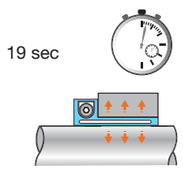
Helps save space



High concentricity



Secure and speedy installation



Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 and portions given secondary operation

* The precision grade of E Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

E

KHK E Series

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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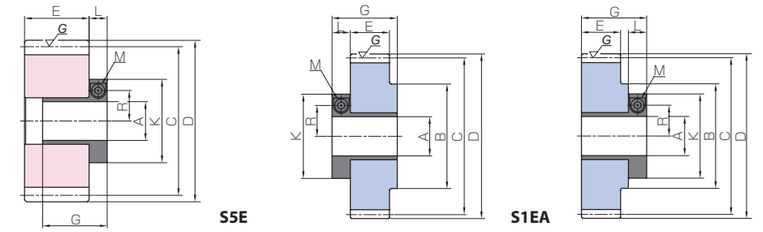
Please see Page 16 for more details.

E Series

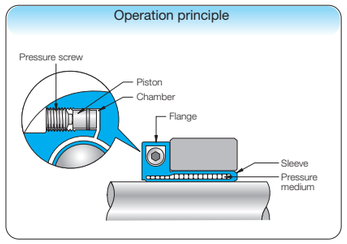


■ Features of E Series

- Can be easily installed with one bolt (shortens work time)
- Concentricity 0. 02mm
- Zero backlash between the gear and shaft
- No decrease in shaft strength due to fretting wear (worn or seized shaft)
- No need to machine keyways on the shaft, reducing the number of parts such as keyway materials and set screws
- Does not take up mounting space and easy to position and match the phase
- Finished by the manufacturer in 2 working days (excluding the day ordered)
  For products with a pitch of module 4 or higher, manufacture is completed in 7 working days (excluding the day ordered)

■ Operation principle of ETP-E Plus

The pressure medium enclosed in the chamber is pressurized due to the tightening of the pressure screw and moves into the sleeve. The pressure of this pressure medium causes the sleeve to receive pressure from the inside, which causes the shaft side sleeve to contract, the hub side sleeve to expand, allowing the shaft and hub to be fastened via the sleeve.

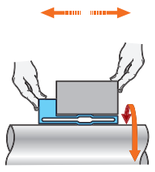


Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m) Bending strength	Surface durability
SSG3-15	15	36	45	51	30	83.1	30.5
SSG3-16	16	38	48	54		92.1	35.2
SSG3-17	17	37	51	57		101	40.3
SSG3-18	18	40	54	60		110	45.8
SSG3-19	19	45	57	63		120	51.6
SSG3-20	20	50	60	66		129	57.8
SSG3-21	21	52	63	69		139	64.4
SSG3-22	22	54	66	72		149	71.3
SSG3-24	24	58	72	78		168	86.4
SSG3-25	25	60	75	81		178	94.5
SSG3-26	26	62	78	84		188	103
SSG3-27	27	65	81	87		198	111
SSG3-28	28	70	84	90		208	120
SSG3-29	29	70	87	93		218	129
SSG3-30	30	75	90	96		228	138
SSG3-32	32	75	96	102		229	146
SSG3-34	34	75	102	108		248	166
SSG3-35	35	80	105	111		258	177
SSG3-36	36	80	108	114		268	188
SSG3-38	38	80	114	120		287	210
SSG3-40	40	80	120	126		306	234
SSG3-42	42	80	126	132		326	260
SSG3-44	44	80	132	138		345	286
SSG3-45	45	80	135	141		355	300
SSG3-48	48	85	144	150		384	343
SSG3-50	50	85	150	156		404	374
SSG3-55	55	90	165	171		421	423
SSG3-56	56	90	168	174		430	439
SSG3-60	60	100	180	186		467	508
SSG3-70	70	100	210	216		560	699
SSG3-75	75	100	225	231		607	806
SSG3-80	80	100	240	246		654	921

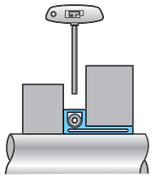
* For the backlash of each product, please refer to the dimension table of the original product.

■ Effects of ETP-E Plus

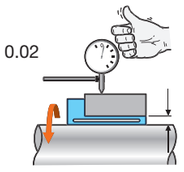
Easy and accurate positioning



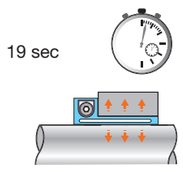
Helps save space



High concentricity



Secure and speedy installation



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Precautions for Standard Machined Products → Pages 42~44

To order E Series products, please specify: **Catalog Number + E + BORE.**

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

Bore A / Catalog Number	15	19	20	22	24	25	28	30	32	35	38	40	42
SSG3-15 E BORE	*												
SSG3-16 E BORE													
SSG3-17 E BORE													
SSG3-18 E BORE	*	*	*	*									
SSG3-19 E BORE													
SSG3-20 E BORE		*	*	*	*								
SSG3-21 E BORE													
SSG3-22 E BORE													
SSG3-24 E BORE													
SSG3-25 E BORE		*	*	*	*								
SSG3-26 E BORE													
SSG3-27 E BORE													
SSG3-28 E BORE													
SSG3-29 E BORE													
SSG3-30 E BORE				*	*								
SSG3-32 E BORE				*	*								
SSG3-34 E BORE													
SSG3-35 E BORE													
SSG3-36 E BORE				*	*								
SSG3-38 E BORE													
SSG3-40 E BORE				*	*								
SSG3-42 E BORE													
SSG3-44 E BORE													
SSG3-45 E BORE													
SSG3-48 E BORE													
SSG3-50 E BORE													
SSG3-55 E BORE													
SSG3-56 E BORE													
SSG3-60 E BORE													
SSG3-70 E BORE													
SSG3-75 E BORE													
SSG3-80 E BORE													
Bore A	15	19	20	22	24	25	28	30	32	35	38	40	42
K	50	55	56	61	63	63	70	71	78	86	92.5	94	96.5
G	37	39	41	43	44	46	48	50	52	55	67	70	70
R	15.1	17.4	18	19.3	20.3	20.8	22.6	23.6	24.8	26.4	31	32	33.2
L	14										20		
Screw M	1-M10										1-M16		
Recommended fastening torque of screw M (N·m)	7										24		
ETP allowable fastening torque (N·m)	46	85	110	130	190	230	280	380	440	640	890	1100	1100
ETP allowable thrust force N	5100	7300	9100	9600	13000	15000	16000	21000	22000	30000	38000	45000	43000
ETP allowable radial load N	500	1000	1000	1200	1400	1500	1800	2000	2200	2500	2800	3000	3200
Bushing weight (kg)	0.16	0.2	0.21	0.25	0.26	0.27	0.33	0.35	0.41	0.47	0.83	0.88	0.95

* Allowable torque is the value when the thrust force is 0, and allowable thrust force is when the torque is 0.
* Allowable torque and allowable thrust force are the values at 20°C.
* Tolerance of the target shaft diameter is h7 (g6, h6).

"✻" is an SSAG product that's given secondary operations.

For updated data, please see the KHK Website.

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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 and portions given secondary operation

* The precision grade of E Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

E

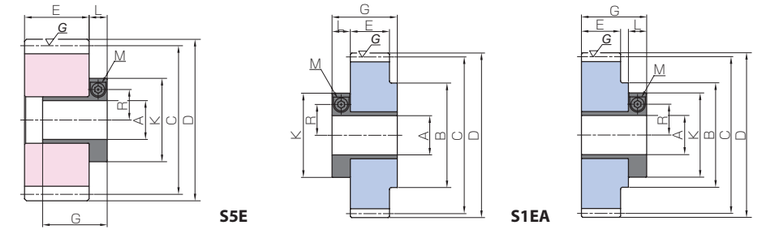
KHK E Series

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Delivered with this marking.

Please see Page 16 for more details.

E Series



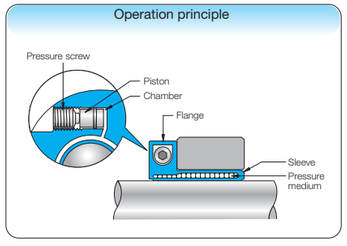
To order E Series products, please specify: **Catalog Number + E + BORE.**

■ Features of E Series

- Can be easily installed with one bolt (shortens work time)
- Concentricity 0. 02mm
- Zero backlash between the gear and shaft
- No decrease in shaft strength due to fretting wear (worn or seized shaft)
- No need to machine keyways on the shaft, reducing the number of parts such as keyway materials and set screws
- Does not take up mounting space and easy to position and match the phase
- Finished by the manufacturer in 2 working days (excluding the day ordered) For products with a pitch of module 4 or higher, manufacture is completed in 7 working days (excluding the day ordered)

■ Operation principle of ETP-E Plus

The pressure medium enclosed in the chamber is pressurized due to the tightening of the pressure screw and moves into the sleeve. The pressure of this pressure medium causes the sleeve to receive pressure from the inside, which causes the shaft side sleeve to contract, the hub side sleeve to expand, allowing the shaft and hub to be fastened via the sleeve.



Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m) Bending strength	Surface durability
SSG4-15	15	45	60	68		197	74.1
SSG4-16	16	50	64	72		218	85.6
SSG4-18	18	60	72	80		262	111
SSG4-20	20	65	80	88		307	141
SSG4-22	22	70	88	96		352	174
SSG4-24	24	75	96	104		368	194
SSG4-25	25	80	100	108		389	213
SSG4-28	28	85	112	120		455	270
SSG4-30	30	90	120	128		499	313
SSG4-32	32	90	128	136		544	358
SSG4-35	35	90	140	148	40	612	432
SSG4-36	36	90	144	152		634	458
SSG4-40	40	90	160	168		674	529
SSG4-42	42	90	168	176		717	586
SSG4-44	44	90	176	184		760	646
SSG4-45	45	90	180	188		781	677
SSG4-48	48	100	192	200		846	774
SSG4-50	50	100	200	208		889	842
SSG4-55	55	100	220	228		998	1030
SSG4-56	56	110	224	232		1020	1060
SSG4-60	60	110	240	248		1110	1230
SSG5-20	20	82	100	110		553	259
SSG5-25	25	105	125	135	50	760	426
SSG5-30	30	120	150	160		975	623
SSG6-20	20	100	120	132		955	457
SSG6-25	25	125	150	162	60	1310	747
SSG6-30	30	150	180	192		1560	1020

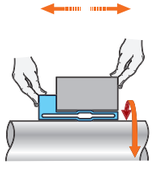
* For the backlash of each product, please refer to the dimension table of the original product.

Bore A / Catalog Number	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	60	70	80
SSG4-15 E BORE	*	*																
SSG4-16 E BORE																		
SSG4-18 E BORE	*	*	*	*	*	*												
SSG4-20 E BORE	*	*	*	*	*	*	*											
SSG4-22 E BORE																		
SSG4-24 E BORE																		
SSG4-25 E BORE	*	*	*	*	*	*	*											
SSG4-28 E BORE																		
SSG4-30 E BORE	*	*	*	*	*	*	*											
SSG4-32 E BORE																		
SSG4-35 E BORE																		
SSG4-36 E BORE		*	*	*	*	*	*											
SSG4-40 E BORE		*	*	*	*	*	*											
SSG4-42 E BORE																		
SSG4-44 E BORE																		
SSG4-45 E BORE																		
SSG4-48 E BORE																		
SSG4-50 E BORE				*	*	*	*											
SSG4-55 E BORE																		
SSG4-56 E BORE																		
SSG4-60 E BORE																		
SSG5-20 E BORE					*	*	*	*	*	*	*							
SSG5-25 E BORE					*	*	*	*	*	*	*							
SSG5-30 E BORE					*	*	*	*	*	*	*							
SSG6-20 E BORE								*	*	*	*	*	*	*				
SSG6-25 E BORE								*	*	*	*	*	*	*	*			
SSG6-30 E BORE								*	*	*	*	*	*	*	*			
Bore A	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	60	70	80
K	56	61	63	63	70	71	78	86	92.5	94	96.5	101	104	106	116	123.5	150	160
G	41	43	44	46	48	50	52	55	67	70	70	72	73	74	79	83	101	110
R	18	19.3	20.3	20.8	22.6	23.6	24.8	26.4	31	32	33.2	34.8	36.8	37.5	40.5	43.3	50.8	56.3
L	14								20								24	
Screw M	1-M10								1-M16								1-M20	
Recommended fastening torque of screw M (N·m)	7								24								40	
ETP allowable fastening torque (N·m)	110	130	190	230	280	380	440	640	890	1100	1100	1400	1700	1900	2400	3300	5600	8700
ETP allowable thrust force N	9100	9600	13000	15000	16000	21000	22000	30000	38000	45000	43000	51000	57000	63000	71000	90000	130000	180000
ETP allowable radial load N	1000	1200	1400	1500	1800	2000	2200	2500	2800	3000	3200	3500	4000	4500	5000	5300	6400	7500
Bushing weight (kg)	0.21	0.25	0.26	0.27	0.33	0.35	0.41	0.47	0.83	0.88	0.95	1.03	1.09	1.18	1.46	1.79	2.93	3.58

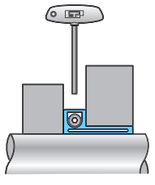
* Allowable torque is the value when the thrust force is 0, and allowable thrust force is when the torque is 0.
* Allowable torque and allowable thrust force are the values at 20°C.
* Tolerance of the target shaft diameter is h7 (g6, h6).
"*" is an SSAG product that's given secondary operations.

■ Effects of ETP-E Plus

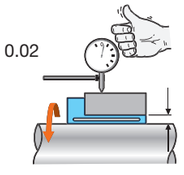
Easy and accurate positioning



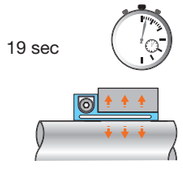
Helps save space



High concentricity



Secure and speedy installation



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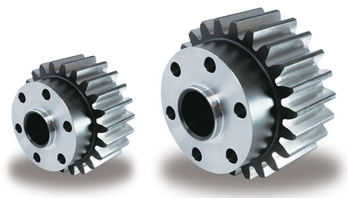
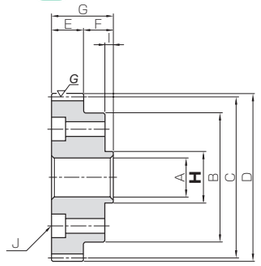
For updated data, please see the KHK Website.



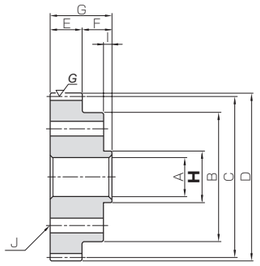
Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for teeth and portions given secondary operation

* The R Series is given secondary operations and has accuracy grades "equivalent" to the original products.

R



S1Z



S1U

Recommended mating rack

SRGF/SRGFD
Hardened Ground Racks

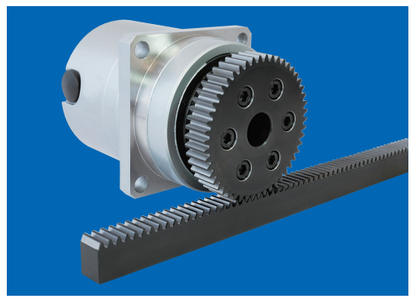
Please see Page 230 for more details.

Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Mounting hub dia.	Mounting hub width
				A	B	C	D	E	F	G	H_{h7}	I
SSG1.5-50R24	***m*1.5**	50	S1Z	18	60	75	78	15	14	29	24	4
SSG2-40R24	***m*2**	40	S1Z	20	60	80	84	20	16	36	24	4
SSG2.5-27R24	***m*2.5**	27	S1U	20	56	67.5	72.5	25	18	43	24	4
SSG2.5-28R24		28	S1Z		60	70	75					
SSG2.5-30R24		30			65	75	80					
SSG2.5-42R32		42		25	75	105	110				32	
SSG3-24R24	***m*3**	24	S1Z	20	58	72	78	30	20	50	24	4
SSG3-25R24		25			60	75	81					
SSG3-26R24		26			62	78	84					
SSG3-30R32		30		25	75	90	96				32	
SSG3-32R32		32			75	96	102					
SSG3-34R32		34			75	102	108					
SSG3-35R32		35			80	105	111					
SSG3-36R32		36			80	108	114					
SSG4-24R32	***m*4**	24	S1Z	20	75	96	104	40	25	65	32	4
SSG4-25R32		25			80	100	108					
SSG5-20R32	***m*5**	20	S1Z	25	82	100	110	50	25	75	32	4
SSG5-30R47		30			120	150	160				47	6
SSG6-25R47	***m*6**	25	S1Z	30	125	150	162	60	28	88	47	6
SSG6-30R60		30			150	180	192				60	

Mounting hole specification J						Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
Drilled hole dia.	Counterbore dia.	Counterbore depth	Quantity	P.C.D.	Included screws	Bending strength	Surface durability	Bending strength	Surface durability			
6.6	11	9	6	45	M6×20	54.7	47.2	5.58	4.82	0.08~0.16	0.63	**SSG1.5-50R24**
6.6	11	14	6	45	M6×25	98.3	72.1	10.0	7.35	0.10~0.20	0.89	**SSG2-40R24**
6.6	-	-	6	45	M6×45	115	63.2	11.7	6.44	0.10~0.20	0.82	**SSG2.5-27R24**
	11	19			M6×25	120	68.2	12.3	6.95		0.86	**SSG2.5-28R24**
						132	78.7	13.5	8.03		1.02	**SSG2.5-30R24**
9	14	17		60	M8×30	188	147	19.2	15.0		1.86	**SSG2.5-42R32**
6.6	11	24	6	45	M6×30	168	86.4	17.1	8.81	0.10~0.20	1.04	**SSG3-24R24**
						178	94.5	18.1	9.64		1.14	**SSG3-25R24**
						188	103	19.2	10.5		1.25	**SSG3-26R24**
9	14	22		60	M8×35	228	138	23.3	14.1		1.65	**SSG3-30R32**
						229	146	23.4	14.9		1.86	**SSG3-32R32**
						248	166	25.3	17.0		2.08	**SSG3-34R32**
						258	177	26.3	18.0		2.27	**SSG3-35R32**
						268	188	27.3	19.1		2.39	**SSG3-36R32**
9	14	32	6	60	M8×40	368	194	37.5	19.8	0.10~0.20	2.55	**SSG4-24R32**
						389	213	39.7	21.7		2.84	**SSG4-25R32**
9	14	42	6	60	M8×40	553	259	56.4	26.5	0.10~0.22	3.30	**SSG5-20R32**
			14	100	M8×35	975	623	99.4	63.5		7.52	**SSG5-30R47**
9	14	52	14	100	M8×40	1310	747	134	76.2	0.10~0.22	8.95	**SSG6-25R47**
18	26	44	6	120	M16×60	1560	1020	160	104		13.1	**SSG6-30R60**

■ Features of R Series

- Products matching the mounting holes of the corresponding speed reducer series.
- They come with set bolts and can be used immediately.
- As flange mounting types, they have high rigidity and the gear does not bend.
- Ideal for the mating pinion of racks.



■ Rack and pinion for corresponding flange output speed reducers

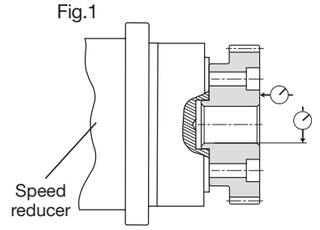
Mounting hub dia. H (Common to all speed reducers)	NIDEC DRIVE TECHNOLOGY VRG Series	Sumitomo Heavy Industries IB Series	Harmonic Drive Systems HPG Series	R Series Catalog Numbers		KHK recommended mating rack
24	C90	P120	20	SSG Module - No. of teeth	R24	KRGF Series SRGF Series SRF Series See Page 213
32	D120	P130	32		R32	
47	E170	-	50		R47	
60	-	-	65		R60	

(R Series Catalog Numbers)
R series catalog numbers are composed as follows:
(Base SSG ground spur gear catalog number) + R + (mounting hub diameter)

■ Mounting Method and Precautions

① Clean the gear mounting surface and flange surface of the speed reducer and make sure that there are no scratches or dents.
② Set the mounting hub of the gear in the hole at the rotational center of the flange, and temporarily tighten the hexagon socket head cap screws.
③ Tighten the hexagon socket head cap screws on the diagonals while checking the runout of the gear reference face (Fig. 1). (Fig.2)

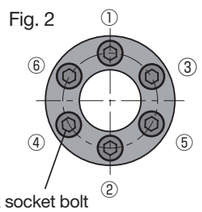
Fig.1



■ Removal Method and Precautions

① Turn off the power source (supply) and check that no load is applied to the gear.
② Loosen the hexagon socket head cap screws and make sure that the gear moves freely.
③ Remove the hexagon socket head cap screws while making sure that there is no danger of falling, etc.

Fig. 2

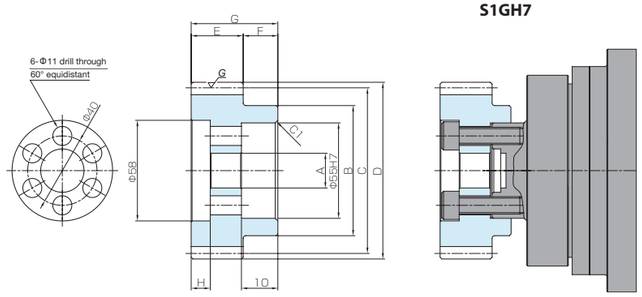


■ We recommend ideal pinions for speed reducers

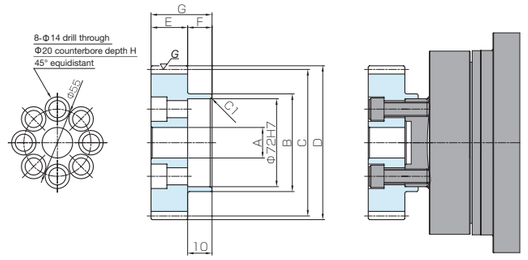
① CP type and helical type stock gears can be given secondary operations according to the customer's specifications at "KHK Quick-Mod Gears". See Page 24 for more details
② High-precision gears for reduction gears are also available with a short delivery time. Estimates are available upon the submission of production drawings.
③ Feel free to contact us about selecting racks and pinions.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

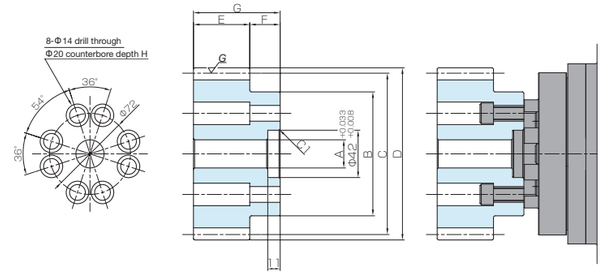
Speed reducer model number GH7 pinion **S1GH7**



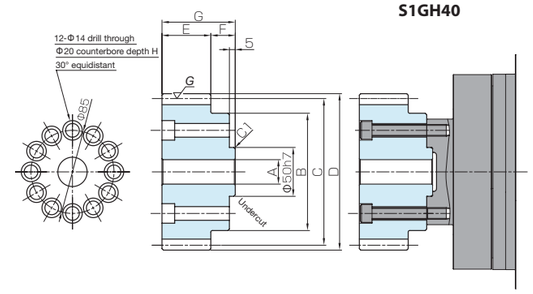
Speed reducer model number GH17 pinion **S1GH17**



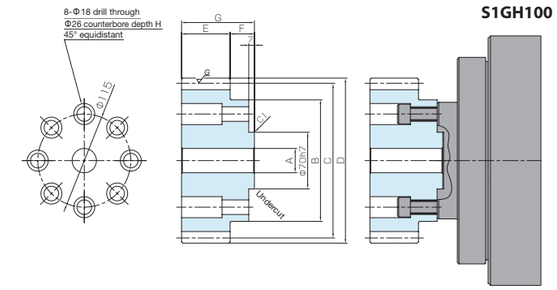
Speed reducer model number GH24 pinion **S1GH24**



Speed reducer model number GH40 pinion **S1GH40**



Speed reducer model number GH100 pinion **S1GH100**



SSG Series

Common Specifications	
Precision grade	JIS N7 grade (JIS B 1702-1: 1998)*
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 and portions given secondary operation

SSCPG Series

Common Specifications	
Precision grade	JIS N7 grade (JIS B 1702-1: 1998)*
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 and portions given secondary operation

ZSTP Series

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

Speed reducer model number	Catalog Number	Module/pitch	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Counterbore depth	Included screws	Allowable torque (N·m)		Weight (kg)	Mating rack	Catalog Number	Speed reducer model number
					A_{H7}	B	C	D	E	F	G	H		Bending strength	Surface durability				
GH7	**SSG3-30RGH7**	***m*3**	30	S1GH7	25	75	90	96	30	20	50	11	M10×45	251	209	1.422	SRGF3-1000	**SSG3-30RGH7**	GH7
	SSCPG10-30RGH7	**CP10 (*m*3.1831)**	30	S1GH7	20	75	95.49	101.86	30	20	50	11	M10×45	283	240	1.635	SRGCPF10-1000	**SSCPG10-30RGH7**	
	ZSTP3-30LRGH7	***m*3(CP10)**	30	S1GH7	25	85	95.49	104	30	20	50	11	M10×45	551	676	1.808	ZST3-1000R	**ZSTP3-30LRGH7**	
GH17	**SSG3-40RGH17**	***m*3**	40	S1GH17	25	80	120	126	30	20	50	13	M12×45	358	407	2.281	SRGF3-1000	**SSG3-40RGH17**	GH17
	SSCPG10-40RGH17	**CP10 (*m*3.1831)**	40	S1GH17	25	80	127.32	133.69	30	20	50	13	M12×45	403	466	2.616	SRGCPF10-1000	**SSCPG10-40RGH17**	
	ZSTP3-30LRGH17	***m*3(CP10)**	30	S1GH17	25	85	95.49	104	30	20	50	13	M12×45	551	676	1.406	ZST3-1000R	**ZSTP3-30LRGH17**	
GH24	**SSG4-30RGH24**	***m*4**	30	S1GH24	20	90	120	128	40	25	65	29	M12×55	595	501	3.627	SRGF4-1000	**SSG4-30RGH24**	GH24
	SSCPG15-30RGH24	**CP15 (*m*4.7746)**	30	S1GH24	25	110	143.24	152.79	50	27	77	41	M12×55	978	821	6.808	SRGCPF15-1000	**SSCPG15-30RGH24**	
	ZSTP4-30LRGH24	***m*4(CP13.333)**	30	S1GH24	25	110	127.32	138	40	25	65	29	M12×55	986	972	4.615	ZST4-1000R	**ZSTP4-30LRGH24**	
GH40	**SSG5-30RGH40**	***m*5**	30	S1GH40	25	120	150	160	50	25	75	13	M12×75	1070	916	7.230	SRGF5-1000	**SSG5-30RGH40**	GH40
	SSCPG15-30RGH40	**CP15 (*m*4.7746)**	30	S1GH40	25	110	143.24	152.79	50	27	77	15	M12×75	978	821	6.431	SRGCPF15-1000	**SSCPG15-30RGH40**	
	ZSTP5-24LRGH40	***m*5(CP16.667)**	24	S1GH40	25	110	127.32	142	50	25	75	13	M12×75	1980	1850	5.022	ZST5-1000R	**ZSTP5-24LRGH40**	
GH100	**SSG6-30RGH100**	***m*6**	30	S1GH100	30	150	180	192	60	28	88	33	M16×75	1850	1600	12.754	SRGF6-1000	**SSG6-30RGH100**	GH100
	SSCPG20-30RGH100	**CP20 (*m*6.3662)**	30	S1GH100	30	150	190.99	203.72	60	30	90	35	M16×75	2090	1850	14.462	SRGCPF20-1000	**SSCPG20-30RGH100**	

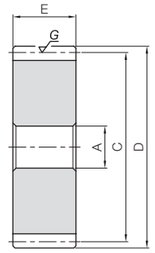
Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

SSAG Module 1, 1.5, 2, 2.5
Ground Spur Gears

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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).

J



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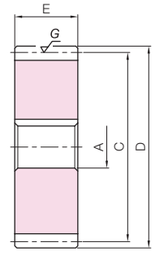
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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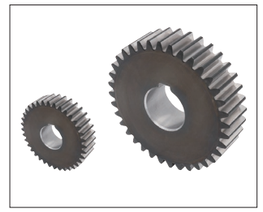


Catalog Number	Module	No. of teeth	Shape	Bore A_{H7}	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSAG1-25		25		8	25	27		7.92	3.82	0.81	0.39		0.035
SSAG1-30	***m*1**	30	S5		30	32	10	10.2	5.57	1.04	0.57	0.08~0.16	0.052
SSAG1-36		36		10	36	38		10.7	6.77	1.10	0.69		0.074
SSAG1.5-16		16			24	27		13.8	5.02	1.41	0.51		0.044
SSAG1.5-18		18		10	27	30		16.6	6.51	1.69	0.66		0.058
SSAG1.5-20		20			30	33		19.4	8.20	1.98	0.84		0.074
SSAG1.5-25		25			37.5	40.5		22.2	11.1	2.27	1.13		0.12
SSAG1.5-30	***m*1.5**	30	S5		45	48	15	28.5	16.3	2.91	1.66	0.08~0.16	0.17
SSAG1.5-32		32		15	48	51		31.1	18.6	3.17	1.90		0.19
SSAG1.5-36		36			54	57		36.2	23.8	3.70	2.43		0.25
SSAG1.5-40		40			60	63		41.5	29.6	4.23	3.02		0.31
SSAG1.5-50		50			75	78		54.7	47.2	5.58	4.82		0.50
SSAG2-15		15			30	34		29.6	10.5	3.01	1.07		0.099
SSAG2-16		16		10	32	36		27.3	10.1	2.78	1.03		0.11
SSAG2-18		18			36	40		32.7	13.1	3.34	1.34		0.15
SSAG2-20		20		15	40	44		38.3	16.6	3.91	1.69		0.17
SSAG2-25	***m*2**	25	S5		50	54	20	52.7	27.0	5.38	2.75	0.10~0.20	0.28
SSAG2-30		30			60	64		67.6	39.5	6.89	4.03		0.42
SSAG2-32		32		18	64	68		73.7	45.2	7.51	4.61		0.47
SSAG2-36		36			72	76		85.9	57.8	8.76	5.90		0.60
SSAG2-40		40			80	84		98.3	72.1	10.0	7.35		0.75
SSAG2-50		50			100	104		120	106	12.2	10.8		1.19
SSAG2.5-15		15			37.5	42.5		48.1	17.4	4.91	1.77		0.18
SSAG2.5-18		18		15	45	50		63.9	26.1	6.52	2.66		0.28
SSAG2.5-20		20			50	55		74.8	32.9	7.63	3.36		0.35
SSAG2.5-25		25			62.5	67.5		103	53.8	10.5	5.48		0.54
SSAG2.5-30	***m*2.5**	30	S5		75	80	25	132	78.7	13.5	8.03	0.10~0.20	0.81
SSAG2.5-32		32		20	80	85		144	90.1	14.7	9.19		0.92
SSAG2.5-36		36			90	95		168	115	17.1	11.8		1.19
SSAG2.5-40		40			100	105		177	133	18.1	13.6		1.48

[Caution on Secondary Operations] ① A reference surface is set for gear grinding. Use the surface opposite from the markings as the reference surface for secondary operation.

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

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

Bore H7	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Keyway Js9	3×1.4	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Screw size																			
Catalog Number	—																		
SSAG1-25J BORE																			
SSAG1-30J BORE																			
SSAG1-36J BORE																			
SSAG1.5-16J BORE																			
SSAG1.5-18J BORE																			
SSAG1.5-20J BORE																			
SSAG1.5-25J BORE																			
SSAG1.5-30J BORE																			
SSAG1.5-32J BORE																			
SSAG1.5-36J BORE																			
SSAG1.5-40J BORE																			
SSAG1.5-50J BORE																			
SSAG2-15J BORE																			
SSAG2-16J BORE																			
SSAG2-18J BORE																			
SSAG2-20J BORE																			
SSAG2-25J BORE																			
SSAG2-30J BORE																			
SSAG2-32J BORE																			
SSAG2-36J BORE																			
SSAG2-40J BORE																			
SSAG2-50J BORE																			
SSAG2.5-15J BORE																			
SSAG2.5-18J BORE																			
SSAG2.5-20J BORE																			
SSAG2.5-25J BORE																			
SSAG2.5-30J BORE																			
SSAG2.5-32J BORE																			
SSAG2.5-36J BORE																			
SSAG2.5-40J BORE																			

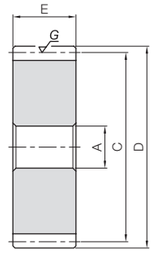
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

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

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)*
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).

J



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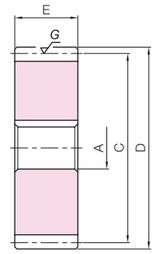
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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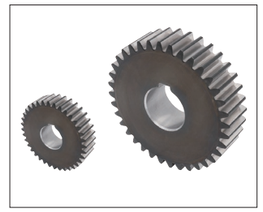


Catalog Number	Module	No. of teeth	Shape	Bore A_{H7}	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSAG3-15		15			45	51		83.1	30.5	8.48	3.11		0.33
SSAG3-18		18		15	54	60		110	45.8	11.3	4.67		0.50
SSAG3-20		20			60	66		129	57.8	13.2	5.90		0.62
SSAG3-25		25		20	75	81		178	94.5	18.1	9.64		0.97
SSAG3-30	***m*3**	30	S5		90	96	30	228	138	23.3	14.1	0.10~0.20	1.42
SSAG3-32		32			96	102		229	146	23.4	14.9		1.59
SSAG3-36		36		25	108	114		268	188	27.3	19.1		2.04
SSAG3-40		40			120	126		306	234	31.2	23.9		2.55
SSAG3-50		50			150	156		404	374	41.2	38.1		4.05

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

Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	5×2.3			6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	—														
SSAG3-15J BORE															
SSAG3-18J BORE															
SSAG3-20J BORE															
SSAG3-25J BORE															
SSAG3-30J BORE															
SSAG3-32J BORE															
SSAG3-36J BORE															
SSAG3-40J BORE															
SSAG3-50J BORE															

Catalog Number	Module	No. of teeth	Shape	Bore A_{H7}	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)
SSAG4-15		15			60	68		197	74.1	20.1	7.55		0.79
SSAG4-18		18			72	80		262	111	26.7	11.4		1.18
SSAG4-20		20		20	80	88		307	141	31.3	14.3		1.48
SSAG4-25		25	S5		100	108	40	389	213	39.7	21.7	0.10~0.20	2.37
SSAG4-30	***m*4**	30			120	128		499	313	50.9	31.9		3.45
SSAG4-36		36			144	152		634	458	64.7	46.7		4.96
SSAG4-40		40		25	160	168		674	529	68.7	54.0		6.16
SSAG4-50		50			200	208		889	842	90.7	85.9		9.71
SSAG5-20		20			100	110		553	259	56.4	26.5		2.89
SSAG5-25	***m*5**	25	S5	25	125	135	50	760	426	77.5	43.4	0.10~0.22	4.62
SSAG5-30		30			150	160		975	623	99.4	63.5		6.74
SSAG6-20		20			120	132		955	457	97.4	46.6		5.10
SSAG6-25	***m*6**	25	S5	25	150	162	60	1310	747	134	76.2	0.10~0.22	8.09
SSAG6-30		30			180	192		1560	1020	160	104		11.8

[Caution on Secondary Operations] ① A reference surface is set for gear grinding. Use the surface opposite from the markings as the reference surface for secondary operation.

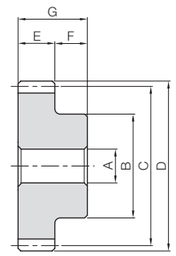
To order J Series products, please specify: **Catalog No. + J + BORE.**

Bore H7	* The product shapes of J Series items are identified by background color.															
Keyway Js9	20	22	25	28	30	32	35	40	45	50	55	60	65	70	75	80
Screw size	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	—															
SSAG4-15J BORE																
SSAG4-18J BORE																
SSAG4-20J BORE																
SSAG4-25J BORE																
SSAG4-30J BORE																
SSAG4-36J BORE																
SSAG4-40J BORE																
SSAG4-50J BORE																
SSAG5-20J BORE																
SSAG5-25J BORE																
SSAG5-30J BORE																
SSAG6-20J BORE																
SSAG6-25J BORE																
SSAG6-30J 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.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS grade N8 (JIS B 1702-1: 1998)*
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
Shape	S1



S1

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Allowable torque				Backlash (mm)	Weight (kg)	Catalog Number
											Bending strength		Surface durability				
				A_{H7}	B	C	D	E	F	G	N·m	kgf·m	N·m	kgf·m			
KS1.5-20 (made to order)		20		8	24	30	33				34.3	3.49	6.83	0.70		0.12	**KS1.5-20** (made to order)
KS1.5-25 (made to order)	***m*1.5**	25			30	37.5	40.5	15	14	29	46.2	4.72	11.7	1.19	0.10~0.22	0.20	**KS1.5-25** (made to order)
KS1.5-30 (made to order)		30		10	38	45	48				58.5	5.96	18.2	1.86		0.29	**KS1.5-30** (made to order)
KS2-20 (made to order)		20			32	40	44				81.2	8.28	16.7	1.70		0.27	**KS2-20** (made to order)
KS2-25 (made to order)	***m*2**	25		12	40	50	54	20	16	36	110	11.2	28.6	2.92	0.12~0.26	0.43	**KS2-25** (made to order)
KS2-30 (made to order)		30			50	60	64				139	14.1	44.7	4.55		0.66	**KS2-30** (made to order)
KS2.5-20 (made to order)		20			40	50	55				159	16.2	33.5	3.41		0.50	**KS2.5-20** (made to order)
KS2.5-25 (made to order)	***m*2.5**	25		15	50	62.5	67.5	25	18	43	214	21.8	57.4	5.85	0.14~0.28	0.82	**KS2.5-25** (made to order)
KS2.5-30 (made to order)		30			65	75	80				271	27.6	89.5	9.13		1.28	**KS2.5-30** (made to order)
KS3-20 (made to order)		20	S1	15	50	60	66				274	28.0	59.1	6.02		0.90	**KS3-20** (made to order)
KS3-25 (made to order)	***m*3**	25		20	60	75	81	30	20	50	370	37.7	101	10.3	0.14~0.32	1.36	**KS3-25** (made to order)
KS3-30 (made to order)		30			75	90	96				468	47.7	158	16.1		2.07	**KS3-30** (made to order)
KS4-20 (made to order)		20			65	80	88				650	66.3	145	14.8		2.07	**KS4-20** (made to order)
KS4-25 (made to order)	***m*4**	25		20	80	100	108	40	25	65	877	89.4	248	25.3	0.18~0.38	3.29	**KS4-25** (made to order)
KS4-30 (made to order)		30			90	120	128				1110	113	388	39.5		4.64	**KS4-30** (made to order)
KS5-20 (made to order)		20		22	82	100	110				1270	129	290	29.6		3.90	**KS5-20** (made to order)
KS5-25 (made to order)	***m*5**	25		25	105	125	135	50	25	75	1710	175	498	50.8	0.20~0.44	6.23	**KS5-25** (made to order)
KS5-30 (made to order)		30			120	150	160				2170	221	779	79.4		8.87	**KS5-30** (made to order)

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

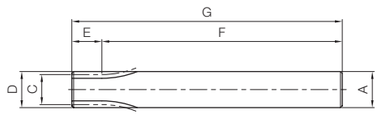
KS Thermal Refined Spur Gear recommended mating racks

KRF/KRFD Thermal Refined Racks

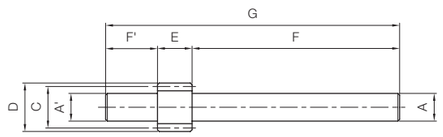
Please see Page 240 for more details.

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

* Products with module 1.5 use S45C thermal refined materials, so the surface hardness is 200~270 HB.



SA



SB

Catalog Number	Module	No. of teeth	Profile shift coefficient	Shape	Shaft diameter (L)	Shaft length (L)	Pitch dia.	Outside dia.	Face width	Shaft diameter (R)	Shaft length (R)	Total Length
					A'	F'	C	D	E	A	F	G
SSS1-10		10					10	12		12		
SSS1-12	***m*1**	12	0	SA	—	—	12	14	12	14	78	90
SSS1-13		13					13	15		15		
SSS1.5-10		10	+0.5		12.2		15	19.35		12.2		
SSS1.5-12	***m*1.5**	12	0	SB	13.7	25	18	21	15	13.7	100	140
SSS1.5-13		13	0		15.2		19.5	22.5		15.2		

Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
Bending strength	Surface durability	Bending strength	Surface durability			
1.62	0.063	0.16	0.0064		0.077	**SSS1-10**
2.52	0.092	0.26	0.0094	0.08~0.18	0.10	**SSS1-12**
3.05	0.11	0.31	0.011		0.12	**SSS1-13**
12.7	0.71	1.30	0.073		0.14	**SSS1.5-10**
9.97	0.89	1.02	0.091	0.10~0.22	0.17	**SSS1.5-12**
12.1	1.05	1.23	0.11		0.21	**SSS1.5-13**

[Caution on Product Characteristics] ① For the center distance of the profile shifted gear, please refer to "Center distance of stock spur gear meshing with profile shifted gear" below.
② 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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Center distance of stock spur gear meshing with profile shifted gear

The center distance of the stock gear (x = 0) that meshes with profile shifted gear (x = +0.5) of m = 1 is shown in the table at right. Please multiply by the module of the gear to be used.

■ Center distance where number of teeth is 12 to 30 (unit: mm)

Number of teeth (x = 0) \ Number of teeth (x = +0.5)	10
12	11.4410
13	11.9428
14	12.4446
15	12.9462
16	13.4477
17	13.9492
18	14.4505
19	14.9518
20	15.4530
21	15.9542
22	16.4553
23	16.9564
24	17.4574
25	17.9583
26	18.4592
27	18.9601
28	19.4610
29	19.9618
30	20.4625

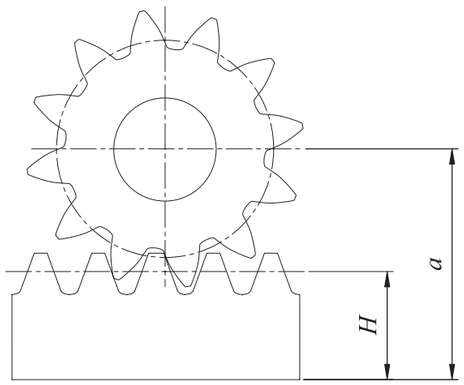
■ Center distance where number of teeth is 32 to 62 (unit: mm)

Number of teeth (x = 0) \ Number of teeth (x = +0.5)	10
32	21.4640
34	22.4653
35	22.9660
36	23.4666
38	24.4677
40	25.4688
42	26.4698
44	27.4707
45	27.9712
46	28.4716
48	29.4725
50	30.4733
52	31.4740
54	32.4747
55	32.9750
56	33.4754
58	34.4760
60	35.4766
62	36.4772

■ Center distance where number of teeth is 64 to 200 (unit: mm)

Number of teeth (x = 0) \ Number of teeth (x = +0.5)	10
64	37.4777
65	37.9780
66	38.4782
68	39.4787
70	40.4792
72	41.4796
75	42.9803
76	43.4805
80	45.4813
84	47.4820
85	47.9822
88	49.4826
90	50.4830
95	52.9837
100	55.4844
120	65.4866
150	80.4890
200	105.4915

■ Mounting distance of a profile shifted gear and the meshing rack



$$a = \frac{zm}{2} + H + xm$$

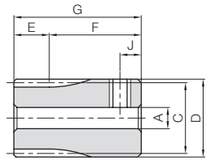
Where
a : Mounting distance
H : Pitch line height
m : Module
z : No. of teeth
x : Profile shift coefficient

Product Precautions → Page 50

Please make use of GCSW for Web (gear calculation software).

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.



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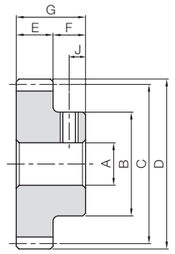

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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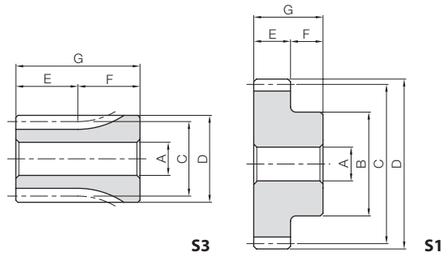
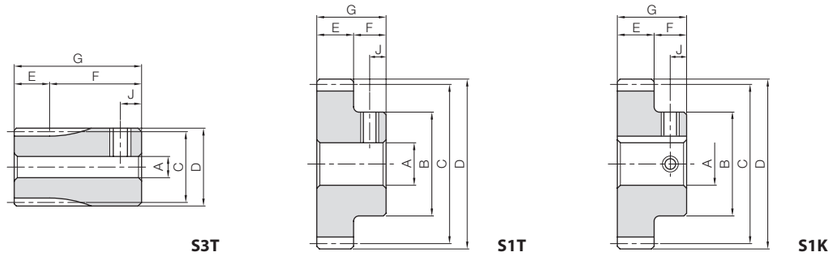
Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Socket head screw		Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
													Bending strength	Surface durability	Bending strength	Surface durability			
				$A_{H7(H8)}$	B	C	D	E	F	G	Size	J							
SS0.5-15A	***m*0.5**	15	S3T	3_{H8}	8.5	7.5	8.5	5	11	16	M3	2.5	0.46	0.022	0.047	0.0022	0~0.10	0.0056	**SS0.5-15A**
SS0.5-18A		18		4_{H8}	10	9	10				M3		0.61	0.032	0.063	0.0033		0.0076	**SS0.5-18A**
SS0.5-20A		20		3_{H8}	11	10	11				M3		0.72	0.040	0.073	0.0041		0.010	**SS0.5-20A**
SS0.5-20B				4_{H8}							M3							0.0095	**SS0.5-20B**
SS0.5-22A		22		4_{H8}	12	11	12				M3		0.83	0.049	0.084	0.0050		0.012	**SS0.5-22A**
SS0.5-24A		24		4_{H8}	13	12	13				M3	2.5	0.93	0.059	0.095	0.0060		0.014	**SS0.5-24A**
SS0.5-24B				5_{H8}							M4	3						0.013	**SS0.5-24B**
SS0.5-25B		25		5_{H8}	13.5	12.5	13.5				M4	3	0.99	0.064	0.10	0.0065		0.014	**SS0.5-25B**
SS0.5-28A		28	S1T	4_{H8}	12	14	15		7	12	M3	3.5	1.16	0.081	0.12	0.0082		0.011	**SS0.5-28A**
SS0.5-30B		30		5	13	15	16				M4		1.27	0.093	0.13	0.0095		0.012	**SS0.5-30B**
SS0.5-50B		50		6	22	25	26				M4		2.43	0.27	0.25	0.027		0.037	**SS0.5-50B**
SS0.5-54A		54		5	25	27	28				M4		2.67	0.32	0.27	0.032		0.047	**SS0.5-54A**
SS0.5-60A		60		6	28	30	31				M4		3.03	0.39	0.31	0.040		0.058	**SS0.5-60A**
SS0.5-80A		80		6	28	40	41				M4		4.24	0.72	0.43	0.074		0.079	**SS0.5-80A**
SS0.5-80B				8							M5							0.077	**SS0.5-80B**
SS0.5-96A		96		8	28	48	49				M5		5.21	1.06	0.53	0.11		0.099	**SS0.5-96A**
SS0.5-120A		120		8	28	60	61				M5		6.68	1.70	0.68	0.17		0.14	**SS0.5-120A**
SS0.8-15A	***m*0.8**	15	S3T	5_{H8}	13.6	12	13.6	8	14	22	M4	3.5	1.89	0.088	0.19	0.0090	0~0.10	0.019	**SS0.8-15A**
SS0.8-20A		20	S1T	5_{H8}	13	16	17.6		8	16	M4	4	2.94	0.17	0.30	0.017		0.018	**SS0.8-20A**
SS0.8-20B				6							M4							0.017	**SS0.8-20B**
SS0.8-25A		25		5_{H8}	16	20	21.6				M4		4.05	0.27	0.41	0.027		0.029	**SS0.8-25A**
SS0.8-28A		28		6	18	22.4	24				M4		4.73	0.34	0.48	0.035		0.037	**SS0.8-28A**
SS0.8-30A		30		5_{H8}	20	24	25.6				M4		5.19	0.39	0.53	0.040		0.045	**SS0.8-30A**
SS0.8-30C				8							M5							0.041	**SS0.8-30C**
SS0.8-40A		40		6	28	32	33.6				M4		7.55	0.72	0.77	0.074		0.085	**SS0.8-40A**
SS0.8-45A		45		6	28	36	37.6				M4		8.75	0.93	0.89	0.095		0.098	**SS0.8-45A**

Product Precautions → Page 50

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





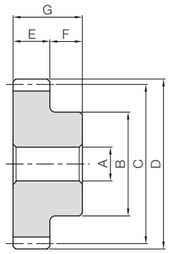
To order Hardened Plus, please specify Catalog No. + H. **Example: SS1-15H**

Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Keyway	Socket head screw		Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability (H)		Backlash (mm)	Weight (kg)	Catalog Number
				A_{H7}	B	C	D	E	F	G	Width × Depth	Size	J	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m			
SS1-15		15	S3	8	17	15	17		20	30	—	—	—	3.69	0.38	0.17	0.018	0.85	0.086		0.038	**SS1-15**
SS1-15A			S3T	5								M4	4								0.044	**SS1-15A**
SS1-15B			S3T	6								M4	4								0.042	**SS1-15B**
SS1-16		16	S3	8	18	16	18					—	—	4.09	0.42	0.2	0.021	0.98	0.10		0.044	**SS1-16**
SS1-16B			S3T	6								M4	4								0.049	**SS1-16B**
SS1-17		17	S3	8	19	17	19					—	—	4.5	0.46	0.23	0.023	1.12	0.11		0.050	**SS1-17**
SS1-18		18	S3	8	20	18	20					—	—	4.91	0.5	0.26	0.027	1.26	0.13		0.057	**SS1-18**
SS1-19		19	S3	8	21	19	21					—	—	5.33	0.54	0.29	0.030	1.42	0.14		0.065	**SS1-19**
SS1-20		20	S1	8	16	20	22		10	20	—	—	—	5.75	0.59	0.33	0.033	1.59	0.16		0.033	**SS1-20**
SS1-20A			S1T	5								M4	5								0.037	**SS1-20A**
SS1-20B			S1T	6								M4	5								0.036	**SS1-20B**
SS1-20C			S1T	8								M5	5								0.032	**SS1-20C**
SS1-21		21	S1	8	17	21	23					—	—	6.17	0.63	0.36	0.037	1.77	0.18		0.037	**SS1-21**
SS1-22		22	S1	8	18	22	24					—	—	6.6	0.67	0.4	0.041	1.95	0.20		0.042	**SS1-22**
SS1-23		23	S1	8	18	23	25					—	—	7.03	0.72	0.45	0.045	2.15	0.22		0.045	**SS1-23**
SS1-24		24	S1	8	20	24	26				—	—	—	7.47	0.76	0.49	0.050	2.36	0.24		0.052	**SS1-24**
SS1-24A			S1T	6							—	M4	5								0.055	**SS1-24A**
SS1-24C			S1K	10							4 x 1.8	M4	5								0.046	**SS1-24C**
SS1-25		25	S1	8	20	25	27				—	—	—	7.91	0.81	0.54	0.055	2.57	0.26		0.055	**SS1-25**
SS1-25B			S1T	8							—	M5	5								0.054	**SS1-25B**
SS1-25C			S1K	10							4 x 1.8	M4	5								0.049	**SS1-25C**
SS1-26	***m*1**	26	S1	8	22	26	28	10			—	—	—	8.35	0.85	0.58	0.059	2.79	0.28	0.08~0.18	0.064	**SS1-26**
SS1-27		27	S1	8	22	27	29				—	—	—	8.79	0.9	0.63	0.064	3.01	0.31		0.067	**SS1-27**
SS1-28		28	S1	8	22	28	30				—	—	—	9.24	0.94	0.68	0.070	3.25	0.33		0.070	**SS1-28**
SS1-29		29	S1	8	24	29	31				—	—	—	9.69	0.99	0.73	0.075	3.49	0.36		0.079	**SS1-29**
SS1-30		30	S1	10	25	30	32		10	20	—	—	—	10.1	1.03	0.79	0.081	3.74	0.38		0.082	**SS1-30**
SS1-30A			S1T	6							—	M4	5								0.089	**SS1-30A**
SS1-30B			S1T	8							—	M5	5								0.085	**SS1-30B**
SS1-32		32	S1	10	26	32	34				—	—	—	11.1	1.13	0.90	0.092	4.27	0.44		0.092	**SS1-32**
SS1-32A			S1T	8								M5	5								0.096	**SS1-32A**
SS1-34		34	S1	10	26	34	36				—	—	—	12.0	1.22	1.03	0.10	4.83	0.49		0.10	**SS1-34**
SS1-35		35	S1	10	26	35	37				—	—	—	12.4	1.27	1.09	0.11	5.13	0.52		0.10	**SS1-35**
SS1-36		36	S1	10	28	36	38				—	—	—	12.9	1.31	1.16	0.12	5.44	0.55		0.12	**SS1-36**
SS1-38		38	S1	10	32	38	40				—	—	—	13.8	1.41	1.30	0.13	6.08	0.62		0.14	**SS1-38**
SS1-40		40	S1	10	35	40	42				—	—	—	14.7	1.50	1.45	0.15	6.76	0.69		0.16	**SS1-40**
SS1-40B			S1K	10							4 x 1.8	M4	5								0.16	**SS1-40B**
SS1-42		42	S1	10	35	42	44				—	—	—	15.7	1.60	1.61	0.16	7.47	0.76		0.17	**SS1-42**
SS1-44		44	S1	10	35	44	46				—	—	—	16.6	1.69	1.77	0.18	8.23	0.84		0.18	**SS1-44**
SS1-45		45	S1	10	35	45	47				—	—	—	17.1	1.74	1.86	0.19	8.62	0.88		0.19	**SS1-45**
SS1-45A			S1T	8							—	M5	5								0.19	**SS1-45A**
SS1-45B			S1K	10							4 x 1.8	M4	5								0.19	**SS1-45B**
SS1-46		46	S1	10	35	46	48				—	—	—	17.6	1.79	1.95	0.20	9.02	0.92		0.19	**SS1-46**
SS1-48		48	S1	10	35	48	50				—	—	—	18.5	1.89	2.13	0.22	9.84	1.00		0.21	**SS1-48**

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

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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



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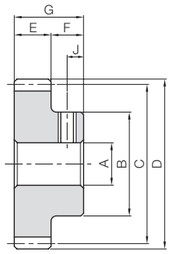

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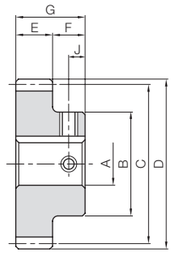

S1K

To order Hardened Plus, please specify Catalog No. + H. **Example: SS1-50H**

Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Keyway	Socket head screw		Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability (H)		Backlash (mm)	Weight (kg)	Catalog Number
				A_{H7}	B	C	D	E	F	G	Width × Depth	Size	J	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m			
SS1-50 (H)		50	S1	10		50	52				—	—	—	19.5	1.98	2.32	0.24	10.7	1.09		0.22	**SS1-50**
SS1-50A (H)			S1T	8							—	M5	5								0.22	**SS1-50A**
SS1-52 (H)		52	S1	10		52	54				—	—	—	20.4	2.08	2.52	0.26	11.6	1.18		0.23	**SS1-52**
SS1-54 (H)		54	S1	10	35	54	56				—	—	—	21.4	2.18	2.73	0.28	12.5	1.28		0.24	**SS1-54**
SS1-55 (H)		55	S1	10		55	57				—	—	—	21.8	2.23	2.83	0.29	13.0	1.33		0.25	**SS1-55**
SS1-56 (H)		56	S1	10		56	58				—	—	—	22.3	2.28	2.94	0.30	13.5	1.38		0.26	**SS1-56**
SS1-60 (H)		60	S1	10		60	62				—	—	—	24.2	2.47	3.40	0.35	15.6	1.59		0.29	**SS1-60**
SS1-60C (H)			S1K	15							5 x 2.3	M4	5								0.27	**SS1-60C**
SS1-62 (H)		62	S1	10	40	62	64				—	—	—	25.2	2.57	3.64	0.37	16.7	1.70		0.32	**SS1-62**
SS1-64 (H)		64	S1	10		64	66				—	—	—	26.2	2.67	3.89	0.40	17.8	1.81		0.34	**SS1-64**
SS1-65 (H)		65	S1	10		65	67				—	—	—	26.6	2.72	4.02	0.41	18.4	1.87		0.35	**SS1-65**
SS1-68 (H)		68	S1	10		68	70				—	—	—	28.1	2.86	4.42	0.45	20.1	2.05		0.37	**SS1-68**
SS1-70 (H)		70	S1	10		70	72				—	—	—	29.1	2.96	4.70	0.48	21.4	2.18		0.39	**SS1-70**
SS1-72 (H)	*m*1	72	S1	10		72	74	10	10	20	—	—	—	30.0	3.06	4.98	0.51	22.6	2.31	0.08~0.18	0.41	**SS1-72**
SS1-75 (H)		75	S1	10		75	77				—	—	—	31.5	3.21	5.43	0.55	24.6	2.51		0.43	**SS1-75**
SS1-76 (H)		76	S1	10		76	78				—	—	—	32.0	3.26	5.59	0.57	25.3	2.58		0.44	**SS1-76**
SS1-80 (H)		80	S1	10	40	80	82				—	—	—	33.9	3.46	6.23	0.63	28.1	2.87		0.48	**SS1-80**
SS1-84 (H)		84	S1	10		84	86				—	—	—	35.8	3.66	6.90	0.7	31.1	3.17		0.52	**SS1-84**
SS1-85 (H)		85	S1	10		85	87				—	—	—	36.3	3.71	7.08	0.72	31.8	3.25		0.53	**SS1-85**
SS1-88 (H)		88	S1	10		88	90				—	—	—	37.8	3.85	7.62	0.78	34.2	3.48		0.56	**SS1-88**
SS1-90 (H)		90	S1	10		90	92				—	—	—	38.8	3.95	7.98	0.81	35.8	3.65		0.59	**SS1-90**
SS1-96 (H)		96	S1	10		96	98				—	—	—	41.7	4.25	9.15	0.93	40.8	4.16		0.65	**SS1-96**
SS1-100 (H)		100	S1	10		100	102				—	—	—	43.7	4.45	9.97	1.02	44.4	4.53		0.70	**SS1-100**
SS1-110 (H)		110	S1	15	50	110	112				—	—	—	48.6	4.95	12.2	1.24	53.9	5.50		0.87	**SS1-110**
SS1-120 (H)		120	S1	15	50	120	122				—	—	—	53.5	5.45	14.7	1.50	64.4	6.57		1.01	**SS1-120**
SS1-150 (H)		150	S1	20	120	150	152				—	—	—	68.2	6.96	23.6	2.41	102	10.4		2.23	**SS1-150**
SS1-200 (H)		200	S1	20	160	200	202				—	—	—	71.5	7.29	33.6	3.42	144	14.7		4.00	**SS1-200**

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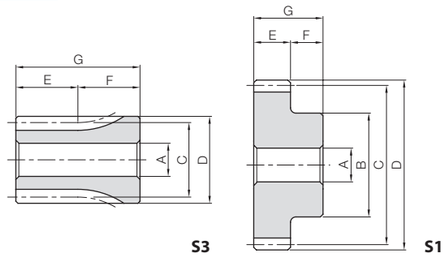
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

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



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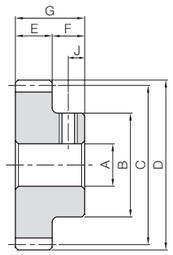

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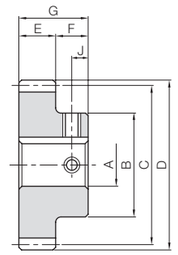

S1K

To order Hardened Plus, please specify Catalog No. + H. **Example: SS1.5-12H**

Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Keyway	Socket head screw		Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability (H)		Backlash (mm)	Weight (kg)	Catalog Number
				A_{H7}	B	C	D	E	F	G	Width × Depth	Size	J	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m			
SS1.5-12 (H)		12	S3	8	21	18	21		15	30	—	—	—	6.86	0.70	0.36	0.037	1.76	0.18		0.059	**SS1.5-12**
SS1.5-13 (H)		13	S3	8	22.5	19.5	22.5				—	—	—	8.84	0.90	0.44	0.045	2.12	0.22		0.070	**SS1.5-13**
SS1.5-14 (H) **SS1.5-14B**		14	S1 S1T	8 8	16	21	24				— —	— M5	— 5	11.1	1.13	0.52	0.053	2.50	0.26		0.047 0.046	**SS1.5-14** **SS1.5-14B**
SS1.5-15 (H)		15	S1	8	18	22.5	25.5				—	—	—	12.5	1.27	0.60	0.062	2.91	0.30		0.057	**SS1.5-15**
SS1.5-16 (H) **SS1.5-16B**		16	S1 S1T	8 8	20	24	27				— —	— M5	— 5	13.8	1.41	0.70	0.071	3.36	0.34		0.068 0.067	**SS1.5-16** **SS1.5-16B**
SS1.5-17 (H)		17	S1	8	21	25.5	28.5				—	—	—	15.2	1.55	0.80	0.082	3.84	0.39		0.077	**SS1.5-17**
SS1.5-18 (H)		18	S1	8	22	27	30				—	—	—	16.6	1.69	0.91	0.093	4.35	0.44		0.087	**SS1.5-18**
SS1.5-19 (H)		19	S1	8	23	28.5	31.5				—	—	—	18.0	1.83	1.03	0.11	4.89	0.50		0.098	**SS1.5-19**
SS1.5-20 (H)		20	S1	8	24	30	33				—	—	—	19.4	1.98	1.15	0.12	5.47	0.56		0.11	**SS1.5-20**
SS1.5-21 (H)		21	S1	8	25	31.5	34.5				—	—	—	20.8	2.12	1.29	0.13	6.08	0.62		0.12	**SS1.5-21**
SS1.5-22 (H)		22	S1	8	26	33	36				—	—	—	22.3	2.27	1.43	0.15	6.72	0.69		0.13	**SS1.5-22**
SS1.5-23 (H)		23	S1	8	27	34.5	37.5				—	—	—	23.7	2.42	1.58	0.16	7.40	0.75		0.15	**SS1.5-23**
SS1.5-24 (H)		24	S1	8	28	36	39				—	—	—	25.2	2.57	1.73	0.18	8.12	0.83		0.16	**SS1.5-24**
SS1.5-25 (H)	***m*1.5**	25	S1	8	30	37.5	40.5	15			—	—	—	26.7	2.72	1.90	0.19	8.87	0.90	0.10~0.22	0.18	**SS1.5-25**
SS1.5-26 (H) **SS1.5-26A**		26	S1 S1K	10 12	32	39	42		10	25	— 4 x 1.8	— M4	— 5	28.2	2.87	2.06	0.21	9.62	0.98		0.19 0.18	**SS1.5-26** **SS1.5-26A**
SS1.5-27 (H)		27	S1	10	34	40.5	43.5				—	—	—	29.7	3.03	2.23	0.23	10.4	1.06		0.21	**SS1.5-27**
SS1.5-28 (H) **SS1.5-28A**		28	S1 S1K	10 12	36	42	45				— 4 x 1.8	— M4	— 5	31.2	3.18	2.41	0.25	11.2	1.14		0.23 0.22	**SS1.5-28** **SS1.5-28A**
SS1.5-29 (H)		29	S1	10	37	43.5	46.5				—	—	—	32.7	3.34	2.60	0.26	12.1	1.23		0.24	**SS1.5-29**
SS1.5-30 (H) **SS1.5-30C**		30	S1 S1K	10 15	38	45	48				— 5 x 2.3	— M4	— 5	34.2	3.49	2.79	0.28	12.9	1.32		0.26 0.24	**SS1.5-30** **SS1.5-30C**
SS1.5-32 (H) **SS1.5-32B**		32	S1 S1K	10 12	40 38	48	51				— 4 x 1.8	— M4	— 5	37.3	3.80	3.19	0.33	14.8	1.51		0.30 0.28	**SS1.5-32** **SS1.5-32B**
SS1.5-34 (H)		34	S1	10	40	51	54				—	—	—	40.4	4.12	3.63	0.37	16.7	1.71		0.32	**SS1.5-34**
SS1.5-35 (H)		35	S1	10	42	52.5	55.5				—	—	—	41.9	4.28	3.85	0.39	17.8	1.81		0.35	**SS1.5-35**
SS1.5-36 (H)		36	S1	10	45	54	57				—	—	—	43.5	4.43	4.09	0.42	18.8	1.92		0.38	**SS1.5-36**
SS1.5-38 (H)		38	S1	12	45	57	60				—	—	—	46.6	4.75	4.58	0.47	21.0	2.14		0.40	**SS1.5-38**
SS1.5-40 (H)		40	S1	12	45	60	63				—	—	—	49.8	5.07	5.10	0.52	23.4	2.38		0.44	**SS1.5-40**

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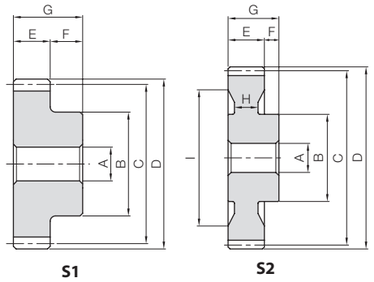
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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
Backlash	0.10 to 0.22

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

J H



S1 S2

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info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
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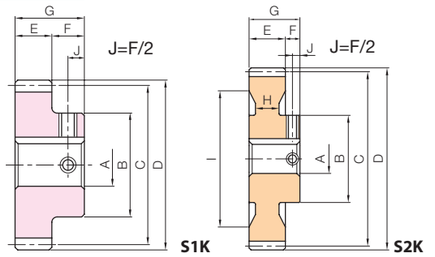
J Series



S1K S2K

To order Hardened Plus, please specify Catalog No. + H. **Example: SS1.5-42H**

Catalog Number	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Web thickness	Web O.D.	Allowable torque: Bending strength N·m	Bending strength kgf·m	Surface durability N·m	Surface durability kgf·m	Surface durability (H) N·m	Surface durability (H) kgf·m	Weight (kg)
			A_{H7}	B	C	D	E	F	G	H	I							
SS1.5-42	42	S1	12	45	63	66	15	10	25	—	—	52.9	5.40	5.65	0.58	25.8	2.63	0.47
SS1.5-44	44				66	69						56.1	5.72	6.23	0.64	28.4	2.90	0.51
SS1.5-45	45				67.5	70.5						57.7	5.88	6.53	0.67	29.8	3.03	0.52
SS1.5-46	46				69	72						59.3	6.04	6.83	0.70	31.1	3.17	0.54
SS1.5-48	48				72	75						62.4	6.37	7.47	0.76	34.0	3.46	0.58
SS1.5-50	50				75	78						65.7	6.69	8.15	0.83	36.9	3.77	0.62
SS1.5-52	52		15	50	78	81						68.9	7.02	8.85	0.90	40.0	4.08	0.68
SS1.5-54	54				81	84						72.1	7.35	9.59	0.98	43.3	4.41	0.73
SS1.5-55	55				82.5	85.5						73.7	7.51	9.96	1.02	44.9	4.58	0.75
SS1.5-56	56				84	87						75.3	7.68	10.4	1.06	46.6	4.75	0.77
SS1.5-58	58				87	90						78.5	8.01	11.2	1.14	50.1	5.11	0.82
SS1.5-60	60				90	93						81.8	8.34	12.0	1.22	53.7	5.47	0.87
SS1.5-62	62			55	93	96						85.0	8.67	12.8	1.31	57.4	5.85	0.95
SS1.5-64	64				96	99						88.3	9.00	13.7	1.40	61.3	6.25	1.00
SS1.5-68	68				102	105						94.8	9.66	15.6	1.59	69.3	7.07	1.11
SS1.5-70	70				105	108						98.0	10.0	16.6	1.69	73.6	7.50	1.17
SS1.5-72	72				108	111						101	10.3	17.6	1.79	77.9	7.95	1.23
SS1.5-75	75			60	112.5	115.5						106	10.8	19.2	1.95	84.7	8.64	1.36
SS1.5-76	76				114	117						108	11.0	19.7	2.01	87.0	8.88	1.39
SS1.5-80	80				120	123						114	11.7	22.0	2.24	96.7	9.86	1.52
SS1.5-84	84				126	129						121	12.3	24.4	2.49	107	10.9	1.66
SS1.5-88	88				132	135						128	13.0	27.0	2.75	117	12.0	1.80
SS1.5-90	90				135	138						131	13.3	28.3	2.89	123	12.5	1.87
SS1.5-95	95				142.5	145.5						139	14.2	31.8	3.24	137	14.0	2.07
SS1.5-100	100	S2			150	153				9	125	147	15.0	35.5	3.62	152	15.5	1.88
SS1.5-120	120			70	180	183				10	153	180	18.4	52.3	5.33	221	22.5	2.74
SS1.5-150	150	S1	20	180	225	228				—	—	192	19.6	70.3	7.17	276	28.1	6.62
SS1.5-200	200		25	240	300	303						261	26.7	131	13.3	504	51.4	11.8

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SS1.5-42J12**

Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35
Screw size	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3	
Catalog Number	M4						M5				M6			M8	
SS1.5-42 J BORE		*													
SS1.5-44 J BORE		*													
SS1.5-45 J BORE		*													
SS1.5-46 J BORE		*													
SS1.5-48 J BORE		*													
SS1.5-50 J BORE		*													
SS1.5-52 J BORE				*											
SS1.5-54 J BORE				*											
SS1.5-55 J BORE				*											
SS1.5-56 J BORE				*											
SS1.5-58 J BORE				*											
SS1.5-60 J BORE				*											
SS1.5-62 J BORE				*											
SS1.5-64 J BORE				*											
SS1.5-68 J BORE				*											
SS1.5-70 J BORE				*											
SS1.5-72 J BORE				*											
SS1.5-75 J BORE				*											
SS1.5-76 J BORE				*											
SS1.5-80 J BORE				*											
SS1.5-84 J BORE				*											
SS1.5-88 J BORE				*											
SS1.5-90 J BORE				*											
SS1.5-95 J BORE				*											
SS1.5-100 J BORE				*											
SS1.5-120 J BORE				*											
SS1.5-150															
SS1.5-200															

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE. **Example: SS1.5-42HJ14**

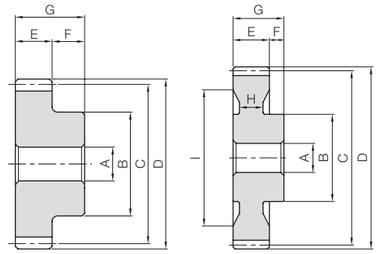
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

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

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
Backlash	0.12 to 0.26

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

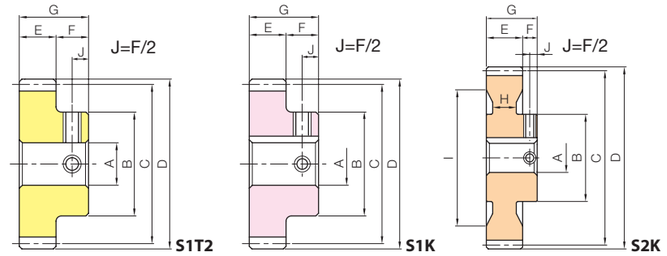
J H



S1 S2

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



S1T2 S1K S2K

H To order Hardened Plus, please specify Catalog No. + H. **Example: SS2-12H**

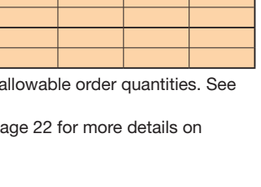
Catalog Number		No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Web thickness H	Web O.D. I	Allowable torque: Bending strength N·m	Bending strength kgf·m	Surface durability N·m	Surface durability kgf·m	Surface durability (H) N·m	Surface durability (H) kgf·m	Weight (kg)
SS2-12	H	12		10	18	24	28						16.3	1.66	0.88	0.090	4.24	0.43	0.073
SS2-13	H	13		10	20	26	30						21.0	2.14	1.07	0.11	5.11	0.52	0.090
SS2-14	H	14		10	20	28	32						26.3	2.69	1.26	0.13	6.02	0.61	0.10
SS2-15	H	15		12	24	30	34						29.6	3.01	1.48	0.15	7.01	0.71	0.12
SS2-16	H	16		12	26	32	36						32.7	3.34	1.71	0.17	8.08	0.82	0.14
SS2-17	H	17		12	28	34	38						36.0	3.67	1.96	0.20	9.23	0.94	0.16
SS2-18	H	18		12	30	36	40						39.3	4.01	2.23	0.23	10.5	1.07	0.19
SS2-19	H	19		12	31	38	42						42.6	4.35	2.52	0.26	11.8	1.20	0.21
SS2-20	H	20		12	32	40	44						46.0	4.69	2.83	0.29	13.2	1.34	0.23
SS2-21	H	21		12	34	42	46						49.4	5.04	3.15	0.32	14.7	1.50	0.26
SS2-22	H	22		12	36	44	48						52.8	5.39	3.50	0.36	16.2	1.66	0.29
SS2-23	H	23		12	37	46	50						56.3	5.74	3.86	0.39	17.9	1.82	0.32
SS2-24	H	24		12	38	48	52						59.8	6.09	4.24	0.43	19.6	2.00	0.35
SS2-25	H	25		12	40	50	54						63.3	6.45	4.64	0.47	21.4	2.18	0.38
SS2-26	H	26		12	42	52	56						66.8	6.81	5.04	0.51	23.2	2.37	0.42
SS2-27	H	27		12	45	54	58						70.4	7.17	5.45	0.56	25.1	2.56	0.46
SS2-28	H	28		12	45	56	60						73.9	7.54	5.89	0.60	27.0	2.76	0.48
SS2-29	H	29		12	47	58	62						77.5	7.91	6.33	0.65	29.1	2.96	0.52
SS2-30	H	30		12	50	60	64						81.1	8.27	6.80	0.69	31.2	3.18	0.57
SS2-32	H	32		12	50	64	68						88.4	9.01	7.78	0.79	35.6	3.63	0.63
SS2-34	H	34	S1	12	50	68	72						95.7	9.76	8.84	0.90	40.3	4.11	0.70
SS2-35	H	35	S1	12	52	70	74						99.3	10.1	9.39	0.96	42.8	4.36	0.74
SS2-36	H	36	S1	12	55	72	76						103	10.5	9.96	1.02	45.3	4.62	0.80
SS2-38	H	38	S1	12	55	76	80				—	—	111	11.3	11.2	1.14	50.6	5.16	0.87
SS2-40	H	40	S1	15	55	80	84						118	12.0	12.5	1.27	56.2	5.73	0.93
SS2-42	H	42	S1	15		84	88						125	12.8	13.8	1.41	62.1	6.34	1.01
SS2-44	H	44	S1	15		88	92	20	10	30			133	13.6	15.2	1.55	68.3	6.97	1.10
SS2-45	H	45	S1	15	55	90	94						137	13.9	16.0	1.63	71.6	7.30	1.14
SS2-46	H	46	S1	15		92	96						140	14.3	16.7	1.71	74.9	7.63	1.19
SS2-48	H	48	S1	15		96	100						148	15.1	18.3	1.87	81.7	8.33	1.28
SS2-50	H	50	S1	15		100	104						156	15.9	19.9	2.03	88.8	9.05	1.38
SS2-52	H	52	S1	15		104	108						163	16.6	21.7	2.21	96.2	9.81	1.48
SS2-54	H	54	S1	15	55	108	112						171	17.4	23.4	2.39	104	10.6	1.58
SS2-55	H	55	S1	15		110	114						175	17.8	24.4	2.48	108	11.0	1.64
SS2-56	H	56	S1	15		112	116						179	18.2	25.3	2.58	112	11.4	1.69
SS2-58	H	58	S1	15		116	120						186	19.0	27.3	2.78	120	12.3	1.84
SS2-60	H	60	S1	15		120	124						194	19.8	29.3	2.99	129	13.1	1.96
SS2-62	H	62	S1	15	60	124	128						202	20.6	31.5	3.21	138	14.1	2.08
SS2-64	H	64	S1	15		128	132						209	21.3	33.7	3.44	147	15.0	2.20
SS2-65	H	65	S1	15		130	134						213	21.7	34.8	3.55	152	15.5	2.26
SS2-66	H	66	S1	15		132	136						217	22.1	36.0	3.67	157	16.0	2.33
SS2-68	H	68	S1	15		136	140						225	22.9	38.4	3.91	166	17.0	2.46
SS2-70	H	70	S1	15	60	140	144						232	23.7	40.8	4.16	177	18.0	2.60
SS2-72	H	72	S1	15		144	148						240	24.5	43.3	4.42	187	19.1	2.74
SS2-75	H	75	S1	20		150	154						252	25.7	47.3	4.82	203	20.7	2.92
SS2-76	H	76	S1	20	60	152	156						256	26.1	48.6	4.96	209	21.3	3.00
SS2-80	H	80	S2	20	60	160	164					136	271	27.7	54.3	5.53	232	23.6	2.67
SS2-84	H	84	S2	20	70	168	172					140	287	29.2	60.2	6.14	256	26.1	3.09
SS2-85	H	85	S2	20	70	170	174				12	146	291	29.6	61.7	6.30	262	26.8	3.09
SS2-90	H	90	S2	20	70	180	184					156	310	31.6	69.7	7.11	295	30.1	3.38
SS2-100	H	100	S2	20	70	200	204					176	291	29.7	72.7	7.42	288	29.3	4.01
SS2-120	H	120	S2	20	90	240	244					210	357	36.4	108	11.0	421	43.0	5.91
SS2-150	H	150	S1	25	240	300	304				—	—	455	46.4	174	17.7	672	68.5	14.5

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SS2-12J10**

Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35
Screw size	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3	
Catalog Number	M4						M5				M6			M8	
SS2-12 J BORE	*														
SS2-13 J BORE	*														
SS2-14 J BORE	*														
SS2-15 J BORE		*													
SS2-16 J BORE		*													
SS2-17 J BORE		*													
SS2-18 J BORE		*													
SS2-19 J BORE		*													
SS2-20 J BORE		*													
SS2-21 J BORE		*													
SS2-22 J BORE		*													
SS2-23 J BORE		*													
SS2-24 J BORE		*													
SS2-25 J BORE		*													
SS2-26 J BORE		*													
SS2-27 J BORE		*													
SS2-28 J BORE		*													
SS2-29 J BORE		*													
SS2-30 J BORE		*													
SS2-32 J BORE		*													
SS2-34 J BORE		*													
SS2-35 J BORE		*													
SS2-36 J BORE		*													
SS2-38 J BORE		*													
SS2-40 J BORE				*											
SS2-42 J BORE				*											
SS2-44 J BORE				*											
SS2-45 J BORE				*											
SS2-46 J BORE				*											
SS2-48 J BORE				*											
SS2-50 J BORE				*											
SS2-52 J BORE				*											
SS2-54 J BORE				*											
SS2-55 J BORE				*											
SS2-56 J BORE				*											
SS2-58 J BORE				*											
SS2-60 J BORE				*											
SS2-62 J BORE				*											
SS2-64 J BORE				*											
SS2-65 J BORE				*											
SS2-66 J BORE				*											
SS2-68 J BORE				*											
SS2-70 J BORE				*											
SS2-72 J BORE				*											
SS2-75 J BORE									*						
SS2-76 J BORE									*						
SS2-80 J BORE									*						
SS2-84 J BORE									*						
SS2-85 J BORE									*						
SS2-90 J BORE									*						
SS2-100 J BORE									*						
SS2-120 J BORE									*						

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SS2-16HJ14

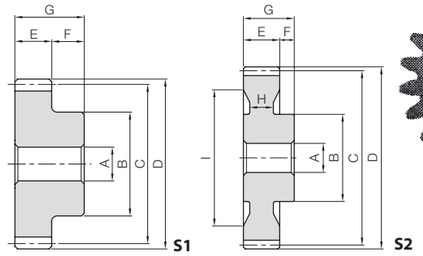


[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

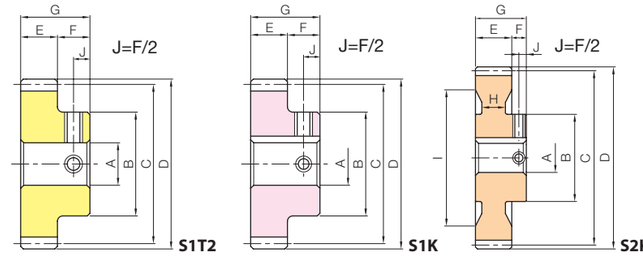
Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating
Backlash	0.14 to 0.28

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



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



H To order Hardened Plus, please specify Catalog No. + H. **Example: SS2.5-12H**

Catalog Number		No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Web thickness	Web O.D.	Allowable torque: Bending strength N·m	Bending strength kgf·m	Surface durability N·m	Surface durability kgf·m	Surface durability (H) N·m	Surface durability (H) kgf·m	Weight (kg)
				A_{H7}	B	C	D	E	F	G	H	I							
SS2.5-12	H	12	S1	12	23	30	35						31.8	3.24	1.77	0.18	8.37	0.85	0.15
SS2.5-13	H	13			25	32.5	37.5						40.9	4.17	2.14	0.22	10.1	1.03	0.18
SS2.5-14	H	14			25	35	40						51.5	5.25	2.53	0.26	11.9	1.21	0.20
SS2.5-15	H	15		15	30	37.5	42.5						57.7	5.89	2.96	0.30	13.9	1.41	0.23
SS2.5-16	H	16			32	40	45						64.0	6.52	3.43	0.35	16.0	1.63	0.27
SS2.5-17	H	17			35	42.5	47.5						70.3	7.17	3.93	0.40	18.3	1.86	0.32
SS2.5-18	H	18			38	45	50						76.7	7.82	4.47	0.46	20.7	2.11	0.37
SS2.5-20	H	20			40	50	55						89.8	9.16	5.66	0.58	26.1	2.66	0.45
SS2.5-22	H	22			44	55	60						103	10.5	6.99	0.71	32.1	3.28	0.56
SS2.5-23	H	23			46	57.5	62.5						110	11.2	7.71	0.79	35.4	3.61	0.61
SS2.5-24	H	24			48	60	65						117	11.9	8.47	0.86	38.8	3.95	0.67
SS2.5-25	H	25			50	62.5	67.5						124	12.6	9.26	0.94	42.3	4.32	0.74
SS2.5-26	H	26			55	65	70						130	13.3	10.1	1.03	45.9	4.68	0.82
SS2.5-27	H	27			60	67.5	72.5						137	14.0	10.9	1.11	49.6	5.06	0.92
SS2.5-28	H	28			60	70	75						144	14.7	11.7	1.20	53.4	5.45	0.97
SS2.5-30	H	30			65	75	80						159	16.2	13.6	1.39	61.6	6.28	1.13
SS2.5-32	H	32			70	80	85				—	—	173	17.6	15.6	1.59	70.3	7.17	1.30
SS2.5-34	H	34			70	85	90						187	19.1	17.7	1.80	79.6	8.11	1.42
SS2.5-35	H	35			70	87.5	92.5						194	19.8	18.8	1.92	84.4	8.61	1.49
SS2.5-36	H	36			70	90	95						201	20.5	20.0	2.04	89.5	9.12	1.56
SS2.5-38	H	38		20		95	100						216	22.0	22.4	2.28	99.9	10.2	1.66
SS2.5-40	H	40				100	105	25	12	37			230	23.5	24.9	2.54	111	11.3	1.81
SS2.5-42	H	42			70	105	110						245	25.0	27.6	2.82	123	12.5	1.97
SS2.5-44	H	44				110	115						260	26.5	30.5	3.11	135	13.8	2.14
SS2.5-45	H	45				112.5	117.5						267	27.2	31.9	3.26	141	14.4	2.22
SS2.5-46	H	46				115	120						274	28.0	33.5	3.41	148	15.1	2.31
SS2.5-48	H	48				120	125						289	29.5	36.7	3.74	161	16.4	2.49
SS2.5-50	H	50			70	125	130						304	31.0	40.0	4.08	175	17.9	2.68
SS2.5-52	H	52				130	135						319	32.5	43.5	4.44	190	19.3	2.88
SS2.5-54	H	54				135	140						334	34.0	47.2	4.81	205	20.9	3.08
SS2.5-56	H	56			70	140	145						349	35.6	51.0	5.20	221	22.5	3.29
SS2.5-58	H	58			70	145	150						364	37.1	55.0	5.61	237	24.2	3.51
SS2.5-60	H	60		25	70	150	155						379	38.6	59.1	6.03	254	25.9	3.69
SS2.5-64	H	64	S2		80	160	165					131	409	41.7	67.8	6.92	290	29.6	3.76
SS2.5-66	H	66			80	165	170					140	424	43.2	72.4	7.39	309	31.5	3.87
SS2.5-68	H	68				170	175				15	140	439	44.7	77.2	7.87	328	33.4	4.13
SS2.5-70	H	70				175	180					146	454	46.3	82.1	8.37	348	35.5	4.30
SS2.5-72	H	72			80	180	185					151	469	47.8	87.1	8.89	368	37.6	4.49
SS2.5-76	H	76				190	195					160	499	50.9	97.7	9.97	411	41.9	4.90
SS2.5-80	H	80				200	205						441	45.0	90.9	9.27	359	36.7	6.50
SS2.5-90	H	90	S1	30	90	225	230				—	—	505	51.5	117	12.0	460	46.9	8.20
SS2.5-100	H	100			90	250	255						569	58.0	147	15.0	573	58.5	10.0
SS2.5-120	H	120	S2		100	300	305				15	272	696	71.0	218	22.2	840	85.7	10.8

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SS2.5-12J12**

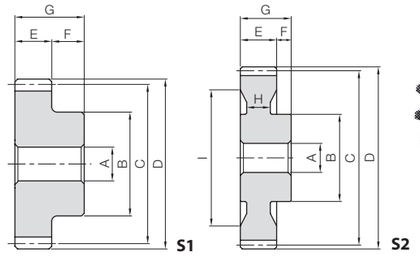
Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40
Screw size	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		12×3.3
Catalog Number	M4					M5				M6			M8		
SS2.5-12 J BORE	*														
SS2.5-13 J BORE	*														
SS2.5-14 J BORE	*														
SS2.5-15 J BORE			*												
SS2.5-16 J BORE			*												
SS2.5-17 J BORE			*												
SS2.5-18 J BORE			*												
SS2.5-20 J BORE			*												
SS2.5-22 J BORE			*												
SS2.5-23 J BORE			*												
SS2.5-24 J BORE			*												
SS2.5-25 J BORE			*												
SS2.5-26 J BORE			*												
SS2.5-27 J BORE			*												
SS2.5-28 J BORE			*												
SS2.5-30 J BORE			*												
SS2.5-32 J BORE			*												
SS2.5-34 J BORE			*												
SS2.5-35 J BORE			*												
SS2.5-36 J BORE			*												
SS2.5-38 J BORE								*							
SS2.5-40 J BORE								*							
SS2.5-42 J BORE								*							
SS2.5-44 J BORE								*							
SS2.5-45 J BORE								*							
SS2.5-46 J BORE								*							
SS2.5-48 J BORE								*							
SS2.5-50 J BORE								*							
SS2.5-52 J BORE								*							
SS2.5-54 J BORE								*							
SS2.5-56 J BORE								*							
SS2.5-58 J BORE								*							
SS2.5-60 J BORE										*					
SS2.5-64 J BORE										*					
SS2.5-66 J BORE										*					
SS2.5-68 J BORE										*					
SS2.5-70 J BORE										*					
SS2.5-72 J BORE										*					
SS2.5-76 J BORE										*					
SS2.5-80 J BORE										*					
SS2.5-90 J BORE												*			
SS2.5-100 J BORE												*			
SS2.5-120 J BORE												*			

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SS2.5-14HJ14

[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.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

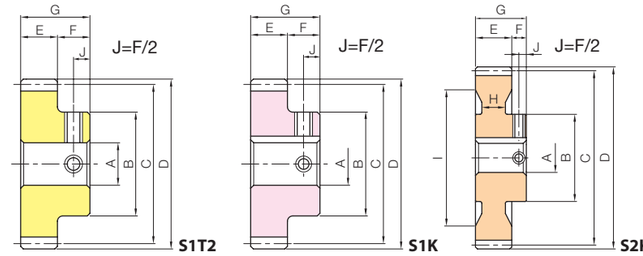
Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating
Backlash	0.14 to 0.32

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



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



To order Hardened Plus, please specify Catalog No. + H. **Example: SS3-12H**

Catalog Number	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Web thickness	Web O.D.	Allowable torque: Bending strength		Surface durability		Surface durability (H)		Weight (kg)
			A_{H7}	B	C	D	E	F	G	H	I	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m	
SS3-12	12	S1	15	28	36	42						54.9	5.59	3.12	0.32	14.6	1.49	0.25
SS3-14	14			32	42	48						88.9	9.07	4.47	0.46	20.8	2.12	0.36
SS3-15	15			36	45	51						99.7	10.2	5.23	0.53	24.2	2.47	0.43
SS3-16	16			38	48	54						111	11.3	6.05	0.62	28.0	2.85	0.50
SS3-17	17			39	51	57						122	12.4	6.93	0.71	31.9	3.26	0.56
SS3-18	18			40	54	60						133	13.5	7.87	0.80	36.2	3.69	0.62
SS3-19	19			45	57	63						144	14.7	8.88	0.91	40.8	4.16	0.73
SS3-20	20			50	60	66						155	15.8	9.95	1.02	45.6	4.65	0.83
SS3-21	21			52	63	69						167	17.0	11.1	1.13	50.7	5.17	0.92
SS3-22	22			54	66	72						178	18.2	12.3	1.25	56.1	5.72	1.01
SS3-23	23			56	69	75						190	19.4	13.6	1.38	61.7	6.29	1.11
SS3-24	24			58	72	78						202	20.6	14.9	1.52	67.7	6.90	1.21
SS3-25	25		20	60	75	81						214	21.8	16.3	1.66	73.9	7.53	1.26
SS3-26	26			65	78	84						226	23.0	17.7	1.81	80.1	8.16	1.41
SS3-27	27			65	81	87				—	—	237	24.2	19.2	1.96	86.5	8.82	1.49
SS3-28	28			70	84	90						250	25.4	20.7	2.11	93.2	9.50	1.65
SS3-29	29			70	87	93						262	26.7	22.3	2.27	100	10.2	1.74
SS3-30	30			75	90	96						274	27.9	24.0	2.44	107	10.9	1.91
SS3-32	32			75	96	102						298	30.4	27.4	2.80	123	12.5	2.11
SS3-34	34			80	102	108						323	32.9	31.2	3.18	139	14.1	2.41
SS3-35	35		25	80	105	111						335	34.2	33.1	3.38	147	15.0	2.52
SS3-36	36				108	114						348	35.5	35.2	3.59	156	15.9	2.64
SS3-38	38				114	120						373	38.0	39.4	4.02	174	17.8	2.82
SS3-40	40				120	126	30	15	45			398	40.6	44.0	4.49	193	19.1	3.08
SS3-42	42				126	132						423	43.2	48.9	4.98	214	21.8	3.35
SS3-44	44			80	132	138						449	45.7	54.0	5.50	235	24.0	3.64
SS3-45	45				135	141						461	47.0	56.6	5.78	246	25.1	3.79
SS3-46	46				138	144						474	48.3	59.4	6.05	257	26.2	3.94
SS3-48	48				144	150						500	50.9	65.0	6.63	281	28.6	4.25
SS3-50	50				150	156						525	53.6	70.9	7.23	305	31.1	4.58
SS3-52	52	S2		80	156	162					126	551	56.2	77.1	7.86	330	33.7	4.38
SS3-54	54				162	168					132	577	58.8	83.6	8.52	357	36.4	4.61
SS3-55	55				165	171				16	131	590	60.1	86.9	8.86	370	37.8	4.81
SS3-56	56				168	174					134	602	61.4	90.3	9.21	384	39.2	4.94
SS3-58	58				174	180					144	628	64.1	97.3	9.92	413	42.1	5.10
SS3-60	60	S1		80	180	186				—	—	654	66.7	105	10.7	442	45.1	6.41
SS3-64	64	S2		80	192	198					158	588	60.0	99.9	10.2	396	40.4	5.99
SS3-65	65			80	195	201					161	599	61.1	103	10.5	409	41.7	6.13
SS3-66	66			90	198	204					160	610	62.2	107	10.9	422	43.1	6.67
SS3-68	68			90	204	210					170	632	64.4	114	11.6	450	45.8	6.86
SS3-70	70		25	90	210	216				16	176	654	66.6	121	12.4	478	48.7	7.15
SS3-72	72				216	222					182	675	68.9	129	13.1	507	51.7	7.46
SS3-75	75				225	231					190	708	72.2	141	14.3	552	56.3	7.95
SS3-76	76				228	234					190	719	73.3	145	14.8	567	57.9	8.20
SS3-80	80		30		240	246					200	763	77.8	162	16.5	632	64.4	8.85
SS3-90	90		30	100	270	276					240	872	89.0	208	21.2	809	82.4	10.6
SS3-100	100			100	300	306					270	983	100	261	26.6	1010	103	12.5
SS3-120	120			130	360	366					330	1200	123	386	39.4	1480	151	18.1

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SS3-12J15**

Bore H7 / Keyway Js9 / Screw size / Catalog Number	* The product shapes of J Series items are identified by background color.															
	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	5×2.3			6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M4			M5				M6			M8			M10	
SS3-12 J BORE	✻														
SS3-14 J BORE	✻														
SS3-15 J BORE	✻														
SS3-16 J BORE	✻														
SS3-17 J BORE	✻														
SS3-18 J BORE	✻														
SS3-19 J BORE	✻														
SS3-20 J BORE	✻														
SS3-21 J BORE	✻														
SS3-22 J BORE	✻														
SS3-23 J BORE	✻														
SS3-24 J BORE	✻														
SS3-25 J BORE						✻									
SS3-26 J BORE						✻									
SS3-27 J BORE						✻									
SS3-28 J BORE						✻									
SS3-29 J BORE						✻									
SS3-30 J BORE						✻									
SS3-32 J BORE						✻									
SS3-34 J BORE						✻									
SS3-35 J BORE						✻									
SS3-36 J BORE						✻									
SS3-38 J BORE								✻							
SS3-40 J BORE								✻							
SS3-42 J BORE								✻							
SS3-44 J BORE								✻							
SS3-45 J BORE								✻							
SS3-46 J BORE								✻							
SS3-48 J BORE								✻							
SS3-50 J BORE								✻							
SS3-52 J BORE								✻							
SS3-54 J BORE								✻							
SS3-55 J BORE								✻							
SS3-56 J BORE								✻							
SS3-58 J BORE								✻							
SS3-60 J BORE								✻							
SS3-64 J BORE								✻							
SS3-65 J BORE								✻							
SS3-66 J BORE								✻							
SS3-68 J BORE								✻							
SS3-70 J BORE								✻							
SS3-72 J BORE								✻							
SS3-75 J BORE								✻							
SS3-76 J BORE								✻							
SS3-80 J BORE										✻					
SS3-90 J BORE										✻					
SS3-100 J BORE										✻					
SS3-120 J BORE										✻					

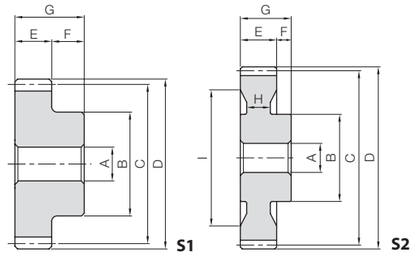
To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SS3-14HJ16

[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.
② "✻" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

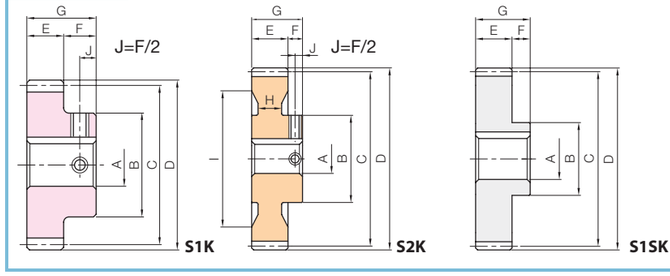
Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coated (excludes semi-custom products)
Backlash	0.18 to 0.38

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



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



To order Hardened Plus, please specify Catalog No. + H. Example: SS4-12H

Catalog Number		No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Web thickness	Web O.D.	Allowable torque: Bending strength N·m	Bending strength kgf·m	Surface durability N·m	Surface durability kgf·m	Surface durability (H) N·m	Surface durability (H) kgf·m	Weight (kg)
				A_{H7}	B	C	D	E	F	G	H	I							
SS4-12	H	12	S1	20	35	48	56	40	20	60	—	—	130	13.3	7.62	0.78	35.3	3.59	0.57
SS4-14	H	14			40	56	64						211	21.5	10.9	1.11	50.1	5.11	0.82
SS4-15	H	15			45	60	68						236	24.1	12.8	1.30	58.4	5.96	0.99
SS4-16	H	16			50	64	72						262	26.7	14.7	1.50	67.3	6.87	1.17
SS4-17	H	17			53	68	76						288	29.4	16.9	1.72	76.9	7.85	1.34
SS4-18	H	18			55	72	80						314	32.0	19.2	1.96	87.2	8.89	1.50
SS4-19	H	19			60	76	84						341	34.8	21.7	2.21	98.1	10.0	1.72
SS4-20	H	20			65	80	88						368	37.5	24.3	2.48	110	11.2	1.95
SS4-21	H	21			69	84	92						395	40.3	27.1	2.76	122	12.4	2.18
SS4-22	H	22			73	88	96						423	43.1	30.1	3.06	135	13.8	2.42
SS4-23	H	23			77	92	100						450	45.9	33.2	3.38	148	15.1	2.67
SS4-24	H	24			80	96	104						478	48.8	36.4	3.72	163	16.6	2.91
SS4-25	H	25			84	100	108						506	51.6	39.9	4.07	178	18.1	3.19
SS4-26	H	26			87	104	112						534	54.5	43.3	4.42	192	19.6	3.45
SS4-27	H	27			90	108	116						563	57.4	46.9	4.78	208	21.2	3.73
SS4-28	H	28			95	112	120						591	60.3	50.6	5.16	224	22.8	4.06
SS4-29	H	29			95	116	124						620	63.2	54.5	5.56	241	24.5	4.28
SS4-30	H	30			100	120	128						649	66.2	58.7	5.98	258	26.3	4.64
SS4-32	H	32		22	100	128	136	40	16	56	26	150	707	72.1	67.4	6.87	294	30.0	4.86
SS4-34	H	34			100	136	144						766	78.1	76.7	7.82	333	33.9	5.38
SS4-35	H	35			140	148							795	81.1	81.6	8.32	353	36.0	5.65
SS4-36	H	36			144	152							825	84.1	86.7	8.84	374	38.1	5.93
SS4-38	H	38			152	160							884	90.1	97.3	9.92	418	42.6	6.52
SS4-40	H	40		25	160	168							943	96.2	109	11.1	464	47.3	7.08
SS4-42	H	42			168	176							1000	102	120	12.3	512	52.2	7.73
SS4-44	H	44			176	184							1060	108	133	13.6	563	57.4	8.41
SS4-45	H	45			180	188							1090	112	139	14.2	590	60.1	8.76
SS4-46	H	46			184	192							1120	115	146	14.9	617	62.9	9.12
SS4-48	H	48	S2	30	192	200							987	101	133	13.6	528	53.9	9.12
SS4-50	H	50			200	208						158	1040	106	146	14.8	575	58.6	9.60
SS4-52	H	52			208	216						165	1090	111	158	16.1	624	63.7	10.2
SS4-54	H	54			216	224						175	1140	116	172	17.5	676	68.9	10.8
SS4-55	H	55			220	228						178	1160	119	179	18.2	702	71.6	11.1
SS4-56	H	56			224	232						182	1190	121	186	18.9	729	74.3	11.5
SS4-58	H	58			232	240						190	1240	127	200	20.4	785	80.0	12.5
SS4-60	H	60			240	248						198	1290	132	215	22	842	85.9	13.2
SS4-62	H	62			248	256						210	1340	137	231	23.6	902	92.0	13.1
SS4-64	H	64			256	264						214	1390	142	248	25.2	964	98.3	13.4
SS4-65	H	65			260	268						218	1420	145	256	26.1	996	102	13.7
SS4-66	H	66			264	272						220	1450	148	265	27	1030	105	14.7
SS4-68	H	68			272	280						225	1500	153	282	28.8	1090	112	15.5
SS4-70	H	70			280	288						233	1550	158	300	30.6	1160	119	16.1
SS4-80	H	80			320	328						273	1810	184	400	40.8	1540	157	19.3
SS4-90S	S	90	S1	40	180	360	368	40	16	56	—	—	1910	195	467	47.6	—	—	34.6
SS4-100S	S	100			200	400	408						2150	219	586	59.7			42.9
SS4-110S	S	110			220	440	448						2390	244	720	73.4			52.0
SS4-120S	S	120			240	480	488						2630	269	869	88.6			62.0

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

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

To order J Series products, please specify: Catalog No. + J + BORE. Example: SS4-14J20

Bore H7	* The product shapes of J Series items are identified by background color.												
Keyway Js9	20	22	25	28	30	32	35	40	45	50	55	60	65
Screw size	6×2.8		8×3.3			10×3.3		12×3.3	14×3.8		16×4.3	18×4.4	
Catalog Number	M5		M6			M8			M10		M12		
SS4-12													
SS4-14 J BORE	*												
SS4-15 J BORE	*												
SS4-16 J BORE	*												
SS4-17 J BORE	*												
SS4-18 J BORE	*												
SS4-19 J BORE	*												
SS4-20 J BORE	*												
SS4-21 J BORE	*												
SS4-22 J BORE	*												
SS4-23 J BORE	*												
SS4-24 J BORE	*												
SS4-25 J BORE	*												
SS4-26 J BORE	*												
SS4-27 J BORE	*												
SS4-28 J BORE	*												
SS4-29 J BORE	*												
SS4-30 J BORE	*												
SS4-32 J BORE		*											
SS4-34 J BORE		*											
SS4-35 J BORE		*											
SS4-36 J BORE		*											
SS4-38 J BORE		*											
SS4-40 J BORE			*										
SS4-42 J BORE			*										
SS4-44 J BORE			*										
SS4-45 J BORE			*										
SS4-46 J BORE			*										
SS4-48 J BORE			*										
SS4-50 J BORE					*								
SS4-52 J BORE					*								
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SS4-58 J BORE					*								
SS4-60 J BORE					*								
SS4-62 J BORE					*								
SS4-64 J BORE					*								
SS4-65 J BORE					*								
SS4-66 J BORE					*								
SS4-68 J BORE					*								
SS4-70 J BORE					*								
SS4-80 J BORE					*								
SS4-90SJ BORE								Ask for Quote					
SS4-100SJ BORE								Ask for Quote					
SS4-110SJ BORE								Ask for Quote					
SS4-120SJ BORE								Ask for Quote					

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SS4-14HJ22

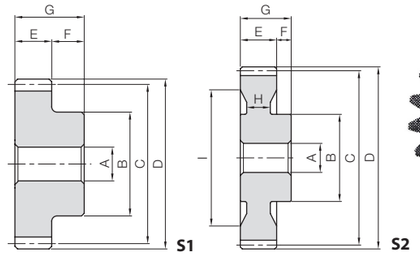
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Please make use of GCSW for Web (gear calculation software).

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 coated (excludes semi-custom products)
Backlash	0.20 to 0.44

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



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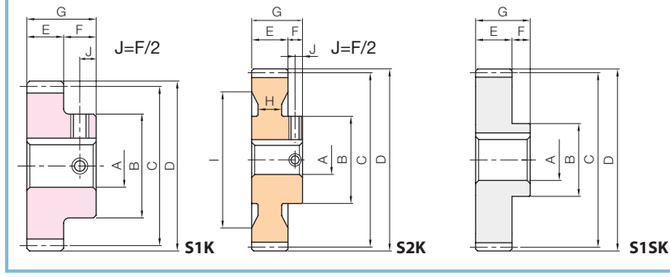
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



To order Hardened Plus, please specify Catalog No. + H. **Example: SS5-12H**

Catalog Number		No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Web thickness	Web O.D.	Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability (H)		Weight (kg)
				A_{H7}	B	C	D	E	F	G	H	I	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m	
SS5-12	H	12	S1	22	46	60	70		25	75	—	—	254	25.9	15.2	1.55	69.7	7.11	1.21
SS5-13	H	13			50	65	75						327	33.4	18.4	1.88	84.0	8.57	1.46
SS5-14	H	14			52	70	80						412	42.0	21.8	2.22	99.1	10.1	1.70
SS5-15	H	15			60	75	85						462	47.1	25.5	2.60	115	11.8	2.07
SS5-16	H	16			65	80	90						512	52.2	29.5	3.01	133	13.6	2.40
SS5-17	H	17			68	85	95						562	57.3	33.8	3.45	152	15.5	2.72
SS5-18	H	18			70	90	100						614	62.6	38.4	3.92	172	17.6	3.03
SS5-19	H	19			76	95	105						666	67.9	43.4	4.42	194	19.8	3.45
SS5-20	H	20			82	100	110						718	73.3	48.6	4.96	217	22.1	3.90
SS5-21	H	21		25	90	105	115						772	78.7	54.2	5.53	241	24.5	4.36
SS5-22	H	22			95	110	120						825	84.1	60.1	6.13	266	27.1	4.83
SS5-23	H	23			100	115	125						879	89.7	66.3	6.77	293	29.9	5.33
SS5-24	H	24			100	120	130						934	95.2	73.0	7.45	321	32.7	5.69
SS5-25	H	25			105	125	135						989	101	80.0	8.16	350	35.7	6.23
SS5-26	H	26			110	130	140						1040	106	87.1	8.88	379	38.7	6.79
SS5-27	H	27			110	135	145						1100	112	94.4	9.62	410	41.8	7.19
SS5-28	H	28			110	140	150						1160	118	102	10.4	441	45.0	7.62
SS5-29	H	29			115	145	155						1210	124	110	11.2	474	48.4	8.23
SS5-30	H	30			120	150	160						1270	129	118	12.1	508	51.8	8.87
SS5-32	H	32		30	120	160	170						1380	141	136	13.8	580	59.1	9.36
SS5-34	H	34			120	170	180						1500	153	154	15.7	656	66.9	10.4
SS5-35	H	35			120	175	185						1550	158	164	16.7	696	71.0	10.9
SS5-36	H	36			120	180	190						1610	164	174	17.8	737	75.1	11.5
SS5-38	H	38			120	190	200						1730	176	195	19.9	823	83.9	12.6
SS5-40	H	40	S2		120	200	210				36	160	1540	157	182	18.5	719	73.3	13.2
SS5-42	H	42			120	210	220					170	1630	167	202	20.6	796	81.2	14.2
SS5-44	H	44			120	220	230					175	1730	177	223	22.8	878	89.5	15.4
SS5-45	H	45			120	225	235		21	71		185	1780	182	234	23.9	920	93.8	15.8
SS5-46	H	46			120	230	240				30	185	1830	187	246	25.1	963	98.2	16.2
SS5-48	H	48			120	240	250					200	1930	197	269	27.5	1050	107	17.0
SS5-50	H	50	S1		120	250	260				—	—	2030	207	294	30.0	1150	117	20.7
SS5-52	H	52	S2		130	260	270				30	220	2130	217	320	32.6	1250	127	19.8
SS5-54	H	54			130	270	280					230	2220	227	347	35.4	1350	137	20.9
SS5-56	H	56			130	280	290					240	2320	237	375	38.3	1450	148	22.0
SS5-58	H	58			130	290	300					240	2420	247	405	41.3	1570	160	23.8
SS5-60	H	60			130	300	310					250	2520	257	435	44.4	1680	171	25.1
SS5-62S	S	62	S1	40	160	310	320	50	21	71	—	—	2420	247	423	43.1	—	—	32.2
SS5-64S	S	64			160	320	330						2520	257	453	46.2			34.2
SS5-65S	S	65			160	325	335						2560	261	468	47.7			35.2
SS5-66S	S	66			170	330	340						2610	266	484	49.3			36.6
SS5-68S	S	68			170	340	350						2700	275	516	52.6			38.7
SS5-70S	S	70			180	350	360						2790	285	549	56.0			41.3
SS5-80S	S	80			200	400	410						3260	333	732	74.7			53.8
SS5-90S	S	90			230	450	460						3730	380	944	96.3			68.6
SS5-100S	S	100			250	500	510						4200	428	1190	121			84.5
SS5-110S	S	110			280	550	560						4670	476	1460	149			103
SS5-120S	S	120			300	600	610						4780	487	1640	167			122

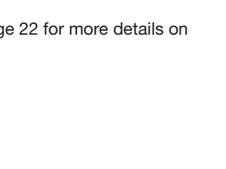
[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SS5-13J22**

Bore H7	* The product shapes of J Series items are identified by background color.																
Keyway Js9	22	25	28	30	32	35	40	45	50	55	60	65	70	75	80	85	
Screw size	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	M5	M6			M8			M10		M12			M16				
SS5-12																	
SS5-13 J BORE	*																
SS5-14 J BORE	*																
SS5-15 J BORE	*																
SS5-16 J BORE	*																
SS5-17 J BORE	*																
SS5-18 J BORE	*																
SS5-19 J BORE	*																
SS5-20 J BORE	*																
SS5-21 J BORE		*															
SS5-22 J BORE		*															
SS5-23 J BORE		*															
SS5-24 J BORE		*															
SS5-25 J BORE		*															
SS5-26 J BORE		*															
SS5-27 J BORE		*															
SS5-28 J BORE		*															
SS5-29 J BORE		*															
SS5-30 J BORE		*															
SS5-32 J BORE				*													
SS5-34 J BORE				*													
SS5-35 J BORE				*													
SS5-36 J BORE				*													
SS5-38 J BORE				*													
SS5-40 J BORE				*													
SS5-42 J BORE				*													
SS5-44 J BORE				*													
SS5-45 J BORE				*													
SS5-46 J BORE				*													
SS5-48 J BORE				*													
SS5-50 J BORE				*													
SS5-52 J BORE				*													
SS5-54 J BORE				*													
SS5-56 J BORE				*													
SS5-58 J BORE				*													
SS5-60 J BORE				*													
SS5-62SJ BORE							Ask for Quote										
SS5-64SJ BORE							Ask for Quote										
SS5-65SJ BORE							Ask for Quote										
SS5-66SJ BORE							Ask for Quote										
SS5-68SJ BORE							Ask for Quote										
SS5-70SJ BORE							Ask for Quote										
SS5-80SJ BORE							Ask for Quote										
SS5-90SJ BORE							Ask for Quote										
SS5-100SJ BORE							Ask for Quote										
SS5-110SJ BORE							Ask for Quote										
SS5-120SJ BORE							Ask for Quote										

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SS5-14HJ25

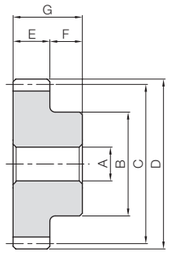


[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

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 coated (excludes semi-custom products)
Backlash	0.22 to 0.48

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



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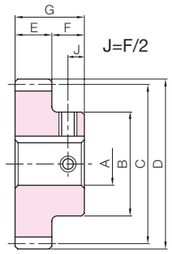
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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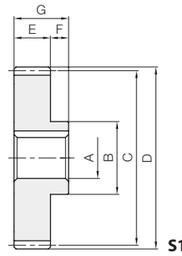

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To order Hardened Plus, please specify Catalog No. + H. **Example: SS6-12H**

Catalog Number		No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability (H)		Weight (kg)
				A_{H7}	B	C	D	E	F	G	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m	
SS6-12	H	12	S1	25	55	72	84	60	28	88	439	44.8	26.8	2.73	122	12.4	2.10
SS6-14	H	14			60	84	96				711	72.5	38.4	3.92	173	17.6	2.89
SS6-15	H	15			70	90	102				798	81.4	44.9	4.58	201	20.5	3.50
SS6-16	H	16			75	96	108				884	90.2	52.0	5.30	232	23.7	4.04
SS6-17	H	17			78	102	114				972	99.1	59.6	6.07	265	27.0	4.56
SS6-18	H	18			80	108	120				1060	108	67.7	6.90	300	30.6	5.08
SS6-19	H	19			90	114	126				1150	117	76.4	7.79	338	34.4	5.87
SS6-20	H	20			100	120	132				1240	127	85.9	8.75	377	38.5	6.71
SS6-21	H	21		28	105	126	138				1330	136	95.9	9.78	419	42.7	7.35
SS6-22	H	22			110	132	144				1430	145	107	10.9	463	47.3	8.11
SS6-23	H	23			115	138	150				1520	155	118	12.0	510	52.0	8.90
SS6-24	H	24			120	144	156				1610	165	129	13.2	559	57.0	9.73
SS6-25	H	25			125	150	162				1710	174	142	14.5	610	62.2	10.6
SS6-26	H	26			130	156	168				1800	184	154	15.7	661	67.4	11.5
SS6-27	H	27			135	162	174				1900	194	167	17.0	713	72.7	12.4
SS6-28	H	28			140	168	180				2000	204	181	18.4	768	78.3	13.4
SS6-30	H	30		30	150	180	192				2190	223	209	21.3	884	90.2	15.4
SS6-32	H	32			150	192	204				1990	203	200	20.4	792	80.8	16.4
SS6-34	H	34			150	204	216				2150	220	228	23.2	899	91.7	18.1
SS6-35	H	35			150	210	222				2240	228	242	24.7	955	97.4	19.0
SS6-36	H	36			150	216	228				2320	237	258	26.3	1010	103	20.0
SS6-38	H	38			150	228	240				2490	254	289	29.5	1130	116	22.0
SS6-40	H	40			150	240	252		23	83	2650	271	323	33.0	1260	129	24.0
SS6-42	H	42		40	150	252	264				2820	288	359	36.6	1400	143	25.9
SS6-44	H	44			150	264	276				2990	305	397	40.5	1540	157	28.2
SS6-45	H	45			180	270	282				3080	314	416	42.5	1620	165	30.7
SS6-46	H	46			180	276	288				3160	322	436	44.5	1690	173	32.0
SS6-48	H	48			180	288	300				3330	340	478	48.8	1850	189	34.5
SS6-50	H	50			180	300	312				3500	357	522	53.2	2020	206	37.1
SS6-52S	S	52	S1	40	180	312	324	60	23	83	3390	346	515	52.5	—	—	39.8
SS6-54S	S	54			180	324	336				3550	362	558	56.9			42.6
SS6-55S	S	55			180	330	342				3630	370	581	59.2			44.1
SS6-56S	S	56			180	336	348				3710	378	603	61.5			45.5
SS6-58S	S	58			180	348	360				3870	394	651	66.4			48.6
SS6-60S	S	60			180	360	372				4030	411	700	71.4			51.7
SS6-62S	S	62			190	372	384				4190	427	751	76.6			55.5
SS6-64S	S	64			190	384	396				4350	443	804	82.0			58.9
SS6-65S	S	65			200	390	402				4430	451	832	84.8			61.1
SS6-66S	S	66			200	396	408				4510	460	860	87.7			62.9
SS6-68S	S	68			200	408	420				4670	476	917	93.5			66.4
SS6-70S	S	70			210	420	432				4830	492	976	99.5			70.7
SS6-80S	S	80			240	480	492				5630	575	1300	133			92.6
SS6-90S	S	90			270	540	552				6440	657	1680	172			117
SS6-100S	S	100			300	600	612				6740	687	1970	200			145

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SS6-12J25**

Bore H7	* The product shapes of J Series items are identified by background color.															
Keyway Js9	25	28	30	32	35	40	45	50	55	60	65	70	75	80	85	
Screw size	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	M6			M8			M10		M12			M16				
SS6-12 J BORE	*															
SS6-14 J BORE	*															
SS6-15 J BORE	*															
SS6-16 J BORE	*															
SS6-17 J BORE	*															
SS6-18 J BORE	*															
SS6-19 J BORE	*															
SS6-20 J BORE	*															
SS6-21 J BORE		*														
SS6-22 J BORE		*														
SS6-23 J BORE		*														
SS6-24 J BORE		*														
SS6-25 J BORE		*														
SS6-26 J BORE		*														
SS6-27 J BORE		*														
SS6-28 J BORE		*														
SS6-30 J BORE			*													
SS6-32 J BORE			*													
SS6-34 J BORE			*													
SS6-35 J BORE			*													
SS6-36 J BORE			*													
SS6-38 J BORE			*													
SS6-40 J BORE			*													
SS6-42 J BORE						*										
SS6-44 J BORE						*										
SS6-45 J BORE						*										
SS6-46 J BORE						*										
SS6-48 J BORE						*										
SS6-50 J BORE						*										
SS6-52SJ BORE	Ask for Quote															
SS6-54SJ BORE	Ask for Quote															
SS6-55SJ BORE	Ask for Quote															
SS6-56SJ BORE	Ask for Quote															
SS6-58SJ BORE	Ask for Quote															
SS6-60SJ BORE	Ask for Quote															
SS6-62SJ BORE	Ask for Quote															
SS6-64SJ BORE	Ask for Quote															
SS6-65SJ BORE	Ask for Quote															
SS6-66SJ BORE	Ask for Quote															
SS6-68SJ BORE	Ask for Quote															
SS6-70SJ BORE	Ask for Quote															
SS6-80SJ BORE	Ask for Quote															
SS6-90SJ BORE	Ask for Quote															
SS6-100SJ BORE	Ask for Quote															

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SS6-14HJ28

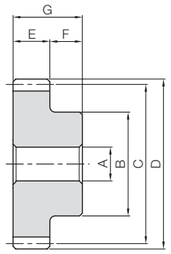
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

Please make use of GCSW for Web (gear calculation software).

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 coated (excludes semi-custom products)

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



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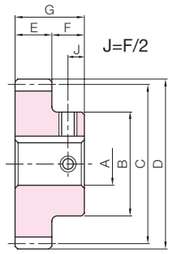
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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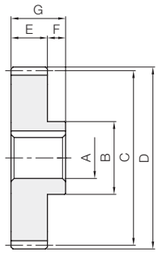

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To order Hardened Plus, please specify Catalog No. + H. **Example: SS8-12H**

Catalog Number	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability (H)		Weight (kg)
			A_{H7}	B	C	D	E	F	G	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m	
SS8-12 (H)	12	S1	28	75	96	112	75	35	110	975	99.5	62.6	6.39	280	28.5	4.94
SS8-13 (H)	13			80	104	120				1260	128	75.2	7.66	334	34.1	5.85
SS8-14 (H)	14			85	112	128				1580	161	88.9	9.06	393	40.1	6.83
SS8-15 (H)	15			90	120	136				1770	181	104	10.6	458	46.7	7.87
SS8-16 (H)	16			100	128	144				1970	200	121	12.3	527	53.7	9.20
SS8-17 (H)	17			105	136	152				2160	220	139	14.1	601	61.3	10.4
SS8-18 (H)	18			110	144	160				2360	240	158	16.1	681	69.4	11.7
SS8-19 (H)	19			120	152	168				2560	261	178	18.2	765	78.0	13.3
SS8-20 (H)	20			130	160	176				2760	281	200	20.4	855	87.2	15.0
SS8-21 (H)	21		30	140	168	184				2960	302	223	22.8	949	96.8	16.7
SS8-22 (H)	22			150	176	192				3170	323	248	25.3	1050	107	18.6
SS8-23 (H)	23			155	184	200				3380	344	273	27.9	1150	118	20.2
SS8-24 (H)	24			160	192	208				2990	305	250	25.5	991	101	22.0
SS8-25 (H)	25			170	200	216				3160	323	273	27.8	1080	110	24.1
SS8-26 (H)	26			170	208	224				3340	341	297	30.3	1170	119	25.6
SS8-27 (H)	27			170	216	232				3520	359	322	32.8	1270	129	27.2
SS8-28 (H)	28			180	224	240				3700	377	348	35.5	1370	139	29.6
SS8-30 (H)	30			180	240	256				4060	414	404	41.2	1580	161	33.0
SS8-32S (S)	32	S1	40	200	256	272	75	35	110	4080	416	421	42.9	—	—	37.9
SS8-34S (S)	34			210	272	288				4420	451	479	48.9			42.6
SS8-35S (S)	35			210	280	296				4590	468	510	52.0			44.7
SS8-36S (S)	36			210	288	304				4760	486	542	55.3			46.8
SS8-38S (S)	38			220	304	320				5100	520	608	62.0			52.1
SS8-40S (S)	40			220	320	336				5450	555	679	69.3			56.7
SS8-42S (S)	42			230	336	352				5790	591	754	76.9			62.5
SS8-44S (S)	44			230	352	368				6140	626	834	85.0			67.6
SS8-45S (S)	45			230	360	376				6310	644	875	89.2			70.3
SS8-46S (S)	46			240	368	384				6490	662	917	93.6			74.0
SS8-48S (S)	48			240	384	400				6840	697	1010	103			79.5
SS8-50S (S)	50			240	400	416				7190	733	1100	112			85.3
SS8-52S (S)	52			240	416	432				7540	769	1200	122			91.4
SS8-54S (S)	54			240	432	448				7890	805	1300	132			97.6
SS8-55S (S)	55			240	440	456				8070	823	1350	138			101
SS8-56S (S)	56			240	448	464				8240	841	1400	143			104
SS8-58S (S)	58			240	464	480				8600	877	1510	154			111
SS8-59S (S)	59			240	472	488				8770	895	1570	160			114
SS8-60S (S)	60			240	480	496				8950	913	1630	166			118

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SS8-12J28**

Bore H7	* The product shapes of J Series items are identified by background color.																							
Keyway Js9	28	30	32	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	120	130	140		
Screw size	8×3.3		10×3.3		12×3.3	14×3.8		16×4.3	18×4.4		20×4.9		22×5.4		25×5.4		28×6.4			32×7.4			36×8.4	
Catalog Number	M6		M8			M10		M12			M16				M20					M24				
SS8-12 J BORE																								
SS8-13 J BORE																								
SS8-14 J BORE																								
SS8-15 J BORE																								
SS8-16 J BORE																								
SS8-17 J BORE																								
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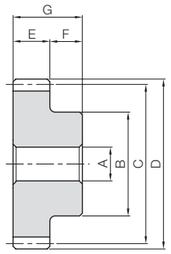
SS8-27 J BORE																								
SS8-28 J BORE																								
SS8-30 J BORE																								
SS8-32SJ BORE	Ask for Quote																							
SS8-34SJ BORE	Ask for Quote																							
SS8-35SJ BORE	Ask for Quote																							
SS8-36SJ BORE	Ask for Quote																							
SS8-38SJ BORE	Ask for Quote																							
SS8-40SJ BORE	Ask for Quote																							
SS8-42SJ BORE	Ask for Quote																							
SS8-44SJ BORE	Ask for Quote																							
SS8-45SJ BORE	Ask for Quote																							
SS8-46SJ BORE	Ask for Quote																							
SS8-48SJ BORE	Ask for Quote																							
SS8-50SJ BORE	Ask for Quote																							
SS8-52SJ BORE	Ask for Quote																							
SS8-54SJ BORE	Ask for Quote																							
SS8-55SJ BORE	Ask for Quote																							
SS8-56SJ BORE	Ask for Quote																							
SS8-58SJ BORE	Ask for Quote																							
SS8-59SJ BORE	Ask for Quote																							
SS8-60SJ BORE	Ask for Quote																							

[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.
② Hardened Plus is not available for products listed in the J Series lineup.

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 coated (excludes semi-custom products)

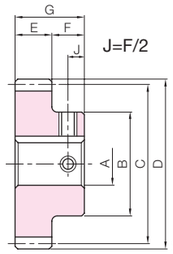
* The precision grade of J Series products is equivalent to the value shown in the table.



S1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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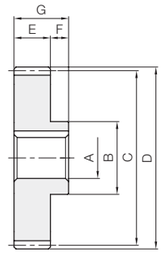

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To order Hardened Plus, please specify Catalog No. + H. **Example: SS10-15H**

Catalog Number	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Allowable torque						Weight (kg)
										Bending strength		Surface durability		Surface durability (H)		
			A_{H7}	B	C	D	E	F	G	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m	
SS10-15 (H)	15	S1	30	115	150	170	90	40	130	3330	323	339	20.7	871	88.8	15.0
SS10-20 (H)	20		30	165	200	220				4310	323	440	33.0	1280	130	28.2
SS10-25 (H)	25		40	200	250	270				5930	529	605	54.0	2060	211	43.3

Catalog Number	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)
			A_{H7}	B	C	D	E	F	G	Bending strength	Surface durability	Bending strength	Surface durability		
SS10-26S (S)	26	S1	50	210	260	280	90	40	130	5790	522	590	53.3	0.34~0.68	46.4
SS10-27S (S)	27			220	270	290				6100	566	622	57.7		50.4
SS10-28S (S)	28			220	280	300				6400	612	653	62.4		53.4
SS10-29S (S)	29			230	290	310				6720	660	685	67.3		57.7
SS10-30S (S)	30			240	300	320				7030	710	717	72.4		62.1
SS10-32S (S)	32			250	320	340				7660	815	781	83.1		70.2
SS10-34S (S)	34			260	340	360				8290	929	845	94.7		78.8
SS10-35S (S)	35			260	350	370				8610	988	878	101		82.6
SS10-36S (S)	36			270	360	380				8930	1050	910	107		87.9
SS10-38S (S)	38			270	380	400				9570	1180	976	120		96.1
SS10-40S (S)	40			280	400	420				10200	1320	1040	134		106
SS10-42S (S)	42			290	420	440				10900	1460	1110	149		117
SS10-44S (S)	44			290	440	460				11500	1620	1170	165		126
SS10-45S (S)	45			290	450	470				11800	1700	1210	173		131
SS10-46S (S)	46			290	460	480				12200	1780	1240	182		136
SS10-48S (S)	48			300	480	500				12800	1950	1310	199		148
SS10-50S (S)	50			300	500	520				13500	2140	1370	218		159

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SS10-15J30**

Bore H7	* The product shapes of J Series items are identified by background color.																		
Keyway Js9	30	32	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	
Screw size	8×3.3	10×3.3		12×3.3	14×3.8		16×4.3	18×4.4		20×4.9		22×5.4		25×5.4		28×6.4			
Catalog Number	M6	M8			M10		M12			M16				M20					
SS10-15 J BORE																			
SS10-20 J BORE																			
SS10-25 J BORE																			

Bore H7	* The product shapes of J Series items are identified by background color.																				
Keyway Js9	50	55	60	65	70	75	80	85	90	95	100	105	110	120	130	140	150	160	170	180	190	200
Catalog Number	14×3.8	16×4.3	18×4.4		20×4.9		22×5.4		25×5.4		28×6.4			32×7.4		36×8.4		40×9.4		45×10.4		
SS10-26SJ BORE	Ask for Quote																					
SS10-27SJ BORE	Ask for Quote																					
SS10-28SJ BORE	Ask for Quote																					
SS10-29SJ BORE	Ask for Quote																					
SS10-30SJ BORE	Ask for Quote																					
SS10-32SJ BORE	Ask for Quote																					
SS10-34SJ BORE	Ask for Quote																					
SS10-35SJ BORE	Ask for Quote																					
SS10-36SJ BORE	Ask for Quote																					
SS10-38SJ BORE	Ask for Quote																					
SS10-40SJ BORE	Ask for Quote																					
SS10-42SJ BORE	Ask for Quote																					
SS10-44SJ BORE	Ask for Quote																					
SS10-45SJ BORE	Ask for Quote																					
SS10-46SJ BORE	Ask for Quote																					
SS10-48SJ BORE	Ask for Quote																					
SS10-50SJ BORE	Ask for Quote																					

[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.
② Hardened Plus is not available for products listed in the J Series lineup.

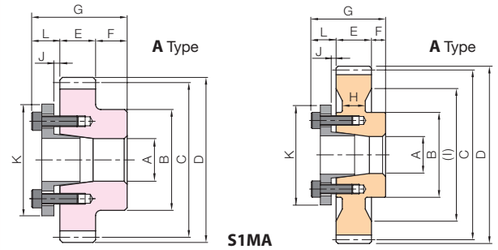
Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

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 coated except for portions given secondary operation

* The precision grade of F Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

F Series



■ Features of F Series

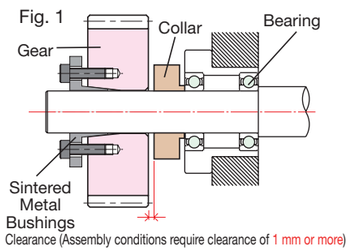
- No rattling of shaft and gear when fastening
- Freely positionable mounting for easy meshing of teeth
- Easily mounted and removed for repeated use
- The bushing slips when overloaded to reduce damage to the gears.

■ Mounting Method and Precautions

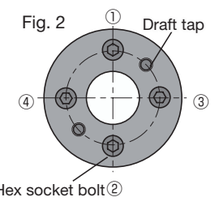
① Shaft diameter recommended tolerance is h7. The limit is h8, but we recommend h6 when minimizing runout. Use 1.6a as reference for the surface roughness of the shaft diameter.
② Wipe away any debris, dirt or oil on the shaft surface and hole of the fastened section with thinner or the like, and lightly apply hydraulic oil #68. Do not apply molybdenum-based oil or oil with additives, as this may cause reduced fastening torque or slippage.
③ Pass completely through the shaft while pressing the bushing flange against the gear before tightening. Removal will not be possible, so be sure to leave a clearance of 1mm or more on the gear rear surface side. (Fig.1)
④ Use a torque wrench to fasten bolts on opposite sides when tightening.
First tighten at 1/4 of the regulated torque, then at 1/2 of the regulated torque, before finally tightening up to the regulated torque. Do not tighten without passing through the shaft, or fasten the bolts after insertion on the draft tap side. (Fig.2)
⑤ If the shaft has a keyway, the fastened section contact area is reduced and the transmission rate is decreased by 15 to 20%.

Catalog Number	No. of teeth	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Web thickness	Web O.D.	Allowable torque (N·m)	
		B	C	D	E	F	H	I	Bending strength	Surface durability
SS1.5-26	26	32	39	42					28.2	2.06
SS1.5-27	27	34	40.5	43.5					29.7	2.23
SS1.5-28	28	36	42	45					31.2	2.41
SS1.5-29	29	37	43.5	46.5					32.7	2.60
SS1.5-30	30	38	45	48					34.2	2.79
SS1.5-32	32	40	48	51					37.3	3.19
SS1.5-34	34	40	51	54					40.4	3.63
SS1.5-35	35	42	52.5	55.5					41.9	3.85
SS1.5-36	36	45	54	57					43.5	4.09
SS1.5-38	38	45	57	60					46.6	4.58
SS1.5-40	40	45	60	63					49.8	5.10
SS1.5-42	42	45	63	66					52.9	5.40
SS1.5-44	44	45	66	69					56.1	5.72
SS1.5-45	45	45	67.5	70.5					57.7	5.88
SS1.5-46	46	45	69	72					59.3	6.04
SS1.5-48	48	45	72	75					62.4	6.37
SS1.5-50	50	45	75	78					65.7	6.69
SS1.5-52	52	50	78	81			—	—	68.9	7.02
SS1.5-54	54	50	81	84	15	10			72.1	7.35
SS1.5-55	55	50	82.5	85.5					73.7	7.51
SS1.5-56	56	50	84	87					75.3	7.68
SS1.5-58	58	50	87	90					78.5	8.01
SS1.5-60	60	50	90	93					81.8	8.34
SS1.5-62	62	55	93	96					85.0	8.67
SS1.5-64	64	55	96	99					88.3	9.00
SS1.5-68	68	55	102	105					94.8	9.66
SS1.5-70	70	55	105	108					98.0	10.0
SS1.5-72	72	55	108	111					101	10.3
SS1.5-75	75	60	112.5	115.5					106	10.8
SS1.5-76	76	60	114	117					108	11.0
SS1.5-80	80	60	120	123					114	11.7
SS1.5-84	84	60	126	129					121	12.3
SS1.5-88	88	60	132	135					128	13.0
SS1.5-90	90	60	135	138					131	13.3
SS1.5-95	95	60	142.5	145.5					139	14.2
SS1.5-100	100	60	150	153			9	125	147	15.0
SS1.5-120	120	70	180	183			10	153	180	18.4
SS1.5-150	150	180	225	228			—	—	192	19.6

* For the backlash of each product, please refer to the dimension table of the original product.



Clearance (Assembly conditions require clearance of 1 mm or more)



■ Removal Method and Precautions

① Turn off the power source (supply), check that no load is applied to the gear, and confirm that there is no danger due to falling, etc.
② Insert removed bolts into all draft taps, and gradually and evenly tighten each bolt in diagonal order until removal is complete.
③ The washer and thread surfaces will be roughened, compromising tightening strength, if the bolts are reused. Consequently, we recommend using new bolts of the same size.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

To order F Series products, please specify: **Catalog Number + F + BORE + A.**

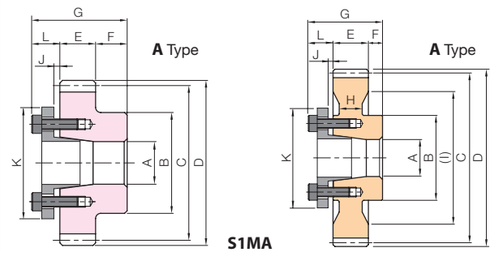
Bore A / Catalog Number	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35
SS1.5-26 F Bore A															
SS1.5-27 F Bore A															
SS1.5-28 F Bore A															
SS1.5-29 F Bore A															
SS1.5-30 F Bore A															
SS1.5-32 F Bore A															
SS1.5-34 F Bore A															
SS1.5-35 F Bore A															
SS1.5-36 F Bore A															
SS1.5-38 F Bore A															
SS1.5-40 F Bore A															
SS1.5-42 F Bore A															
SS1.5-44 F Bore A															
SS1.5-45 F Bore A															
SS1.5-46 F Bore A															
SS1.5-48 F Bore A															
SS1.5-50 F Bore A															
SS1.5-52 F Bore A															
SS1.5-54 F Bore A															
SS1.5-55 F Bore A															
SS1.5-56 F Bore A															
SS1.5-58 F Bore A															
SS1.5-60 F Bore A															
SS1.5-62 F Bore A															
SS1.5-64 F Bore A															
SS1.5-68 F Bore A															
SS1.5-70 F Bore A															
SS1.5-72 F Bore A															
SS1.5-75 F Bore A															
SS1.5-76 F Bore A															
SS1.5-80 F Bore A															
SS1.5-84 F Bore A															
SS1.5-88 F Bore A															
SS1.5-90 F Bore A															
SS1.5-95 F Bore A															
SS1.5-100 F Bore A															
SS1.5-120 F Bore A															
SS1.5-150 F Bore A															
Bore A	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35
Ref. slipping torque N·m	18	23	37	39	42	45	48	49	97	110	124	141	149	163	173
Ref. thrust load kN	3.59	3.76	5.21	5.1	5.17	5.23	5.28	5.12	9.68	9.98	9.90	10.0	9.89	10.1	9.88
Sintered Metal Bushings L	10		12						14						
Sintered Metal Bushings K	29	31	36	37	38	39	40	42	46	47	51	53	56	58	61
Clearance J	2		3												
Total Length G	35		37						39						
Hex socket bolt Qty	3		4												
Hex socket bolt Size	M4×12		M4×15						M5×18						
Hex socket bolt Tightening torque N·m	3.9								7.8						
Bushing weight (g)	20	22	38	40	41	43	45	49	71	71	81	84	93	97	106

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 coated except for portions given secondary operation

* The precision grade of F Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

F Series



■ Features of F Series

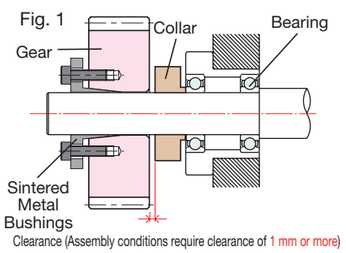
- No rattling of shaft and gear when fastening
- Freely positionable mounting for easy meshing of teeth
- Easily mounted and removed for repeated use
- The bushing slips when overloaded to reduce damage to the gears.

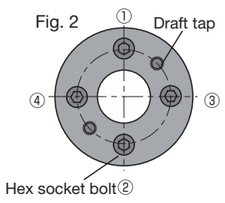
■ Mounting Method and Precautions

① Shaft diameter recommended tolerance is h7. The limit is h8, but we recommend h6 when minimizing runout. Use 1.6a as reference for the surface roughness of the shaft diameter.
② Wipe away any debris, dirt or oil on the shaft surface and hole of the fastened section with thinner or the like, and lightly apply hydraulic oil #68. Do not apply molybdenum-based oil or oil with additives, as this may cause reduced fastening torque or slippage.
③ Pass completely through the shaft while pressing the bushing flange against the gear before tightening. Removal will not be possible, so be sure to leave a clearance of 1mm or more on the gear rear surface side. (Fig.1)
④ Use a torque wrench to fasten bolts on opposite sides when tightening.
First tighten at 1/4 of the regulated torque, then at 1/2 of the regulated torque, before finally tightening up to the regulated torque. Do not tighten without passing through the shaft, or fasten the bolts after insertion on the draft tap side. (Fig.2)
⑤ If the shaft has a keyway, the fastened section contact area is reduced and the transmission rate is decreased by 15 to 20%.

Catalog Number	No. of teeth	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Web thickness	Web O.D.	Allowable torque (N·m)	
		B	C	D	E	F	H	I	Bending strength	Surface durability
SS2-23	23	37	46	50					56.3	3.86
SS2-24	24	38	48	52					59.8	4.24
SS2-25	25	40	50	54					63.3	4.64
SS2-26	26	42	52	56					66.8	5.04
SS2-27	27	45	54	58					70.4	5.45
SS2-28	28	45	56	60					73.9	5.89
SS2-29	29	47	58	62					77.5	6.33
SS2-30	30	50	60	64					81.1	6.80
SS2-32	32	50	64	68					88.4	7.78
SS2-34	34	50	68	72					95.7	8.84
SS2-35	35	52	70	74					99.3	9.39
SS2-36	36	55	72	76					103	9.96
SS2-38	38	55	76	80					111	11.2
SS2-40	40	55	80	84					118	12.5
SS2-42	42	55	84	88					125	13.8
SS2-44	44	55	88	92					133	15.2
SS2-45	45	55	90	94					137	16.0
SS2-46	46	55	92	96			—	—	140	16.7
SS2-48	48	55	96	100					148	18.3
SS2-50	50	55	100	104					156	19.9
SS2-52	52	55	104	108	20	10			163	21.7
SS2-54	54	55	108	112					171	23.4
SS2-55	55	55	110	114					175	24.4
SS2-56	56	55	112	116					179	25.3
SS2-58	58	60	116	120					186	27.3
SS2-60	60	60	120	124					194	29.3
SS2-62	62	60	124	128					202	31.5
SS2-64	64	60	128	132					209	33.7
SS2-65	65	60	130	134					213	34.8
SS2-66	66	60	132	136					217	36.0
SS2-68	68	60	136	140					225	38.4
SS2-70	70	60	140	144					232	40.8
SS2-72	72	60	144	148					240	43.3
SS2-75	75	60	150	154					252	47.3
SS2-76	76	60	152	156					256	48.6
SS2-80	80	60	160	164				136	271	54.3
SS2-84	84	70	168	172				140	287	60.2
SS2-85	85	70	170	174			12	146	291	61.7
SS2-90	90	70	180	184				156	310	69.7
SS2-100	100	70	200	204				176	291	72.7
SS2-120	120	90	240	244				210	357	108

* For the backlash of each product, please refer to the dimension table of the original product.





■ Removal Method and Precautions

① Turn off the power source (supply), check that no load is applied to the gear, and confirm that there is no danger due to falling, etc.
② Insert removed bolts into all draft taps, and gradually and evenly tighten each bolt in diagonal order until removal is complete.
③ The washer and thread surfaces will be roughened, compromising tightening strength, if the bolts are reused. Consequently, we recommend using new bolts of the same size.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

To order F Series products, please specify: **Catalog Number + F + BORE + A.**

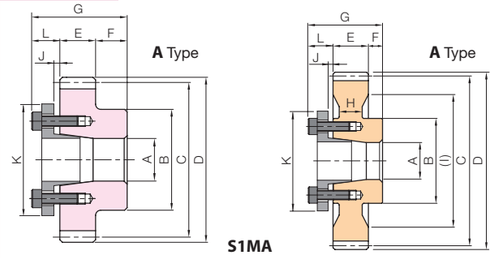
Bore A / Catalog Number	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40
SS2-23 F Bore A															
SS2-24 F Bore A															
SS2-25 F Bore A															
SS2-26 F Bore A															
SS2-27 F Bore A															
SS2-28 F Bore A															
SS2-29 F Bore A															
SS2-30 F Bore A															
SS2-32 F Bore A															
SS2-34 F Bore A															
SS2-35 F Bore A															
SS2-36 F Bore A															
SS2-38 F Bore A															
SS2-40 F Bore A															
SS2-42 F Bore A															
SS2-44 F Bore A															
SS2-45 F Bore A															
SS2-46 F Bore A															
SS2-48 F Bore A															
SS2-50 F Bore A															
SS2-52 F Bore A															
SS2-54 F Bore A															
SS2-55 F Bore A															
SS2-56 F Bore A															
SS2-58 F Bore A															
SS2-60 F Bore A															
SS2-62 F Bore A															
SS2-64 F Bore A															
SS2-65 F Bore A															
SS2-66 F Bore A															
SS2-68 F Bore A															
SS2-70 F Bore A															
SS2-72 F Bore A															
SS2-75 F Bore A															
SS2-76 F Bore A															
SS2-80 F Bore A															
SS2-84 F Bore A															
SS2-85 F Bore A															
SS2-90 F Bore A															
SS2-100 F Bore A															
SS2-120 F Bore A															
Bore A	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40
Ref. slipping torque N·m	23	37	39	42	45	48	49	97	110	124	141	149	163	173	725
Ref. thrust load kN	3.76	5.21	5.10	5.17	5.23	5.28	5.12	9.68	9.98	9.90	10.0	9.89	10.1	9.88	12.3
Sintered Metal Bushings L	10	12						14							19
Sintered Metal Bushings K	31	36	37	38	39	40	42	46	47	51	53	56	58	61	71
Clearance J	2	3													
Total Length G	40	42						44							49
Hex socket bolt Qty	3	4													6
Hex socket bolt Size	M4×12	M4×15						M5×18							M6×25
Hex socket bolt Tightening torque N·m	3.9							7.8							13.7
Bushing weight (g)	22	38	40	41	43	45	49	71	71	81	84	93	97	106	237

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 coated except for portions given secondary operation

* The precision grade of F Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

F Series



■ Features of F Series

- No rattling of shaft and gear when fastening
- Freely positionable mounting for easy meshing of teeth
- Easily mounted and removed for repeated use
- The bushing slips when overloaded to reduce damage to the gears.

■ Mounting Method and Precautions

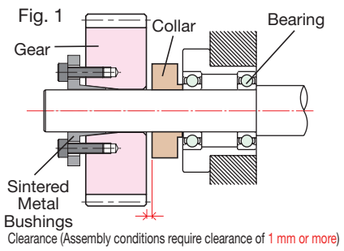
① Shaft diameter recommended tolerance is h7. The limit is h8, but we recommend h6 when minimizing runout. Use 1.6a as reference for the surface roughness of the shaft diameter.
② Wipe away any debris, dirt or oil on the shaft surface and hole of the fastened section with thinner or the like, and lightly apply hydraulic oil #68. Do not apply molybdenum-based oil or oil with additives, as this may cause reduced fastening torque or slippage.
③ Pass completely through the shaft while pressing the bushing flange against the gear before tightening. Removal will not be possible, so be sure to leave a clearance of 1mm or more on the gear rear surface side. (Fig.1)
④ Use a torque wrench to fasten bolts on opposite sides when tightening. First tighten at 1/4 of the regulated torque, then at 1/2 of the regulated torque, before finally tightening up to the regulated torque. Do not tighten without passing through the shaft, or fasten the bolts after insertion on the draft tap side. (Fig.2)
⑤ If the shaft has a keyway, the fastened section contact area is reduced and the transmission rate is decreased by 15 to 20%.

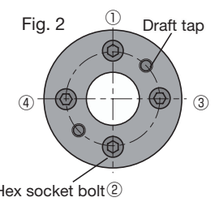
Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Web thickness H	Web O.D. I	Allowable torque (N·m) Bending strength	Surface durability
SS2.5-22	22	44	55	60					103	6.99
SS2.5-23	23	46	57.5	62.5					110	7.71
SS2.5-24	24	48	60	65					117	8.47
SS2.5-25	25	50	62.5	67.5					124	9.26
SS2.5-26	26	55	65	70					130	10.1
SS2.5-27	27	60	67.5	72.5					137	10.9
SS2.5-28	28	60	70	75					144	11.7
SS2.5-30	30	65	75	80					159	13.6
SS2.5-32	32	70	80	85					173	15.6
SS2.5-34	34	70	85	90					187	17.7
SS2.5-35	35	70	87.5	92.5					194	18.8
SS2.5-36	36	70	90	95					201	20.0
SS2.5-38	38	70	95	100			—	—	216	22.4
SS2.5-40	40	70	100	105					230	24.9
SS2.5-42	42	70	105	110					245	27.6
SS2.5-44	44	70	110	115					260	30.5
SS2.5-45	45	70	112.5	117.5	25	12			267	31.9
SS2.5-46	46	70	115	120					274	33.5
SS2.5-48	48	70	120	125					289	36.7
SS2.5-50	50	70	125	130					304	40.0
SS2.5-52	52	70	130	135					319	43.5
SS2.5-54	54	70	135	140					334	47.2
SS2.5-56	56	70	140	145					349	51.0
SS2.5-58	58	70	145	150					364	55.0
SS2.5-60	60	70	150	155					379	59.1
SS2.5-64	64	80	160	165			15	131	409	67.8
SS2.5-66	66	80	165	170				140	424	72.4
SS2.5-68	68	80	170	175				140	439	77.2
SS2.5-70	70	80	175	180				146	454	82.1
SS2.5-72	72	80	180	185				151	469	87.1
SS2.5-76	76	80	190	195				160	499	97.7
SS2.5-80	80	80	200	205			—	—	441	90.9
SS2.5-90	90	90	225	230					505	117

* For the backlash of each product, please refer to the dimension table of the original product.

To order F Series products, please specify: **Catalog Number + F + BORE + A.**

Bore A	* The product shapes of F Series items are identified by background color.												
Catalog Number	15	16	17	18	19	20	22	25	28	30	32	35	40
SS2.5-22 F Bore A													
SS2.5-23 F Bore A													
SS2.5-24 F Bore A													
SS2.5-25 F Bore A													
SS2.5-26 F Bore A													
SS2.5-27 F Bore A													
SS2.5-28 F Bore A													
SS2.5-30 F Bore A													
SS2.5-32 F Bore A													
SS2.5-34 F Bore A													
SS2.5-35 F Bore A													
SS2.5-36 F Bore A													
SS2.5-38 F Bore A													
SS2.5-40 F Bore A													
SS2.5-42 F Bore A													
SS2.5-44 F Bore A													
SS2.5-45 F Bore A													
SS2.5-46 F Bore A													
SS2.5-48 F Bore A													
SS2.5-50 F Bore A													
SS2.5-52 F Bore A													
SS2.5-54 F Bore A													
SS2.5-56 F Bore A													
SS2.5-58 F Bore A													
SS2.5-60 F Bore A													
SS2.5-64 F Bore A													
SS2.5-66 F Bore A													
SS2.5-68 F Bore A													
SS2.5-70 F Bore A													
SS2.5-72 F Bore A													
SS2.5-76 F Bore A													
SS2.5-80 F Bore A													
SS2.5-90 F Bore A													
Bore A	15	16	17	18	19	20	22	25	28	30	32	35	40
Ref. slipping torque N·m	39	42	45	48	49	97	110	124	141	149	163	173	725
Ref. thrust load kN	5.10	5.17	5.23	5.28	5.12	9.68	9.98	9.90	10.0	9.89	10.1	9.88	12.3
Sintered Metal Bushings L			12						14				19
Sintered Metal Bushings K	37	38	39	40	42	46	47	51	53	56	58	61	71
Clearance J							3						
Total Length G			49						51				56
With hex socket Bolt Qty						4							6
With hex socket Bolt Size			M4×15				M5×18						M6×25
With hex socket Bolt Tightening torque N·m			3.9				7.8						13.7
Bushing weight (g)	40	41	43	45	49	71	71	81	84	93	97	106	237





■ Removal Method and Precautions

① Turn off the power source (supply), check that no load is applied to the gear, and confirm that there is no danger due to falling, etc.
② Insert removed bolts into all draft taps, and gradually and evenly tighten each bolt in diagonal order until removal is complete.
③ The washer and thread surfaces will be roughened, compromising tightening strength, if the bolts are reused. Consequently, we recommend using new bolts of the same size.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

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 coated except for portions given secondary operation

* The precision grade of F Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

ZAHNRAD24.COM
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info@zahnrad24.com
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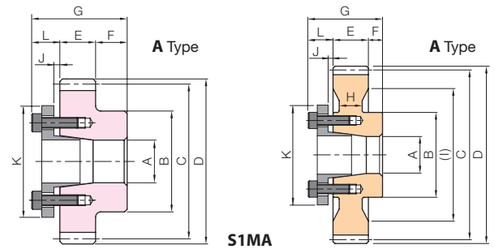
Oberes Dorf 1
95152 Selbitz

F Series



■ Features of F Series

- No rattling of shaft and gear when fastening
- Freely positionable mounting for easy meshing of teeth
- Easily mounted and removed for repeated use
- The bushing slips when overloaded to reduce damage to the gears

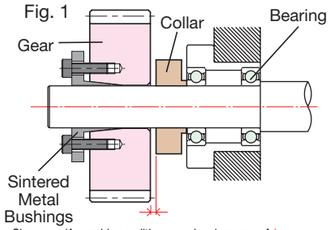
■ Mounting Method and Precautions

① Shaft diameter recommended tolerance is h7. The limit is h8, but we recommend h6 when minimizing runout. Use 1.6a as reference for the surface roughness of the shaft diameter.
② Wipe away any debris, dirt or oil on the shaft surface and hole of the fastened section with thinner or the like, and lightly apply hydraulic oil #68. Do not apply molybdenum-based oil or oil with additives, as this may cause reduced fastening torque or slippage.
③ Pass completely through the shaft while pressing the bushing flange against the gear before tightening. Removal will not be possible, so be sure to leave a clearance of 1mm or more on the gear rear surface side. (Fig.1)
④ Use a torque wrench to fasten bolts on opposite sides when tightening. First tighten at 1/4 of the regulated torque, then at 1/2 of the regulated torque, before finally tightening up to the regulated torque. Do not tighten without passing through the shaft, or fasten the bolts after insertion on the draft tap side. (Fig.2)
⑤ If the shaft has a keyway, the fastened section contact area is reduced and the transmission rate is decreased by 15 to 20%.

Catalog Number	No. of teeth	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Web thickness H	Web O.D. I	Allowable torque (N·m) Bending strength	Surface durability
SS3-19	19	45	57	63					144	8.88
SS3-20	20	50	60	66					155	9.95
SS3-21	21	52	63	69					167	11.1
SS3-22	22	54	66	72					178	12.3
SS3-23	23	56	69	75					190	13.6
SS3-24	24	58	72	78					202	14.9
SS3-25	25	60	75	81					214	16.3
SS3-26	26	65	78	84					226	17.7
SS3-27	27	65	81	87					237	19.2
SS3-28	28	70	84	90					250	20.7
SS3-29	29	70	87	93					262	22.3
SS3-30	30	75	90	96					274	24.0
SS3-32	32	75	96	102			—	—	298	27.4
SS3-34	34	80	102	108					323	31.2
SS3-35	35	80	105	111					335	33.1
SS3-36	36	80	108	114					348	35.2
SS3-38	38	80	114	120					373	39.4
SS3-40	40	80	120	126					398	44.0
SS3-42	42	80	126	132					423	48.9
SS3-44	44	80	132	138	30	15			449	54.0
SS3-45	45	80	135	141					461	56.6
SS3-46	46	80	138	144					474	59.4
SS3-48	48	80	144	150					500	65.0
SS3-50	50	80	150	156					525	70.9
SS3-52	52	80	156	162				126	551	77.1
SS3-54	54	80	162	168				132	577	83.6
SS3-55	55	80	165	171			16	131	590	86.9
SS3-56	56	80	168	174				134	602	90.3
SS3-58	58	80	174	180				144	628	97.3
SS3-60	60	80	180	186			—	—	654	105
SS3-64	64	80	192	198				158	588	99.9
SS3-65	65	80	195	201				161	599	103
SS3-66	66	90	198	204				160	610	107
SS3-68	68	90	204	210				170	632	114
SS3-70	70	90	210	216			16	176	654	121
SS3-72	72	90	216	222				182	675	129
SS3-75	75	90	225	231				190	708	141
SS3-76	76	90	228	234				190	719	145
SS3-80	80	90	240	246				200	763	162

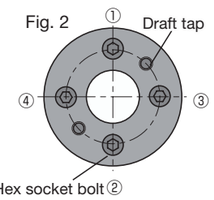
* For the backlash of each product, please refer to the dimension table of the original product.

Fig. 1



Clearance (Assembly conditions require clearance of 1 mm or more)

Fig. 2



■ Removal Method and Precautions

① Turn off the power source (supply), check that no load is applied to the gear, and confirm that there is no danger due to falling, etc.
② Insert removed bolts into all draft taps, and gradually and evenly tighten each bolt in diagonal order until removal is complete.
③ The washer and thread surfaces will be roughened, compromising tightening strength, if the bolts are reused. Consequently, we recommend using new bolts of the same size.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

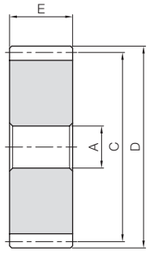
To order F Series products, please specify: **Catalog Number + F + BORE + A.**

Bore A / Catalog Number	* The product shapes of F Series items are identified by background color. 15	16	17	18	19	20	22	25	28	30	32	35	40
SS3-19 F Bore A													
SS3-20 F Bore A													
SS3-21 F Bore A													
SS3-22 F Bore A													
SS3-23 F Bore A													
SS3-24 F Bore A													
SS3-25 F Bore A													
SS3-26 F Bore A													
SS3-27 F Bore A													
SS3-28 F Bore A													
SS3-29 F Bore A													
SS3-30 F Bore A													
SS3-32 F Bore A													
SS3-34 F Bore A													
SS3-35 F Bore A													
SS3-36 F Bore A													
SS3-38 F Bore A													
SS3-40 F Bore A													
SS3-42 F Bore A													
SS3-44 F Bore A													
SS3-45 F Bore A													
SS3-46 F Bore A													
SS3-48 F Bore A													
SS3-50 F Bore A													
SS3-52 F Bore A													
SS3-54 F Bore A													
SS3-55 F Bore A													
SS3-56 F Bore A													
SS3-58 F Bore A													
SS3-60 F Bore A													
SS3-64 F Bore A													
SS3-65 F Bore A													
SS3-66 F Bore A													
SS3-68 F Bore A													
SS3-70 F Bore A													
SS3-72 F Bore A													
SS3-75 F Bore A													
SS3-76 F Bore A													
SS3-80 F Bore A													
Bore A	15	16	17	18	19	20	22	25	28	30	32	35	40
Ref. slipping torque N·m	39	42	45	48	49	97	110	124	141	149	163	173	725
Ref. thrust load kN	5.10	5.17	5.23	5.28	5.12	9.68	9.98	9.90	10.0	9.89	10.1	9.88	12.3
Sintered Metal Bushings L			12						14				19
Sintered Metal Bushings K	37	38	39	40	42	46	47	51	53	56	58	61	71
Clearance J							3						
Total Length G			57				59						64
With hex socket Bolt Qty						4							6
With hex socket Bolt Size			M4×15				M5×18						M6×25
With hex socket Bolt Tightening torque N·m			3.9				7.8						13.7
Bushing weight (g)	40	41	43	45	49	71	71	81	84	93	97	106	237

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 J Series products is equivalent to the value shown in the table.

J H



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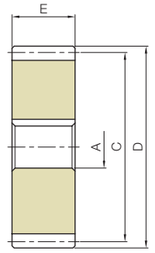
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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To order Hardened Plus, please specify Catalog No. + H. **Example: SSA1-20H**

Catalog Number		Module	No. of teeth	Shape	Bore	Pitch dia.	Outside dia.	Face width	Allowable torque: Bending strength N·m	Bending strength kgf·m	Surface durability N·m	Surface durability kgf·m	Surface durability (H) N·m	Surface durability (H) kgf·m	Backlash (mm)	Weight (kg)
					AH7	C	D	E								
SSA1-20	H		20			20	22		5.75	0.59	0.33	0.033	1.59	0.16		0.021
SSA1-24	H		24			24	26		7.47	0.76	0.49	0.050	2.36	0.24		0.032
SSA1-25	H		25			25	27		7.91	0.81	0.54	0.055	2.57	0.26		0.035
SSA1-28	H		28			28	30		9.24	0.94	0.68	0.070	3.25	0.33		0.044
SSA1-30	H		30			30	32		10.1	1.03	0.79	0.081	3.74	0.38		0.052
SSA1-32	H		32		8	32	34		11.1	1.13	0.90	0.092	4.27	0.44		0.059
SSA1-35	H		35			35	37		12.4	1.27	1.09	0.11	5.13	0.52		0.072
SSA1-36	H		36			36	38		12.9	1.31	1.16	0.12	5.44	0.55		0.076
SSA1-40	H		40			40	42		14.7	1.50	1.45	0.15	6.76	0.69		0.095
SSA1-45	H	***m*1**	45	S5		45	47	10	17.1	1.74	1.86	0.19	8.62	0.88	0.08~0.18	0.12
SSA1-48	H		48			48	50		18.5	1.89	2.13	0.22	9.84	1.00		0.14
SSA1-50	H		50			50	52		19.5	1.98	2.32	0.24	10.7	1.09		0.15
SSA1-55	H		55			55	57		21.8	2.23	2.83	0.29	13.0	1.33		0.18
SSA1-56	H		56			56	58		22.3	2.28	2.94	0.30	13.5	1.38		0.19
SSA1-60	H		60		10	60	62		24.2	2.47	3.40	0.35	15.6	1.59		0.22
SSA1-70	H		70			70	72		29.1	2.96	4.70	0.48	21.4	2.18		0.30
SSA1-80	H		80			80	82		33.9	3.46	6.23	0.63	28.1	2.87		0.39
SSA1-100	H		100			100	102		43.7	4.45	9.97	1.02	44.4	4.53		0.61
SSA1-120	H		120			120	122		53.5	5.45	14.7	1.50	64.4	6.57		0.88
SSA1.5-20	H		20			30	33		19.4	1.98	1.15	0.12	5.47	0.56		0.074
SSA1.5-24	H		24			36	39		25.2	2.57	1.73	0.18	8.12	0.83		0.11
SSA1.5-25	H		25			37.5	40.5		26.7	2.72	1.90	0.19	8.87	0.90		0.12
SSA1.5-28	H		28		10	42	45		31.2	3.18	2.41	0.25	11.2	1.14		0.15
SSA1.5-30	H		30			45	48		34.2	3.49	2.79	0.28	12.9	1.32		0.18
SSA1.5-32	H		32			48	51		37.3	3.80	3.19	0.33	14.8	1.51		0.20
SSA1.5-35	H		35			52.5	55.5		41.9	4.28	3.85	0.39	17.8	1.81		0.25
SSA1.5-36	H		36			54	57		43.5	4.43	4.09	0.42	18.8	1.92		0.26
SSA1.5-40	H	***m*1.5**	40	S5		60	63	15	49.8	5.07	5.10	0.52	23.4	2.38	0.10~0.22	0.31
SSA1.5-45	H		45		15	67.5	70.5		57.7	5.88	6.53	0.67	29.8	3.03		0.40
SSA1.5-48	H		48			72	75		62.4	6.37	7.47	0.76	34.0	3.46		0.46
SSA1.5-50	H		50			75	78		65.7	6.69	8.15	0.83	36.9	3.77		0.50
SSA1.5-56	H		56			84	87		75.3	7.68	10.4	1.06	46.6	4.75		0.63
SSA1.5-60	H		60			90	93		81.8	8.34	12.0	1.22	53.7	5.47		0.73
SSA1.5-70	H		70			105	108		98.0	10.0	16.6	1.69	73.6	7.50		1.00
SSA1.5-80	H		80			120	123		114	11.7	22.0	2.24	96.7	9.86		1.31
SSA1.5-100	H		100			150	153		147	15.0	35.5	3.62	152	15.5		2.06

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SSA1-20J8**

Bore H7	* The product shapes of J Series items are identified by background color.																		
Keyway Js9	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	3×1.4	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	—																		
SSA1-20 J BORE	*																		
SSA1-24 J BORE	*																		
SSA1-25 J BORE	*																		
SSA1-28 J BORE	*																		
SSA1-30 J BORE	*																		
SSA1-32 J BORE	*																		
SSA1-35 J BORE	*																		
SSA1-36 J BORE	*																		
SSA1-40 J BORE	*																		
SSA1-45 J BORE	*																		
SSA1-48 J BORE	*																		
SSA1-50 J BORE		*																	
SSA1-55 J BORE		*																	
SSA1-56 J BORE		*																	
SSA1-60 J BORE		*																	
SSA1-70 J BORE		*																	
SSA1-80 J BORE		*																	
SSA1-100 J BORE		*																	
SSA1-120 J BORE		*																	
SSA1.5-20 J BORE		*																	
SSA1.5-24 J BORE		*																	
SSA1.5-25 J BORE		*																	
SSA1.5-28 J BORE		*																	
SSA1.5-30 J BORE		*																	
SSA1.5-32 J BORE		*																	
SSA1.5-35 J BORE		*																	
SSA1.5-36 J BORE		*																	
SSA1.5-40 J BORE					*														
SSA1.5-45 J BORE					*														
SSA1.5-48 J BORE					*														
SSA1.5-50 J BORE					*														
SSA1.5-56 J BORE					*														
SSA1.5-60 J BORE					*														
SSA1.5-70 J BORE					*														
SSA1.5-80 J BORE					*														
SSA1.5-100 J BORE					*														

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SSA1-24HJ10

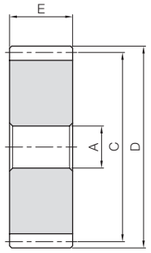
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

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

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 J Series products is equivalent to the value shown in the table.

J H



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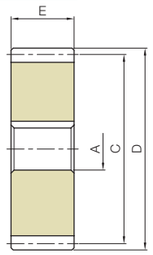
J Series



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H To order Hardened Plus, please specify Catalog No. + H. **Example: SSA2-15H**

Catalog Number	Module	No. of teeth	Shape	Bore	Pitch dia.	Outside dia.	Face width	Allowable torque: Bending strength N·m	Bending strength kgf·m	Surface durability N·m	Surface durability kgf·m	Surface durability (H) N·m	Surface durability (H) kgf·m	Backlash (mm)	Weight (kg)
				A_{H7}	C	D	E								
SSA2-15	m2	15	S5	10	30	34	20	29.6	3.01	1.48	0.15	7.01	0.71	0.12~0.26	0.099
SSA2-18		18			36	40		39.3	4.01	2.23	0.23	10.5	1.07		0.15
SSA2-20		20		12	40	44		46.0	4.69	2.83	0.29	13.2	1.34		0.18
SSA2-24		24			48	52		59.8	6.09	4.24	0.43	19.6	2.00		0.27
SSA2-25		25			50	54		63.3	6.45	4.64	0.47	21.4	2.18		0.29
SSA2-28		28		15	56	60		73.9	7.54	5.89	0.60	27.0	2.76		0.36
SSA2-30		30			60	64		81.1	8.27	6.80	0.69	31.2	3.18		0.42
SSA2-32		32			64	68		88.4	9.01	7.78	0.79	35.6	3.63		0.48
SSA2-35		35			70	74		99.3	10.1	9.39	0.96	42.8	4.36		0.58
SSA2-36		36			72	76		103	10.5	9.96	1.02	45.3	4.62		0.61
SSA2-40		40		18	80	84		118	12.0	12.5	1.27	56.2	5.73		0.75
SSA2-45		45			90	94		137	13.9	16.0	1.63	71.6	7.30		0.96
SSA2-48		48			96	100		148	15.1	18.3	1.87	81.7	8.33		1.10
SSA2-50		50			100	104		156	15.9	19.9	2.03	88.8	9.05		1.19
SSA2-55		55			110	114		175	17.8	24.4	2.48	108	11.0		1.45
SSA2-56		56			112	116		179	18.2	25.3	2.58	112	11.4		1.51
SSA2-60		60			120	124		194	19.8	29.3	2.99	129	13.1		1.74
SSA2-70		70			140	144		232	23.7	40.8	4.16	177	18.0		2.38
SSA2-80		80			160	164		271	27.7	54.3	5.53	232	23.6		3.12
SSA2-100		100			200	204		291	29.7	72.7	7.42	288	29.3		4.89
SSA2.5-15	m2.5	15	S5	12	37.5	42.5	25	57.7	5.89	2.96	0.30	13.9	1.41	0.14~0.28	0.19
SSA2.5-18		18			45	50		76.7	7.82	4.47	0.46	20.7	2.11		0.29
SSA2.5-20		20		15	50	55		89.8	9.16	5.66	0.58	26.1	2.66		0.35
SSA2.5-24		24			60	65		117	11.9	8.47	0.86	38.8	3.95		0.52
SSA2.5-25		25			62.5	67.5		124	12.6	9.26	0.94	42.3	4.32		0.57
SSA2.5-28		28		18	70	75		144	14.7	11.7	1.20	53.4	5.45		0.71
SSA2.5-30		30			75	80		159	16.2	13.6	1.39	61.6	6.28		0.82
SSA2.5-32		32			80	85		173	17.6	15.6	1.59	70.3	7.17		0.94
SSA2.5-35		35			87.5	92.5		194	19.8	18.8	1.92	84.4	8.61		1.13
SSA2.5-36		36			90	95		201	20.5	20.0	2.04	89.5	9.12		1.20
SSA2.5-40		40		22	100	105		230	23.5	24.9	2.54	111	11.3		1.47
SSA2.5-45		45			112.5	117.5		267	27.2	31.9	3.26	141	14.4		1.88
SSA2.5-48		48			120	125		289	29.5	36.7	3.74	161	16.4		2.14
SSA2.5-50		50			125	130		304	31.0	40.0	4.08	175	17.9		2.33
SSA2.5-56		56			140	145		349	35.6	51.0	5.20	221	22.5		2.95
SSA2.5-60		60			150	155		379	38.6	59.1	6.03	254	25.9		3.39
SSA2.5-70		70			175	180		454	46.3	82.1	8.37	348	35.5		4.65
SSA2.5-80		80			200	205		441	45.0	90.9	9.27	359	36.7		6.09

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SSA2-15J10**

Bore H7 / Keyway Js9 / Screw size / Catalog Number	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
	—																	
SSA2-15 J BORE	*																	
SSA2-18 J BORE	*																	
SSA2-20 J BORE		*																
SSA2-24 J BORE		*																
SSA2-25 J BORE		*																
SSA2-28 J BORE				*														
SSA2-30 J BORE				*														
SSA2-32 J BORE				*														
SSA2-35 J BORE				*														
SSA2-36 J BORE				*														
SSA2-40 J BORE							*											
SSA2-45 J BORE							*											
SSA2-48 J BORE							*											
SSA2-50 J BORE							*											
SSA2-55 J BORE							*											
SSA2-56 J BORE							*											
SSA2-60 J BORE							*											
SSA2-70 J BORE							*											
SSA2-80 J BORE							*											
SSA2-100 J BORE							*											
SSA2.5-15J BORE		*																
SSA2.5-18J BORE		*																
SSA2.5-20 J BORE				*														
SSA2.5-24 J BORE				*														
SSA2.5-25 J BORE				*														
SSA2.5-28 J BORE							*											
SSA2.5-30 J BORE							*											
SSA2.5-32 J BORE							*											
SSA2.5-35 J BORE							*											
SSA2.5-36 J BORE							*											
SSA2.5-40 J BORE										*								
SSA2.5-45 J BORE										*								
SSA2.5-48 J BORE										*								
SSA2.5-50 J BORE										*								
SSA2.5-56 J BORE										*								
SSA2.5-60 J BORE										*								
SSA2.5-70 J BORE										*								
SSA2.5-80 J BORE										*								

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SSA2-15HJ12

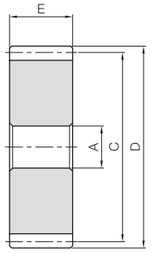
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

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 J Series products is equivalent to the value shown in the table.



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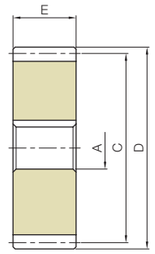
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



S5K

To order Hardened Plus, please specify Catalog No. + H. **Example: SSA3-15H**

Catalog Number	Module	No. of teeth	Shape	Bore	Pitch dia.	Outside dia.	Face width	Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability (H)		Backlash (mm)	Weight (kg)
				A_{H7}	C	D	E	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m		
SSA3-15 (H)		15		12	45	51		99.7	10.2	5.22	0.53	24.2	2.47		0.35
SSA3-18 (H)		18			54	60		133	13.5	7.87	0.80	36.2	3.69		0.51
SSA3-20 (H)		20		15	60	66		155	15.8	9.95	1.02	45.6	4.65		0.62
SSA3-24 (H)		24			72	78		202	20.6	14.9	1.52	67.7	6.90		0.92
SSA3-25 (H)		25			75	81		214	21.8	16.3	1.66	73.9	7.53		1.00
SSA3-28 (H)		28		20	84	90		250	25.4	20.7	2.11	93.2	9.50		1.23
SSA3-30 (H)		30			90	96		274	27.9	24.0	2.44	107	10.9		1.42
SSA3-32 (H)		32			96	102		298	30.4	27.4	2.80	123	12.5		1.63
SSA3-35 (H)		35			105	111		335	34.2	33.1	3.38	147	15.0		1.97
SSA3-36 (H)	*m*3	36	S5		108	114	30	348	35.5	35.2	3.59	156	15.9	0.14~0.32	2.08
SSA3-40 (H)		40		25	120	126		398	40.6	44.0	4.49	193	19.1		2.55
SSA3-45 (H)		45			135	141		461	47.0	56.6	5.78	246	25.1		3.26
SSA3-48 (H)		48			144	150		500	50.9	65.0	6.63	281	28.6		3.72
SSA3-50 (H)		50			150	156		525	53.6	70.9	7.23	305	31.1		4.05
SSA3-55 (H)		55			165	171		590	60.1	86.9	8.86	370	37.8		4.92
SSA3-56 (H)		56			168	174		602	61.4	90.3	9.21	384	39.2		5.10
SSA3-60 (H)		60			180	186		654	66.7	105	10.7	442	45.1		5.88
SSA3-70 (H)		70			210	216		654	66.6	121	12.4	478	48.7		8.04
SSA3-80 (H)		80			240	246		763	77.8	162	16.5	632	64.4		10.5
SSA4-15 (H)		15		20	60	68		236	24.1	12.8	1.30	58.4	5.96		0.79
SSA4-18 (H)		18			72	80		314	32.0	19.2	1.96	87.2	8.89		1.18
SSA4-20 (H)		20			80	88		368	37.5	24.3	2.48	110	11.2		1.48
SSA4-24 (H)		24			96	104		478	48.8	36.4	3.72	163	16.6		2.17
SSA4-25 (H)		25			100	108		506	51.6	39.9	4.07	178	18.1		2.37
SSA4-28 (H)		28		25	112	120		591	60.3	50.6	5.16	224	22.8		2.94
SSA4-30 (H)		30			120	128		649	66.2	58.7	5.98	258	26.3		3.40
SSA4-32 (H)		32			128	136		707	72.1	67.4	6.87	294	30.0		3.89
SSA4-35 (H)	*m*4	35	S5		140	148	40	795	81.1	81.6	8.32	353	36.0	0.18~0.38	4.68
SSA4-36 (H)		36			144	152		825	84.1	86.7	8.84	374	38.1		4.96
SSA4-40 (H)		40		30	160	168		943	96.2	109	11.1	464	47.3		6.09
SSA4-45 (H)		45			180	188		1090	112	139	14.2	590	60.1		7.77
SSA4-48 (H)		48			192	200		987	101	133	13.6	528	53.9		8.87
SSA4-50 (H)		50			200	208		1040	106	146	14.8	575	58.6		9.64
SSA4-55 (H)		55			220	228		1160	119	179	18.2	702	71.6		11.7
SSA4-56 (H)		56			224	232		1190	121	186	18.9	729	74.3		12.2
SSA4-60 (H)		60			240	248		1290	132	215	22.0	842	85.9		14.0
SSA5-15 (H)		15		20	75	85		462	47.1	25.5	2.60	115	11.8		1.61
SSA5-18 (H)		18			90	100		614	62.6	38.4	3.92	172	17.6		2.37
SSA5-20 (H)		20		22	100	110		718	73.3	48.6	4.96	217	22.1		2.93
SSA5-24 (H)		24			120	130		934	95.2	73.0	7.45	321	32.7		4.29
SSA5-25 (H)		25			125	135		989	101	80.0	8.16	350	35.7		4.67
SSA5-28 (H)		28		25	140	150		1160	118	102	10.4	441	45.0		5.85
SSA5-30 (H)		30			150	160		1270	129	118	12.1	508	51.8		6.74
SSA5-32 (H)	*m*5	32	S5		160	170	50	1380	141	136	13.8	580	59.1	0.20~0.44	7.70
SSA5-35 (H)		35			175	185		1550	158	164	16.7	696	71.0		9.25
SSA5-36 (H)		36			180	190		1610	164	174	17.8	737	75.1		9.80
SSA5-40 (H)		40		30	200	210		1540	157	182	18.5	719	73.3		12.1
SSA5-45 (H)		45			225	235		1780	182	234	23.9	920	93.8		15.3
SSA5-48 (H)		48			240	250		1930	197	269	27.5	1050	107		17.5
SSA5-50 (H)		50			250	260		2030	207	294	30.0	1150	117		19.0

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SSA3-15J12**

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	—																							
SSA3-15 J BORE	*																							
SSA3-18 J BORE	*																							
SSA3-20 J BORE			*																					
SSA3-24 J BORE			*																					
SSA3-25 J BORE			*																					
SSA3-28 J BORE								*																
SSA3-30 J BORE								*																
SSA3-32 J BORE								*																
SSA3-35 J BORE								*																
SSA3-36 J BORE								*																
SSA3-40 J BORE										*														
SSA3-45 J BORE										*														
SSA3-48 J BORE										*														
SSA3-50 J BORE										*														
SSA3-55 J BORE										*														
SSA3-56 J BORE										*														
SSA3-60 J BORE										*														
SSA3-70 J BORE										*														
SSA3-80 J BORE										*														
SSA4-15J BORE								*																
SSA4-18J BORE								*																
SSA4-20J BORE								*																
SSA4-24J BORE								*																
SSA4-25J BORE								*																
SSA4-28J BORE										*														
SSA4-30J BORE										*														
SSA4-32J BORE										*														
SSA4-35J BORE										*														
SSA4-36J BORE										*														
SSA4-40J BORE											*													
SSA4-45J BORE											*													
SSA4-48J BORE											*													
SSA4-50J BORE											*													
SSA4-55J BORE											*													
SSA4-56J BORE											*													
SSA4-60J BORE											*													
SSA5-15J BORE								*																
SSA5-18J BORE								*																
SSA5-20J BORE									*															
SSA5-24J BORE									*															
SSA5-25J BORE									*															
SSA5-28J BORE										*														
SSA5-30J BORE										*														
SSA5-32J BORE										*														
SSA5-35J BORE										*														
SSA5-36J BORE										*														
SSA5-40J BORE											*													
SSA5-45J BORE											*													
SSA5-48J BORE											*													
SSA5-50J BORE											*													

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SSA3-15HJ14

* Please see Page 144~145 for Caution on Secondary Operations and Caution on J Series.

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

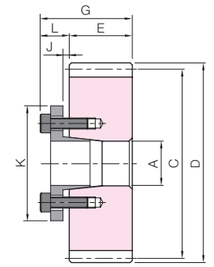
You can download CAD data (DXF format) of KHK Products from the Website.

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 coated except for portions given secondary operation

* The precision grade of F Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

F Series



S5M

■ Features of F Series

- No rattling of shaft and gear when fastening
- Freely positionable mounting for easy meshing of teeth
- Easily mounted and removed for repeated use
- The bushing slips when overloaded to reduce damage to the gears.

■ Mounting Method and Precautions

① Shaft diameter recommended tolerance is h7. The limit is h8, but we recommend h6 when minimizing runout. Use 1.6a as reference for the surface roughness of the shaft diameter.
② Wipe away any debris, dirt or oil on the shaft surface and hole of the fastened section with thinner or the like, and lightly apply hydraulic oil #68. Do not apply molybdenum-based oil or oil with additives, as this may cause reduced fastening torque or slippage.
③ Pass completely through the shaft while pressing the bushing flange against the gear before tightening. Removal will not be possible, so be sure to leave a clearance of 1mm or more on the gear rear surface side. (Fig.1)
④ Use a torque wrench to fasten bolts on opposite sides when tightening. First tighten at 1/4 of the regulated torque, then at 1/2 of the regulated torque, before finally tightening up to the regulated torque. Do not tighten without passing through the shaft, or fasten the bolts after insertion on the draft tap side. (Fig.2)
⑤ If the shaft has a keyway, the fastened section contact area is reduced and the transmission rate is decreased by 15 to 20%.

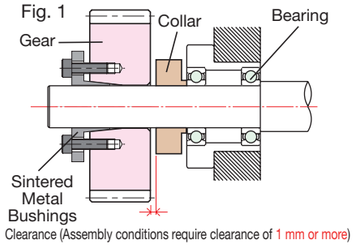
Catalog Number	Module	No. of teeth	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m) Bending strength	Surface durability
SSA2-24		24	48	52		59.8	4.24
SSA2-25		25	50	54		63.3	4.64
SSA2-28		28	56	60		73.9	5.89
SSA2-30		30	60	64		81.1	6.80
SSA2-32		32	64	68		88.4	7.78
SSA2-35		35	70	74		99.3	9.39
SSA2-36		36	72	76		103	9.96
SSA2-40		40	80	84		118	12.5
SSA2-45	***m*2**	45	90	94	20	137	16.0
SSA2-48		48	96	100		148	18.3
SSA2-50		50	100	104		156	19.9
SSA2-55		55	110	114		175	24.4
SSA2-56		56	112	116		179	25.3
SSA2-60		60	120	124		194	29.3
SSA2-70		70	140	144		232	40.8
SSA2-80		80	160	164		271	54.3
SSA2-100		100	200	204		291	72.7
SSA2.5-24		24	60	65		117	8.47
SSA2.5-25		25	62.5	67.5		124	9.26
SSA2.5-28		28	70	75		144	11.7
SSA2.5-30		30	75	80		159	13.6
SSA2.5-32		32	80	85		173	15.6
SSA2.5-35		35	87.5	92.5		194	18.8
SSA2.5-36		36	90	95		201	20.0
SSA2.5-40	***m*2.5**	40	100	105	25	230	24.9
SSA2.5-45		45	112.5	117.5		267	31.9
SSA2.5-48		48	120	125		289	36.7
SSA2.5-50		50	125	130		304	40.0
SSA2.5-56		56	140	145		349	51.0
SSA2.5-60		60	150	155		379	59.1
SSA2.5-70		70	175	180		454	82.1
SSA2.5-80		80	200	205		441	90.9

* For the backlash of each product, please refer to the dimension table of the original product.

To order F Series products, please specify: **Catalog Number + F + BORE.**

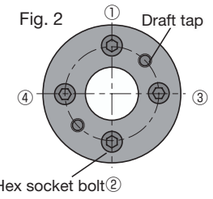
Bore A / Catalog Number	12	14	15	16	17	18	19	20	22	25	28	30	32	35
SSA2-24 F Bore														
SSA2-25 F Bore														
SSA2-28 F Bore														
SSA2-30 F Bore														
SSA2-32 F Bore														
SSA2-35 F Bore														
SSA2-36 F Bore														
SSA2-40 F Bore														
SSA2-45 F Bore														
SSA2-48 F Bore														
SSA2-50 F Bore														
SSA2-55 F Bore														
SSA2-56 F Bore														
SSA2-60 F Bore														
SSA2-70 F Bore														
SSA2-80 F Bore														
SSA2-100 F Bore														
SSA2.5-24 F Bore														
SSA2.5-25 F Bore														
SSA2.5-28 F Bore														
SSA2.5-30 F Bore														
SSA2.5-32 F Bore														
SSA2.5-35 F Bore														
SSA2.5-36 F Bore														
SSA2.5-40 F Bore														
SSA2.5-45 F Bore														
SSA2.5-48 F Bore														
SSA2.5-50 F Bore														
SSA2.5-56 F Bore														
SSA2.5-60 F Bore														
SSA2.5-70 F Bore														
SSA2.5-80 F Bore														
Bore A	12	14	15	16	17	18	19	20	22	25	28	30	32	35
Ref. slipping torque N·m	23	37	39	42	45	48	49	97	110	124	141	149	163	173
Ref. thrust load kN	3.76	5.21	5.1	5.17	5.23	5.28	5.12	9.68	9.98	9.9	10	9.89	10.1	9.88
Sintered Metal Bushings L	10	12						14						
Sintered Metal Bushings K	31	36	37	38	39	40	42	46	47	51	53	56	58	61
Clearance J	2	3												
Total Length G *m*2	30	32						34						
Total Length G *m*2.5	35	37						39						
Hex socket bolt Qty	3	4												
Hex socket bolt Size	M4×12	M4×15						M5×18						
Hex socket bolt Tightening torque N·m	3.9	7.8												
Bushing weight (g)	22	38	40	41	43	45	49	71	71	81	84	93	97	106

Fig. 1



Clearance (Assembly conditions require clearance of 1 mm or more)

Fig. 2



■ Removal Method and Precautions

① Turn off the power source (supply), check that no load is applied to the gear, and confirm that there is no danger due to falling, etc.
② Insert removed bolts into all draft taps, and gradually and evenly tighten each bolt in diagonal order until removal is complete.
③ The washer and thread surfaces will be roughened, compromising tightening strength, if the bolts are reused. Consequently, we recommend using new bolts of the same size.

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Precautions for Standard Machined Products → Pages 42~44

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 coated except for portions given secondary operation

* The precision grade of F Series products is equivalent to the value shown in the table.
* Bushing material: S45C, screw material: SCM435

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Features of F Series

- No rattling of shaft and gear when fastening
- Freely positionable mounting for easy meshing of teeth
- Easily mounted and removed for repeated use
- The bushing slips when overloaded to reduce damage to the gears.

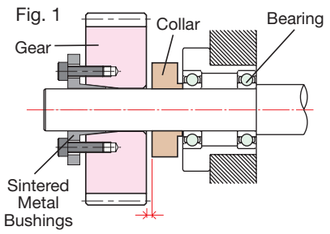
■ Mounting Method and Precautions

① Shaft diameter recommended tolerance is h7. The limit is h8, but we recommend h6 when minimizing runout. Use 1.6a as reference for the surface roughness of the shaft diameter.
② Wipe away any debris, dirt or oil on the shaft surface and hole of the fastened section with thinner or the like, and lightly apply hydraulic oil #68. Do not apply molybdenum-based oil or oil with additives, as this may cause reduced fastening torque or slippage.
③ Pass completely through the shaft while pressing the bushing flange against the gear before tightening. Removal will not be possible, so be sure to leave a clearance of 1mm or more on the gear rear surface side. (Fig.1)
④ Use a torque wrench to fasten bolts on opposite sides when tightening.
First tighten at 1/4 of the regulated torque, then at 1/2 of the regulated torque, before finally tightening up to the regulated torque. Do not tighten without passing through the shaft, or fasten the bolts after insertion on the draft tap side. (Fig.2)
⑤ If the shaft has a keyway, the fastened section contact area is reduced and the transmission rate is decreased by 15 to 20%.

Catalog Number	Module	No. of teeth	Pitch dia. C	Outside dia. D	Face width E	Allowable torque (N·m) Bending strength	Surface durability
SSA3-20		20	60	66		155	9.95
SSA3-24		24	72	78		202	14.9
SSA3-25		25	75	81		214	16.3
SSA3-28		28	84	90		250	20.7
SSA3-30		30	90	96		274	24.0
SSA3-32		32	96	102		298	27.4
SSA3-35		35	105	111		335	33.1
SSA3-36		36	108	114		348	35.2
SSA3-40	***m*3**	40	120	126	30	398	44.0
SSA3-45		45	135	141		461	56.6
SSA3-48		48	144	150		500	65.0
SSA3-50		50	150	156		525	70.9
SSA3-55		55	165	171		590	86.9
SSA3-56		56	168	174		602	90.3
SSA3-60		60	180	186		654	105
SSA3-70		70	210	216		654	121
SSA3-80		80	240	246		763	162

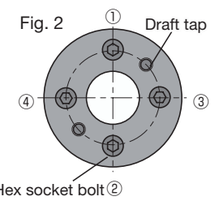
* For the backlash of each product, please refer to the dimension table of the original product.

Fig. 1



Clearance (Assembly conditions require clearance of 1 mm or more)

Fig. 2



■ Removal Method and Precautions

① Turn off the power source (supply), check that no load is applied to the gear, and confirm that there is no danger due to falling, etc.
② Insert removed bolts into all draft taps, and gradually and evenly tighten each bolt in diagonal order until removal is complete.
③ The washer and thread surfaces will be roughened, compromising tightening strength, if the bolts are reused. Consequently, we recommend using new bolts of the same size.

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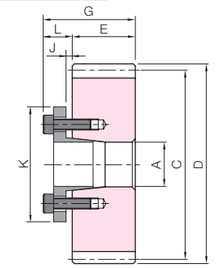
Precautions for Standard Machined Products → Pages 42~44

F Series



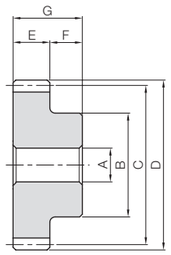
S5M

To order F Series products, please specify: **Catalog Number + F + BORE.**

Bore A	* The product shapes of F Series items are identified by background color.												
Catalog Number	15	16	17	18	19	20	22	25	28	30	32	35	40
SSA3-20 F Bore													
SSA3-24 F Bore													
SSA3-25 F Bore													
SSA3-28 F Bore													
SSA3-30 F Bore													
SSA3-32 F Bore													
SSA3-35 F Bore													
SSA3-36 F Bore													
SSA3-40 F Bore													
SSA3-45 F Bore													
SSA3-48 F Bore													
SSA3-50 F Bore													
SSA3-55 F Bore													
SSA3-56 F Bore													
SSA3-60 F Bore													
SSA3-70 F Bore													
SSA3-80 F Bore													
Bore A	15	16	17	18	19	20	22	25	28	30	32	35	40
Ref. slipping torque N·m	39	42	45	48	49	97	110	124	141	149	163	173	725
Ref. thrust load kN	5.10	5.17	5.23	5.28	5.12	9.68	9.98	9.90	10.0	9.89	10.1	9.88	12.3
Sintered Metal Bushings L	12					14							19
Sintered Metal Bushings K	37	38	39	40	42	46	47	51	53	56	58	61	71
Clearance J	3												
Total Length G	42					44							49
Hex socket bolt Qty	4												6
Hex socket bolt Size	M4×15					M5×18							M6×25
Hex socket bolt Tightening torque N·m	3.9					7.8							13.7
Bushing weight (g)	40	41	43	45	49	71	71	81	84	93	97	106	237

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.



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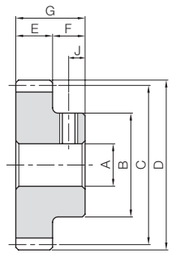

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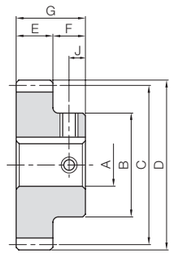

S1K

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

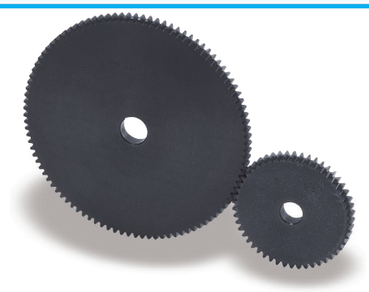
To order Hardened Plus, please specify Catalog No. + H. **Example: SSY0.8-20H**

Catalog Number	Module	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Keyway Width × Depth
SSY0.8-20	***m*0.8**	20	S1	5	13.5	16	17.6	4	8	12	—
SSY0.8-25		25	S1	5	17	20	21.6				
SSY0.8-30		30	S1	5	20	24	25.6				
SSY0.8-40		40	S1	5	25	32	33.6				
SSY0.8-50 **SSY0.8-50A**		50	S1 S1T	5 6	25	40	41.6				
SSY1-12 **SSY1-12A**	***m*1**	12	S1 S1T	5	9	12	14	6	8	14	—
SSY1-14 **SSY1-14A**		14	S1 S1T	5	11	14	16				
SSY1-15 **SSY1-15A**		15	S1 S1T	6	12	15	17				
SSY1-16 **SSY1-16A**		16	S1 S1T	6	13	16	18				
SSY1-18 **SSY1-18A**		18	S1 S1T	6	14	18	20				
SSY1-20 **SSY1-20A** **SSY1-20B**		20	S1 S1T S1T	6 6 8	16	20	22				
SSY1-24 **SSY1-24A**		24	S1 S1T	6	16	24	26				
SSY1-25		25	S1	6	16	25	27				
SSY1-28 **SSY1-28A**		28	S1 S1T	6	16	28	30				
SSY1-30 **SSY1-30A** **SSY1-30B**		30	S1 S1T S1T	6 6 8	25	30	32				
SSY1-32		32	S1	6	25	32	34				
SSY1-35 **SSY1-35A**		35	S1 S1T	6 8	25	35	37				
SSY1-36		36	S1	6	25	36	38				
SSY1-40 **SSY1-40A**		40	S1 S1T	8	28	40	42				
SSY1-45		45	S1	8	28	45	47				
SSY1-48		48	S1	8	28	48	50				
SSY1-50		50	S1	8	28	50	52				
SSY1-55		55	S1	8	28	55	57				
SSY1-56		56	S1	8	28	56	58				
SSY1-60		60	S1	8	35	60	62				
SSY1-64		64	S1	8	35	64	66				
SSY1-70		70	S1	8	35	70	72				
SSY1-72		72	S1	8	35	72	74				
SSY1-75		75	S1	8	35	75	77				
SSY1-80		80	S1	10	40	80	82				
SSY1-90		90	S1	10	40	90	92				
SSY1-100		100	S1	10	50	100	102				
SSY1-110		110	S1	10	50	110	112				
SSY1-120 **SSY1-120A**		120	S1 S1K	10 12	50 35	120	122				— 4 x 1.8

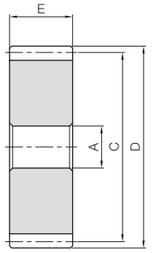
Socket head screw Size	J	Allowable torque: Bending strength N·m	Bending strength kgf·m	Surface durability N·m	Surface durability kgf·m	Surface durability (H) N·m	Surface durability (H) kgf·m	Backlash (mm)	Weight (kg)	Catalog Number
—	—	1.47	0.15	0.085	0.0087	0.41	0.042	0 ~0.10	0.013	**SSY0.8-20**
—	—	2.03	0.21	0.134	0.014	0.65	0.066		0.022	**SSY0.8-25**
—	—	2.60	0.27	0.197	0.020	0.95	0.097		0.032	**SSY0.8-30**
—	—	3.77	0.39	0.362	0.037	1.71	0.17		0.054	**SSY0.8-40**
— M4	— 4	4.98	0.51	0.580	0.059	2.70 —	0.28 —		0.068 0.067	**SSY0.8-50** **SSY0.8-50A**
— M4	— 4	1.22	0.12	0.069	0.0070	0.34 —	0.034 —		0.0072 0.0070	**SSY1-12** **SSY1-12A**
— M4	— 4	1.98	0.20	0.096	0.010	0.47 —	0.048 —		0.011 0.011	**SSY1-14** **SSY1-14A**
— M4	— 4	2.22	0.23	0.11	0.011	0.54 —	0.055 —		0.012 0.012	**SSY1-15** **SSY1-15A**
— M4	— 4	2.46	0.25	0.13	0.013	0.62 —	0.063 —		0.015 0.014	**SSY1-16** **SSY1-16A**
— M4	— 4	2.95	0.30	0.16	0.017	0.79 —	0.08 —		0.019 0.018	**SSY1-18** **SSY1-18A**
— M4 M5	— 4 4	3.45	0.35	0.20	0.021	0.98 — —	0.10 — —		0.024 0.024 0.021	**SSY1-20** **SSY1-20A** **SSY1-20B**
— M4	— 4	4.48	0.46	0.30	0.030	1.42 —	0.14 —		0.031 0.030	**SSY1-24** **SSY1-24A**
—	—	4.74	0.48	0.32	0.033	1.54	0.16		0.033	**SSY1-25**
— M4	— 4	5.55	0.57	0.41	0.042	1.95 —	0.20 —		0.039 0.038	**SSY1-28** **SSY1-28A**
— M4 M5	— 4 4	6.08	0.62	0.47	0.048	2.24 — —	0.23 — —	0.08~0.18	0.061 0.060 0.057	**SSY1-30** **SSY1-30A** **SSY1-30B**
—	—	6.63	0.68	0.54	0.055	2.56	0.26		0.066	**SSY1-32**
— M5	— 4	7.45	0.76	0.66	0.067	3.08 —	0.31 —		0.073 0.069	**SSY1-35** **SSY1-35A**
—	—	7.73	0.79	0.70	0.071	3.26	0.33		0.076	**SSY1-36**
— M5	— 4	8.84	0.90	0.87	0.089	4.05 —	0.41 —		0.092 0.091	**SSY1-40** **SSY1-40A**
—	—	10.3	1.05	1.12	0.11	5.17	0.53		0.11	**SSY1-45**
—	—	11.1	1.13	1.28	0.13	5.90	0.60		0.12	**SSY1-48**
—	—	11.7	1.19	1.39	0.14	6.42	0.65		0.13	**SSY1-50**
—	—	13.1	1.34	1.70	0.17	7.81	0.80		0.15	**SSY1-55**
—	—	13.4	1.37	1.77	0.18	8.11	0.83		0.15	**SSY1-56**
—	—	14.5	1.48	2.04	0.21	9.34	0.95		0.19	**SSY1-60**
—	—	15.7	1.60	2.34	0.24	10.7	1.09		0.21	**SSY1-64**
—	—	17.4	1.78	2.82	0.29	12.8	1.31		0.24	**SSY1-70**
—	—	18.0	1.84	2.99	0.30	13.6	1.39		0.25	**SSY1-72**
—	—	18.9	1.93	3.26	0.33	14.8	1.51		0.26	**SSY1-75**
—	—	20.3	2.07	3.74	0.38	16.9	1.72		0.31	**SSY1-80**
—	—	23.3	2.37	4.79	0.49	21.5	2.19		0.37	**SSY1-90**
—	—	26.2	2.67	5.98	0.61	26.6	2.72		0.48	**SSY1-100**
—	—	29.1	2.97	7.31	0.75	32.4	3.30		0.56	**SSY1-110**
— M4	— 4	32.1	3.27	8.80	0.90	38.7 —	3.94 —		0.65 0.58	**SSY1-120** **SSY1-120A**

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

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



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



S5

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

H To order Hardened Plus, please specify Catalog No. + H. **Example: SSAY1-20H**

Catalog Number	Module	No. of teeth	Shape	Bore	Pitch dia.	Outside dia.	Face width	Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability H	
				A_{H7}	C	D	E	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m
SSAY1-20 H	*m*1	20	S5	6	20	22	6	3.45	0.35	0.20	0.021	0.98	0.10
SSAY1-24 H		24			24	26		4.48	0.46	0.30	0.030	1.42	0.14
SSAY1-25 H		25			25	27		4.74	0.48	0.32	0.033	1.54	0.16
SSAY1-28 H		28			28	30		5.55	0.57	0.41	0.042	1.95	0.20
SSAY1-30 H		30			30	32		6.08	0.62	0.47	0.048	2.24	0.23
SSAY1-32 H		32		6	32	34		6.63	0.68	0.54	0.055	2.56	0.26
SSAY1-35 H		35			35	37		7.45	0.76	0.66	0.067	3.08	0.31
SSAY1-36 H		36			36	38		7.73	0.79	0.70	0.071	3.26	0.33
SSAY1-40 H		40			40	42		8.84	0.90	0.87	0.089	4.05	0.41
SSAY1-45 H		45			45	47		10.3	1.05	1.12	0.11	5.17	0.53
SSAY1-48 H		48		6	48	50		11.1	1.13	1.28	0.13	5.90	0.60
SSAY1-50 H		50		8	50	52		11.7	1.19	1.39	0.14	6.42	0.65
SSAY1-55 H		55		8	55	57		13.1	1.34	1.70	0.17	7.81	0.80
SSAY1-56 H		56		8	56	58		13.4	1.37	1.77	0.18	8.11	0.83
SSAY1-60 H		60		8	60	62		14.5	1.48	2.04	0.21	9.34	0.95
SSAY1-70 H		70		8	70	72		17.4	1.78	2.82	0.29	12.8	1.31
SSAY1-80 H		80		10	80	82		20.3	2.07	3.74	0.38	16.9	1.72
SSAY1-100 H		100		10	100	102		26.2	2.67	5.98	0.61	26.6	2.72

Backlash (mm)	Weight (kg)	Catalog Number
0.08~0.18	0.013	**SSAY1-20** H
	0.020	**SSAY1-24** H
	0.022	**SSAY1-25** H
	0.028	**SSAY1-28** H
	0.032	**SSAY1-30** H
	0.037	**SSAY1-32** H
	0.044	**SSAY1-35** H
	0.047	**SSAY1-36** H
	0.058	**SSAY1-40** H
	0.074	**SSAY1-45** H
	0.084	**SSAY1-48** H
	0.090	**SSAY1-50** H
	0.11	**SSAY1-55** H
	0.11	**SSAY1-56** H
	0.13	**SSAY1-60** H
	0.18	**SSAY1-70** H
	0.23	**SSAY1-80** H
	0.37	**SSAY1-100** H

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

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

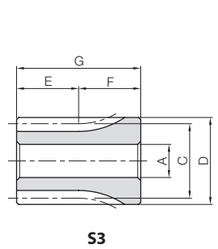
SUS Module 1

Stainless Steel Spur Gears

Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)

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

J



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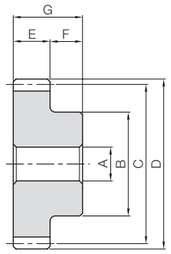
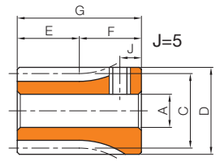


S1

J Series



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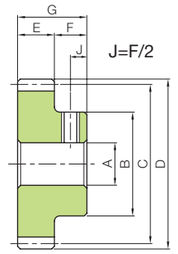

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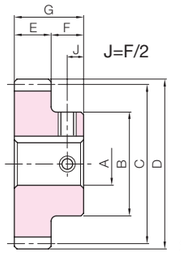

S1K

Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SUS1-15	15			17	15	17				2.04	0.12	0.21	0.013		0.038
SUS1-16	16	S3		18	16	18		20	30	2.26	0.14	0.23	0.015		0.044
SUS1-18	18			20	18	20				2.71	0.18	0.28	0.019		0.058
SUS1-20	20			16	20	22				3.18	0.23	0.32	0.024		0.033
SUS1-22	22			18	22	24				3.65	0.29	0.37	0.029		0.042
SUS1-24	24			20	24	26				4.13	0.35	0.42	0.036		0.053
SUS1-25	25		8	20	25	27				4.37	0.38	0.45	0.039		0.056
SUS1-28	28			23	28	30				5.11	0.48	0.52	0.049		0.074
SUS1-30	30			25	30	32				5.60	0.56	0.57	0.057		0.087
SUS1-32	32			26	32	34				6.11	0.64	0.62	0.066		0.098
SUS1-35	35			26	35	37				6.87	0.78	0.70	0.079		0.11
SUS1-36	36			28	36	38				7.12	0.82	0.73	0.084		0.12
SUS1-40	40			35	40	42	10			8.15	1.03	0.83	0.11	0.08~0.18	0.16
SUS1-45	45	S1		35	45	47		10	20	9.44	1.32	0.96	0.13		0.19
SUS1-48	48			35	48	50				10.2	1.51	1.04	0.15		0.21
SUS1-50	50			35	50	52				10.8	1.65	1.10	0.17		0.22
SUS1-55	55			40	55	57				12.1	2.01	1.23	0.21		0.28
SUS1-56	56		10	40	56	58				12.3	2.09	1.26	0.21		0.28
SUS1-60	60			40	60	62				13.4	2.42	1.37	0.25		0.31
SUS1-64	64			45	64	66				14.5	2.77	1.47	0.28		0.37
SUS1-70	70			50	70	72				16.1	3.34	1.64	0.34		0.45
SUS1-80	80			60	80	82				18.7	4.42	1.91	0.45		0.61
SUS1-90	90			60	90	92				21.4	5.67	2.19	0.58		0.72
SUS1-100	100		12	60	100	102				24.1	7.08	2.46	0.72		0.83
SUS1-120	120			60	120	122				29.6	10.4	3.01	1.06		1.10

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

Bore H_7	* The product shapes of J Series items are identified by background color.																
Keyway Js9	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	
Screw size	-	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		
Catalog Number	M5	M4						M5				M6			M8		
SUS1-15J BORE																	
SUS1-16J BORE																	
SUS1-18J BORE																	
SUS1-20J BORE																	
SUS1-22J BORE																	
SUS1-24J BORE																	
SUS1-25J BORE																	
SUS1-28J BORE																	
SUS1-30J BORE																	
SUS1-32J BORE																	
SUS1-35J BORE																	
SUS1-36J BORE																	
SUS1-40J BORE																	
SUS1-45J BORE																	
SUS1-48J BORE																	
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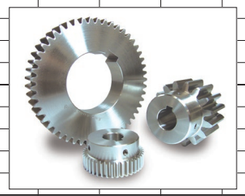
SUS1-120J BORE																	



[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.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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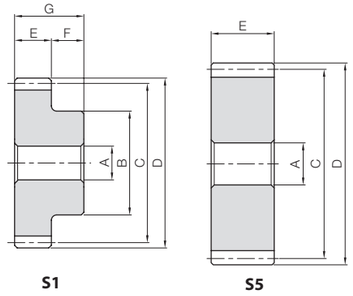
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)

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

J



S1 S5

Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SUS1.5-15	15	S1	8	18	22.5	25.5	15	14	29	6.89	0.43	0.70	0.044	0.10~0.22	0.064
SUS1.5-16	16			20	24	27				7.63	0.50	0.78	0.051		0.077
SUS1.5-18	18			22	27	30				9.16	0.65	0.93	0.066		0.099
SUS1.5-20	20			24	30	33				10.7	0.82	1.09	0.084		0.12
SUS1.5-22	22			26	33	36				12.3	1.01	1.26	0.10		0.15
SUS1.5-24	24			28	36	39				13.9	1.23	1.42	0.13		0.18
SUS1.5-25	25			30	37.5	40.5				14.8	1.35	1.50	0.14		0.20
SUS1.5-28	28		10	36	42	45				17.2	1.71	1.76	0.17		0.26
SUS1.5-30	30			38	45	48				18.9	1.98	1.93	0.20		0.30
SUS1.5-32	32			40	48	51				20.6	2.27	2.10	0.23		0.34
SUS1.5-35	35			42	52.5	55.5				23.2	2.74	2.36	0.28		0.39
SUS1.5-36	36			45	54	57				24.0	2.91	2.45	0.30		0.43
SUS1.5-40	40		12	45	60	63				27.5	3.62	2.80	0.37		0.49
SUS1.5-42	42			45	63	66				29.2	4.01	2.98	0.41		0.52
SUS1.5-45	45			45	67.5	70.5				31.9	4.64	3.25	0.47		0.58
SUS1.5-48	48			45	72	75				34.5	5.31	3.52	0.54		0.63
SUS1.5-50	50			50	75	78				36.3	5.79	3.70	0.59		0.72
SUS1.5-55	55			55	82.5	85.5				40.7	7.08	4.15	0.72		0.87
SUS1.5-56	56			55	84	87				41.6	7.36	4.24	0.75		0.90
SUS1.5-60	60		15	60	90	93				45.2	8.51	4.61	0.87		1.03
SUS1.5-64	64			60	96	99				48.8	9.75	4.97	0.99		1.13
SUS1.5-70	70			70	105	108				54.2	11.8	5.52	1.20		1.42
SUS1.5-80	80			80	120	123				63.2	15.6	6.45	1.59		1.86
SUS1.5-100	100			80	150	153				81.4	25.2	8.30	2.57		2.62
SUS2-15	15	S1	12	24	30	34	20	16	36	16.3	1.05	1.67	0.11	0.12~0.26	0.14
SUS2-16	16			26	32	36				18.1	1.22	1.85	0.12		0.16
SUS2-18	18			30	36	40				21.7	1.59	2.21	0.16		0.22
SUS2-20	20			32	40	44				25.4	2.01	2.59	0.20		0.27
SUS2-22	22			36	44	48				29.2	2.48	2.98	0.25		0.34
SUS2-24	24			38	48	52				33.0	3.01	3.37	0.31		0.40
SUS2-25	25			40	50	54				35.0	3.30	3.57	0.34		0.44
SUS2-28	28			45	56	60				40.9	4.18	4.17	0.43		0.56
SUS2-30	30			50	60	64				44.8	4.83	4.57	0.49		0.67
SUSA2-32	32	S5	15	—	64	68		—	—	48.9	5.53	4.98	0.56		0.48
SUSA2-35	35				70	74				54.9	6.67	5.60	0.68		0.58
SUSA2-36	36				72	76				57.0	7.08	5.81	0.72		0.62
SUSA2-40	40				80	84				65.2	8.85	6.65	0.90		0.77
SUSA2-42	42				84	88				69.3	9.81	7.07	1.00		0.85
SUSA2-45	45				90	94				75.5	11.4	7.70	1.16		0.98
SUSA2-48	48				96	100				81.8	13.0	8.34	1.33		1.12
SUSA2-50	50				100	104				86.0	14.2	8.77	1.44		1.22
SUSA2-55	55				110	114				96.5	17.3	9.84	1.77		1.48
SUSA2-60	60				120	124				107	20.8	10.9	2.13		1.77
SUSA2-70	70				140	144				128	29.0	13.1	2.96		2.41

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
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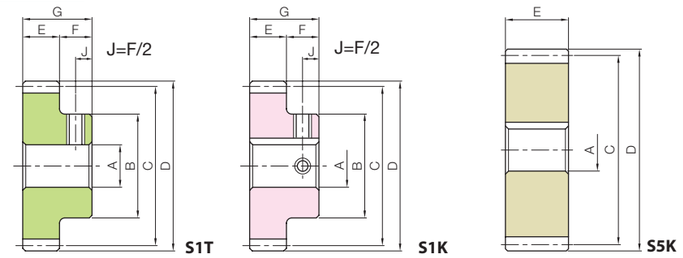
J Series



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

Bore H_7	* The product shapes of J Series items are identified by background color.																			
Keyway Js9	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	
Screw size	-	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8		
Catalog Number	M5	M4						M5				M6			M8			M10	-	
SUS1.5-15 J BORE																				
SUS1.5-16 J BORE																				
SUS1.5-18 J BORE																				
SUS1.5-20 J BORE																				
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SUS1.5-80 J BORE																				
SUS1.5-100J BORE																				
SUS2-15 J BORE																				
SUS2-16 J BORE																				
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SUSA2-45 J BORE																				
SUSA2-48 J BORE																				
SUSA2-50 J BORE																				
SUSA2-55 J BORE																				
SUSA2-60 J BORE																				
SUSA2-70 J 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.

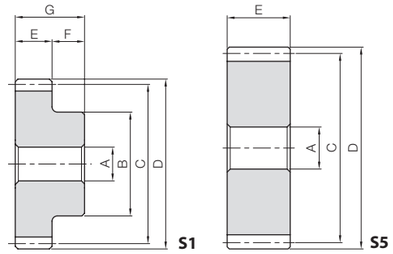
SUS/SUSA Module 2.5, 3, 4

Stainless Steel Spur Gears

Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)

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

J



Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SUS2.5-15	15	S1	15	30	37.5	42.5	25	18	43	31.9	2.11	3.25	0.21	0.14~0.28	0.26
SUS2.5-16	16			32	40	45				35.3	2.44	3.60	0.25		0.30
SUS2.5-18	18			38	45	50				42.4	3.18	4.32	0.32		0.42
SUS2.5-20	20			40	50	55				49.6	4.02	5.06	0.41		0.51
SUS2.5-24	24			48	60	65				64.5	6.01	6.58	0.61		0.76
SUS2.5-25	25			50	62.5	67.5				68.3	6.58	6.96	0.67		0.83
SUS2.5-28	28			60	70	75				79.8	8.34	8.14	0.85		1.11
SUS2.5-30	30			65	75	80				87.6	9.65	8.93	0.98		1.29
SUSA2.5-32	32	S5	20	—	80	85		—	—	95.4	11.1	9.73	1.13		0.96
SUSA2.5-36	36				90	95				111	14.2	11.3	1.45		1.23
SUSA2.5-40	40				100	105				127	17.7	13.0	1.81		1.49
SUSA2.5-42	42				105	110				135	19.6	13.8	2.00		1.65
SUSA2.5-48	48				120	125				160	26.1	16.3	2.66		2.18
SUSA2.5-50	50				125	130				168	28.4	17.1	2.90		2.37
SUSA2.5-60	60				150	155				209	42.0	21.3	4.28		3.44
SUSA2.5-64	64				160	165				226	48.2	23.0	4.91		3.92
SUS3-15	15	S1	15	36	45	51	30	20	50	55.1	3.71	5.62	0.38	0.14~0.32	0.47
SUS3-18	18			40	54	60				73.3	5.59	7.47	0.57		0.67
SUS3-20	20			50	60	66				85.8	7.07	8.74	0.72		0.91
SUS3-22	22			54	66	72				98.5	8.73	10.0	0.89		1.11
SUS3-24	24			58	72	78				111	10.6	11.4	1.08		1.32
SUS3-25	25		20	60	75	81				118	11.6	12.0	1.18		1.37
SUS3-28	28			70	84	90				138	14.7	14.1	1.50		1.80
SUS3-30	30			75	90	96				151	17.0	15.4	1.74		2.09
SUSA3-32	32	S5	20	—	96	102		—	—	165	19.5	16.8	1.99		1.65
SUSA3-35	35				105	111				185	23.6	18.9	2.40		1.99
SUSA3-36	36				108	114				192	25.0	19.6	2.55		2.10
SUSA3-40	40		25		120	126				220	31.3	22.4	3.19		2.57
SUSA3-45	45				135	141				255	40.2	26.0	4.10		3.29
SUSA3-50	50				150	156				290	50.4	29.6	5.14		4.09
SUSA3-60	60				180	186				362	74.3	36.9	7.58		5.94
SUS4-15	15	S1	20	45	60	68	40	25	65	131	9.06	13.3	0.92	0.18~0.38	1.05
SUS4-20	20			65	80	88				203	17.3	20.7	1.76		2.09
SUS4-25	25			84	100	108				280	28.3	28.5	2.89		3.43
SUS4-30	30			100	120	128				359	41.7	36.6	4.25		4.98
SUSA4-40	40	S5	30	—	160	168		—	—	521	77.1	53.2	7.86		6.15
SUSA4-50	50				200	208				573	103	58.5	10.5		9.74

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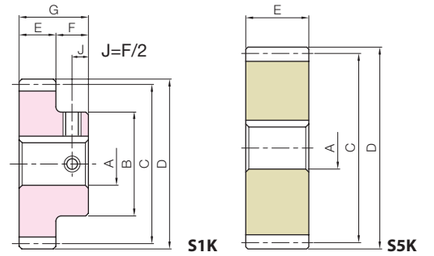
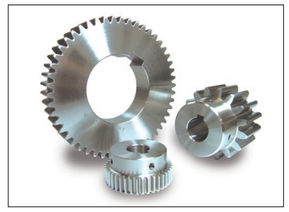
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series





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

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

Bore H_7 / Keyway Js_9	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	5×2.3			6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M4			M5				M6			M8			M10	
SUS2.5-15 J BORE															
SUS2.5-16 J BORE															
SUS2.5-18 J BORE															
SUS2.5-20 J BORE															
SUS2.5-24 J BORE															
SUS2.5-25 J BORE															
SUS2.5-28 J BORE															
SUS2.5-30 J BORE															
SUSA2.5-32 J BORE															
SUSA2.5-36 J BORE															
SUSA2.5-40 J BORE															
SUSA2.5-42 J BORE															
SUSA2.5-48 J BORE															
SUSA2.5-50 J BORE															
SUSA2.5-60 J BORE															
SUSA2.5-64 J BORE															
SUS3-15 J BORE															
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SUSA3-50 J BORE															
SUSA3-60 J BORE															
SUS4-15 J BORE															
SUS4-20 J BORE															
SUS4-25 J BORE															
SUS4-30 J BORE															
SUSA4-40 J BORE															
SUSA4-50 J 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.

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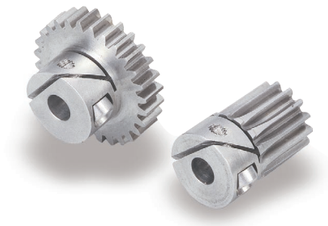
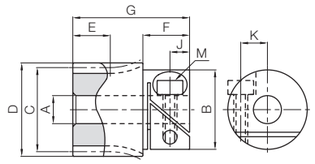
You can download CAD data (DXF format) of KHK Products from the Website.

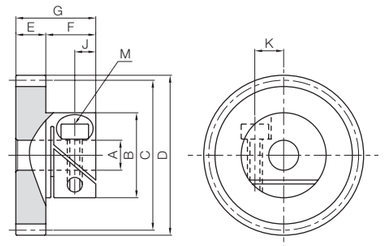


Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)

* The gear grade listed is the value before clamping. The precision grade of products with a module of 0.5 or less is equivalent to the value shown in the table.



S3



S1

Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Hex socket screw			Allowable torque (N-m)		Allowable torque (kgf·m)		Ref. slipping torque	Standard screw tightening torque (N-m)	Backlash (mm)	Weight (g)	Catalog Number
				A_{H7}	B	C	D	E	F	G	M	J	K	Bending strength	Surface durability	Bending strength	Surface durability					
SUSF0.5-24	***m*0.5**	24	S3	5	14	12	13	7	8	22	M2.5	3.3	4.4	0.72	0.056	0.074	0.0057	0.62	0.45	0~0.10	20.0	**SUSF0.5-24**
SUSF0.5-30		30	S1			15	16	5	10	15				0.98	0.091	0.10	0.0093				16.9	**SUSF0.5-30**
SUSF0.5-50		50		6	17	25	26				M3	4.5	5.7	1.34	0.19	0.14	0.019	1.79	0.80		34.1	**SUSF0.5-50**
SUSF0.5-60		60		8	19	30	31						6	1.67	0.28	0.17	0.029	2.22			44.5	**SUSF0.5-60**
SUSF0.5-70		70				35	36							2.01	0.39	0.20	0.040				54.7	**SUSF0.5-70**
SUSF0.5-80		80		10	24	40	41		14	19	M4	5.3	7.7	2.34	0.51	0.24	0.052	4.50	2.00		88.2	**SUSF0.5-80**
SUSF1-14	***m*1**	14	S3	6	17	14	16	8	10	25	M3	4.5	5.7	1.46	0.088	0.15	0.0090	1.79	0.80	0~0.10	33.3	**SUSF1-14**
SUSF1-15		15				15	17							1.63	0.10	0.17	0.010				36.2	**SUSF1-15**
SUSF1-18		18	S1			18	20	6		16				2.17	0.15	0.22	0.015				26.5	**SUSF1-18**
SUSF1-20		20				20	22							1.91	0.14	0.19	0.015				29.4	**SUSF1-20**
SUSF1-24		24				24	26							2.48	0.21	0.25	0.021				35.9	**SUSF1-24**
SUSF1-25		25				25	27							2.62	0.23	0.27	0.023				37.8	**SUSF1-25**
SUSF1-30		30		8	19	30	32						6	3.36	0.34	0.34	0.034	2.22	0.80		49.7	**SUSF1-30**
SUSF1-35		35				35	37							4.12	0.47	0.42	0.047				61.9	**SUSF1-35**
SUSF1-36		36				36	38							4.27	0.49	0.44	0.050				64.5	**SUSF1-36**
SUSF1-40		40				40	42							4.89	0.62	0.50	0.063				75.9	**SUSF1-40**
SUSF1-50		50		10	24	50	52		14	20	M4	5.3	7.7	6.45	0.99	0.66	0.10	4.50	2.00		131	**SUSF1-50**
SUSF1-60		60				60	62							8.03	1.45	0.82	0.15				172	**SUSF1-60**
SUSF1-64		64				64	66							8.67	1.66	0.88	0.17				191	**SUSF1-64**

[Caution on Product Characteristics] ① F-Loc gears are attached to the shaft by a friction coupling. Recommended shaft tolerances are g6, h6, or h7. Torque slippage should be considered when making a selection.
② Do not tighten the clamping screw without inserting a shaft, or the bore will be permanently deformed and will not accept a shaft.
③ The tooth and hub mating section has a rotation-stop pin inserted.

[Caution on Secondary Operations] ① Secondary operations cannot be performed, as this is a complete product.

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info@zahnrad24.com
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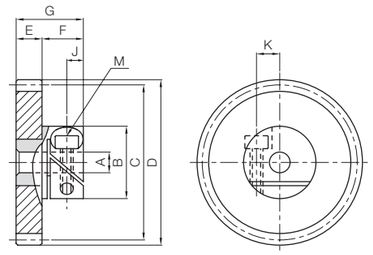
Product Precautions → Page 50

Specifications	
Precision grade	JIS grade N10 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	Polyacetal (Hub: SUS303)
Heat Treatment	—
Tooth hardness	(110 to 120HRR)

* The gear grade listed is the value before clamping. The precision grade of products with a module of 0.5 or less is equivalent to the value shown in the table.



S1

Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Hex socket screw			Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Ref. slipping torque	Standard screw tightening torque (N·m)	Backlash (mm)	Weight (g)	Catalog Number
				A_{H7}	B	C	D	E	F	G	M	J	K							
DSF0.5-36	***m*0.5**	36	S1	5	14	18	19	5	8.5	13.5	M2.5	3.3	4.4	0.49	0.050	0.62	0.45	0~0.10	11.7	**DSF0.5-36**
DSF0.5-40		40				20	21							0.55	0.057				12.1	**DSF0.5-40**
DSF0.5-50		50				25	26							0.73	0.075				13.4	**DSF0.5-50**
DSF0.5-60		60				30	31							0.90	0.092				14.9	**DSF0.5-60**
DSF0.5-80		80				40	41							1.25	0.13				18.8	**DSF0.5-80**
DSF0.5-120		120		8	19	60	61		10	15	M3	4.5	6	1.93	0.20	2.22	0.80		40.1	**DSF0.5-120**
DSF1-20	***m*1**	20	S1	5	14	20	22	6	8.5	14.5	M2.5	3.3	4.4	0.96	0.098	0.62	0.45	0~0.10	12.7	**DSF1-20**
DSF1-24		24				24	26							1.22	0.12				13.9	**DSF1-24**
DSF1-25		25				25	27							1.28	0.13				14.2	**DSF1-25**
DSF1-30		30		8	19	30	32		10	16	M3	4.5	6	1.61	0.16	2.22	0.80		26.5	**DSF1-30**
DSF1-32		32				32	34							1.75	0.18				27.3	**DSF1-32**
DSF1-36		36				36	38							2.04	0.21				29.1	**DSF1-36**
DSF1-40		40				40	42							2.33	0.24				31.2	**DSF1-40**
DSF1-50		50				50	52							3.07	0.31				37.1	**DSF1-50**
DSF1-60		60				60	62							3.78	0.39				44.5	**DSF1-60**
DSF1-80		80				80	82							5.23	0.53				63.1	**DSF1-80**
DSF1-100		100				100	102							6.68	0.68				87.0	**DSF1-100**

[Caution on Product Characteristics] ① F-Loc gears are attached to the shaft by a friction coupling. Recommended shaft tolerances are g6, h6, or h7. Torque slippage should be considered when making a selection.
② Do not tighten the clamping screw without inserting a shaft, or the bore will be permanently deformed and will not accept a shaft.
③ The tooth and hub mating section has a rotation-stop pin inserted.

[Caution on Secondary Operations] ① Secondary operations cannot be performed, as this is a complete product.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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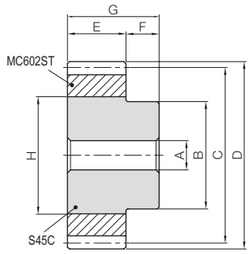
Spur Gears
Helical Gears
Internal Gears
Racks
CP Racks & Pinions
Miter Gears
Bevel Gears
Screw Gears
Worm Gears
Gearboxes
Other Products

Plastic Spur Gears with Steel Core

Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	MC602ST with S45C core
Heat Treatment	—
Tooth hardness	(115 to 120HRR)

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

J



S1

Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Core O.D. H	Allowable torque (N-m) Bending strength	Allowable torque (kgf-m) Bending strength	Backlash (mm)	Weight (kg)
NSU1-30	30	S1	8	20	30	32	10	10	20	20	1.23	0.13	0~0.34	0.046
NSU1-35	35			25	35	37				25	1.50	0.15		0.075
NSU1-36	36		10	25	36	38				25	1.56	0.16		0.076
NSU1-40	40			25	40	42				28	1.78	0.18		0.082
NSU1-45	45			30	45	47				34	2.06	0.21		0.12
NSU1-48	48			30	48	50				34	2.23	0.23		0.13
NSU1-50	50				50	52				34	2.35	0.24		0.13
NSU1-60	60			40	60	62				45	2.93	0.30	0~0.36	0.23
NSU1-70	70				70	72				45	3.46	0.35		0.24
NSU1-80	80				80	82				45	4.00	0.41		0.25
NSU1-90	90			40	90	92				55	4.56	0.46		0.32
NSU1-100	100				100	102				65	5.12	0.52		0.40
NSU1.5-30	30	S1	10	30	45	48	15	12	27	30	4.15	0.42	0~0.38	0.15
NSU1.5-32	32			33	48	51				33	4.51	0.46		0.18
NSU1.5-35	35				52.5	55.5				36	5.07	0.52	0~0.40	0.20
NSU1.5-36	36				54	57				36	5.26	0.54		0.21
NSU1.5-40	40			40	60	63				45	6.00	0.61		0.31
NSU1.5-45	45				67.5	70.5				45	6.94	0.71		0.33
NSU1.5-50	50		12		75	78				45	7.92	0.81		0.33
NSU1.5-60	60			50	90	93				55	9.89	1.01		0.51
NSU1.5-80	80			60	120	123				85	13.5	1.38	0~0.42	1.01
NSU1.5-90	90				135	138				100	15.4	1.57		1.29
NSU2-20	20	S1	10	22	40	44	20	14	34	22	5.89	0.60	0~0.42	0.10
NSU2-25	25			30	50	54				30	7.85	0.80		0.20
NSU2-28	28			35	56	60				35	9.05	0.92	0~0.44	0.27
NSU2-30	30				60	64				35	9.84	1.00		0.28
NSU2-32	32		12	40	64	68				40	10.7	1.09		0.35
NSU2-35	35				70	74				45	12.0	1.22		0.41
NSU2-36	36				72	76				45	12.5	1.27		0.42
NSU2-40	40			55	80	84				60	14.2	1.45		0.71
NSU2-45	45		15		90	94				60	16.5	1.68		0.74
NSU2-48	48			60	96	100				65	17.8	1.82		0.88
NSU2-50	50				100	104				65	18.8	1.92	0~0.46	0.90
NSU2-56	56				112	116				65	21.5	2.20		0.95
NSU2-60	60				120	124				85	23.5	2.39		1.29
NSU2-80	80				160	164				125	32.0	3.27		2.38

[Caution on Product Characteristics] ① When the core O.D is the same as the hub diameter, you may see some serration on the hub. There is no effect on the strength of the gear.

[Caution on Secondary Operations] ① Because it affects the welded portion, there is no additional modification other than to the boss part.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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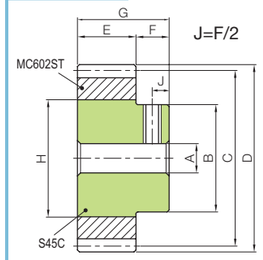
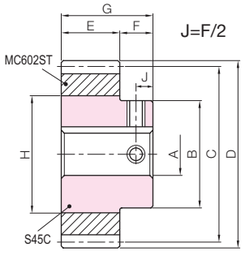
Precautions for Standard Machined Products → Pages 42~44

J Series



S1T



S1K

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

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

Bore $_{H7}$	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35
Keyway $_{Js9}$		4×1.8		5×2.3				6×2.8				8×3.3			10 X 3.3	
Screw size	—	M4						M5				M6			M8	
Catalog Number	M5															
NSU1-30 J BORE																
NSU1-35 J BORE																
NSU1-36 J BORE																
NSU1-40 J BORE																
NSU1-45 J BORE																
NSU1-48 J BORE																
NSU1-50 J BORE																
NSU1-60 J BORE																
NSU1-70 J BORE																
NSU1-80 J BORE																
NSU1-90 J BORE																
NSU1-100 J BORE																
NSU1.5-30 J BORE																
NSU1.5-32 J BORE																
NSU1.5-35 J BORE																
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NSU1.5-40 J BORE																
NSU1.5-45 J BORE																
NSU1.5-50 J BORE																
NSU1.5-60 J BORE																
NSU1.5-80 J BORE																
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NSU2-20 J BORE																
NSU2-25 J BORE																
NSU2-28 J BORE																
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NSU2-48 J BORE																
NSU2-50 J BORE																
NSU2-56 J BORE																
NSU2-60 J BORE																
NSU2-80 J BORE																

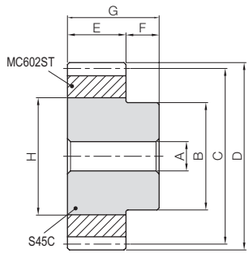
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Plastic Spur Gears with Steel Core

Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	MC602ST with S45C core
Heat Treatment	—
Tooth hardness	(115 to 120HRR)

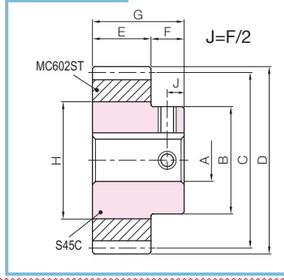
* The precision grade is equivalent to the value shown in the table.

J



S1

J Series



S1K

Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Core O.D. H	Allowable torque (N-m) Bending strength	Allowable torque (kgf-m) Bending strength	Backlash (mm)	Weight (kg)
NSU2.5-18	18	S1	12	25	45	50	25	15	40	25	9.93	1.01	0~0.44	0.15
NSU2.5-20	20			28	50	55				28	11.5	1.17		0.20
NSU2.5-24	24			35	60	65				35	14.5	1.48	0~0.46	0.32
NSU2.5-25	25			35	62.5	67.5				35	15.3	1.56		0.33
NSU2.5-28	28			40	70	75				40	17.7	1.80		0.44
NSU2.5-30	30			45	75	80				50	19.2	1.96		0.61
NSU2.5-32	32			45	80	85				50	20.9	2.13		0.63
NSU2.5-36	36			55	90	95				60	24.3	2.48		0.91
NSU2.5-40	40		15	65	100	105				70	27.8	2.83		1.21
NSU2.5-50	50			65	125	130				95	36.7	3.74	0~0.48	1.89
NSU2.5-60	60		20	70	150	155				115	45.8	4.67		2.62
NSU2.5-70	70			70	175	180				140	54.1	5.51		3.64
NSU3-20	20	S1	12	33	60	66	30	17	47	33	19.9	2.03	0~0.54	0.35
NSU3-22	22			38	66	72				38	22.5	2.29		0.46
NSU3-25	25			45	75	81				45	26.5	2.70		0.65
NSU3-28	28		15	50	84	90				50	30.5	3.11		0.79
NSU3-30	30			55	90	96				60	33.2	3.39		1.05
NSU3-32	32			60	96	102				65	36.1	3.68		1.24
NSU3-34	34			60	102	108				65	39.0	3.98	0~0.56	1.27
NSU3-35	35			60	105	111				75	40.5	4.13		1.51
NSU3-36	36			60	108	114				80	42.1	4.29		1.65
NSU3-40	40		20	70	120	126				85	48.0	4.90		1.94
NSU3-44	44			70	132	138				95	54.0	5.51		2.31
NSU3-45	45				135	141				105	55.5	5.66		2.65
NSU3-48	48				144	150				105	60.2	6.14		2.72
NSU3-50	50				150	156				105	63.4	6.46		2.77
NSU3-56	56				168	174				130	72.7	7.42		3.85
NSU3-60	60			70	180	186				145	79.1	8.07		4.62
NSU3-70	70				210	216				175	93.4	9.53		6.45

[Caution on Product Characteristics] ① When the core O.D is the same as the hub diameter, you may see some serration on the hub. There is no effect on the strength of the gear.

[Caution on Secondary Operations] ① Because it affects the welded portion, there is no additional modification other than to the boss part.

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

Bore $_{H7}$	* The product shapes of J Series items are identified by background color.														
Keyway $_{Js9}$	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40
Screw size	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		12×3.3
Catalog Number	M4					M5				M6			M8		
NSU2.5-18 J BORE															
NSU2.5-20 J BORE															
NSU2.5-24 J BORE															
NSU2.5-25 J BORE															
NSU2.5-28 J BORE															
NSU2.5-30 J BORE															
NSU2.5-32 J BORE															
NSU2.5-36 J BORE															
NSU2.5-40 J BORE															
NSU2.5-50 J BORE															
NSU2.5-60 J BORE															
NSU2.5-70 J BORE															
NSU3-20 J BORE															
NSU3-22 J BORE															
NSU3-25 J BORE															
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NSU3-44 J BORE															
NSU3-45 J BORE															
NSU3-48 J BORE															
NSU3-50 J BORE															
NSU3-56 J BORE															
NSU3-60 J BORE															
NSU3-70 J 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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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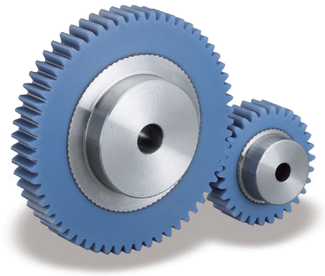
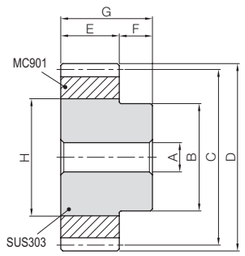
Precautions for Standard Machined Products → Pages 42~44

Plastic Spur Gears with Steel Core



Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	MC901 with SUS303 core
Heat Treatment	—
Tooth hardness	(115 to 120HRR)

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



S1

Catalog Number	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Core O.D. H	Allowable torque (N-m) Bending strength	Allowable torque (kgf-m) Bending strength	Backlash (mm)	Weight (kg)
PU1-30	30	S1	8	20	30	32	10	10	20	20	1.03	0.10	0~0.34	0.046
PU1-35	35			25	35	37				25	1.25	0.13		0.075
PU1-40	40		10	25	40	42				28	1.48	0.15		0.083
PU1-50	50			30	50	52				34	1.96	0.20		0.13
PU1-60	60			40	60	62				45	2.41	0.25	0~0.36	0.23
PU1-80	80			40	80	82				45	3.34	0.34		0.25
PU1.5-30	30	S1	10	30	45	48	15	12	27	30	3.46	0.35	0~0.38	0.15
PU1.5-40	40			40	60	63				45	5.00	0.51	0~0.40	0.31
PU1.5-50	50		12	40	75	78				45	6.60	0.67		0.33
PU1.5-60	60			50	90	93				55	8.14	0.83		0.51
PU1.5-80	80			60	120	123				85	11.3	1.15	0~0.42	1.02
PU2-20	20	S1	10	22	40	44	20	14	34	22	4.91	0.50	0~0.42	0.10
PU2-25	25			30	50	54				30	6.54	0.67		0.20
PU2-30	30			35	60	64				35	8.20	0.84	0~0.44	0.28
PU2-35	35		12	40	70	74				45	10.0	1.02		0.41
PU2-40	40		15	55	80	84				60	11.9	1.21		0.72
PU2-50	50			60	100	104				65	15.7	1.60		0.90
PU2-60	60			60	120	124				85	19.3	1.97	0~0.46	1.30

[Caution on Product Characteristics] ① When the core O.D is the same as the hub diameter, you may see some serration on the hub. There is no effect on the strength of the gear.

[Caution on Secondary Operations] ① Because it affects the welded portion, there is no additional modification other than to the boss part.

ZAHNRAD24.COM
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info@zahnrad24.com
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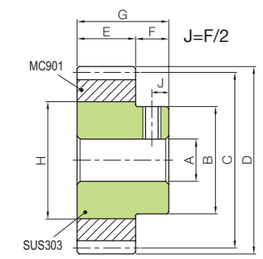
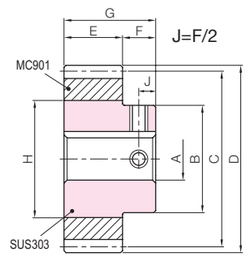
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

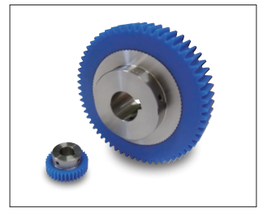
J Series



S1T



S1K

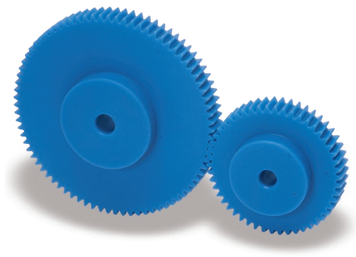


To order J Series products, please specify: Catalog No. + J + BORE.

Bore $_{H7}$	* The product shapes of J Series items are identified by background color.																
Keyway $_{Js9}$	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35
Screw size	—	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3	
Catalog Number	M5	M4						M5				M6			M8	
PU1-30 J BORE																
PU1-35 J BORE																
PU1-40 J BORE																
PU1-50 J BORE																
PU1-60 J BORE																
PU1-80 J BORE																
PU1.5-30 J BORE																
PU1.5-40 J BORE																
PU1.5-50 J BORE																
PU1.5-60 J BORE																
PU1.5-80 J BORE																
PU2-20 J BORE																
PU2-25 J BORE																
PU2-30 J BORE																
PU2-35 J BORE																
PU2-40 J BORE																
PU2-50 J BORE																
PU2-60 J 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.

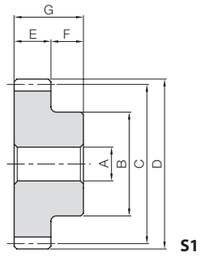
Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44



Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
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.

J



S1

Catalog Number	No. of teeth	Shape	Bore A	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Backlash (mm)	Weight (kg)
PS1-15	15	S1	6	12	15	17	10	10	20	0.41	0.042	0~0.32	0.0027
PS1-16	16			12	16	18				0.45	0.046		0.0030
PS1-18	18			14	18	20				0.53	0.054		0.0041
PS1-20	20			16	20	22				0.61	0.063		0.0053
PS1-22	22		8	18	22	24				0.69	0.071	0~0.34	0.0062
PS1-24	24			20	24	26				0.77	0.079		0.0077
PS1-25	25			20	25	27				0.82	0.083		0.0082
PS1-26	26			20	26	28				0.86	0.088		0.0086
PS1-28	28			22	28	30				0.94	0.096		0.010
PS1-30	30			25	30	32				1.03	0.10		0.013
PS1-32	32			26	32	34				1.11	0.11		0.014
PS1-35	35			26	35	37				1.25	0.13		0.016
PS1-36	36			28	36	38				1.30	0.13		0.018
PS1-40	40			35	40	42				1.48	0.15		0.024
PS1-45	45			35	45	47				1.71	0.17		0.028
PS1-48	48		10		48	50				1.86	0.19		0.030
PS1-50	50				50	52				1.96	0.20		0.032
PS1-55	55			35	55	57				2.18	0.22	0~0.36	0.037
PS1-60	60				60	62				2.41	0.25		0.042
PS1-65	65				65	67				2.64	0.27		0.048
PS1-70	70			40	70	72				2.87	0.29		0.057
PS1-75	75				75	77				3.11	0.32		0.064
PS1-80	80				80	82				3.34	0.34		0.071
PS1-90	90				90	92				3.80	0.39		0.087
PS1-95	95				95	97				4.03	0.41		0.095
PS1-100	100				100	102				4.27	0.44		0.10

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FEINWERKTECHNIK GmbH
Oberes Dorf 1
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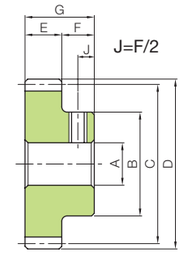
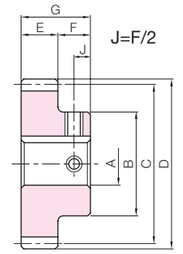
* In regard to MC Nylon gears, other materials are available for plastic gears, including Ultra High Molecular Weight Polyethylene (U-PE), which has excellent abrasion resistance and resin conforming to the Plastic Implementation Measure (PIM).
A single piece order is acceptable and will be produced as a custom-made gear.
Please see Page 26 for more details on quotations and orders.

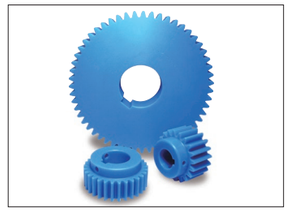
J Series



S1T



S1K



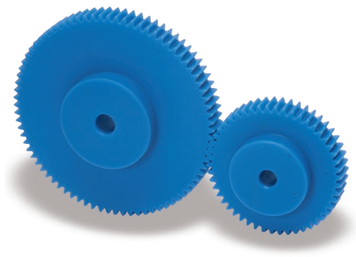
To order J Series products, please specify: Catalog No. + J + BORE.

Bore H8	* The product shapes of J Series items are identified by background color.														
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30
Screw size	—		4×1.8		5×2.3				6×2.8				8×3.3		
Catalog Number	M4	M5	M4						M5				M6		
PS1-15 J BORE															
PS1-16 J BORE															
PS1-18 J BORE															
PS1-20 J BORE															
PS1-22 J BORE															
PS1-24 J BORE															
PS1-25 J BORE															
PS1-26 J BORE															
PS1-28 J BORE															
PS1-30 J BORE															
PS1-32 J BORE															
PS1-35 J BORE															
PS1-36 J BORE															
PS1-40 J BORE															
PS1-45 J BORE															
PS1-48 J BORE															
PS1-50 J BORE															
PS1-55 J BORE															
PS1-60 J BORE															
PS1-65 J BORE															
PS1-70 J BORE															
PS1-75 J BORE															
PS1-80 J BORE															
PS1-90 J BORE															
PS1-95 J BORE															
PS1-100 J 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.
② Since tapped holes of plastic products are easily damaged, avoid overtightening when fastening screws. For products with a short tapped hole, tighten screws to a torque of less than 0.12 N·m for M4 threads, and 0.38 N·m for M5 threads.

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

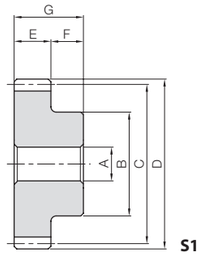
Plastic Spur Gears



Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
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.

J



S1

Catalog Number	No. of teeth	Shape	Bore A_{H8}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Backlash (mm)	Weight (kg)
PS1.5-15	15	S1	8	18	22.5	25.5	15	10	25	1.39	0.14	0~0.38	0.0084
PS1.5-16	16			20	24	27				1.53	0.16		0.010
PS1.5-18	18			22	27	30				1.79	0.18		0.013
PS1.5-20	20			24	30	33				2.07	0.21		0.016
PS1.5-22	22			26	33	36				2.34	0.24		0.020
PS1.5-24	24			28	36	39				2.61	0.27		0.023
PS1.5-25	25			30	37.5	40.5				2.76	0.28		0.026
PS1.5-26	26			32	39	42				2.91	0.3		0.029
PS1.5-28	28			36	42	45				3.18	0.32		0.034
PS1.5-30	30			38	45	48				3.46	0.35		0.039
PS1.5-32	32			40	48	51				3.76	0.38		0.045
PS1.5-35	35			42	52.5	55.5				4.22	0.43		0.052
PS1.5-36	36			45	54	57				4.38	0.45		0.057
PS1.5-40	40		10	45	60	63				5.00	0.51		0.065
PS1.5-45	45			45	67.5	70.5				5.79	0.59		0.078
PS1.5-48	48			45	72	75				6.27	0.64	0~0.40	0.087
PS1.5-50	50			45	75	78				6.60	0.67		0.093
PS1.5-55	55			45	82.5	85.5				7.36	0.75		0.11
PS1.5-60	60			50	90	93				8.14	0.83		0.13
PS1.5-65	65		12	50	97.5	100.5				8.91	0.91		0.15
PS1.5-70	70			50	105	108				9.69	0.99		0.17
PS1.5-75	75			50	112.5	115.5				10.5	1.07		0.19
PS1.5-80	80			55	120	123				11.3	1.15	0~0.42	0.22
PS1.5-90	90			55	135	138				12.8	1.31		0.27
PS1.5-100	100			60	150	153				14.4	1.47		0.34

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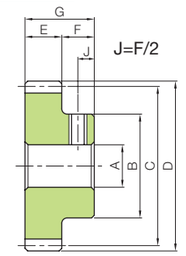
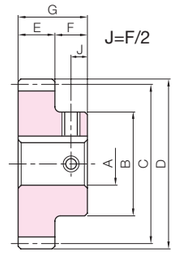
* In regard to MC Nylon gears, other materials are available for plastic gears, including Ultra High Molecular Weight Polyethylene (U-PE), which has excellent abrasion resistance and resin conforming to the Plastic Implementation Measure (PIM).
A single piece order is acceptable and will be produced as a custom-made gear.
Please see Page 26 for more details on quotations and orders.

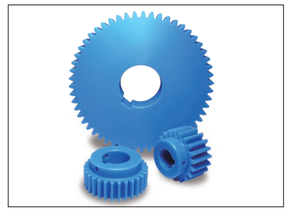
J Series



S1T



S1K

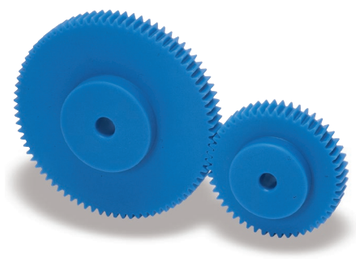


To order J Series products, please specify: Catalog No. + J + BORE.

Bore $_{H8}$	* The product shapes of J Series items are identified by background color.														
Keyway $_{Js9}$	8	10	12	14	15	16	17	18	19	20	22	25	28	30	
Screw size	—	4×1.8		5×2.3				6×2.8				8×3.3			
Catalog Number	M5	M4						M5				M6			
PS1.5-15 J BORE															
PS1.5-16 J BORE															
PS1.5-18 J BORE															
PS1.5-20 J BORE															
PS1.5-22 J BORE															
PS1.5-24 J BORE															
PS1.5-25 J BORE															
PS1.5-26 J BORE															
PS1.5-28 J BORE															
PS1.5-30 J BORE															
PS1.5-32 J BORE															
PS1.5-35 J BORE															
PS1.5-36 J BORE															
PS1.5-40 J BORE															
PS1.5-45 J BORE															
PS1.5-48 J BORE															
PS1.5-50 J BORE															
PS1.5-55 J BORE															
PS1.5-60 J BORE															
PS1.5-65 J BORE															
PS1.5-70 J BORE															
PS1.5-75 J BORE															
PS1.5-80 J BORE															
PS1.5-90 J BORE															
PS1.5-100 J 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.
② Since tapped holes of plastic products are easily damaged, avoid overtightening when fastening screws. For products with a short tapped hole, tighten screws to a torque of less than 0.12 N·m for M4 threads, and 0.38 N·m for M5 threads.

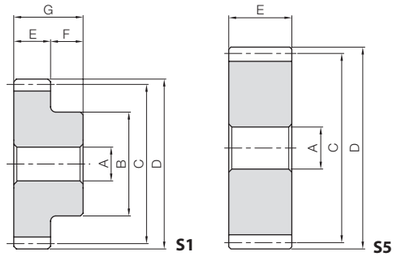
Plastic Spur Gears



Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
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.

J



Catalog Number	No. of teeth	Shape	Bore A_{H8}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Backlash (mm)	Weight (kg)
PS2-12	12	S1	10	18	24	28	20	10	30	2.25	0.23	0~0.42	0.011
PS2-13	13			20	26	30				2.59	0.26		0.013
PS2-14	14			20	28	32				2.96	0.30		0.015
PS2-15	15			24	30	34				3.29	0.34		0.019
PS2-16	16			26	32	36				3.63	0.37		0.022
PS2-18	18			30	36	40				4.24	0.43		0.029
PS2-20	20			32	40	44				4.91	0.50		0.036
PS2-22	22			35	44	48				5.55	0.57		0.044
PS2-24	24			38	48	52				6.19	0.63		0.052
PS2-25	25			40	50	54				6.54	0.67		0.057
PS2-26	26			42	52	56				6.90	0.70	0~0.44	0.063
PS2-28	28			45	56	60				7.54	0.77		0.073
PS2-30	30			50	60	64				8.20	0.84		0.086
PSA2-32	32	S5	12	—	64	68				8.91	0.91		0.072
PSA2-35	35				70	74				10.0	1.02		0.087
PSA2-36	36				72	76				10.4	1.06		0.092
PSA2-40	40				80	84				11.9	1.21		0.11
PSA2-45	45				90	94				13.7	1.40		0.14
PSA2-48	48				96	100				14.9	1.52		0.17
PSA2-50	50				100	104				15.7	1.60		0.18
PSA2-55	55				110	114				17.5	1.78	0~0.46	0.22
PSA2-60	60				120	124				19.3	1.97		0.26
PSA2-65	65		15		130	134				21.1	2.15		0.30
PSA2-70	70				140	144				23.0	2.34		0.35
PSA2-75	75				150	154				24.9	2.54		0.41
PSA2-80	80				160	164				26.7	2.72		0.46
PSA2-85	85				170	174				28.5	2.91		0.52
PSA2-90	90				180	184				30.4	3.10		0.59
PSA2-95	95				190	194				32.3	3.29		0.65
PSA2-100	100				200	204				34.2	3.48		0.72

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A single piece order is acceptable and will be produced as a custom-made gear.
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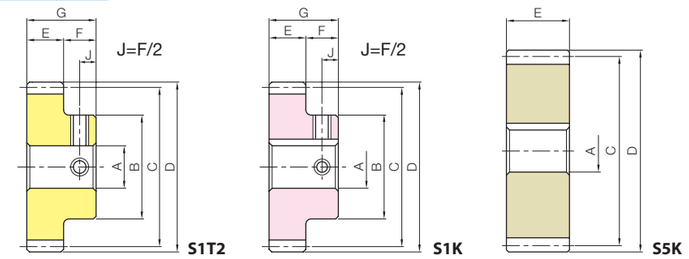
Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44

J Series



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

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

Bore H8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Keyway Js9	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Screw size	M4						M5				M6			M8		—		
Catalog Number																		
PS2-12 J BORE																		
PS2-13 J BORE																		
PS2-14 J BORE																		
PS2-15 J BORE																		
PS2-16 J BORE																		
PS2-18 J BORE																		
PS2-20 J BORE																		
PS2-22 J BORE																		
PS2-24 J BORE																		
PS2-25 J BORE																		
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PS2-30 J BORE																		
PSA2-32 J BORE																		
PSA2-35 J BORE																		
PSA2-36 J BORE																		
PSA2-40 J BORE																		
PSA2-45 J BORE																		
PSA2-48 J BORE																		
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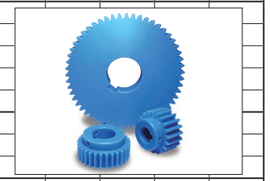
PSA2-65 J BORE																		
PSA2-70 J BORE																		
PSA2-75 J BORE																		
PSA2-80 J BORE																		
PSA2-85 J BORE																		
PSA2-90 J BORE																		
PSA2-95 J BORE																		
PSA2-100 J BORE																		



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Standardized sectional stainless steel hubs. They create a secure method for fastening to the shaft.

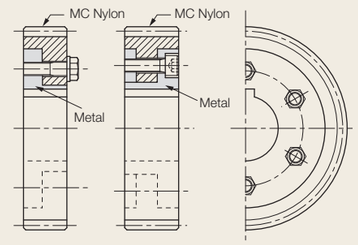
Please see Page 182 for more details.

■ How to attach gears to shafts

To attach gears to shafts, in case of light loads, methods include using keys, taper pins, spring pins, and press fitting after mounting the setscrews. Since loosening tends to occur in the conditions below, plastic gears are better fastened by using a steel hub.

1. When the circumferential temperature is high
2. For large diameter gears
3. If forward-reverse motion impacts keys

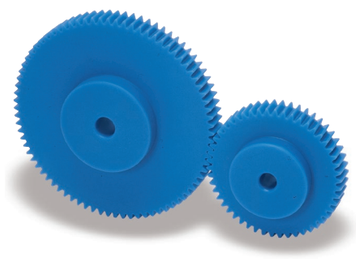
For fastening steel hubs into plastic gears with bolts, see right for various methods.



Fastening with a steel hub bolt

Technical information on gears is available on KHK Web Site.

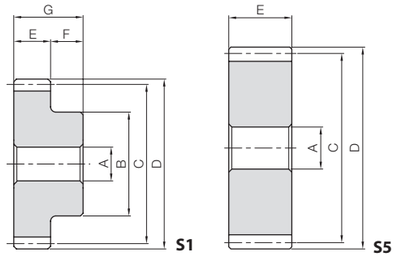
Plastic Spur Gears



Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
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.

J



Catalog Number	No. of teeth	Shape	Bore A_{H8}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Backlash (mm)	Weight (kg)
PS2.5-12	12	S1	10	23	30	35	25	12	37	4.39	0.45	0~0.44	0.023
PS2.5-14	14			25	35	40				5.77	0.59		0.031
PS2.5-15	15		12	30	37.5	42.5				6.42	0.65		0.037
PS2.5-16	16			32	40	45				7.09	0.72		0.043
PS2.5-18	18			38	45	50				8.28	0.84		0.057
PS2.5-20	20			40	50	55				9.59	0.98	0~0.46	0.070
PS2.5-22	22			44	55	60				10.8	1.11		0.085
PS2.5-24	24			48	60	65				12.1	1.23		0.10
PS2.5-25	25			50	62.5	67.5				12.8	1.30		0.11
PS2.5-26	26			55	65	70				13.5	1.37		0.12
PS2.5-28	28			60	70	75				14.7	1.50		0.15
PS2.5-30	30			65	75	80				16.0	1.63		0.17
PSA2.5-32	32	S5	15	—	80	85	—	—	—	17.4	1.77	0~0.48	0.14
PSA2.5-36	36				90	95				20.3	2.07		0.18
PSA2.5-40	40				100	105				23.2	2.36		0.22
PSA2.5-45	45				112.5	117.5				26.8	2.73		0.28
PSA2.5-48	48				120	125				29.0	2.96		0.32
PSA2.5-50	50				125	130				30.6	3.12		0.35
PSA2.5-55	55				137.5	142.5				34.1	3.48		0.43
PSA2.5-60	60				150	155				37.7	3.84		0.51

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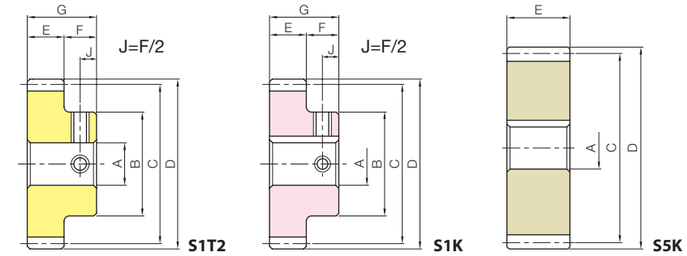
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

* In regard to MC Nylon gears, other materials are available for plastic gears, including Ultra High Molecular Weight Polyethylene (U-PE), which has excellent abrasion resistance and resin conforming to the Plastic Implementation Measure (PIM). A single piece order is acceptable and will be produced as a custom-made gear. Please see Page 26 for more details on quotations and orders.

Product Precautions → Page 50

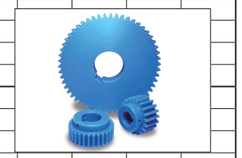
Precautions for Standard Machined Products → Pages 42~44

J Series



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

Bore H8	* The product shapes of J Series items are identified by background color.																	
Keyway Js9	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M4						M5				M6			M8		—		
PS2.5-12 J BORE																		
PS2.5-14 J BORE																		
PS2.5-15 J BORE																		
PS2.5-16 J BORE																		
PS2.5-18 J BORE																		
PS2.5-20 J BORE																		
PS2.5-22 J BORE																		
PS2.5-24 J BORE																		
PS2.5-25 J BORE																		
PS2.5-26 J BORE																		
PS2.5-28 J BORE																		
PS2.5-30 J BORE																		
PSA2.5-32 J BORE																		
PSA2.5-36 J BORE																		
PSA2.5-40 J BORE																		
PSA2.5-45 J BORE																		
PSA2.5-48 J BORE																		
PSA2.5-50 J BORE																		
PSA2.5-55 J BORE																		
PSA2.5-60 J BORE																		



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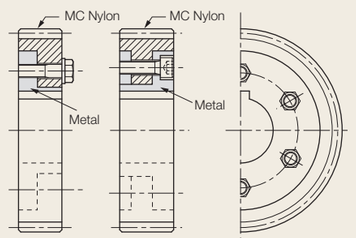
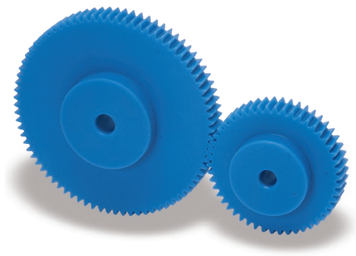
For fastening steel hubs into plastic gears with bolts, see right for various methods.



Fastening with a steel hub bolt



Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	MC901
Heat treatment	—
Tooth hardness	(115 to 120HRR)

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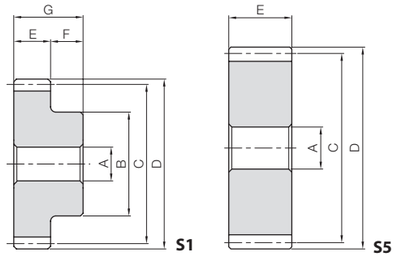
J



Catalog Number	No. of teeth	Shape	Bore A_{H8}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Backlash (mm)	Weight (kg)
PS3-13	13	S1	12	30	39	45	30	15	45	8.74	0.89	0~0.52	0.048
PS3-14	14			32	42	48				9.97	1.02		0.056
PS3-15	15			36	45	51				11.1	1.13		0.065
PS3-16	16			38	48	54				12.3	1.25		0.075
PS3-18	18			40	54	60				14.3	1.46	0~0.54	0.094
PS3-20	20		14	50	60	66				16.6	1.69		0.12
PS3-22	22			54	66	72				18.7	1.91		0.15
PS3-24	24			58	72	78				20.9	2.13		0.18
PS3-25	25			60	75	81				22.1	2.25		0.19
PS3-26	26			65	78	84				23.3	2.37		0.22
PS3-28	28			70	84	90				25.5	2.60		0.25
PS3-30	30			75	90	96				27.7	2.82		0.29
PSA3-32	32	S5	18	—	96	102				30.1	3.07		0.24
PSA3-35	35				105	111				33.8	3.44		0.29
PSA3-36	36				108	114				35.1	3.57		0.31
PSA3-40	40				120	126				40.0	4.08		0.38
PSA3-45	45				135	141		—	—	46.3	4.72	0~0.56	0.49
PSA3-48	48				144	150				50.2	5.12		0.56
PSA3-50	50				150	156				52.8	5.39		0.61
PSA3-55	55				165	171				58.9	6.01		0.74
PSA3-60	60				180	186				65.1	6.64		0.88

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Product Precautions → Page 50
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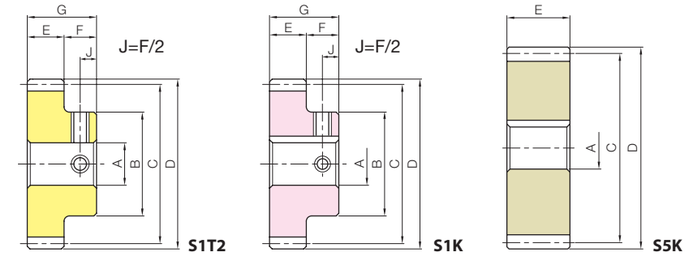
J Series



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Bore H8	* The product shapes of J Series items are identified by background color.																
Keyway Js9	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M4					M5				M6			M8		—		
PS3-13 J BORE																	
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PS3-18 J BORE																	
PS3-20 J BORE																	
PS3-22 J BORE																	
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PS3-30 J BORE																	
PSA3-32 J BORE																	
PSA3-35 J BORE																	
PSA3-36 J BORE																	
PSA3-40 J BORE																	
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PSA3-55 J BORE																	
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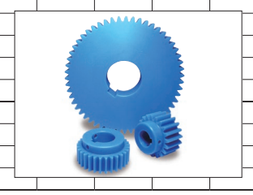

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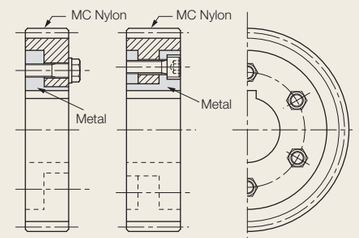
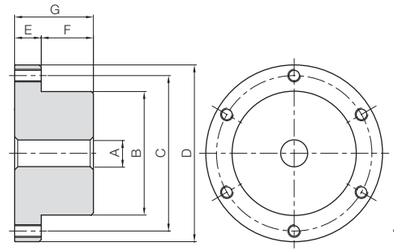


Fastening with a steel hub bolt



T8

■ Material: SUS303

Catalog Number	Shape	Bore	Hub dia.	Socket head screw			Flange diameter	Flange length	Hub width	Total length	Recommended fastening torque		Coupling torque		Weight
		A_{H7}	B	No.	Size	C	D	E	F	G	(N·m)	(kgf·m)	(N·m)	(kgf·m)	(kg)
SUKB20030	T8	10	30	6	M5	42	51	10	20	30	3.00	0.31	83	8.5	0.24
SUKB20046			46			58	67						115	11.7	0.51
SUKB20066			66			78	87						154	15.7	0.98
SUKB25038	T8	12	38	6	M6	53	63	12.5	24.5	37	5.20	0.53	151	15.4	0.48
SUKB25058			58			73	83						208	21.2	1.00
SUKB25083			83			98	108						280	28.5	1.91
SUKB30046	T8	15	46	6	M8	64	76	15	30	45	12.5	1.27	329	33.6	0.83
SUKB30070			70			88	100						453	46.2	1.75
SUKB30100			100			118	130						607	61.9	3.34

[Caution on Product Characteristics]
① The area where PSA Plastic Spur Gears are attached, with hub tolerance h7.
② The friction coupling torques shown in the table are reference values calculated according to these set values; friction factors and fastening torques of the tapping screw.
③ Please refer to the assembly example below, and then attach the hub to the gear with the accessories, plain washers, spring washers and hexagon socket head cap screws.
④ In accordance with the fastening torque values shown in the dimension table, use a torque wrench and fasten hexagon socket head cap screws firmly, to attach the hub.
⑤ If a fastened hexagon socket head cap screw comes loose, the friction tightening torque values shown in the table can not be maintained. It is recommended to check the fasteners regularly and retighten when required.
⑥ For secure positioning, it is recommended to use dowel pins.

[Caution on Secondary Operations]
① Datum plane for machining hubs is the outer circumference of the hub, where PSA Plastic Spur Gears are attached, and the flank of the flange is facing the hub.
② For modifying tapped holes at the outer circumference of the hub, apply machining at positions which will not interfere with the mounting bolt head, using the S1KBK figure as reference.

■ Features of Stainless Steel Hubs

- This is an attached stainless steel hub with excellent rust resistance.
- Perfectly matches with PSA Plastic Spur Gears, and suitable for food processing machinery.
- Efficient use of materials and superior cost performance for this product.

■ Coupling Torque for Stainless Steel Hubs

Coupling torque for Stainless Steel Hubs is calculated from the frictional force generated by the fastening torque at the contact face of the gear and the stainless steel hub.

Fastening Torque F(N) is calculated from the equation below.

$$F=\frac{n\cdot 1000\cdot T}{K\cdot d}$$

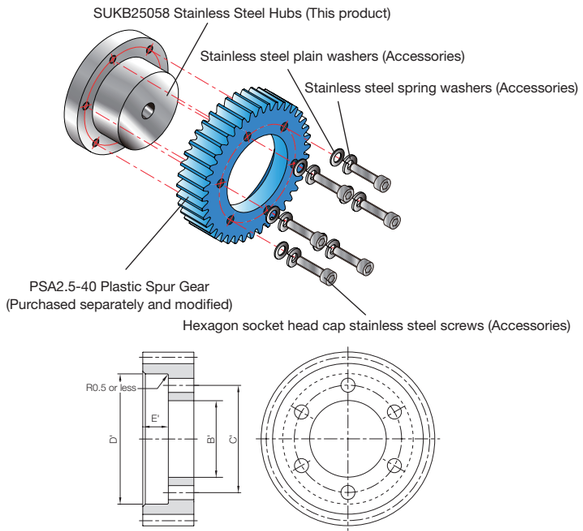
n : Number → No. of threaded holes shown in the dimension table.
T : Tightening torque (N·m) → Fastening torque shown in the dimension table.
K : Torque coefficient → Set the value at 0.164
d : Nominal diameter (mm) → Socket head screw size shown in the dimension table (M5 = 5mm)

Coupling torque T_f (N·m) is calculated from the equation below.

$$T_f=\frac{F\cdot \mu \cdot d_w}{2000}$$

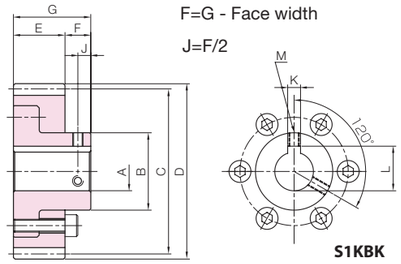
F : Fastening torque (N) → The value obtained from the calculation above.
μ : Friction factor at the contact face of the gear and the stainless steel hub → Set the value at 0.18
d_w : Pitch diameter of the threaded hole (mm) → Socket head screw size C shown in the dimension table

■ Assembly Example of Stainless Steel Hubs



Stainless Steel Hubs	Partner						
Catalog Number	Catalog Number	Bore	Drilled hole			Bore 2	Hole length	Accessories
		B' $_{H8}$	No.	Size	C'	D' $^{+0.1}_{0}$	E' $_{\pm 0.1}$	Bolt (size)
SUKB20030	**PSA2-32 ～ PSA2-36**	30	6	ϕ 5.5	42	51	10	M5×20
SUKB20046	**PSA2-40 ～ PSA2-48**	46			58	67		
SUKB20066	**PSA2-50 ～**	66			78	87		
SUKB25038	**PSA2.5-32 ～ PSA2.5-36**	38		ϕ 6.6	53	63	12.5	M6×25
SUKB25058	**PSA2.5-40 ～ PSA2.5-48**	58			73	83		
SUKB25083	**PSA2.5-50 ～**	83			98	108		
SUKB30046	**PSA3-32 ～ PSA3-36**	46		ϕ 9	64	76	15	M8×30
SUKB30070	**PSA3-40 ～ PSA3-48**	70			88	100		
SUKB30100	**PSA3-50 ～**	100			118	130		

Product Precautions → Page 50
Precautions for Standard Machined Products → Pages 42~44



F=G - Face width
J=F/2

S1KBK

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 $_{Js9}$	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M4						M5				M6			M8			M10	
PSUKB2-32 J BORE																		
PSUKB2-35 J BORE																		
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PSUKB2-65 J BORE																		
PSUKB2-70 J BORE																		
PSUKB2-75 J BORE																		
PSUKB2-80 J BORE																		
PSUKB2-85 J BORE																		
PSUKB2-90 J BORE																		
PSUKB2-95 J BORE																		
PSUKB2-100 J BORE																		
PSUKB2.5-32 J BORE																		
PSUKB2.5-36 J BORE																		
PSUKB2.5-40 J BORE																		
PSUKB2.5-45 J BORE																		
PSUKB2.5-48 J BORE																		
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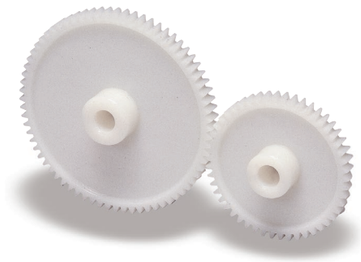
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

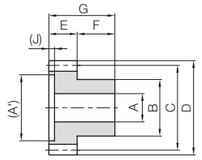
Injection Molded Spur Gears



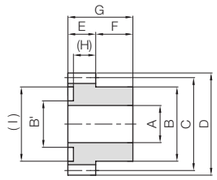
Specifications	
Precision grade	JIS grade N12 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	Duracon (R) (M90-44) **
Heat treatment	—
Tooth hardness	(110 to 120HRR)

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

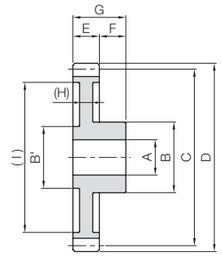
** "Duracon (R)" is a registered trademark of Polyplastics Co., Ltd. in Japan as well as other countries.



S8



S8B



S9

Catalog Number	Module	No. of teeth	Shape	Bore 1	Bore 2	Hub dia. 1	Hub dia. 2	Pitch dia.	Outside dia.	Face width	Hub width
				A	(A')	B	B'	C	D	E	F
DS0.5-12	***m*0.5**	12	S8	2	(4)	4.5	—	6	7	3	4
DS0.5-15		15	S8		(5.5)	4.5	—	7.5	8.5		
DS0.5-16		16	S8	3	(6)	6	—	8	9		
DS0.5-20		20	S8B	4	—	8	5	10	11		
DS0.5-24		24	S9		—	8	5	12	13		
DS0.5-40		40	S9	5	—	12	8	20	21		5
DS0.5-48		48				12	8	24	25		
DS0.5-50		50				12	8	25	26		
DS0.5-56		56		6		14	10	28	29		
DS0.5-60		60				14	10	30	31		
DS0.5-70		70				14	10	35	36		
DS0.5-80		80				14	10	40	41		
DS0.8-12	***m*0.8**	12	S9	3	—	6	4	9.6	11.2	4	5
DS0.8-16		16		4		8	6	12.8	14.4		
DS0.8-20		20		5		10	8	16	17.6		
DS0.8-30		30		6		12	10	24	25.6		
DS0.8-45		45				12	10	36	37.6		
DS0.8-56		56				14.5	11.7	44.8	46.4		6

Total length	Web thickness	Web O.D.	Hole depth	Allowable torque (N·m)	Allowable torque (kgf·m)	Backlash	Weight	Catalog Number
G	(H)	(I)	(J)	Bending strength	Bending strength	(mm)	(g)	
7	—	—	(0.6)	0.063	0.0064	0~0.30	0.17	**DS0.5-12**
	—	—	(0.6)	0.092	0.0094		0.23	**DS0.5-15**
	—	—	(0.6)	0.10	0.010		0.28	**DS0.5-16**
	(2.4)	(8)	—	0.14	0.014		0.47	**DS0.5-20**
	(1.8)	(9.5)	—	0.17	0.018		0.58	**DS0.5-24**
8	(1.8)	(16.5)	—	0.33	0.034		1.53	**DS0.5-40**
		(21)		0.42	0.043		1.91	**DS0.5-48**
		(21.5)		0.44	0.045		2.02	**DS0.5-50**
		(24.5)		0.50	0.051		2.77	**DS0.5-56**
		(26.5)		0.54	0.055		3.02	**DS0.5-60**
		(31.5)		0.64	0.066		3.71	**DS0.5-70**
		(36.5)		0.75	0.076		4.51	**DS0.5-80**
9	(2)	(6.7)	—	0.22	0.022	0~0.48	0.48	**DS0.8-12**
		(9.2)		0.35	0.035		0.84	**DS0.8-16**
		(12.7)		0.47	0.048		1.26	**DS0.8-20**
		(19.5)		0.79	0.080		2.37	**DS0.8-30**
		(31)		1.31	0.13		4.18	**DS0.8-45**
10		(39.5)		1.70	0.17		6.55	**DS0.8-56**

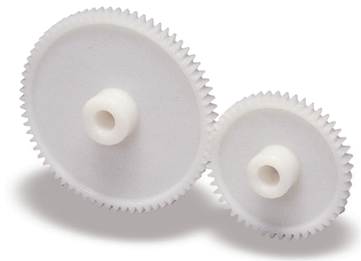
[Caution on Product Characteristics] ① The bore tolerance is -0.05 to -0.30, but it may be slightly higher at the center of the hole.
② For the dimensional accuracy of each part, see the dimensional tolerance of molded items on Page 187.

[Caution on Secondary Operations] ① As it is a molded item, bubbles may form inside the material. Avoid performing secondary operations.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

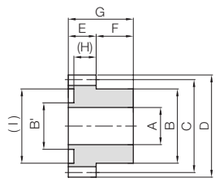
Spur Gears
Helical Gears
Internal Gears
Racks
CP Racks & Pinions
Miter Gears
Bevel Gears
Screw Gears
Worm Gears
Gearboxes
Other Products

Product Precautions → Page 50

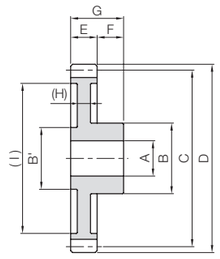


Specifications	
Precision grade	JIS grade N12 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	Duracon (R) (M90-44) **
Heat treatment	—
Tooth hardness	(110 to 120HRR)

* The precision grade is equivalent to the value shown in the table.
** "Duracon (R)" is a registered trademark of Polyplastics Co., Ltd. in Japan as well as other countries.



S8B



S9

Catalog Number	Module	No. of teeth	Shape	Bore 1 A	Bore 2 (A')	Hub dia. 1 B	Hub dia. 2 B'	Pitch dia. C	Outside dia. D	Face width E	Hub width F
DS1-12		12	S8B	4		8	6	12	14		
DS1-16		16				10	8	16	18		
DS1-18		18		5		10	8	18	20		
DS1-20		20				11.7	9	20	22		
DS1-24		24				11.7	9	24	26		
DS1-28		28				11.7	9	28	30		6
DS1-30		30		6		14	12	30	32		
DS1-32		32				14	12	32	34		
DS1-35	***m*1**	35	S9		—	14	12	35	37	6	
DS1-36		36				14	12	36	38		
DS1-40		40		8		16	14	40	42		
DS1-48		48				16	14	48	50		8
DS1-50		50				16	14	50	52		
DS1-60		60				18	15.6	60	62		
DS1-64		64				18	15.6	64	66		
DS1-70		70				18	15.6	70	72		
DS1-80		80				18	15.6	80	82		

Total Length G	Web thickness (H)	Web O.D. (I)	Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Backlash (mm)	Weight (g)	Catalog Number
	(5.5)	(8.5)	0.44	0.045		1.10	**DS1-12**
		(11.5)	0.71	0.073		1.87	**DS1-16**
		(13.5)	0.83	0.085		2.15	**DS1-18**
		(15)	0.96	0.098		2.85	**DS1-20**
		(17)	1.22	0.12		3.81	**DS1-24**
12		(23)	1.48	0.15		4.39	**DS1-28**
		(24)	1.61	0.16		5.46	**DS1-30**
		(26.5)	1.75	0.18		5.86	**DS1-32**
	(3)	(29)	1.96	0.20	0~0.60	6.73	**DS1-35**
		(30)	2.04	0.21		7.01	**DS1-36**
		(34)	2.33	0.24		8.39	**DS1-40**
		(40)	2.92	0.30		12.0	**DS1-48**
		(42.5)	3.07	0.31		12.6	**DS1-50**
14		(52.5)	3.78	0.39		17.6	**DS1-60**
		(56.5)	4.07	0.41		19.4	**DS1-64**
		(62.5)	4.50	0.46		22.4	**DS1-70**
		(72.5)	5.23	0.53		27.9	**DS1-80**

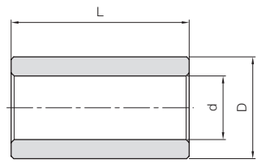
[Caution on Product Characteristics] ① The bore tolerance is -0.05 to -0.30, but it may be slightly higher at the center of the hole.
② For the dimensional accuracy of each part, see the dimensional tolerance of molded items in the table at right.

[Caution on Secondary Operations] ① As it is a molded item, bubbles may form inside the material. Avoid performing secondary operations.

BB
Sintered Metal Bushings

Sintered Metal Bushings

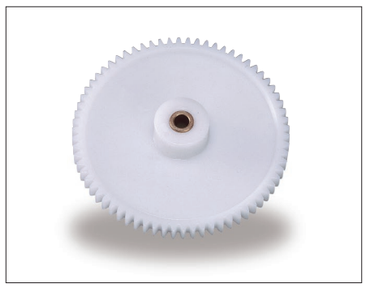
When using the injection molded spur gear with an idler gear (bearing metal press fitting) and diameter smaller than the inside diameter of the molded gear, please press fit the following standard bushing.



T8

Catalog Number	Inner dia. $d^{+0.02}_{0}$	Outside dia. $D^{+0.02}_{+0.01}$	Length $L^{0}_{-0.3}$	Gear example
BB30507	3	5	7	DS0.5
BB30608	3	6	8	DS0.5,DS0.8
BB40609	4	6	9	DS0.8
BB40612	4	6	12	DS1
BB50812	5	8	12	DS1
BB50814	5	8	14	DS1

Material: Oil-free copper alloy



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
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95152 Selbitz

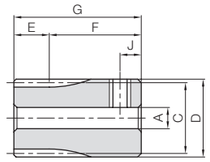
■ Dimensional tolerance of molded item (unit: mm)

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

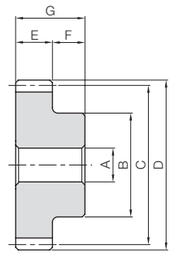
Product Precautions → Page 50

Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	Free cutting brass (C3604)
Heat Treatment	—
Tooth hardness	(80HV or more)

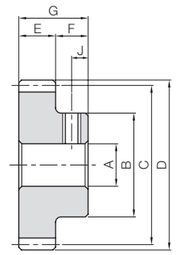
* The precision grade of products with a module of less than 0.8 is equivalent to the value shown in the table.



S3T



S1



S1T

Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Socket head screw		Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Backlash (mm)	Weight (kg)	Catalog Number
				A_{H7}	B	C	D	E	F	G	Size	J					
BSS0.5-15A	***m*0.5**	15	S3T	3	8.5	7.5	8.5	3	11	14	M3	2.5	0.058	0.0059	0~0.10	0.0054	**BSS0.5-15A**
BSS0.5-16A		16			9	8	9						0.065	0.0066		0.0062	**BSS0.5-16A**
BSS0.5-20		20	S1	4	8.5	10	11		7	10	—	—	0.091	0.0093		0.0043	**BSS0.5-20**
BSS0.5-20A			S3T	3	11				11	14	M3	2.5				0.0098	**BSS0.5-20A**
BSS0.5-22A		22	S1T	3	9	11	12				M3	3.5	0.10	0.011		0.0054	**BSS0.5-22A**
BSS0.5-24B		24		4	10	12	13						0.12	0.012		0.0063	**BSS0.5-24B**
BSS0.5-25		25	S1	4	11	12.5	13.5				—	—	0.12	0.013		0.0077	**BSS0.5-25**
BSS0.5-30		30	S1	4	13	15	16				—	—	0.16	0.016		0.011	**BSS0.5-30**
BSS0.5-30A			S1T	3	12						M3	3.5				0.010	**BSS0.5-30A**
BSS0.5-30B			S1T	4	12						M3	3.5				0.0099	**BSS0.5-30B**
BSS0.5-30C			S1T	5	12						M4	3.5				0.0092	**BSS0.5-30C**
BSS0.5-38A		38	S1T	4	16	19	20				M3	3.5	0.22	0.022		0.018	**BSS0.5-38A**
BSS0.5-40		40	S1	4	17	20	21				—	—	0.23	0.024		0.020	**BSS0.5-40**
BSS0.5-50A		50	S1T	4	22	25	26				M3	3.5	0.31	0.031		0.033	**BSS0.5-50A**
BSS0.8-20	***m*0.8**	20	S1	5	13.5	16	17.6	4	8	12	—	—	0.31	0.032	0~0.10	0.014	**BSS0.8-20**
BSS0.8-24B		24			16	19.2	20.8				M4	4	0.40	0.041		0.021	**BSS0.8-24B**
BSS0.8-25		25			17	20	21.6				—	—	0.43	0.043		0.024	**BSS0.8-25**
BSS0.8-30		30	S1	5	20	24	25.6				—	—	0.55	0.056		0.034	**BSS0.8-30**
BSS0.8-30A			S1T	4							M3	4				0.035	**BSS0.8-30A**
BSS0.8-40		40	S1	5	20	32	33.6				—	—	0.79	0.081		0.046	**BSS0.8-40**
BSS1-16B	***m*1**	16	S1T	5	12	16	18	6	8	14	M4	4	0.52	0.053	0.08~0.18	0.015	**BSS1-16B**
BSS1-18B		18		6	15	18	20				M4		0.62	0.063		0.021	**BSS1-18B**
BSS1-20C		20		6	16	20	22				M4		0.73	0.074		0.026	**BSS1-20C**
BSS1-30B		30	S1T	6	25	30	32				M4		1.28	0.13		0.065	**BSS1-30B**
BSS1-40A		40	S1T	6	28	40	42				M4		1.86	0.19		0.10	**BSS1-40A**

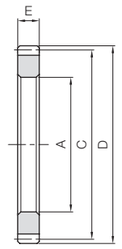
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Product Precautions → Page 50

SSR Module 2, 2.5, 3

Steel Ring Gears (Spur 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)



S5

Catalog Number	Module	No. of teeth	Shape	Bore	Pitch dia.	Outside dia.	Face width	Allowable torque (N·m)		Allowable torque (kgf·m)	
				A_{H8}	C	D	E	Bending strength	Surface durability	Bending strength	Surface durability
SSR2-120	***m*2**	120	S5	194	240	244	20	366	44.0	37.4	4.49
SSR2-200		200		354	400	404		630	84.2	64.3	8.59
SSR2.5-120	***m*2.5**	120	S5	245	300	305	25	715	88.5	72.9	9.02
SSR2.5-200		200		445	500	505		1230	169	126	17.2
SSR3-120	***m*3**	120	S5	296	360	366	30	1240	157	126	16.0
SSR3-160		160		416	480	486		1680	226	171	23.0

[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 bore tolerance is modified at H8, but there may be some errors as the ring shape deforms easily.

Backlash (mm)	Weight (kg)	Catalog Number
0.12~0.26	2.46 4.28	**SSR2-120** **SSR2-200**
0.14~0.28	4.62 8.01	**SSR2.5-120** **SSR2.5-200**
0.14~0.32	7.77 10.6	**SSR3-120** **SSR3-160**

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
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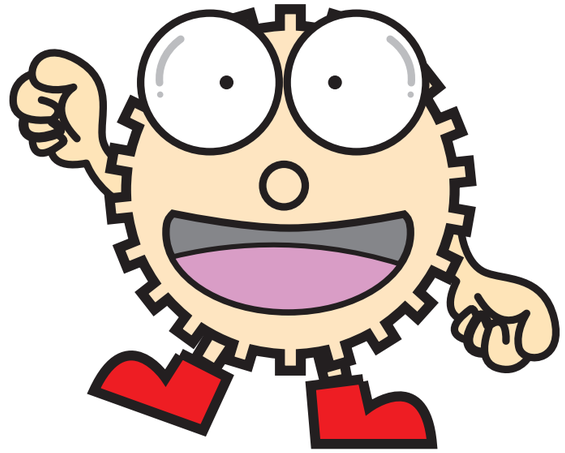
Product Precautions → Page 50

Helical Gears

KHG Ground Helical Gears	SH-H Hardened Helical Gears	SH Helical Gears
NEW JIS	NEW H	
Material: SCM440	Material: S45C	Material: S45C
***m*1~6** Page 196	***m*2, 3** Page 204	***m*2, 3** Page 204



Catalog Number of KHK Stock Gears

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

(Example) Helical Gears

K H G 1 - 20 R

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

Material
S S45C
K SCM440

Type
H Helical Gears

Other Information
G Ground Gears

Features

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

Catalog Number	KHG	SH
Module	1~6	2~3
Reference section of gear	Rotating plane	Normal plane
Material	SCM440	S45C
Heat Treatment	Thermal refined, gear teeth induction hardened	—
Tooth Surface Finish	Ground	Cut
Precision JIS B 1702-1:1998	N6	N8
Secondary Operations	Possible except for tooth	Possible
Features	It has excellent accuracy, strength, wear resistance and quietness, and allows secondary operations. Usable in the same center distance of the spur gear.	It has higher strength and quietness than the SS spur gears.

Selection Hints

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

1. Caution in Selecting the Mating Gears

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

■ Direction of Helix

Left (L) Right (R)

Pinion (L) & Rack (R)

Pinion (R) & Rack (L)

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

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

2. Caution in Selecting Gears Based on Gear Strength

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

■ Calculation of Bending Strength of Gears

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

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

Item \ Catalog Number	KHG	SH
Formula NOTE 1	Formula of spur and helical gears on surface durability (JGMA402-01)	
Kinematic viscosity of lubricant	100cSt(50°C)	
Gear support	Symmetric support by bearings	
Allowable Hertz stress σ_{Hlim} (kgf/mm²)	112	49
Safety factor S_H	1.15	

[NOTE 1] The gear strength formula is based on JGMA (Japanese Gear Manufacturers Association) specifications.
The units for the rotational speed (rpm) and the stress (kgf/mm²) are adjusted to the units needed in the formula.
[NOTE 2] For semi-custom gears, the rotation speed is based on 300rpm.

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FEINWERKTECHNIK GmbH
Oberes Dorf 1
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Product Precautions

Common Notes

[Caution on Product Characteristics]

(1) The allowable torque shown in the table are calculated values according to the assumed usage conditions. Please see page 192 for more details.
(2) The backlash values shown in the table are the theoretical values for the backlash in the normal direction of gears of the same series in mesh.
(3) A set of helical gears must be identical in module, but opposite in spiral hands.
(4) These gears produce axial thrust forces. Please see page 195 for more details.
(5) For the helical gear series combinations, see the Mating Gear Selection Chart on page 192.
(6) Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.
(7) For products having a tapped hole, a set screw is included.
(8) See page 22 for more details on Hardened Plus (H Series and HJ Series).

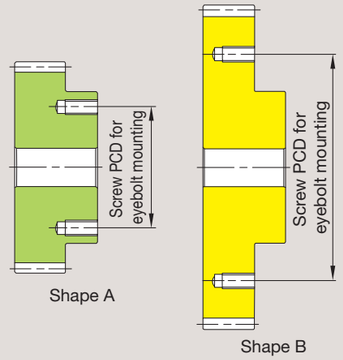
● KHK's Specifications for Heat Treatment
Hardened location: Tooth surface, or Tooth surface and Tooth root
Hardness: 50 to 60 HRC

* 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 being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

[J Series]

(1) Certain products which would otherwise have a very long tapped hole are counterbored. For details, please see the KHK website.
(2) Black oxide is not re-applied to parts undergoing secondary operations.
(3) For bores over ϕ50, the bore tolerance is H8.

Tapped Holes in Semi-Custom Standard Products



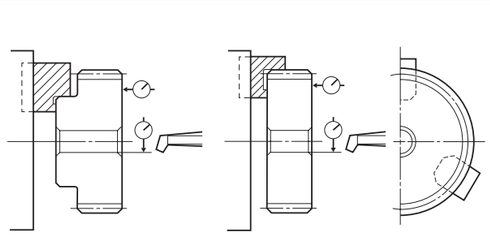
Catalog Number	Shape	Screw P.C.D. for eyebolt mounting
KHG5-50RS	A	125
KHG5-50LS	A	125
KHG5-60RS	B	215
KHG5-60LS	B	215
KHG6-36RS	A	135
KHG6-36LS	A	135
KHG6-40RS	A	145
KHG6-40LS	A	145
KHG6-50RS	A	155
KHG6-50LS	A	155
KHG6-60RS	B	245
KHG6-60LS	B	245

Application Hints

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

1. Caution on Performing Secondary Operations

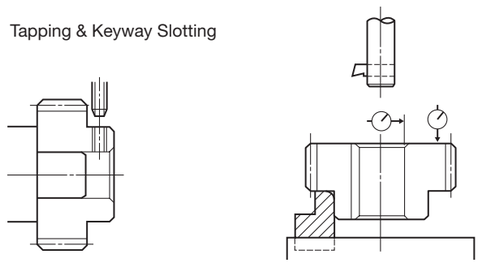
① If reboring, it is important to pay special attention to locating the center in order to avoid runout.
② The reference datum for gear machining is the bore. Therefore, use the bore for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface.
③ If reworking using scroll chucks, we recommend the use of new or rebored jaws for improved precision. Please exercise caution not to crush the teeth.



Lathe Operations

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

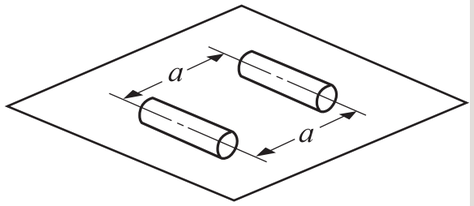
Tapping & Keyway Slotting



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

2. Points of Caution during Assembly

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



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

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

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

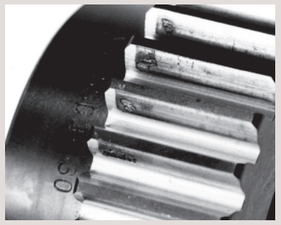
■ Total Length Tolerance for Spur and Helical Gears

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

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

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

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

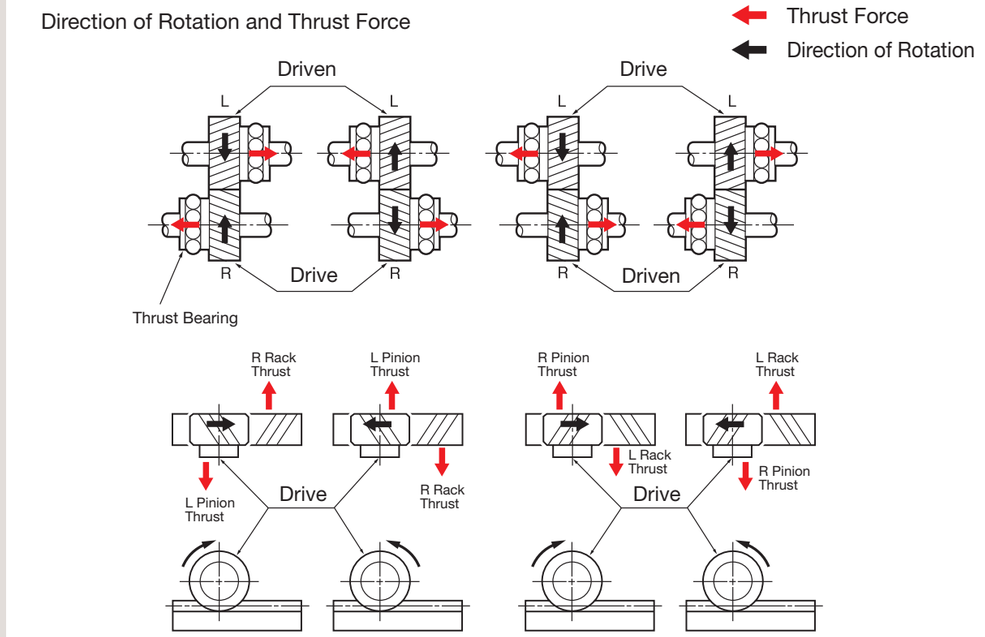


Poor tooth contact and pitting

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

④ Due to the helix of helical gears, they produce thrust force (axial). The bearings must be selected properly to be able to handle these thrust forces. The direction of the thrust forces depend on the helix direction and the direction of rotation as shown below.
For details, use gear calculation software GCSW.

Direction of Rotation and Thrust Force



3. Cautions on Starting

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

② If gears are exposed, be sure to attach a safety cover to ensure safety. Also, be careful not to touch rotating gears.
③ 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.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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FEINWERKTECHNIK GmbH
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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

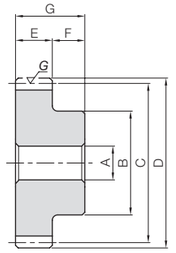
1. Before using a KHK product, read the precautions in the catalog carefully in order to use it correctly.
2. Avoid use in environments that may adversely affect the product.
3. Our products are manufactured under a superior quality control system based on the ISO9001 quality management system; if you notice any malfunctions upon purchasing a product, please contact the supplier.

KHG Module 1, 1.5 Ground Helical Gears

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

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

J



S1

Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
KHG1-20R **KHG1-20L**	***m*1**	20	R L	S1	6	17	20	22	8	10	18	7.80	4.96	0.80	0.51	0.08~0.16	0.034
KHG1-24R **KHG1-24L**		24	R L		8	20	24	26				10.1	7.43	1.03	0.76		0.046
KHG1-30R **KHG1-30L**		30	R L		10	25	30	32				13.6	12.2	1.39	1.24		0.072
KHG1-40R **KHG1-40L**		40	R L			30	40	42				17.9	20.8	1.83	2.12		0.12
KHG1-50R **KHG1-50L**		50	R L		12	35	50	52				23.6	33.8	2.41	3.45		0.18
KHG1-60R **KHG1-60L**		60	R L			40	60	62				29.4	50.2	2.99	5.12		0.26
KHG1-70R **KHG1-70L**		70	R L			40	70	72				35.2	70.1	3.59	7.15		0.32
KHG1.5-20R **KHG1.5-20L**	***m*1.5**	20	R L	S1	12	24	30	33	12	12	24	26.3	17.2	2.68	1.75	0.08~0.16	0.088
KHG1.5-24R **KHG1.5-24L**		24	R L			28	36	39				30.9	23.4	3.16	2.39		0.13
KHG1.5-30R **KHG1.5-30L**		30	R L		15	38	45	48				41.8	38.4	4.26	3.92		0.22
KHG1.5-32R **KHG1.5-32L**		32	R L			40	48	51				45.5	44.3	4.64	4.52		0.26
KHG1.5-36R **KHG1.5-36L**		36	R L			45	54	57				53.0	57.4	5.40	5.85		0.33
KHG1.5-40R **KHG1.5-40L**		40	R L			50	60	63				60.5	72.3	6.17	7.38		0.42
KHG1.5-50R **KHG1.5-50L**		50	R L		18	60	75	78				79.7	118	8.13	12.0		0.63
KHG1.5-60R **KHG1.5-60L**		60	R L		20	60	90	93				99.1	175	10.1	17.9		0.81
KHG1.5-80R **KHG1.5-80L**		80	R L			70	120	123				132	313	13.5	32.0		1.37
KHG1.5-90R **KHG1.5-90L**		90	R L			70	135	138				151	404	15.4	41.2		1.65
KHG1.5-100R **KHG1.5-100L**		100	R L			70	150	153				170	508	17.4	51.8		1.97

[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.

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info@zahnrad24.com
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Oberes Dorf 1
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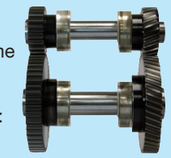
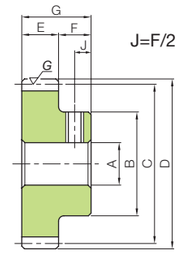
Usable in the assembly distance of the spur gear.

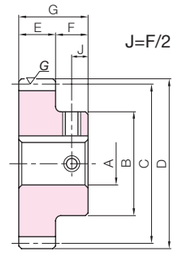
KHG ground helical gears use a "transverse" module.
The assembly distance is the same as spur gear pairs with the same module and number of teeth.
Improved strength and low noise: Take the next step up from spur gears.



J Series



S1T

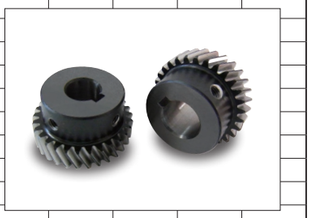


S1K

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

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

Bore H7	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30
Keyway Js9															
Screw size	—		4×1.8		5×2.3				6×2.8				8×3.3		
Catalog Number	M4	M5	M4						M5				M6		
KHG1-20R J BORE															
KHG1-20L J BORE															
KHG1-24R J BORE															
KHG1-24L J BORE															
KHG1-30R J BORE															
KHG1-30L J BORE															
KHG1-40R J BORE															
KHG1-40L J BORE															
KHG1-50R J BORE															
KHG1-50L J BORE															
KHG1-60R J BORE															
KHG1-60L J BORE															
KHG1-70R J BORE															
KHG1-70L J BORE															
KHG1.5-20R J BORE															
KHG1.5-20L J BORE															
KHG1.5-24R J BORE															
KHG1.5-24L J BORE															
KHG1.5-30R J BORE															
KHG1.5-30L J BORE															
KHG1.5-32R J BORE															
KHG1.5-32L J BORE															
KHG1.5-36R J BORE															
KHG1.5-36L J BORE															
KHG1.5-40R J BORE															
KHG1.5-40L J BORE															
KHG1.5-50R J BORE															
KHG1.5-50L J BORE															
KHG1.5-60R J BORE															
KHG1.5-60L J BORE															
KHG1.5-80R J BORE															
KHG1.5-80L J BORE															
KHG1.5-90R J BORE															
KHG1.5-90L J BORE															
KHG1.5-100R J BORE															
KHG1.5-100L J 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.

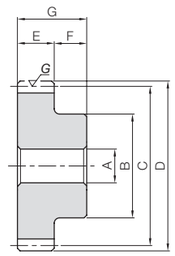
Spur Gears
Helical Gears
Internal Gears
Racks
CP Racks & Pinions
Miter Gears
Bevel Gears
Screw Gears
Worm Gears
Gearboxes
Other Products

Ground Helical Gears

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

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

J



S1

Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N-m) Bending strength	Allowable torque (N-m) Surface durability	Allowable torque (kgf-m) Bending strength	Allowable torque (kgf-m) Surface durability	Backlash (mm)	Weight (kg)
KHG2-15R		15	R		12	24	30	34				40.5	21.1	4.13	2.15		0.11
KHG2-15L			L														
KHG2-18R		18	R			30	36	40				48.6	29.5	4.96	3.01		0.17
KHG2-18L			L														
KHG2-20R		20	R		15	32	40	44				56.7	37.8	5.78	3.85		0.20
KHG2-20L			L														
KHG2-25R		25	R			40	50	54				77.6	62.1	7.91	6.33		0.33
KHG2-25L			L														
KHG2-26R		26	R			42	52	56				81.8	67.8	8.35	6.91		0.37
KHG2-26L			L														
KHG2-30R		30	R		18	50	60	64				99.1	93.1	10.1	9.49		0.50
KHG2-30L			L														
KHG2-32R		32	R			50	64	68				108	107	11.0	10.9		0.55
KHG2-32L			L														
KHG2-35R	***m*2**	35	R	S1		50	70	74	16	13	29	121	131	12.4	13.3	0.10~0.20	0.63
KHG2-35L			L														
KHG2-36R		36	R			50	72	76				126	139	12.8	14.2		0.65
KHG2-36L			L														
KHG2-40R		40	R		20	60	80	84				143	176	14.6	17.9		0.85
KHG2-40L			L														
KHG2-48R		48	R			60	96	100				172	251	17.5	25.6		1.13
KHG2-48L			L														
KHG2-50R		50	R		25	60	100	104				181	274	18.4	28.0		1.16
KHG2-50L			L														
KHG2-60R		60	R			65	120	124				225	408	22.9	41.7		1.65
KHG2-60L			L														
KHG2-70R		70	R			70	140	144				269	572	27.4	58.3		2.21
KHG2-70L			L														
KHG2-80R		80	R			80	160	164				301	732	30.7	74.7		2.93
KHG2-80L			L														

[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.

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Usable in the assembly distance of the spur gear.

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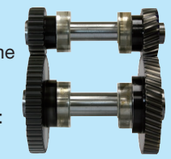
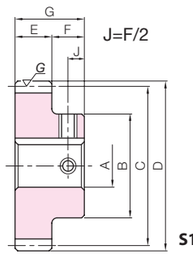
The assembly distance is the same as spur gear pairs with the same module and number of teeth.
Improved strength and low noise: Take the next step up from spur gears.



J Series



S1K

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

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

Bore H7	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Keyway Js9	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Screw size	M4					M5				M6			M8			M10	
Catalog Number																	
KHG2-15R J BORE																	
KHG2-15L J BORE																	
KHG2-18R J BORE																	
KHG2-18L J BORE																	
KHG2-20R J BORE																	
KHG2-20L J BORE																	
KHG2-25R J BORE																	
KHG2-25L J BORE																	
KHG2-26R J BORE																	
KHG2-26L J BORE																	
KHG2-30R J BORE																	
KHG2-30L J BORE																	
KHG2-32R J BORE																	
KHG2-32L J BORE																	
KHG2-35R J BORE																	
KHG2-35L J BORE																	
KHG2-36R J BORE																	
KHG2-36L J BORE																	
KHG2-40R J BORE																	
KHG2-40L J BORE																	
KHG2-48R J BORE																	
KHG2-48L J BORE																	
KHG2-50R J BORE																	
KHG2-50L J BORE																	
KHG2-60R J BORE																	
KHG2-60L J BORE																	
KHG2-70R J BORE																	
KHG2-70L J BORE																	
KHG2-80R J BORE																	
KHG2-80L J 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.

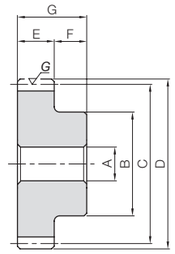
Product Precautions → Page 193
Precautions for Standard Machined Products → Pages 42~44

KHG Module 2.5, 3 Ground Helical Gears

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

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

J



S1

Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
KHG2.5-18R **KHG2.5-18L**	***m*2.5**	18	R L	S1	15	38	45	50	20	14	34	94.9	58.6	9.68	5.97	0.10~0.20	0.33
KHG2.5-20R **KHG2.5-20L**		20	R L		18	40	50	55				111	75.0	11.3	7.65		0.38
KHG2.5-26R **KHG2.5-26L**		26	R L		20	50	65	70				160	135	16.3	13.7		0.65
KHG2.5-40R **KHG2.5-40L**		40	R L		25	70	100	105				268	335	27.3	34.1		1.53
KHG2.5-48R **KHG2.5-48L**		48	R L			75	120	125				336	500	34.2	51.0		2.13
KHG2.5-60R **KHG2.5-60L**		60	R L			80	150	155				439	815	44.8	83.2		3.20
KHG3-16R **KHG3-16L**	***m*3**	16	R L	S1	18	38	48	54	25	16	41	143	80.5	14.6	8.21	0.10~0.20	0.42
KHG3-18R **KHG3-18L**		18	R L			40	54	60				171	106	17.4	10.8		0.53
KHG3-20R **KHG3-20L**		20	R L		20	50	60	66				199	136	20.3	13.9		0.70
KHG3-24R **KHG3-24L**		24	R L			58	72	78				258	206	26.3	21.0		1.03
KHG3-28R **KHG3-28L**		28	R L			70	84	90				318	290	32.4	29.6		1.47
KHG3-30R **KHG3-30L**		30	R L		25	75	90	96				349	339	35.5	34.5		1.65
KHG3-35R **KHG3-35L**		35	R L			80	105	111				407	456	41.5	46.5		2.17
KHG3-36R **KHG3-36L**		36	R L			80	108	114				422	485	43.1	49.5		2.27
KHG3-40R **KHG3-40L**		40	R L			80	120	126				483	613	49.2	62.5		2.69
KHG3-45R **KHG3-45L**		45	R L			80	135	141				559	795	57.0	81.0		3.28
KHG3-48R **KHG3-48L**		48	R L			85	144	150				604	916	61.6	93.4		3.75
KHG3-50R **KHG3-50L**		50	R L		30	85	150	156				635	1000	64.8	102		3.95
KHG3-60R **KHG3-60L**		60	R L			90	180	186				757	1430	77.2	146		5.57

[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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
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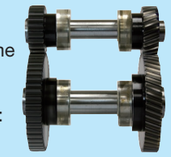
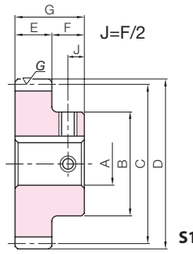
Product Precautions → Page 193
Precautions for Standard Machined Products → Pages 42~44

Usable in the assembly distance of the spur gear.

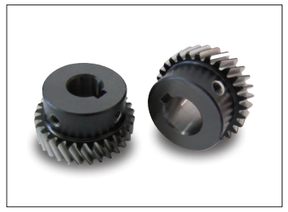
KHG ground helical gears use a "transverse" module.
The assembly distance is the same as spur gear pairs with the same module and number of teeth.
Improved strength and low noise: Take the next step up from spur gears.



J Series



S1K



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

Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	5×2.3			6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M4			M5				M6			M8			M10	
KHG2.5-18R J BORE															
KHG2.5-18L J BORE															
KHG2.5-20R J BORE															
KHG2.5-20L J BORE															
KHG2.5-26R J BORE															
KHG2.5-26L J BORE															
KHG2.5-40R J BORE															
KHG2.5-40L J BORE															
KHG2.5-48R J BORE															
KHG2.5-48L J BORE															
KHG2.5-60R J BORE															
KHG2.5-60L J BORE															
KHG3-16R J BORE															
KHG3-16L J BORE															
KHG3-18R J BORE															
KHG3-18L J BORE															
KHG3-20R J BORE															
KHG3-20L J BORE															
KHG3-24R J BORE															
KHG3-24L J BORE															
KHG3-28R J BORE															
KHG3-28L J BORE															
KHG3-30R J BORE															
KHG3-30L J BORE															
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KHG3-40R J BORE															
KHG3-40L J BORE															
KHG3-45R J BORE															
KHG3-45L J BORE															
KHG3-48R J BORE															
KHG3-48L J BORE															
KHG3-50R J BORE															
KHG3-50L J BORE															
KHG3-60R J BORE															
KHG3-60L J 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.

Ground Helical Gears NEW

Specifications	
Precision grade	JIS grade N6 (JIS B 1702-1: 1998)*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Transverse pressure angle	20°
Helix angle	21°30′
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened**
Tooth hardness	50 to 60HRC
Surface treatment	—

* 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).

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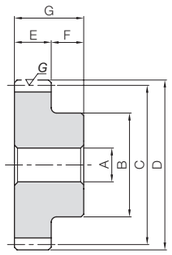
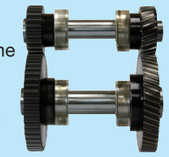


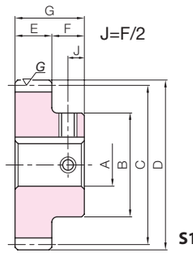
S1

Usable in the assembly distance of the spur gear.

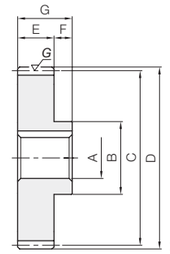
KHG ground helical gears use a "transverse" module.
The assembly distance is the same as spur gear pairs with the same module and number of teeth.
Improved strength and low noise: Take the next step up from spur gears.



J Series



S1K



S1SK

Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
KHG4-18RS S KHG4-18LS S	m4	18	R L	S1	20	60	72	80	32	25	57	389	244	39.7	24.9	0.10~0.20	1.44
KHG4-20RS S KHG4-20LS S		20	R L			65	80	88				454	312	46.3	31.8		1.77
KHG4-25RS S KHG4-25LS S		25	R L			80	100	108				621	513	63.3	52.3		2.82
KHG4-30RS S KHG4-30LS S		30	R L			90	120	128				793	769	80.9	78.4		3.95
KHG4-36RS S KHG4-36LS S		36	R L		25		144	152				1000	1150	102	117		5.12
KHG4-40RS S KHG4-40LS S		40	R L				160	168				1150	1450	117	148		6.08
KHG4-50RS S KHG4-50LS S		50	R L		30	100	200	208				1450	2270	147	231		9.12
KHG4-60RS S KHG4-60LS S		60	R L			110	240	248				1800	3380	183	344		12.9
KHG5-18RS S KHG5-18LS S	m5	18	R L	S1	25	70	90	100	40	25	65	759	484	77.4	49.3	0.10~0.22	2.50
KHG5-20RS S KHG5-20LS S		20	R L			82	100	110				886	620	90.3	63.2		3.25
KHG5-25RS S KHG5-25LS S		25	R L			105	125	135				1210	1020	124	104		5.30
KHG5-30RS S KHG5-30LS S		30	R L			120	150	160				1550	1530	158	156		7.52
KHG5-36RS S KHG5-36LS S		36	R L		30	130	180	190				1960	2290	200	234		10.2
KHG5-40RS S KHG5-40LS S		40	R L			140	200	210				2140	2770	219	282		12.5
KHG5-50RS S KHG5-50LS S		50	R L			150	250	260				2820	4520	288	461		18.5
KHG5-60RS S KHG5-60LS S		60	R L				300	310				3510	6740	358	687		25.3
KHG6-18RS S KHG6-18LS S	m6	18	R L	S1	25	80	108	120	48	28	76	1310	848	134	86.5	0.10~0.22	4.26
KHG6-20RS S KHG6-20LS S		20	R L			100	120	132				1530	1090	156	111		5.69
KHG6-25RS S KHG6-25LS S		25	R L		30	125	150	162				2090	1790	214	182		8.93
KHG6-30RS S KHG6-30LS S		30	R L			150	180	192				2680	2690	273	274		13.1
KHG6-36RS S KHG6-36LS S		36	R L			160	216	228				3240	3850	331	393		17.8
KHG6-40RS S KHG6-40LS S		40	R L			170	240	252				3710	4860	378	496		21.6
KHG6-50RS S KHG6-50LS S		50	R L		40	180	300	312				4880	7950	497	811		31.5
KHG6-60RS S KHG6-60LS S		60	R L				360	372				5810	11400	593	1160		43.2

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 193.

[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 193

Precautions for Standard Machined Products → Pages 42~44

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

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

Bore H7	20	22	25	28	30	32	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110
Keyway Js9	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		25×5.4		28×6.4		
Screw size	M5		M6			M8			M10		M12			M16				M20				
Catalog Number																						
KHG4-18RS J BORE	Ask for Quote																					
KHG4-18LS J BORE	Ask for Quote																					
KHG4-20RS J BORE	Ask for Quote																					
KHG4-20LS J BORE	Ask for Quote																					
KHG4-25RS J BORE	Ask for Quote																					
KHG4-25LS J BORE	Ask for Quote																					
KHG4-30RS J BORE	Ask for Quote																					
KHG4-30LS J BORE	Ask for Quote																					
KHG4-36RS J BORE			Ask for Quote																			
KHG4-36LS J BORE			Ask for Quote																			
KHG4-40RS J BORE			Ask for Quote																			
KHG4-40LS J BORE			Ask for Quote																			
KHG4-50RS J BORE				Ask for Quote																		
KHG4-50LS J BORE				Ask for Quote																		
KHG4-60RS J BORE				Ask for Quote																		
KHG4-60LS J BORE				Ask for Quote																		
KHG5-18RS J BORE			Ask for Quote																			
KHG5-18LS J BORE			Ask for Quote																			
KHG5-20RS J BORE			Ask for Quote																			
KHG5-20LS J BORE			Ask for Quote																			
KHG5-25RS J BORE			Ask for Quote																			
KHG5-25LS J BORE			Ask for Quote																			
KHG5-30RS J BORE			Ask for Quote																			
KHG5-30LS J BORE			Ask for Quote																			
KHG5-36RS J BORE				Ask for Quote																		
KHG5-36LS J BORE				Ask for Quote																		
KHG5-40RS J BORE				Ask for Quote																		
KHG5-40LS J BORE				Ask for Quote																		
KHG5-50RS J BORE				Ask for Quote																		
KHG5-50LS J BORE				Ask for Quote																		
KHG5-60RS J BORE				Ask for Quote																		
KHG5-60LS J BORE				Ask for Quote																		
KHG6-18RS J BORE			Ask for Quote																			
KHG6-18LS J BORE			Ask for Quote																			
KHG6-20RS J BORE			Ask for Quote																			
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KHG6-30LS J BORE				Ask for Quote																		
KHG6-36RS J BORE				Ask for Quote																		
KHG6-36LS J BORE				Ask for Quote																		
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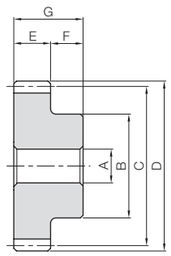
KHG6-50RS J BORE						Ask for Quote																
KHG6-50LS J BORE						Ask for Quote																
KHG6-60RS J BORE						Ask for Quote																
KHG6-60LS J BORE						Ask for Quote																

[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.

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



S1

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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To order Hardened Plus, please specify Catalog No. + H. **Example: SH2-15RH**

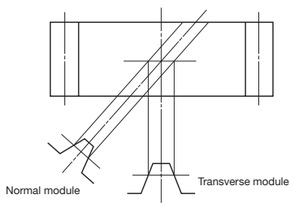
Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
					A_{H7}	B	C	D	E	F	G
SH2-15R SH2-15L	*m*2	15	R L	S1	12	24	31.06	35.06	25	10	35
SH2-20R SH2-20L		20	R L		12	32	41.41	45.41			
SH2-30R SH2-30L		30	R L		12	50	62.12	66.12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

Allowable torque						Backlash (mm)	Weight (kg)	Catalog Number
Bending strength		Surface durability		Surface durability (H)				
N·m	kgf·m	N·m	kgf·m	N·m	kgf·m			
43.7	4.46	2.90	0.30	13.7	1.40	0.12~0.26	0.15	SH2-15R SH2-15L
67.1	6.84	5.85	0.60	27.2	2.78		0.30	SH2-20R SH2-20L
117	11.9	15.3	1.56	69.8	7.12		0.72	SH2-30R SH2-30L
169	17.2	28.9	2.95	130	13.3		1.21	SH2-40R SH2-40L
275	28.0	70.8	7.22	310	31.6		2.61	SH2-60R SH2-60L
138	14.0	9.67	0.99	44.8	4.57	0.14~0.32	0.52	SH3-15R SH3-15L
211	21.6	19.4	1.98	88.7	9.05		0.99	SH3-20R SH3-20L
368	37.5	50.2	5.12	225	22.9		2.20	SH3-30R SH3-30L
531	54.1	95.5	9.73	418	42.6		3.80	SH3-40R SH3-40L
866	88.3	236	24.0	993	101		9.18	SH3-60R SH3-60L

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

■ Reference Section of Gears

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



* Above is for illustration purposes only and differs from actual tooth forms.

■ Center Distance Table of SH Helical Gears

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

■ Center Distance Table of SH Helical Gears

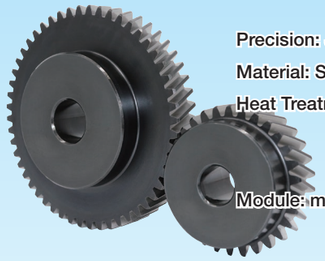
Catalog Number	SH3-15 R L	SH3-20 R L	SH3-30 R L	SH3-40 R L	SH3-60 R L
SH3-15 R L	46.59	—	—	—	—
SH3-20 R L	54.35	62.12	—	—	—
SH3-30 R L	69.88	77.65	93.17	—	—
SH3-40 R L	85.41	93.17	108.70	124.23	—
SH3-60 R L	116.47	124.23	139.76	155.29	186.35

Product Precautions → Page 193
Precautions for Standard Machined Products → Pages 42~44

Recommended Mating Helical Racks

KHK
Helical Rack & Pinion

KHG Ground Helical Gears

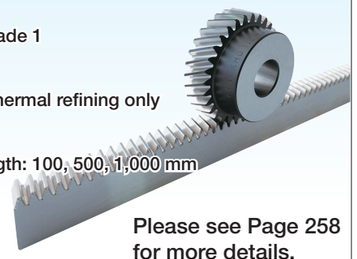


Precision: JIS Grade N6
Material: SCM440
Heat Treatment: Thermal refined / gear teeth induction hardened
Module: m1 to 6

Please see Page 196 for more details.

KRHG/KRHGF/KRHGFD Ground Helical Racks

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



Please see Page 258 for more details.

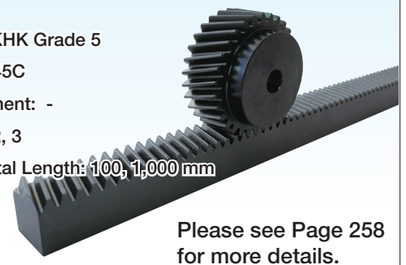
SH Helical Gears

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

Please see Page 204 for more details.

SRH·SRHF·SRHFD Helical Racks

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



Please see Page 258 for more details.

ZSTP Ground Helical Gears

Dedicated for racks

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

Please see Page 266 for more details.

SHE Helical Gears

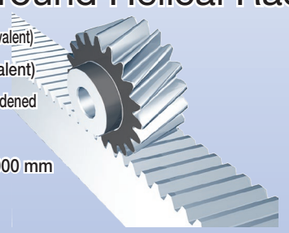
Dedicated for racks

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

Please see Page 264 for more details.

ZST/ZSTD Hardened Ground Helical Racks

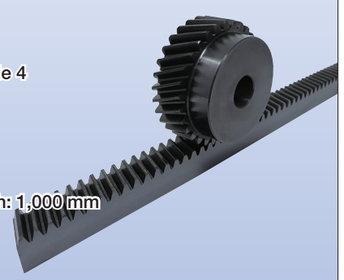
Precision: DIN Grade 6 (KHK Grade 2 equivalent)
Material: DIN C45 (JIS S45C equivalent)
Heat Treatment: Gear teeth induction hardened
Module: m2 to 6
Nominal Total Length: 1,000, 2,000 mm



Please see Page 266 for more details.

SRHEF Helical Racks

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



Please see Page 264 for more details.

Internal Gears

SI Steel Internal Gears	SIR Internal Ring Gears
Material: S45C *m*0.5~2.5 Page 210	Material: S45C *m*2~3 Page 212

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
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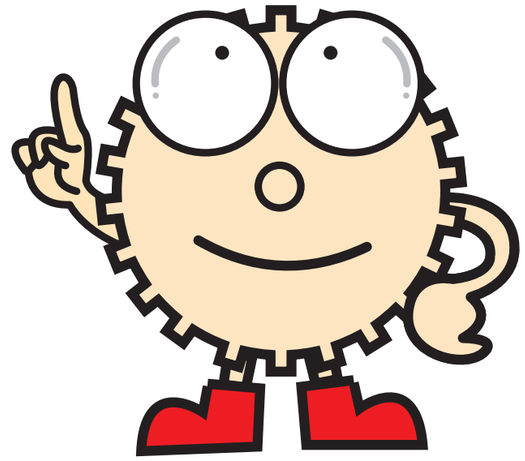

Catalog Number of KHK Stock Gears

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) Internal Gears

S I R 2 - 120

- No. of Teeth (120)
- Module (2)
- Other Products (Ring Shape)
- Type (Internal Gears)
- Material (S45C)

Material
S S45C

Type
I Internal Gears

Other Information
R Ring Gears

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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Features

KHK stock internal gears are offered in modules 0.5 to 3 in 60 to 200 teeth. They can be used in many applications including planetary gear drives.

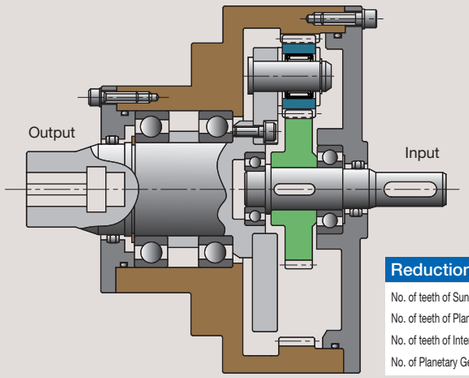
Catalog Number	SI	SIR
Module	0.5~2.5	2~3
Material	S45C	S45C
Heat Treatment	—	—
Tooth Surface Finish	Cut	Cut
Precision JIS B 1702-1:1998	N8 NOTE 1	N9
Secondary Operations	Possible	Possible
Features	A popular type of internal gear; Allows secondary operations.	They have a ring shape with a large number of teeth. Allows secondary operations.

[Note 1] The product accuracy class having a module less than 0.8 corresponds to 'equivalent' as shown in the table.

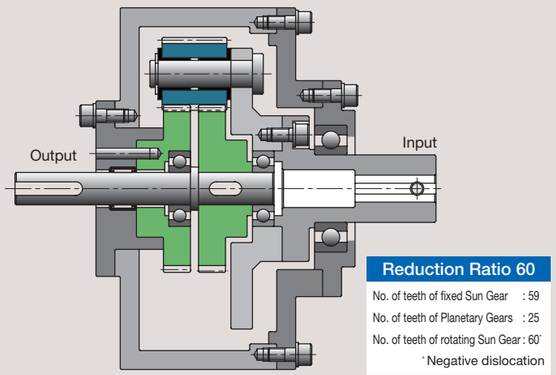
Application Examples

KHK stock internal gears are used to reduce the size of various equipment, such as reduction gears.

Design example of reduction gear (not a design for machinery or a device in actual use)



Planetary Gear Mechanism used in a reduction gear

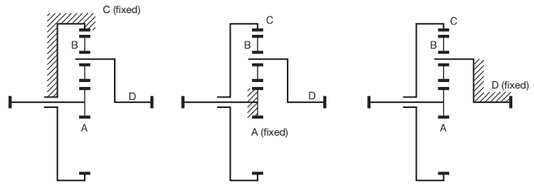


Mechanical Paradox Gear Mechanism used in a large reduction gear

Example of combinations

No. of teeth of Internal Gear	No. of Planetary Gears	No. of teeth of sun gear	No. of teeth of Planetary Gears	Reduction ratio of planetary type	Reduction ratio of solar type	Reduction ratio of star type
60	3	18	21	4.333	1.3	-3.333
80	3	16	32	6	1.2	-5
80	3	40	20	3	1.5	-2
100	3	20	40	6	1.2	-5
100	3	50	25	3	1.5	-2

Types of Planetary Gear Mechanism



Selection Hints

Please select the most suitable products by carefully considering the characteristics of items and contents of the product tables.

1. Caution in Selecting the Mating Gears

KHK stock internal gears can mate with any spur gears of the same module, however, there are cases of interference depending on the number of teeth of the mating gear. The table below contains the assumptions established for these products in order to compute gear strengths.

Interferences and the symptoms

Type	SYMPTOMS	CAUSES
Involute interference	The tip of the internal gear digs into the root of the pinion.	Too few teeth on the pinion.
Trochoid interference	The exiting pinion tooth contacts the internal gear tooth.	Too little difference in number of teeth of the two gears.
Trimming interference	Pinion can slide in or out axially but cannot move radially.	Too little difference in number of teeth of the two gears.

Allowable Mating Pinions and Number of Teeth

No. of teeth of Internal Gear	No. of teeth of Allowable Mating Pinions		
	Lower limit No. of teeth due to involute interference	Upper limit No. of teeth due to trochoid interference	Upper limit No. of teeth due to trimming interference
60	21	51	43
80	20	72	64
100	19	92	84
120	19	112	104
160	19	152	144
200	18	192	184

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. The table below contains the assumptions established for various products in order to compute gear strengths.

Calculation of Bending Strength of Gears

Item \ Catalog Number	SI	SIR
Formula NOTE 1	Formula of spur and helical gears on bending strength (JGMA401-01)	
No. of teeth of mating gears	30	
Rotational Speed	100rpm	
Design Life (Durability)	Over 10^7 cycles	
Impact from motor	Uniform load	
Impact from load	Uniform load	
Direction of load	Bidirectional load (calculated with allowable bending stress of 2/3)	
Allowable bending stress at root σ_{Flim} (kgf/mm^2)	19	
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	Symmetric support by bearings
Allowable Hertz stress σ_{Hlim} (kgf/mm^2)	49
Safety factor S_H	1.15

[NOTE 1] The gear strength formula is based on JGMA (Japanese Gear Manufacturers Association) specifications.
The units for the rotational speed (rpm) and the stress (kgf/mm^2) are adjusted to the units needed in the formula.

Application Hints

In order to use KHK stock internal gears safely, read the Application Hints carefully before proceeding.
Please refer to Page 52 for "Cautions on Handling" and Page 53 for "Cautions on Starting".
Please read "Cautions on Performing Secondary Operations" below when performing modifications and/or secondary operations for safety concerns.
Avoid performing secondary operations that narrow the tooth width, as it affects precision and strength.

1. Caution on Performing Secondary Operations

① If performing outer diameter machining, it is important to pay special attention to locating the center in order to avoid runout.
② Please exercise caution not to cause deformation when chucking the outer diameter. Gear precision may deteriorate and cause trouble.

2. Points of Caution during Assembly

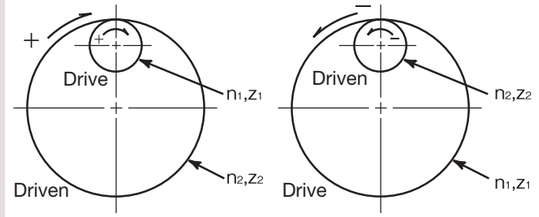
① KHK stock internal gears are designed to give the proper normal direction backlash when assembled using the center distance given by the formula below. The amount of backlash is given in the dimension table for each gear.

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

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

② Refer to the figure below for the direction of rotation of internal gears.

Gear Ratio and Direction of Rotation



Gear Ratio $i = \frac{z_2}{z_1} = \frac{n_1}{n_2}$

z : No. of teeth
n : Rotational speed

③ To use as a planetary gear drive, the following conditions must be satisfied.

Gear tooth conditions for planetary gear mechanisms

- Condition 1: $z_c = z_a + 2z_b$
- Condition 2: $\frac{z_a + z_c}{N}$ = Integer
- Condition 3: $z_b + 2 < (z_a + z_b) \sin\frac{180°}{N}$

z_a : No. of teeth of Sun Gear
z_b : No. of teeth of Planetary Gears
z_c : No. of teeth of Internal Gear
N : No. of Planetary Gears

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.

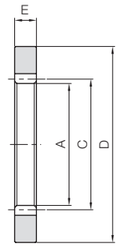
Caution Cautions in Preventing Accidents

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.

SI Module 0.5~2.5 Steel Internal Gears

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.

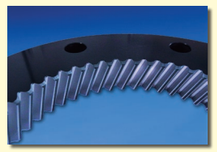


T1

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)
SI0.5-60	***m*0.5**	60	T1	29	30	50	5	3.75	0.67	0.38	0.068	0.04~0.15	0.049
SI0.5-80		80		39	40	60		4.85	0.75	0.49	0.077		0.062
SI0.5-100		100		49	50	70		5.97	0.87	0.61	0.089		0.074
SI0.8-60	***m*0.8**	60		46.4	48	75	8	15.4	2.87	1.57	0.29	0.05~0.16	0.16
SI0.8-80		80		62.4	64	90		19.9	3.24	2.03	0.33		0.20
SI0.8-100		100		78.4	80	105		24.5	3.75	2.50	0.38		0.23
SI1-60	***m*1**	60		58	60	90	10	30.0	5.95	3.06	0.61	0.09~0.21	0.28
SI1-80		80		78	80	110		38.8	6.59	3.96	0.67		0.35
SI1-100		100		98	100	130		47.8	7.64	4.87	0.78		0.43
SI1.5-60	***m*1.5**	60		87	90	130	15	101	20.6	10.3	2.10	0.11~0.25	0.81
SI1.5-80		80		117	120	160		131	23.3	13.4	2.38		1.04
SI1.5-100		100		147	150	190		161	27.0	16.5	2.75		1.26
SI2-60	***m*2**	60		116	120	170	20	240	50.5	24.5	5.15	0.12~0.28	1.79
SI2-80		80		156	160	210		311	57.0	31.7	5.81		2.28
SI2-100		100		196	200	250		382	65.7	39.0	6.70		2.77
SI2.5-60	***m*2.5**	60		145	150	210	25	469	101	47.8	10.3	0.14~0.31	3.33
SI2.5-80		80		195	200	260		607	114	61.9	11.6		4.25

[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.

Ground internal gears are available.



Klingelnberg Gear Grinding Machine VIPER 500W

Internal ground gear machining range	
Maximum gear accuracy	JIS B 1702-1:1998 Grade N5 (former JIS Grade 1)
Maximum module	About m4 (DP6, CP12), special sizes available
Max. helix angle	27°, right/left helix direction available
Maximum outer diameter	ϕ 500mm
Minimum inner diameter	ϕ 150mm
Maximum weight	500 kgf (jig weight included)

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info@zahnrad24.com
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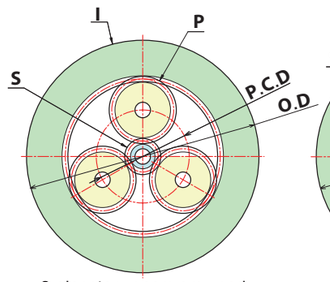
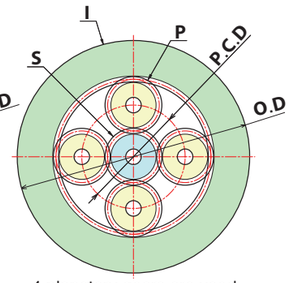
Planetary Gear Systems created by using KHK Stock Gears



3 planetary gears are used



4 planetary gears are used

KHK's stock internal and spur gears working together will allow you to create planetary gear devices.
"In the table below, we introduce examples of planetary gear
The Speed ratio Note 1 are for planetary gear systems created with a stationary internal gear. When used as speed reducers, the input is the sun gear and the output is the carrier.
"Selection of the number of teeth also enables you to create various planetary gear devices with different transmission

Speed ratio Note 1	Stock gears used in the system: Internal gears (I) OD(mm)	Internal gears (I) Catalog Number	Internal gears (I) No. of teeth	Planetary gears (P) Catalog Number	Planetary gears (P) No. of teeth	Planetary gears (P) Quantity	Planetary gears (P) P.C.D(mm)	Planetary gears (P) Equal angles	Sun gear (S) Catalog Number	Sun gear (S) No. of teeth	Allowable transmission torque (kgf·m): Sun gear_T_1 Bending strength	Sun gear_T_1 Surface durability	Planetary carrier _T_2 Bending strength	Planetary carrier _T_2 Surface durability	Total weight (kg)
6	90	SI1-60	60	SSA1-24	24	3	36	120°	SSS1-12	12	0.58	0.0023	3.47	0.11	0.48
	130	SI1.5-60		SSA1.5-24			54		SS1.5-12		1.77	0.0081	10.7	0.40	1.20
	170	SI2-60		SSA2-24			72		SS2-12		4.21	0.020	25.2	0.99	2.66
	210	SI2.5-60		SSA2.5-24			90		SS2.5-12		8.21	0.040	49.3	1.98	5.03
	110	SI1-80	80	SSA1-32	32	3	48	120°	SS1-16	16	0.99	0.0047	5.96	0.24	0.57
	160	SI1.5-80		SSA1.5-32			72		SS1.5-16		3.35	0.026	20.1	1.32	1.72
	210	SI2-80		SSA2-32			96		SS2-16		7.95	0.064	47.7	3.22	3.85
	260	SI2.5-80		SSA2.5-32			120		SS2.5-16		15.5	0.13	93.2	6.45	7.33
	105	SI0.8-100	100	SS0.8-40A	40	4	48	90°	SS0.8-20A	20	0.95	0.0082	5.68	0.41	0.59
	130	SI1-100		SSA1-40			60		SS1-20		1.85	0.016	11.1	0.82	0.84
	190	SI1.5-100		SSA1.5-40			90		SS1.5-20		6.24	0.058	37.5	2.90	2.62
	250	SI2-100		SSA2-40			120		SS2-20		14.8	0.14	88.8	7.09	6.01
5	60	SI0.5-80	80	SS0.5-30B	30	4	25	90°	SS0.5-20A	20	0.23	0.0012	1.13	0.070	0.12
	90	SI0.8-80		SS0.8-30C			40		SS0.8-20A		0.93	0.0050	4.65	0.30	0.40
	110	SI1-80		SSA1-30			50		SS1-20		1.82	0.010	9.08	0.60	0.59
	160	SI1.5-80		SSA1.5-30			75		SS1.5-20		6.13	0.035	30.63	2.13	1.86
	210	SI2-80		SSA2-30			100		SS2-20		14.5	0.087	72.6	5.21	4.18
	260	SI2.5-80		SSA2.5-30			125		SS2.5-20		28.4	0.17	142	10.4	7.97
3	60	SI0.5-80	80	SS0.5-20A	20	4	30	90°	(M)SSG0.5-40B	40	0.46	0.0016	1.39	0.10	0.13
	90	SI0.8-80		SS0.8-20A			48		SS0.8-40A		1.89	0.0068	5.68	0.41	0.35
	110	SI1-80		SSA1-20			60		SS1-40		3.70	0.014	11.1	0.82	0.60
	160	SI1.5-80		SSA1.5-20			90		SS1.5-40		12.5	0.048	37.5	2.91	1.77
	210	SI2-80		SSA2-20			120		SS2-40		29.6	0.12	88.8	7.12	3.93
	260	SI2.5-80		SSA2.5-20			150		SS2.5-40		57.8	0.24	173	14.3	7.47
	70	SI0.5-100	100	SS0.5-25B	25	3	37.5	120°	SS0.5-50B	50	0.47	0.0020	1.42	0.12	0.16
	130	SI1-100		SSA1-25			75		SS1-50		3.79	0.017	11.4	1.01	0.75
	190	SI1.5-100		SSA1.5-25			112.5		SS1.5-50		12.8	0.060	38.4	3.58	2.24
	250	SI2-100		SSA2-25			150		SS2-50		30.4	0.15	91.1	8.79	5.02

(M) ··· Made to Order

Calculation of Allowable Transmission Torque

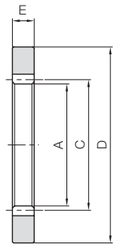
One advantage of a planetary gear system is that they share load burdens by grouping multiple planetary gears.
This enables high torque capacity transmission.
The following formula is the calculation method for T1 (Allowable transmission torque of Sun Gear) and T2 (Allowable transmission torque of Planetary Carrier), shown in the table.

$T1=Ts\cdot Zp\cdot \eta$ (kgf·m) ····· (1)
$T2=Ts\cdot Zp\cdot u\cdot \eta$ (kgf·m) ····· (2)

Here,
Ts : Allowable transmission torque for a Sun gear (kgf·m) on a meshed pair of sun gear and planetary gear.
For a sun gear meshed with a planetary gear, the number of revolutions is set to 100rpm.
Zp : Number of planetary gears used in the system
u : Speed ratio
η : Contact efficiency for torque transmission
In consideration of machining accuracy, variation in tooth thickness or other factors on the planetary carrier, the contact efficiency is set to 75%.

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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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.

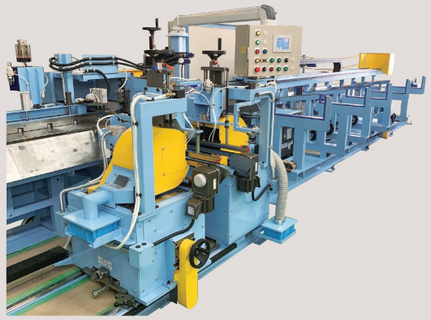
[NOTE 1] The catalog numbers of the above racks with (F) suffix have both ends machined so that they can be butted against each other. The items with (D) have mounting screw holes for immediate assembly.
[NOTE 2] Products with module under 1 are thermal refined. without their gear teeth being induction 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.

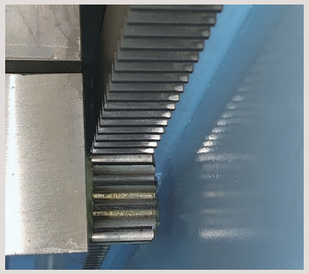
● KHK stock racks have round semi-topping at the corners of the top land of the gear tooth.
● Black products are KHK stock gears that have an applied black oxide coating for rust resistance.

Application Examples

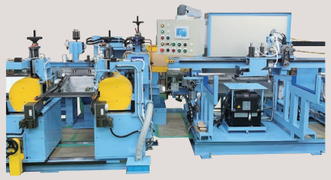
Racks & pinions are adopted in driving devices for linear motion systems, such as transport devices.

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

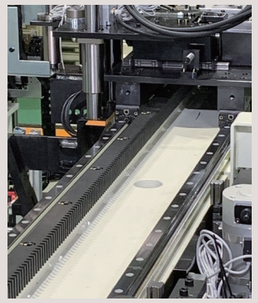


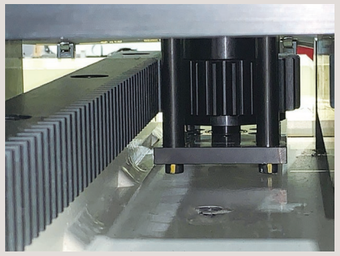


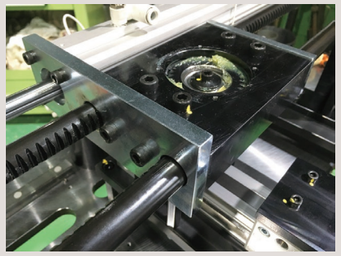
SRFD racks and SSG spur gears used for automatic and manual drive for cutting, machining of both ends and deburring



■ Clamp Seamer Welder

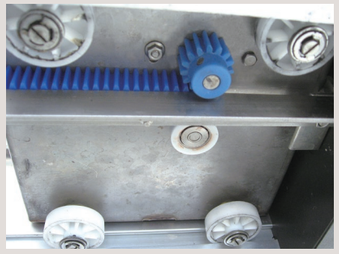






The SRCPFD racks and SSCP spur gears used to drive weld torches at constant speed, and the SRO round racks and SS spur gears used to position workpieces

■ Dremax Long Strip Cutter



PR plastic rack used for feeding Long Strip Cutter

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
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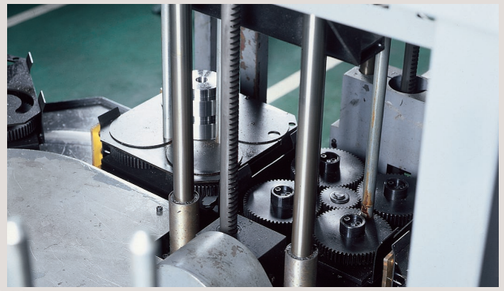
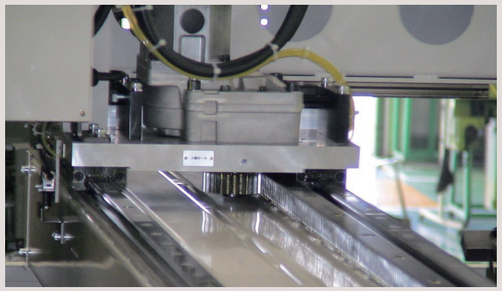
95152 Selbitz

■ 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.

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.

■ 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	×	×	×	×	×	○

■ 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)

Item											
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.

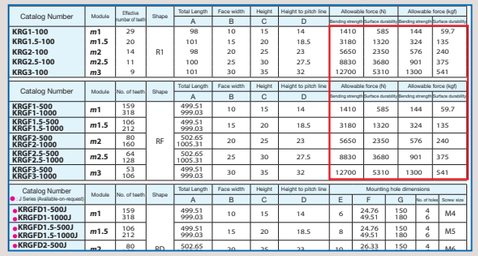
① Products not listed in this catalog or materials, modules, number of teeth and the like not listed in the dimensional tables can be manufactured as custom items. Please see Page 26 for more details about custom-made orders.
② The color and shape of the product images listed on the dimension table page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

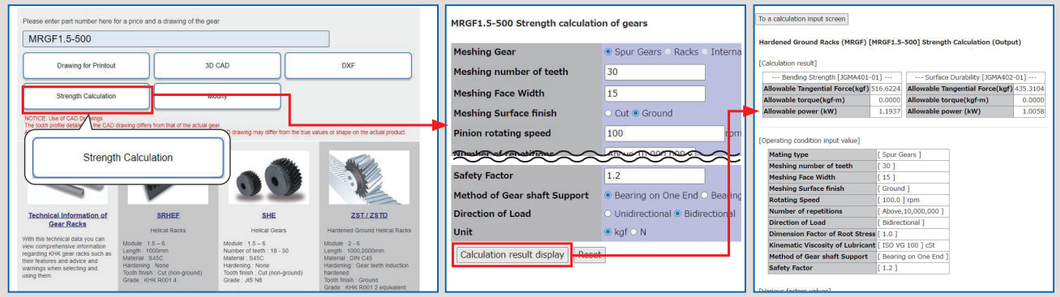
Catalog Number	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability
KRGF1-500 KRGF1-1000	*m*1	159 318		499.51 999.03	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.

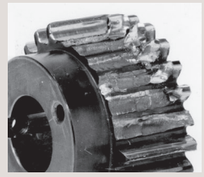
Calculate the strength formally using the various gear strength formulas. Please see our separate technical reference book for more details. We recommend using the Website that allows the strength to be easily calculated.

■ 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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

3. Cautions on Selecting Racks By Precision

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

① Pitch Errors of Racks (KHK R 001)

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

■ Precision Grades of Racks

Unit: μ m

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

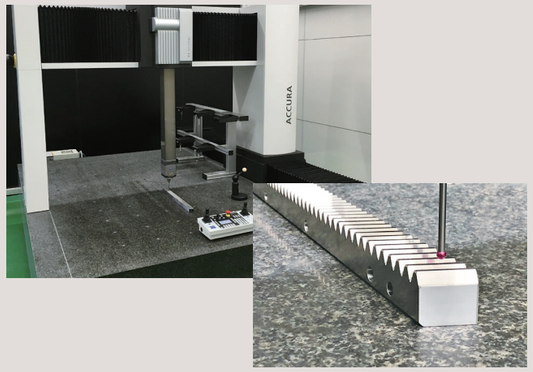
[NOTE] ① Since the pitch accuracy of racks may vary due to humidity, the precision grades are evaluated at the bottom surface of the product, at the temperature of 20°C. The dimensions of the KHK PR Plastic Racks may vary widely due to humidity. Therefore, the total composite error is assumed to be excluded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

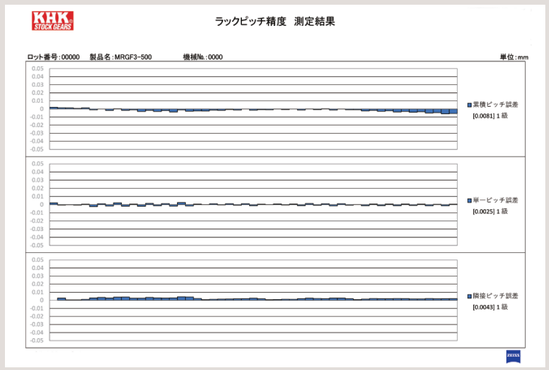
■ Comparison Table of Precision Grades of Racks

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.

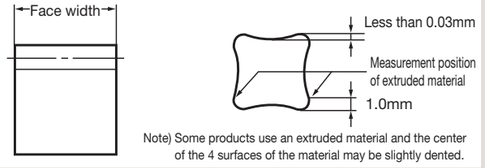
■ Pitch inspection and a sample report using Karl Zeiss ACCURA Coordinate Measuring Machine. (KHK R 001 Grade 1)





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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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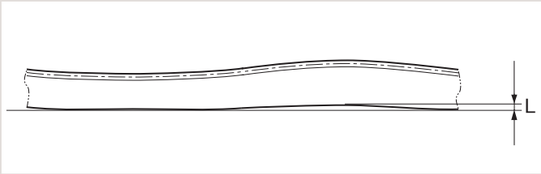
■ Maximum Curvature Values (Flatness Tolerance L)



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

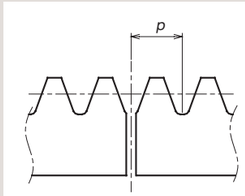
In order to use KHK stock racks safely, carefully read the Application Hints before proceeding. If there are questions or you require clarifications, please contact our technical department or your nearest distributor. E-mail info@khkgears.net
Please read “Cautions on Performing Secondary Operations”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

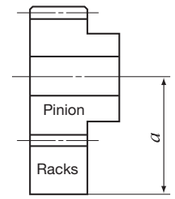
Module	Pitch (p)	Tolerance
*m*0.5	1.57	-0.05 -0.15
*m*0.8	2.51	-0.05 -0.25
*m*1	3.14	-0.1 -0.3
*m*1.5	4.71	
*m*2	6.28	
*m*2.5	7.85	-0.1 -0.4
*m*3	9.42	
*m*4	12.57	
*m*5	15.71	
*m*6	18.85	
*m*8	25.13	
*m*10	31.42	

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

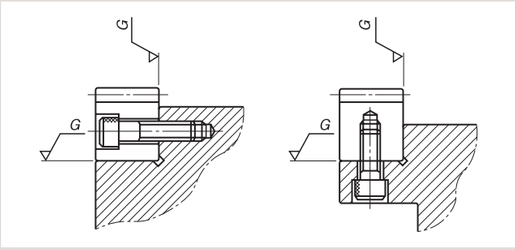
① The recommended assembly distance tolerance of KHK stock racks is H7 for ground racks and H8 for cut racks. Flexible racks need to be adjusted by the customer. The backlash values are given in the table on Page 220. Make sure that the mounting distance stays constant for the length of the rack.

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



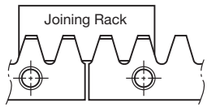
[NOTE] Pinions are assumed to be standard stock spur gears (x=0).

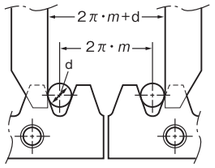
② The recommended flatness and squareness of the mounting surface of KHK stock racks is 0.01 mm for ground racks and 0.05 mm for cut racks.



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.

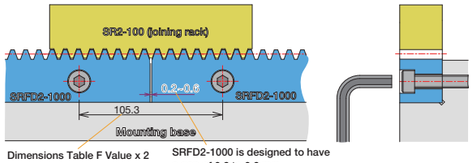




[NOTE] Joining gauge racks for helical racks must have the opposite hand from the racks. Please use 100 mm short racks as a joining gauge rack, or alternatively the rack of the same specifications on hand.

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

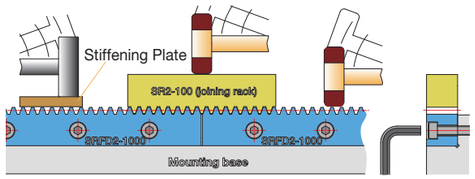
1. Pitch alignment
Place SRFD2-1000 on the mounting base, align SR2-100 and temporarily tighten the bolt.



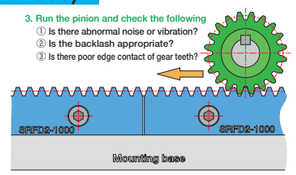
Dimensions Table F Value x 2

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

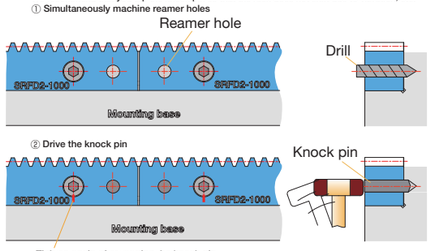
2. Securing to the mounting base
Tap with a plastic hammer, bring it into close contact with the mounting base, and further tighten the bolt. (When using a metal hammer, be careful not to damage the gear teeth by using a stiffening plate, etc.)



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



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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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.

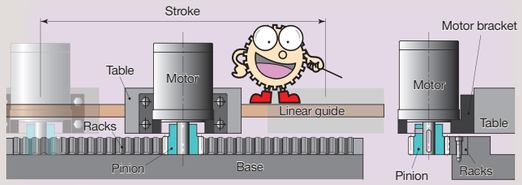
⚠ Caution Cautions in Preventing Accidents

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.

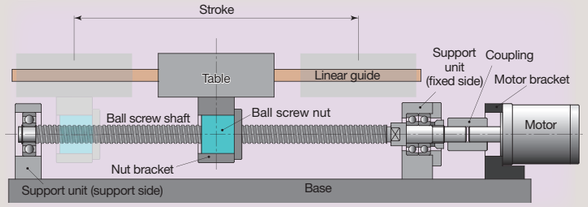
Comparison of Racks & Pinions and Ball Screws

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.

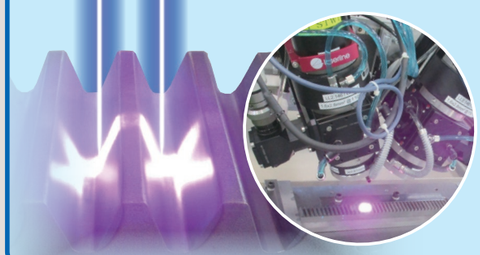
Disadvantages	Details
Backlash is present	Backlash is required for smooth rotation. Backlash may become a problem in forward/reverse rotation positioning.
Lubrication is required	Metal racks require lubrication. Plastic racks do not require lubrication at light loads, but their precision is lower.

● 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

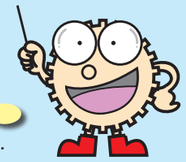


● Lasers used for hardening gear teeth
In this environmentally friendly hardening method, powerful light provides instantaneous hardening and cooling water is not required due to diffusion of heat.

● 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.

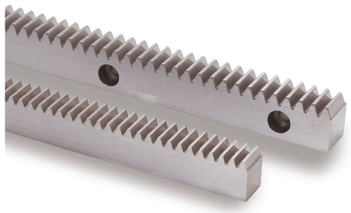
● Less distortion due to burning during hardening
As the laser hardens necessary areas in spots, distortion due to burning can be minimized.

Lasers enable hardening that barely changes the precision grade.



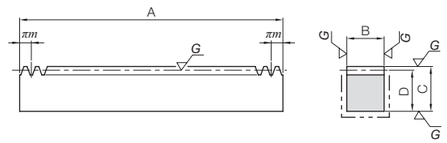
* Please see Page 236, 238, 260 for products.

MRGF/MRGFD Module 1.5~3
Hardened Ground Racks



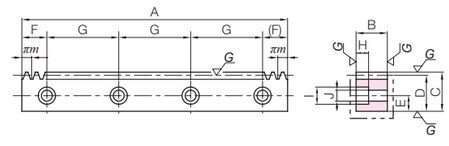
Specifications	
Precision grade	KHK R 001 Grade 1 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM415
Heat treatment	Carburized **
Tooth hardness	55 to 60HRC

* 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.

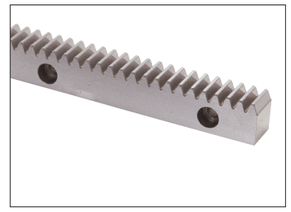


RF

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.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

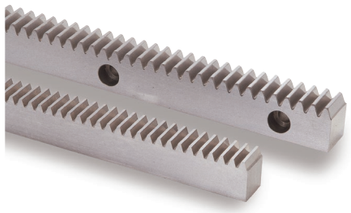
Surface durability is
4 times higher than SRG Hardened Ground Racks,
2 times higher than KRG-H Hardened Ground Racks.

Recommended Mating Pinions

MSGA/MSGB Ground Spur Gears

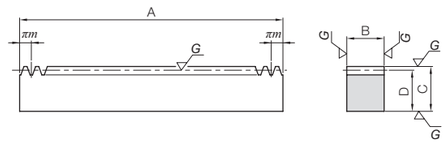
Please see Page 54 for more details.

Hardened Ground Racks



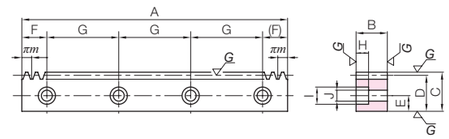
Specifications	
Precision grade	KHK R 001 Grade 1 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened **
Tooth hardness	50 to 60HRC

* 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).

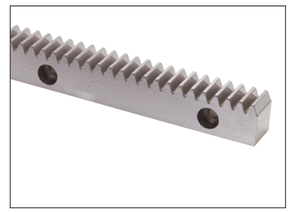


RF

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.

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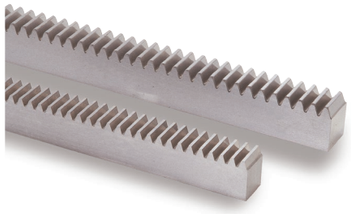
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Recommended Mating Pinions

KSG Ground Spur Gears

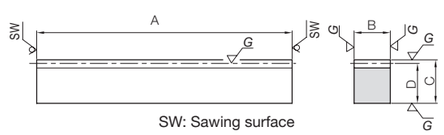
Please see Page 58 for more details.

Thermal Refined Ground Racks



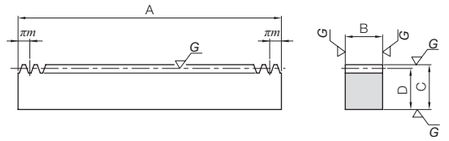
Specifications	
Precision grade	KHK R 001 grade 1 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 to 352HB

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



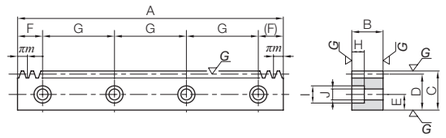
SW: Sawing surface

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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

* 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.

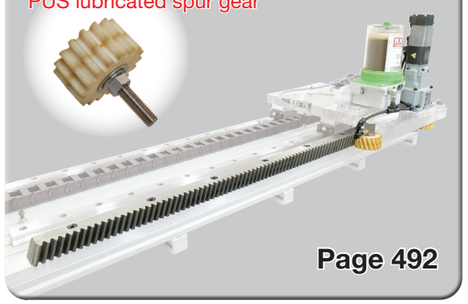
Recommended Mating Pinions

SSG Ground Spur Gears

Please see Page 62 for more details.

Rack & Pinion Lubrication System

PUS lubricated spur gear



Page 492

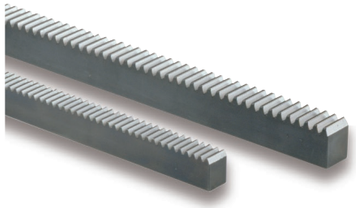
Product Precautions → Page 218

Precautions for Standard Machined Products → Pages 42~44

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

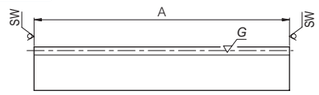
SRG/SRGF/SRGFD/SRGFK

Hardened Ground Racks



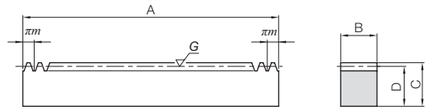
Specifications	
Precision grade	KHK R 001 Grade 3 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened **
Tooth hardness	50 to 60HRC ***
Surface treatment	Black oxide coated except for teeth

* 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		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		301.59	10	12	11	862	514	87.9	52.4	0.04~0.19	0.26
SRGF1-500		159		499.51									0.43
SRGF1.5-500	***m*1.5**	106		499.51	15	20	18.5	2160	1360	220	138	0.04~0.19	1.09
SRGF1.5-1000		212		999.03									2.18
SRGF2-500	***m*2**	80		502.65	20	25	23	3830	2410	391	246	0.05~0.21	1.82
SRGF2-1000		160		1005.31									3.63
SRGF2.5-500	***m*2.5**	64		502.65	25	30	27.5	5990	3770	611	384	0.05~0.21	2.71
SRGF2.5-1000		128		1005.31									5.43
SRGF3-500	***m*3**	53		499.51	30	35	32	8620	5420	879	553	0.05~0.21	3.76
SRGF3-1000		106		999.03									7.53
SRGF4-500	***m*4**	40		502.65	40	45	41	15300	9640	1560	983	0.05~0.21	6.47
SRGF4-1000		80		1005.31									12.9
SRGF5-500	***m*5**	32		502.65	50	50	45	24000	15100	2440	1540	0.05~0.22	8.88
SRGF5-1000		64		1005.31									17.8
SRGF6-500	***m*6**	26		490.09	60	60	54	34500	21700	3520	2210	0.05~0.22	12.5
SRGF6-1000		53		999.03									25.4

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

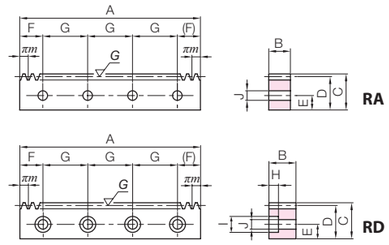
Product Precautions → Page 218

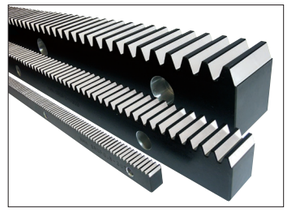
Precautions for Standard Machined Products → Pages 42~44

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.

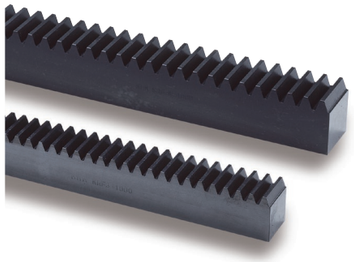
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

[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.

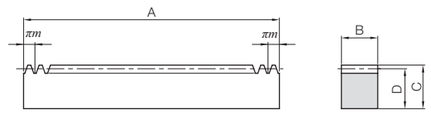
Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
—	—	4.5	862	514	87.9	52.4	0.04~0.19	0.26	●**SRGFK1-300J**
—	—							0.43	●**SRGFK1-500J**
6	10	6	2160	1360	220	138	0.04~0.19	1.07	●**SRGFD1.5-500J**
								2.14	●**SRGFD1.5-1000J**
7	11	7	3830	2410	391	246	0.05~0.21	1.78	●**SRGFD2-500J**
								3.58	●**SRGFD2-1000J**
8.6	14	9	5990	3770	611	384	0.05~0.21	2.64	●**SRGFD2.5-500J**
								5.31	●**SRGFD2.5-1000J**
10.8	17.5	11	8620	5420	879	553	0.05~0.21	3.63	●**SRGFD3-500J**
								7.32	●**SRGFD3-1000J**
13	20	14	15300	9640	1560	983	0.05~0.21	6.21	●**SRGFD4-500J**
								12.6	●**SRGFD4-1000J**
15.2	23	16	24000	15100	2440	1540	0.05~0.22	8.56	●**SRGFD5-500J**
								17.2	●**SRGFD5-1000J**
17.5	26	18	34500	21700	3520	2210	0.05~0.22	12.0	●**SRGFD6-500J**
								24.6	●**SRGFD6-1000J**

Hardened Racks



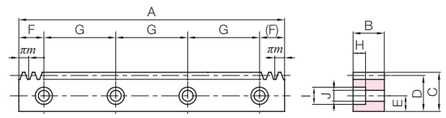
Specifications	
Precision grade	KHK R 001 grade 5 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened **
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* 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).

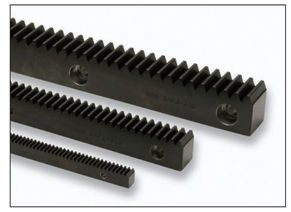


RF

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

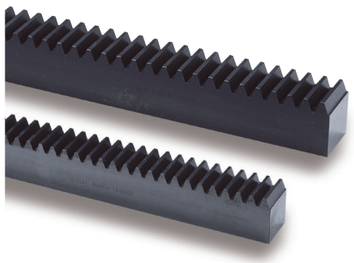
Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
H	I	J	Bending strength	Surface durability	Bending strength	Surface durability			
6	10	6	2940	1710	300	175	0.05~0.31	2.14	●**KRFD1.5-1000HJ**
7	11	7	5230	3090	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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

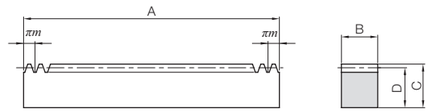
Spur Gears
Helical Gears
Internal Gears
Racks
CP Racks & Pinions
Miter Gears
Bevel Gears
Screw Gears
Worm Gears
Gearboxes
Other Products

Hardened Racks



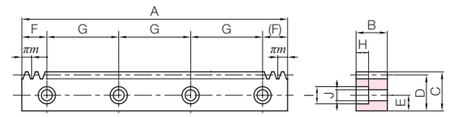
Specifications	
Precision grade	KHK R 001 grade 5 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened **
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* 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).

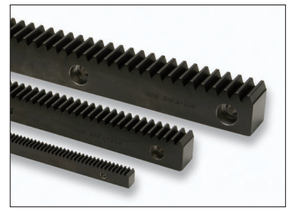


RF

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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

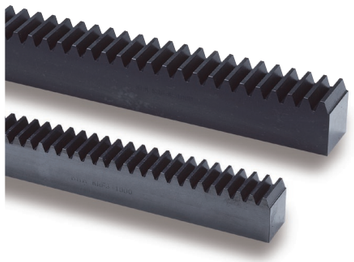
Recommended Mating Pinions

SS- H Hardened Spur Gears

Please see Page 110 for more details.

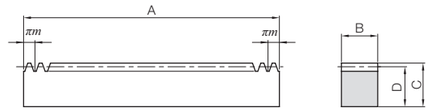
Product Precautions → Page 218 Precautions for Standard Machined Products → Pages 42~44

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

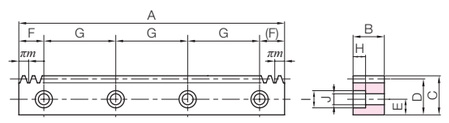
* The precision grade is equivalent to the value shown in the table.
** Due to the gear teeth being laser hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 1 mm).



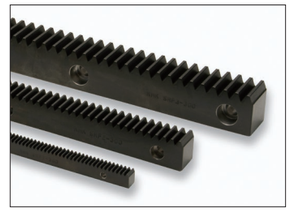
RF

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



RD

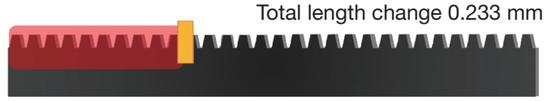


*** Total length change just 1/12 compared to induction hardening! These hardened racks have minimal deformation due to heat treatment.**

Laser hardened total length change

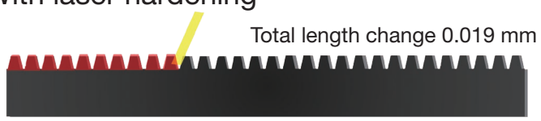
With induction hardening

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	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

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	

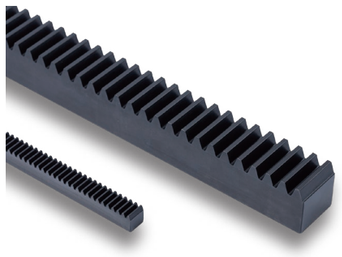
Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
6	10	6	2160	961	220	98.0	0.09~0.25	2.14	●**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

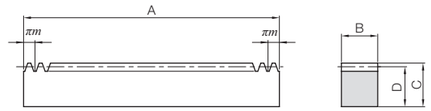
You can download CAD data (DXF format) of KHK Products from the Website.

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



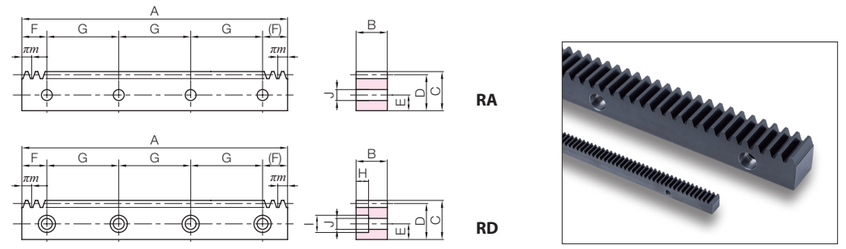
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth laser hardened **
Tooth hardness	55 to 65HRC
Surface treatment	Black oxide coating

* 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.

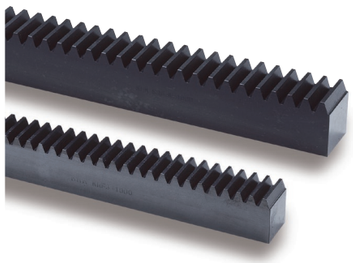
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Recommended Mating Pinions

SS- H Hardened Spur Gears

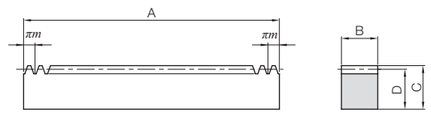
Please see Page 110 for more details.

Thermal Refined Racks



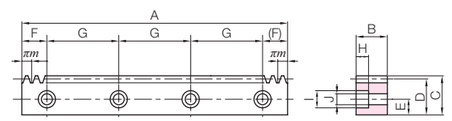
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 to 352HB
Surface treatment	Black oxide coating

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

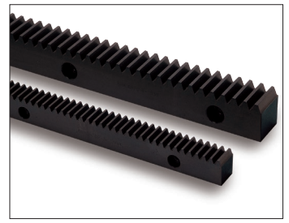


RF

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.

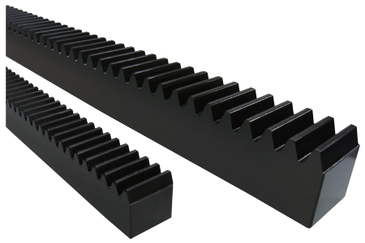
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Recommended Mating Pinions

KS Thermal Refined Spur Gears

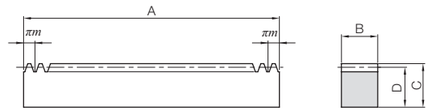
Please see Page 100 for more details.

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



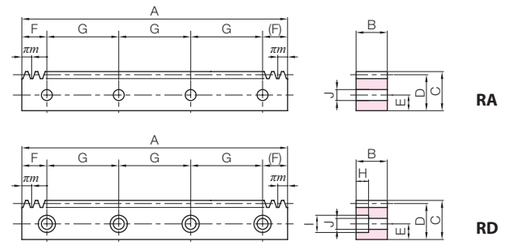
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 210HB)
Surface treatment	Black oxide coating

* 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.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

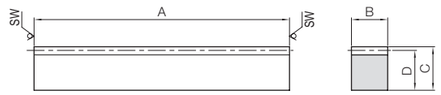
Recommended Mating Pinions

SS Spur Gears

Please see Page 108 for more details.

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

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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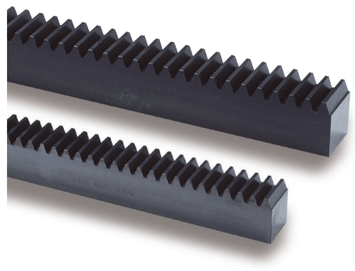
Recommended Mating Pinions

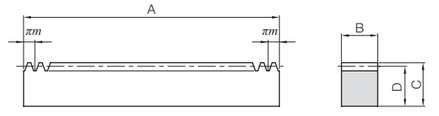
SS Spur Gears

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

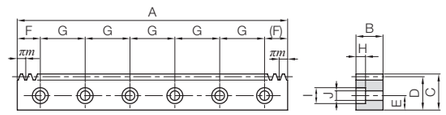
Catalog Number	Module	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)
SRF0.5-300	***m*0.5**	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

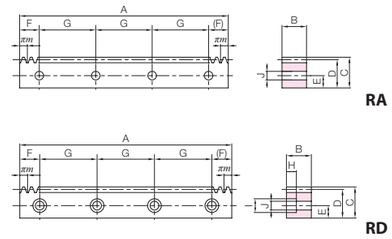
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 210HB)
Surface treatment	Black oxide coating

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



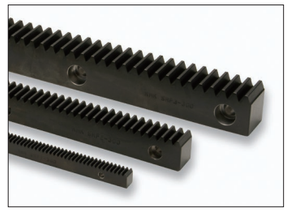
RD

J Series



RA

RD



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
●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			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			
—	—	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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

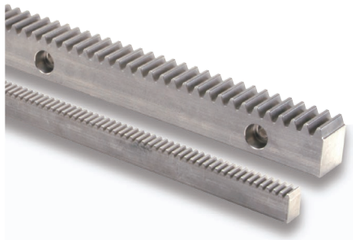
Recommended Mating Pinions

SS Spur Gears

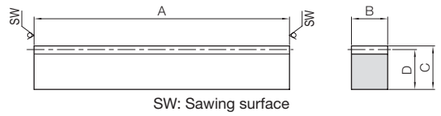
Please see Page 104 for more details.

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

Stainless Steel Racks

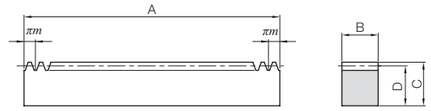


Specifications	
Precision grade	KHK R 001 grade 5
Gear teeth	Standard full depth
Pressure angle	20°
Material	SUS304
Heat treatment	Solution treated
Tooth hardness	(less than 187HB)

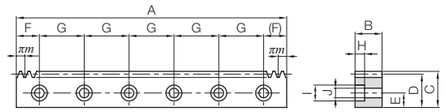


SW: Sawing surface

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

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

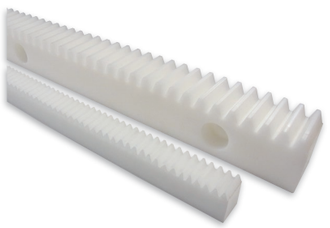
Recommended Mating Pinions

SUS/SUSA Stainless Steel Spur Gears

Please see Page 156 for more details.

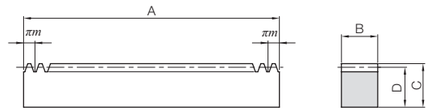
Product Precautions → Page 218

Plastic Racks



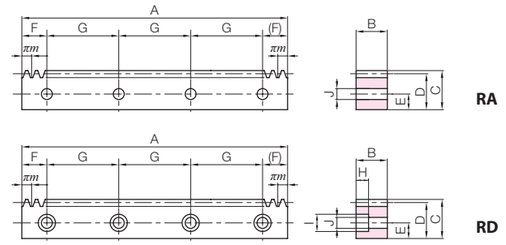
Specifications	
Precision grade	KHK R 001 Grade 5 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	Polyacetal
Heat treatment	—
Tooth hardness	(115 to 120HRR)

* The precision grade 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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

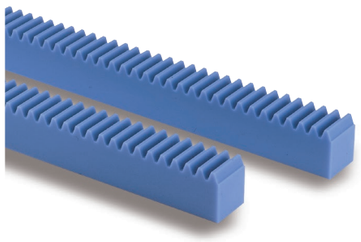
Recommended Mating Pinions

SUS/SUSA Stainless Steel Spur Gears

Please see Page 156 for more details.

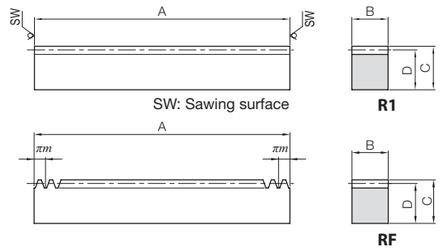
Product Precautions → Page 218
Precautions for Standard Machined Products → Pages 42~44

PR/PRF Module 1~3
Plastic Racks



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

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



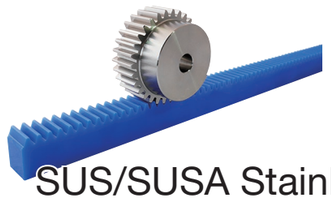
Catalog Number	Module	Effective number of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Allowable force (N)	Allowable force (kgf)	Backlash (mm)	Weight (kg)
				A	B	C	D	Bending strength	Bending strength		
PR1-500	***m*1**	159	R1	505	10	12	11	92.8	9.46	0.18~0.39	0.064
PR1.5-500	***m*1.5**	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	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		
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).

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

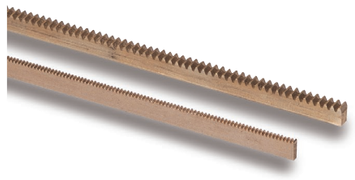
Recommended Mating Pinions



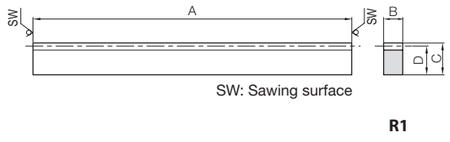
SUS/SUSA Stainless Steel Spur Gears

Please see Page 156 for more details.

BSR Module 0.5, 0.8, 1
Racks



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



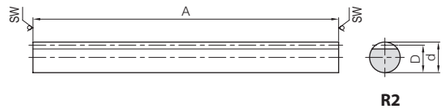
Catalog Number	Module	Effective number of teeth	Shape	Total Length	Face width	Height	Height to pitch line	Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)
				A	B	C	D	Bending strength	Surface durability	Bending strength	Surface durability		
BSR0.5-300	***m*0.5**	190	R1	303	3	9	8.5	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

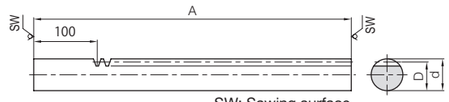
BSS Spur Gears

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.

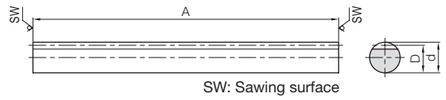
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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)



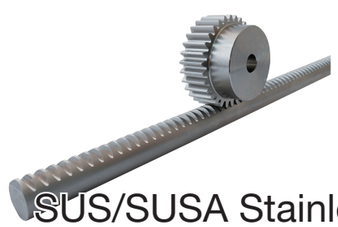
SW: Sawing surface

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



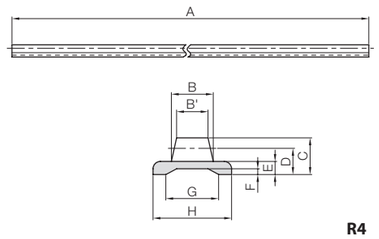
SUS/SUSA Stainless Steel Spur Gears

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.

List of Products for DR Molded Flexible Racks

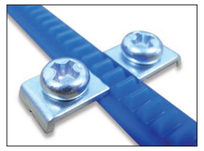
Molded Flexible Racks	Rack Clamps	Slide Rails	Dedicated Pinions
DR0.8-2000	**SRS-1**	**ARL-0.8**	**SSDR0.8-35**
DR1-2000	**SRS-1**	**ARL-1**	**SSDR1-30**
DR1.5-2000	**SRS-2**	**ARL-1.5**	**SSDR1.5-20**
DR2-2000	**SRS-2**	**ARL-2**	**SSDR2-15**

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**

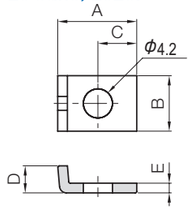
* Molded flexible racks of 2 meters or longer are also available by request as custom-made products.
(Only the length can be changed, up to 50 m)

DR dedicated 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.

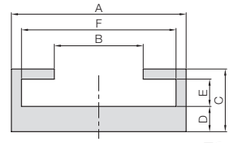
■ Dimensional tolerance of DR / molded item (unit: mm)

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

DR dedicated ARL Slide Rails



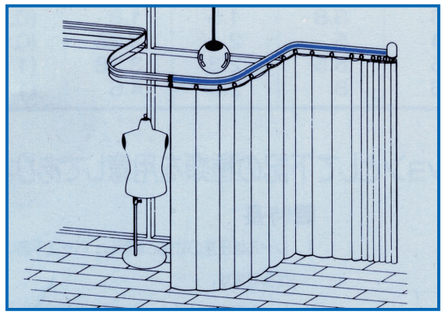
T6

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

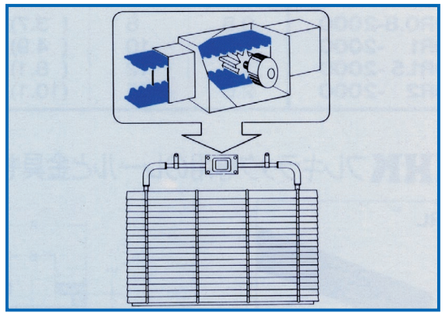
Catalog Number	Shape	A	B	C	D	E	F	Weight (kg)
ARL-0.8	T6	10.3	4.4	4.7	2	1.7	8.3	0.081
ARL-1		12.3	5.6	5.2	2	2.2	10.3	0.096
ARL-1.5		14.3	7.2	5.5	2	2.5	12.3	0.11
ARL-2		17.3	8.8	6.2	2.5	2.7	15.3	0.15

Applications for DR Molded Flexible Racks

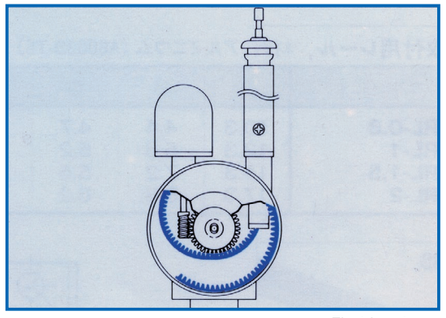
As it is possible to fix the position of the pinion and bend the DR molded flexible racks into any shape, they can be used for special purposes.



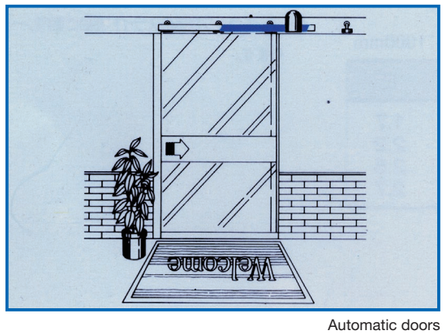
Electric curtain



Electric blinds



Electric antenna



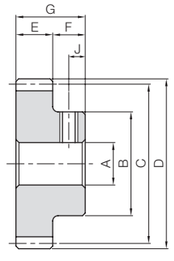
Automatic doors

SSDR Module 0.8, 1, 1.5, 2 DR Pinions

Steel Spur Gears

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.



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Tel +49 (0)9280-7390088
info@zahnrad24.com
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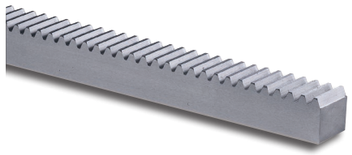
Catalog Number	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Socket head screw	
				A_{H7}	B	C	D	E	F	G	Size	J
SSDR0.8-35	***m*0.8**	35	S1T	5	16	28	29.6	3	7	10	M4	3.5
SSDR1-30	***m*1**	30		6	20	30	32	4	8	12	M4	4
SSDR1.5-20	***m*1.5**	20		6	20	30	33	5	10	15	M4	5
SSDR2-15	***m*2**	15		8	22	30	34	6	10	16	M5	5

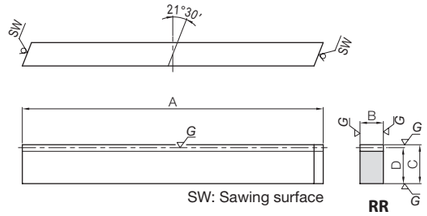
Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Weight (g)	Catalog Number
2.59	0.26	23.5	**SSDR0.8-35**
4.46	0.45	38.6	**SSDR1-30**
7.35	0.75	48.4	**SSDR1.5-20**
10.4	1.06	56.1	**SSDR2-15**

Product Precautions → Page 218

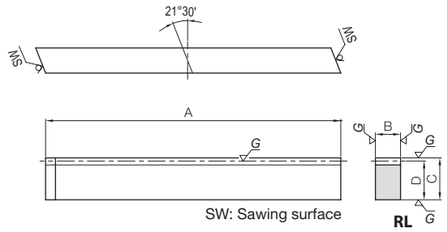


Specifications	
Precision grade	KHK R 001 Grade 1 *
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Transverse pressure angle	20°
Helix angle	21°30'
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 to 352HB

* 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**

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

[Caution on Product Characteristics] ① 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.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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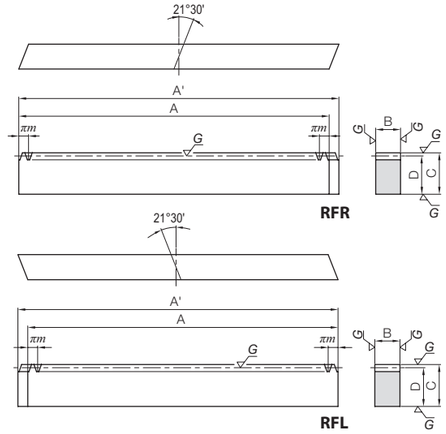
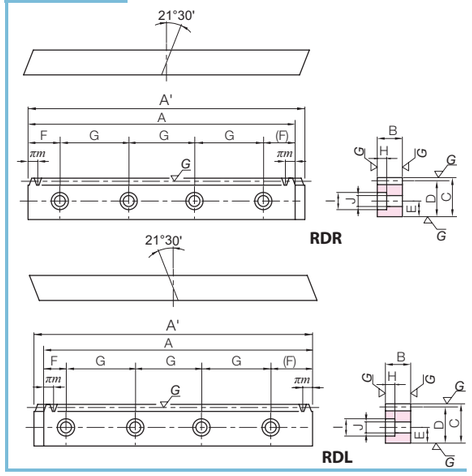
Product Precautions → Page 218
Precautions for Standard Machined Products → Pages 42~44



J Series



Counterbore dimensions Screw size	H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
M4	4.4	8	4.5	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**

Recommended Mating Pinions

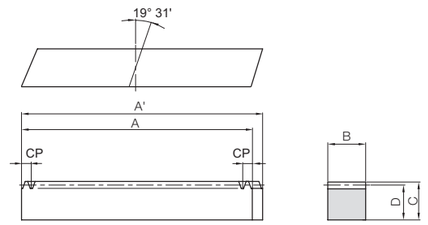
KHG Ground Helical Gears

Please see Page 196 for more details.

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.

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Tel +49 (0)9280-7390088
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Oberes Dorf 1
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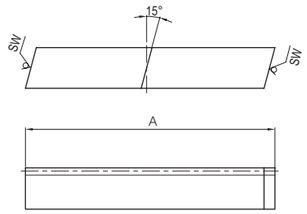
Recommended Mating Pinions

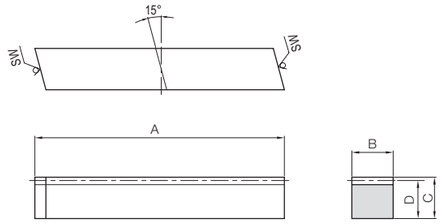
SHE-H Hardened Helical Gears

Please see Page 264 for more details.

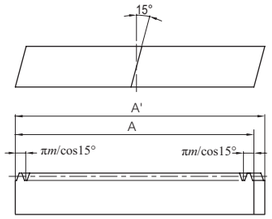
Specifications	
Precision grade	KHK R 001 grade 5
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle	15°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 210HB)
Surface treatment	Black oxide coating



SW: Sawing surface
RR



SW: Sawing surface
RL

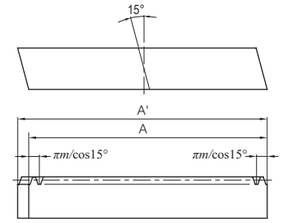


RFR

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**



RFL

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**

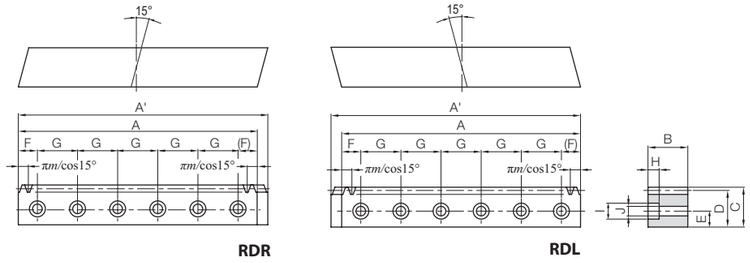
[Caution on Product Characteristics] ① For the proper helical pinions for these racks, see the Mating Gear Selection Chart on Page 192.
② These gears produce axial thrust forces. Please see Page 195 for more details.
[Caution on Secondary Operations] ① Avoid hardening racks with bolt holes, due to mounting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

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Recommended Mating Pinions

SH Helical Gears

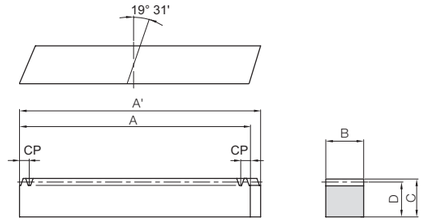
Please see Page 204 for more details.



RDR **RDL**

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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
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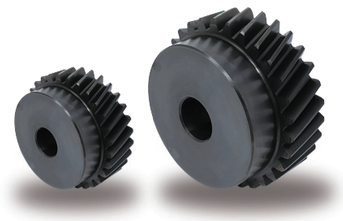
ZST-GL
Assembly Gauges

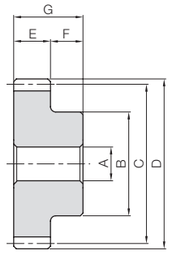
Material: S45C
Accuracy: KHK R 001 Grade 2
Please see Page 268 in the Master Catalog for more details.

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

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

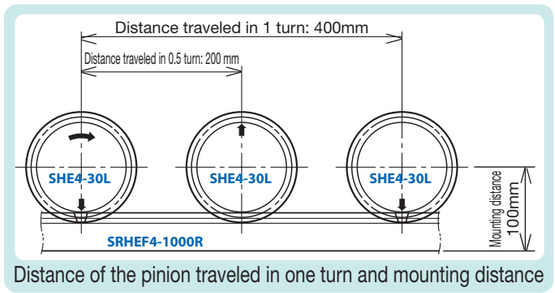


S1

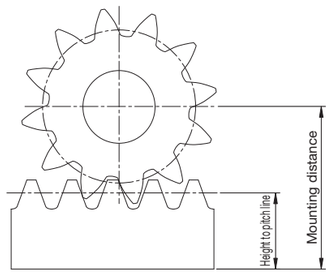
To order Hardened Plus, please specify Catalog No. + H. **Example: SHE1.5-20LH**

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



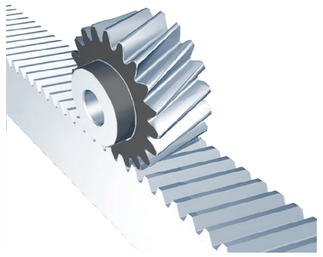
Mounting distance of profile helix gear and meshing rack

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**

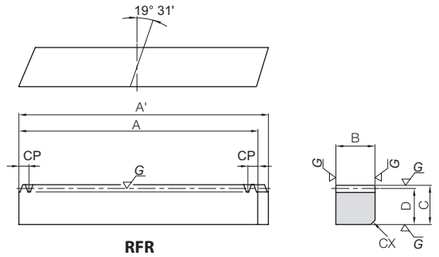
Product Precautions → Page 218
Precautions for Standard Machined Products → Pages 42~44

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

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



RFR

* 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).

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	***m2*** (CP6.667)	150	RFR	1000	1008.51	24	24	22	2	4410	2140	450	219	0.06~0.14	4.13
ZST2-2000R	***m2*** (CP6.667)	300		2000	2008.52										8.26
ZST3-1000R	***m3*** (CP10)	100		1000	1010.29	29	29	26		8210	5580	837	569		5.90
ZST3-2000R	***m3*** (CP10)	200		2000	2010.29										11.8
ZST4-1000R	***m4*** (CP13.333)	75		1000	1013.83	39	39	35	3	15200	8960	1550	914		10.7
ZST4-2000R	***m4*** (CP13.333)	150		2000	2013.83										21.4
ZST5-1000R	***m5*** (CP16.667)	60		1000	1017.38	49		34		22500	13300	2300	1360	0.06~0.15	13.0
ZST6-1000R	***m6*** (CP20)	50			1020.93	59	49	43		33400	22800	3410	2320		19.9

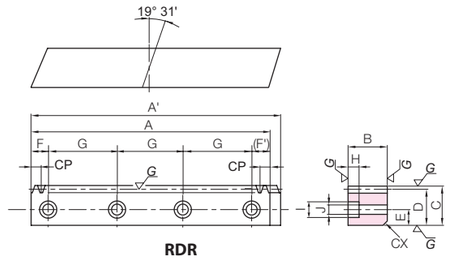
Catalog Number ● : J Series (Available-on-request)	Module (front pitch mm)	No. of teeth	Shape	Total Length A	Total Length A'	Face width B	Height C	Height to pitch line D	C Chamfer Amount CX	Mounting hole dimensions E	F	(F')	G	No. of holes	Screw size
●**ZSTD2-1000RJ**	***m2*** (CP6.667)	150	RDR	1000	1008.51	24	24	22	2	8	71.01	53.99	125	8	M6
●**ZSTD2-2000RJ**	***m2*** (CP6.667)	300		2000	2008.52									16	
●**ZSTD3-1000RJ**	***m3*** (CP10)	100		1000	1010.29	29	29	26		9	72.79	52.21		8	M8
●**ZSTD3-2000RJ**	***m3*** (CP10)	200		2000	2010.29									16	
●**ZSTD4-1000RJ**	***m4*** (CP13.333)	75		1000	1013.83	39	39	35	3	12	76.33	48.67		8	
●**ZSTD4-2000RJ**	***m4*** (CP13.333)	150		2000	2013.83									16	
●**ZSTD5-1000RJ**	***m5*** (CP16.667)	60		1000	1017.38	49		34			79.88	45.12		8	M12
●**ZSTD6-1000RJ**	***m6*** (CP20)	50			1020.93	59	49	43		16	83.43	41.57			M16

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**

PUH Lubricated Helical Gears

Please see Page 494 for more details.

J Series



RDR

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

ZST-GL
Assembly Gauges

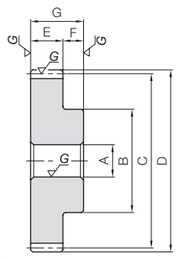
Material: S45C
Accuracy: KHK R 001 Grade 2
Please see Page 268 in the Master Catalog for more details.

[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.

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



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).

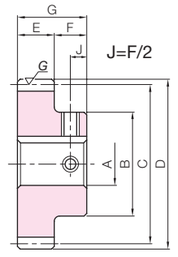
Catalog Number	Module (front pitch mm)	No. of teeth	Profile shift coefficient	Mounting Distance	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Distance traveled in one turn / Distance traveled (mm)	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)
ZSTP2-18L	***m2*** (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	***m3*** (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	***m4*** (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	***m5*** (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	***m6*** (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.

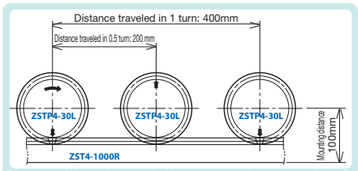
[Caution on Secondary Operations] ① Because of the influence of hardening residual stress, avoid removing the entire boss, as it may cause the gears to deform.

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

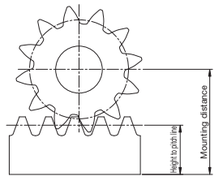
J Series



S1K



Distance of the pinion traveled in one turn and mounting distance



Mounting distance of profile helix gear and meshing rack

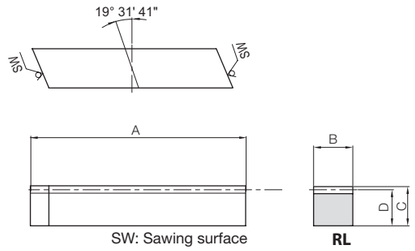
To order J Series products, please specify: Catalog No. + J + BORE.

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

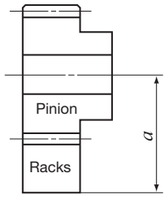
RL

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

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

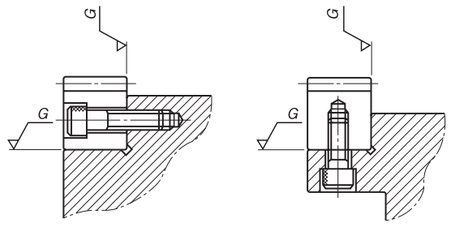
Points of Caution in Assembling

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.

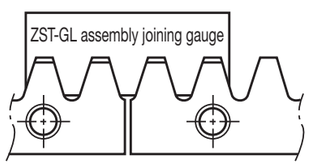


② Machined end type racks such as the ZST and ZSTD Series have pitch tolerance of -0.05 to -0.4mm at the end face. If you try to connect the racks without any space, the pitch at the connection will be too small and will cause problems. Please follow the following diagrams, "Connecting the Racks," for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



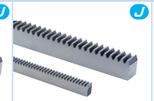
Connecting the Racks



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

Product Precautions → Page 218

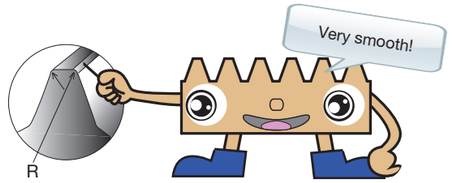
CP Racks & Pinions

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	Material: S45C	Material: SCM415	Material: SCM415	Material: SCM440	Material: SCM440	Material: SCM440	Material: S45C
CP5, 10 Page 278	CP5, 10 Page 278	CP5, 10 Page 280	CP5, 10 Page 280	CP5, 10 Page 282	CP5, 10 Page 282	CP5, 10 Page 284	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	Material: S45C	Material: SCM440	Material: SCM440	Material: SCM440	Material: SCM440	Material: S45C	Material: S45C
CP5~20 Page 286	CP5~20 Page 288	CP5, 10 Page 290	CP5, 10 Page 292	CP5, 10 Page 292	CP5, 10 Page 292	CP2.5~20 Page 294	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	Material: S45C	Material: S45C	Material: SUS303	Material: SUS304	Material: S45C	Material: SS400
CP5~20 Page 296	CP5~20 Page 298	CP2.5~20 Page 300	CP5, 10 Page 302	CP5, 10 Page 302	CP2.5~10 Page 304	CP5 Page 304

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) 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

Features

The KHK stock CP racks & pinions are easy-to-use racks with clear pitch.
For your convenience, we offer circular pitches of 2.5 to 20 mm and in lengths of up to 2000 mm. (FRCP is available to 4000 mm)

■ Racks

Catalog Number Note 1	Pitch mm	Total Length mm Parentheses show no. of teeth	Material	Heat Treatment	Tooth Surface Finish	Gear accuracy KHK R 001 Parentheses show JIS B 1702-1	Features
STRCPF STRCPFD	5, 10	1000	S45C	—	Cut	4	Racks with tapered helix with adjustable backlash.
MRGCPF MRGCPFD	5, 10	500	SCM415	Carburized	Ground	1	CP racks that have been carburized and ground that have excellent accuracy, strength and wear resistance. Secondary operations are possible except for teeth and both ends.
KRGCPF-H KRGCPFD-H	5, 10	500, 1000	SCM440	Thermal refined, gear teeth induction hardened	Ground	1	CP racks that have been tempered, hardened and ground that have excellent accuracy, strength and wear resistance. Secondary operations are possible except for teeth.
KRGCP/KRGCPF KRGCPFD	5, 10	100, 500, 1000	SCM440	Thermal refined	Ground	1	CP racks that have been tempered and ground that have excellent accuracy and strength.
SRGCP/SRGCPF SRGCPFD	5, 10, 15, 20	100, 500, 1000	S45C	Gear teeth induction hardened	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 teeth.
KRCPF-H KRCPFD-H	5, 10	1000	SCM440	Thermal refined, gear teeth induction hardened	Cut	5	CP racks that have been tempered and hardened that have excellent strength and wear resistance. Secondary operations are possible except for teeth.
SRCPF-H SRCPFD-H	5, 10, 15, 20	1000	S45C	Gear teeth induction hardened	Cut	5	CP racks that have been hardened with excellent wear resistance. Secondary operations are possible except for teeth.
SRCPF-HL SRCPFD-HL	5, 10, 15, 20	1000, 1500, 2000	S45C	Gear teeth laser hardened	Cut	4	CP racks that have been laser hardened with a good balance of wear resistance and cost. Secondary operations are possible except for teeth.
KRCPF/KRCPFD	5, 10	500, 1000	SCM440	Thermal refined	Cut	4	CP racks that have been tempered with excellent strength.
SRCP/SRCPF SRCPFD/SRCPFK	2.5, 5, 10, 15, 20	100, 500, 1000, 1500, 2000	S45C	—	Cut	4	Many lineups are available at a low price and excellent usability.
SURCPF SURCPFD	5, 10	500, 1000	SUS304	Solution treated	Cut	5	Stainless steel CP racks with rust resistance.
SROCP	2.5, 5, 10	500, 1000	S45C	—	Cut	4	CP round racks that are suitable when the rack side moves.
FRCP	5	2000, 3000, 4000	SS400	—	Cut	8	Thin CP racks that can be bent.

■ Pinion

KTSCP	5, 10	(20~40)	SCM440	Thermal refined	Cut	(N8)	STRCPF pinion with adjustable backlash.
KSCPG	5, 10	(25~40)	SCM440	Thermal refined, gear teeth induction hardened	Ground	(N6)	CP gears that have been tempered, hardened and ground that has excellent accuracy, strength and abrasion resistance. Recommended for pinions of ground CP racks Secondary operations are possible except for teeth.
SSCPGS	5, 10	(10~20)	S45C	Thermal refined, gear teeth induction hardened	Ground	(N7)	CP gears with shafts that have been tempered, hardened and ground. Secondary operations can be given except for the teeth. This product is ideal for the pinion of the SRGCPF rack.
SSCPG	5, 10, 15, 20	(20~40)	S45C	Gear teeth induction hardened	Ground	(N7)	CP gears that have been hardened and ground. Secondary operations can be given except for the teeth. This product is ideal for the pinion of the SRGCPF rack.
KSSCP	5, 10	(25~40)	SCM440	Thermal refined	Cut	(N8)	Tempered gears with excellent bending strength that can be given secondary operations. The teeth can be additionally hardened. This product is ideal for the pinion of the KRCPF rack.
SSCP	2.5, 5, 10, 15, 20	(20~40)	S45C	—	Cut	(N8)	Available at a low price. The teeth can be additionally hardened. This product is ideal for the pinion of the SRCP and SROCP racks.
SUSCP	5, 10	(20~30)	SUS303	—	Cut	(N8)	Stainless steel CP gears with rust resistance. This product is ideal for the pinion of the SURCPF rack.

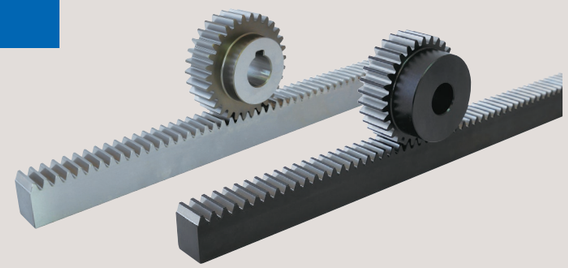
[NOTE 1] The catalog numbers of the above racks with (F) suffix have both ends machined so that they can be butted against each other. The items with (D) have mounting screw holes for immediate assembly.

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

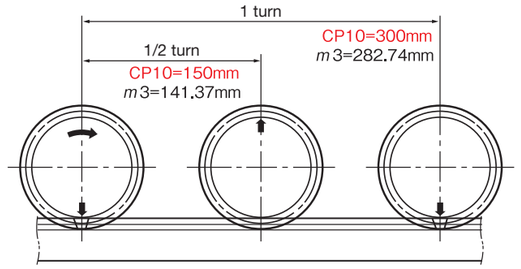
CP racks & pinions are ideal for linear positioning.

CP Racks & Pinions

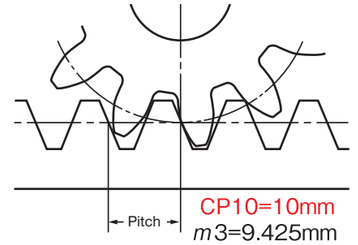
The design can be made easier by setting the moving length of one rotation of a pinion to an integer (mm). Circular pitch racks solve these problems. This problem is solved by CP racks and pinions where one rotation of a pinion moves it precisely 50, 100, 150, ... 600 mm, etc. The following table lists the main features.



■ Movement of one cycle of the CP10-30 pinion vs SS3-30.



■ Difference between CP10 and *m*3



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

STRCPF/STRCPFD & KTSCP

Taper Racks & Pinions

* For product details, please see Page 278.

■ Features of Tapered Racks & Pinions

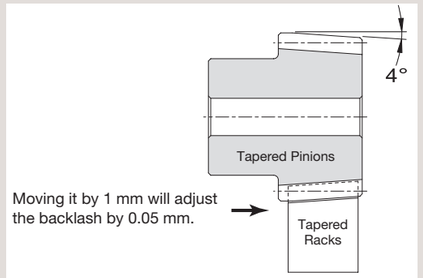
· Easy to adjust the backlash
Normally, the backlash is adjusted by the mounting distance (height of pinion shaft), but for KHK Tapered Racks & Pinions, it can simply be adjusted by moving the pinion mounting position in the axial direction.

· Backlash within 0.05 mm
The backlash of the conventional stock racks & pinions (SRCP5-1000 & SSCP 5-30) is 0.09 to 0.25 mm, but KHK Tapered Racks & Pinions (STRCPF5-1000 & KTSCP5-30) are manufactured within 0.05 mm.

· Thrust load is not applied
As with ordinary racks & pinions, KHK Tapered Racks and Pinions can be used without worrying about the thrust load.
Pinions are CP spur gears that are continuously shifted in the helix direction.

■ Assembly and backlash adjustment method

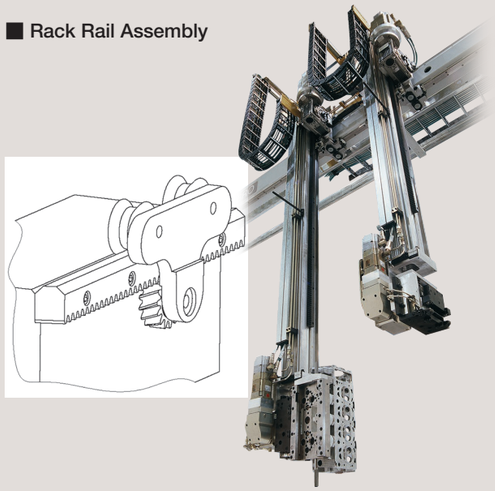
· Assemble at the mounting distance of the theoretical value at the reference tooth position of the racks & pinions.
For the mounting distance and backlash, see the dimension table of the tapered spur gear.
· The backlash can be adjusted by moving the tapered spur gear in the axial direction. Moving it by 1 mm will adjust the backlash by 0.05 mm.
· When the tapered spur gear is pushed to the large end of the rack, the backlash is reduced.
Conversely, retracting it will increase the backlash.



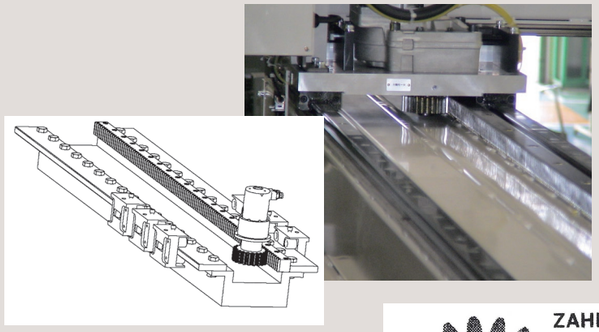
Application Examples

KHK stock CP racks & pinions are adopted in driving devices for linear systems, such as transport devices.

■ Rack Rail Assembly



■ Rack Drive Linear Guide



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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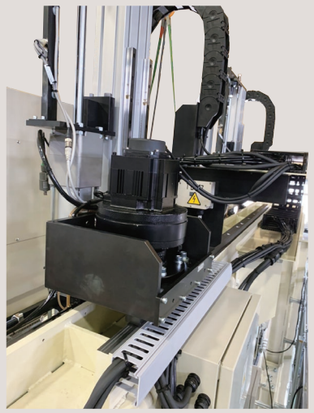
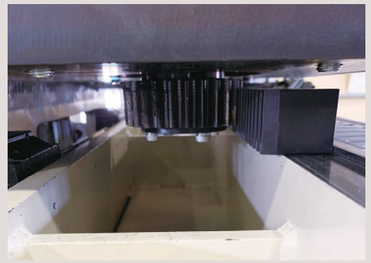
■ Cleaning machine manufactured by Kan Manufactory Co., Ltd.

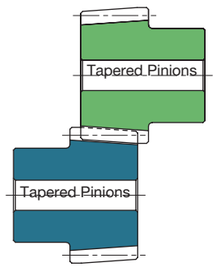




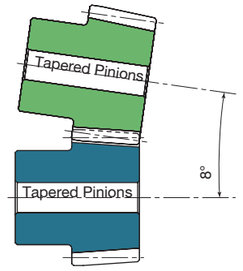
SRCPF-H racks and SSCP spur gears used in cleaning device with automatic transport for automobile parts

■ Examples of using tapered spur gears

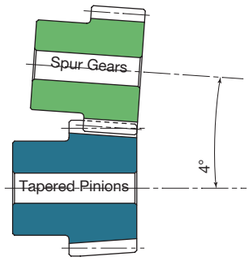
Changing the assembly direction of the tapered spur gear or assembling it with a general spur gear will allow it to be used at the axial angle shown below.



When the boss is set in the opposite direction, the axial angle is 0° (parallel shaft).



When the boss is set in the same direction, the axial angle is 8°.



When the taper spur gear and general spur gear are set, the axial angle is 4°.

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 notes shown below before the final selection.

1. Caution in Selecting the Mating Gears

① KHK stock CP racks are mated with CP spur gears having the same pitch. Since CP2.5 (m0.796), CP5 (m1.592) and CP10 (m3.183) are very close in size to m0.8, m1.5 and m3 respectively, selecting the proper mating gear should be verified to make sure that the items are correct. Otherwise, complications could arise.

② STRCPF and STRCPFD Tapered CP Racks are mated with KTSCP Tapered CP Spur Gears having the same pitch.

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. The table below contains the assumptions established for various products in order to compute gear strengths.

■ Calculation of Bending Strength of Gears

Item \ Catalog Number	MRGCPF MRGCPFD	KRGCPF-H KRGCPFD-H KRCPF-H KRCPFD-H	KRGCP KRGCPF KRGCPFD KRCPF KRCPFD	SRGCP SRGCPF SRGCPFD SRCPF-H SRCPFD-H	SRCPF-HL SRCPFD-HL	SRCP/SRCPF SRCPFD SRCPFK SROCP STRCPF STRCPFD	SURCPF SURCPFD	FRCP	MSCPG	KSCPG KSSCP-H	SSCPGS	SSCPG SSCP-H	KTSCP KSSCP	SSCP	SUSCP
	Racks								Pinion						
Formula NOTE 1	Formula of spur and helical gears on bending strength (JGMA401-01)														
No. of teeth of mating gears	30								Racks						
Rotational Speed of Pinion	100rpm														
Design Life (Durability)	Over 10^7 cycles														
Impact from motor	Uniform load														
Impact from load	Uniform load														
Direction of load	Bidirectional load (calculated with allowable bending stress of 2/3)														
Allowable bending stress at root σ_{Flim} (kgf/mm²)	47	30	29.5	20	20	20	10.5		47	30	24.5	19	29.5	19	10.5
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)														
How to support pinions	Supported on one end.														
Allowable Hertz stress σ_{Hlim} (kgf/mm²)	166	112	76	90	80	52.5	41.3	-	166	112	99	90	76	49	41.3
Safety factor S_H	1.15														

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

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 Error of Racks (KHK R 001) → Page 219
② Precision of Rack Blanks → Page 220
③ Backlash of Rack Teeth → Page 220

When selecting KHK standard gears, glance over the Product Precautions on page 274 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

Product Precautions

CP Rack 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 273 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 on the surface, so 0.5mm or so will not be at the specified hardness.

[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.

CP Spur Gears Common Notes

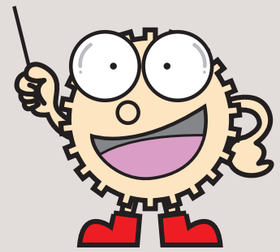
[Caution on Product Characteristics]

(1) The allowable torque shown in the table are calculated values according to the assumed usage conditions. Please see page 273 for more details.
(2) The backlash values shown in the table are the theoretical values for the backlash in the circumferential direction of recommended mating racks with the same pitch.
(3) Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.
(4) For products having a tapped hole, a set screw is included.
(5) For hole lengths 3.5x the bore or more, the hole center is out of H7 tolerance.
(6) 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 being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

[J Series]

(1) For bores over ϕ50, the bore tolerance is H8.
(2) Certain products which would otherwise have a very long tapped hole are counterbored. For details, please see the KHK website.
(3) Black oxide is not re-applied to parts undergoing secondary operations.

MEMO



Application Hints

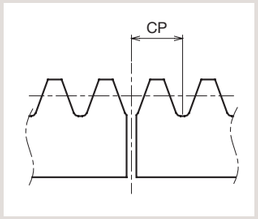
In order to use KHK stock CP racks safely, carefully read the Application Hints before proceeding. If there are questions or you require clarifications, please contact our technical department or your nearest distributor. E-mail: info@khkgears.net
Please read “Cautions on Performing Secondary Operations” 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 round 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 CP 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 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 end pitch (CP) requires careful consideration. The meshing will be poor if the pitch straddling the connection has a positive tolerance. We recommend a minus tolerance on pitch of at the connection. The below is an indication of pitch tolerance for each module.



Unit: mm

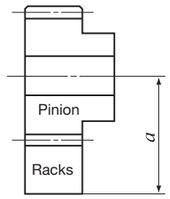
CP	Tolerance
CP2.5	-0.05 -0.25
CP5	-0.1 -0.3
CP10	-0.1 -0.4
CP15	
CP20	

④ To use dowel pins to secure racks, attach the racks to the base and drill both simultaneously.
⑤ KHK stock CP racks made of S45C and SCM440 (except for ground racks) can be induction hardened. However, the precision of pitch is decreased.
⑥ To be able to handle parts safely, all burrs and sharp corners. should be removed after the secondary operations are done.
⑦ If you are going to modify the gear by gripping the teeth, please exercise caution not to crush the teeth by applying too much pressure. Any scarring will cause noise during operation.
⑧ There is a decarburized layer (about 0.5 mm) on the surface of the extruded products. The hardness of the decarburized layer does not increase even if it is quenched.

3. Points of Caution during Assembly

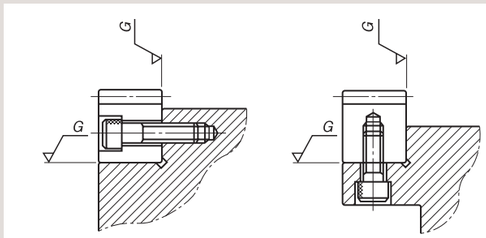
① The recommended assembly distance tolerance of KHK stock CP racks is H7 for ground racks and H8 for cut racks.
The backlash values are given in the table on Page 220.
Make sure that the mounting distance stays constant for the length of the rack.

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



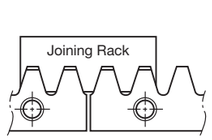
[NOTE] Pinions are assumed to be standard stock spur gears (x=0).

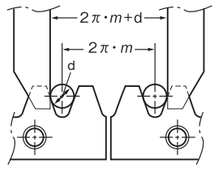
② The recommended flatness and squareness of the mounting surface of KHK stock CP racks is 0.01 mm for ground racks and 0.05 mm for cut racks.



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 SRCPF and SRCPFD 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 following diagrams for assembly.
⑤ With SRCPFD 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.

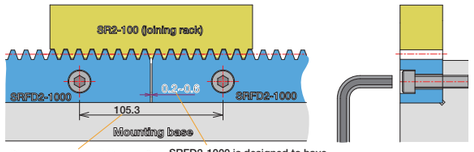




[NOTE] Joining gauge racks for helical racks must have the opposite hand from the racks. Please use 100 mm short racks as a joining gauge rack, or alternatively the rack of the same specifications on hand.

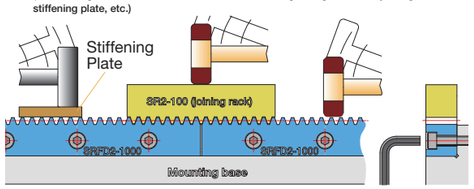
How to mount racks on a mounting base (For SRFD2-1000)

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

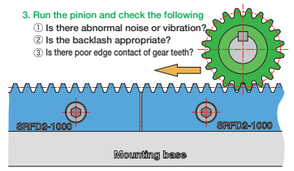


Dimensions Table F Value x 2
SRFD2-1000 is designed to have a gap of 0.2 to 0.6 mm.

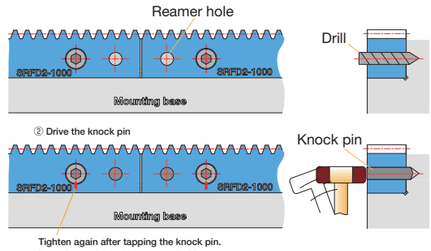
2. Securing to the mounting base
Tap with a plastic hammer, bring it into close contact with the mounting base, and further tighten the bolt.
(When using a metal hammer, be careful not to damage the gear teeth by using a stiffening plate, etc.)



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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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

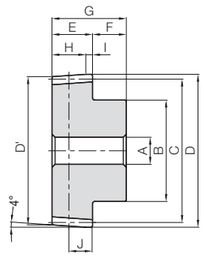
1. When using KHK products, follow relevant safety regulations (Occupational Safety and Health Regulations, etc.).
2. Pay attention to the following items when installing, removing, or performing maintenance and inspection of the product.
① Turn off the power switch.
② Do not reach or crawl under the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

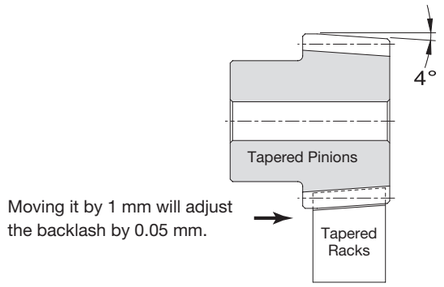
KTSCP Circular pitch 5, 10
CP Tapered Pinions

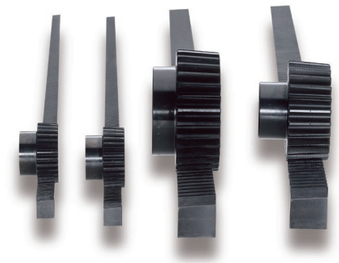
Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 to 352HB
Surface treatment	Black oxide coating



ST

Catalog Number	Pitch mm (Module)	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia. (major)	Outside dia. (minor)	Total tooth width	Hub width	Total length
				A_{H7}	B	C	D	D'	E	F	G
KTSCP5-20	**CP5** (1.5915)	20	ST	8	25	31.83	36.06	33.97	18	15	33
KTSCP5-30		30		10	38	47.75	51.98	49.88			
KTSCP5-40		40		12	45	63.66	67.89	65.8			
KTSCP10-20	**CP10** (3.1831)	20		15	50	63.66	72.13	67.93	36	20	56
KTSCP10-25		25		20	60	79.58	88.04	83.85			
KTSCP10-30		30		20	75	95.49	103.96	99.76			

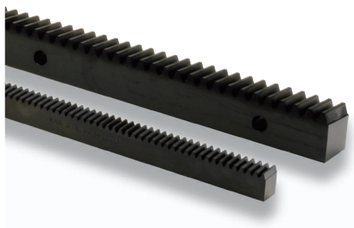




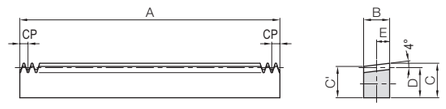
Reference face width	Adjustable width	Position of reference tooth	Distance traveled in one turn (mm)	Allowable torque (N·m)		Allowable torque (kgf·m)		Mounting distance (mm)	Backlash (mm)	Weight (kg)	Catalog Number
H	I	J		Bending strength	Surface durability	Bending strength	Surface durability				
15	3	10.5	100	42.7	7.89	4.35	0.80	33.30	0~0.11	0.16	**KTSCP5-20**
			150	72.8	21.0	7.42	2.15	41.26		0.37	**KTSCP5-30**
			200	104	41.7	10.6	4.25	49.21		0.61	**KTSCP5-40**
30	6	21	200	341	68.2	34.8	6.96	62.10	0~0.12	1.13	**KTSCP10-20**
			250	461	117	47.0	11.9	70.06		1.71	**KTSCP10-25**
			300	582	182	59.4	18.0	78.02		2.58	**KTSCP10-30**

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

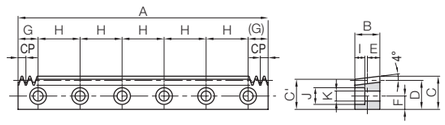
STRCPF/STRCPFD Circular pitch 5, 10
CP Tapered Racks



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



RF



RD

Catalog Number	Pitch mm (Module)	No. of teeth	Shape	Total Length	Face width	Height (major)	Height (minor)	Height to pitch line	Position of reference tooth
				A	B	C	C'	D	E
STRCPF5-1000	**CP5** (1.5915)	200	RF	1000	15	19.5	18.45	17.38	7.5
STRCPF10-1000	**CP10** (3.1831)	100			30	34.5	32.4	30.27	15

Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number
Bending strength	Surface durability	Bending strength	Surface durability			
2290	421	233	42.9	0~0.11	2.05	**STRCPF5-1000**
9150	1820	933	186	0~0.12	7.13	**STRCPF10-1000**

Catalog Number	Pitch mm (Module)	No. of teeth	Shape	Total Length	Face width	Height (major)	Height (minor)	Height to pitch line	Position of reference tooth	Mounting hole dimensions				
				A	B	C	C'	D	E	F	G	H	No. of holes	Screw size
STRCPFD5-1000	**CP5** (1.5915)	200	RD	1000	15	19.5	18.45	17.38	7.5	8	50	180	6	M5
STRCPFD10-1000	**CP10** (3.1831)	100			30	34.5	32.4	30.27	15	14				M10

Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number
I	J	K	Bending strength	Surface durability	Bending strength	Surface durability			
6	10	6	2290	421	233	42.9	0~0.11	2.01	**STRCPFD5-1000**
10.8	17.5	11	9150	1820	933	186	0~0.12	6.92	**STRCPFD10-1000**

SRCP5-100,SRCP10-100
Assembly Gauges

Material: S45C
Accuracy: KHK R 001 Grade 4
Please see Page 300 in the Master Catalog for more details.

[Caution on Product Characteristics] ① When connecting the racks to use as a continuous rack length, adjust the pitch of the joint using identical racks or with an SRCP□-100 rack product of the same pitch. Please read Points of Caution in Assembling (Page 276) for details.

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

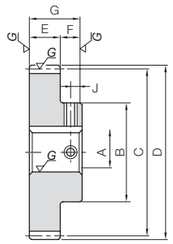
Product Precautions → Page 274

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

MSCPG Circular pitch 5, 10
CP Ground Spur Gears

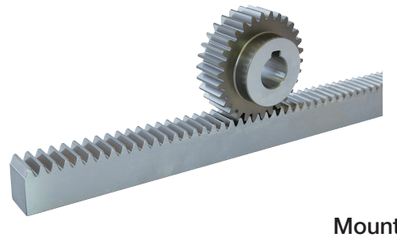
Made to Order

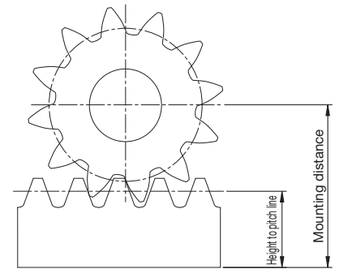
Specifications	
Precision grade	JIS grade N5 (JIS B1702-1: 1998)
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM415
Heat treatment	Carburized
Tooth hardness	55 to 60HRC



S1K

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz





Mounting distance of a profile shifted gear and the meshing rack

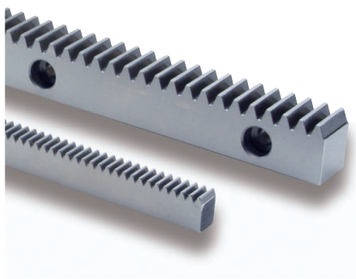
Catalog Number	Pitch mm (Module)	No. of teeth	Profile shift coefficient	Mounting distance	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G
MSCPG5-20A (Made to Order) **MSCPG5-20B** (Made to Order)	**CP5** (1.5915)	20	+0.425	35	S1K	12 15	28	31.83	36.37	15	15	30
MSCPG5-25A (Made to Order) **MSCPG5-25B** (Made to Order)		25	+0.438	39		12 15	35	39.79	44.37			
MSCPG5-30A (Made to Order) **MSCPG5-30B** (Made to Order)		30	+0.451	43		15 20	40	47.75	52.37			
MSCPG5-40A (Made to Order) **MSCPG5-40B** (Made to Order) **MSCPG5-40C** (Made to Order)		40	+0.478	51		15 20 25	45	63.66	68.37			
MSCPG10-20A (Made to Order) **MSCPG10-20B** (Made to Order)	**CP10** (3.1831)	20	+0.111	64	S1K	20 25	50	63.66	70.73	30	20	50
MSCPG10-25A (Made to Order) **MSCPG10-25B** (Made to Order)		25	+0.124	72		25 30	60	79.58	86.73			
MSCPG10-30A (Made to Order) **MSCPG10-30B** (Made to Order)		30	+0.137	80		30 40	70	95.49	102.73			
MSCPG10-40A (Made to Order) **MSCPG10-40B** (Made to Order)		40	+0.164	96		30 40	70	127.32	134.73			

Keyway Width × Depth	Socket head screw Size	Socket head screw J	Distance traveled in one turn (mm)	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number
4x 1.8 5x 2.3	M4	7.5	100	70.0	46.7	7.13	4.76	0.04~0.14	0.14 0.13	**MSCPG5-20A** (Made to Order) **MSCPG5-20B** (Made to Order)
4x 1.8 5x 2.3	M4		125	91.8	78.2	9.37	7.97		0.24 0.22	**MSCPG5-25A** (Made to Order) **MSCPG5-25B** (Made to Order)
5x 2.3 6x 2.8	M4 M5		150	114	119	11.6	12.2		0.32 0.29	**MSCPG5-30A** (Made to Order) **MSCPG5-30B** (Made to Order)
5x 2.3 6x 2.8 8x 3.3	M4 M5 M6		200	159	229	16.2	23.4		0.53 0.50 0.45	**MSCPG5-40A** (Made to Order) **MSCPG5-40B** (Made to Order) **MSCPG5-40C** (Made to Order)
6x 2.8 8x 3.3	M5 M6	10	200	514	375	52.4	38.2	0.05~0.16	0.94 0.87	**MSCPG10-20A** (Made to Order) **MSCPG10-20B** (Made to Order)
8x 3.3	M6		250	689	628	70.3	64.1		1.43 1.34	**MSCPG10-25A** (Made to Order) **MSCPG10-25B** (Made to Order)
8x 3.3 12x 3.3	M6 M8		300	868	960	88.5	97.9		2.03 1.80	**MSCPG10-30A** (Made to Order) **MSCPG10-30B** (Made to Order)
8x 3.3 12x 3.3	M6 M8		400	1230	1850	126	188		3.36 3.13	**MSCPG10-40A** (Made to Order) **MSCPG10-40B** (Made to Order)

[Caution on Product Characteristics] ① The keyway tolerance is the value before hardening.

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

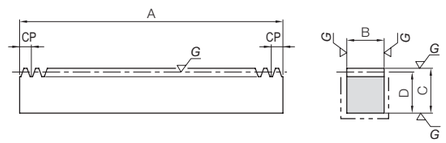
MRGCPF/MRGCPFD Circular pitch 5, 10
CP Hardened Ground Racks



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

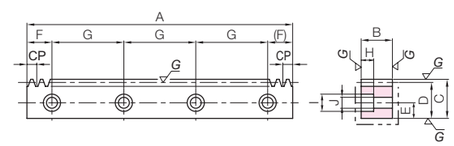
* The precision grade of J Series products is equivalent to the value shown in the table.

** In the illustration, the area surrounded with – – – line is masked during the carburization process (max. HRC40 or so) and can be modified.

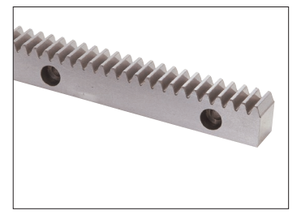


RF

J Series



RD



Catalog Number	Pitch mm (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)
MRGCPF5-500	**CP5** (1.5915)	100	RF	500	15	20	18.41	5380	5000	548	509	0.04~0.14	1.08
MRGCPF10-500	**CP10** (3.1831)	50			30	35	31.82	21500	20100	2190	2050	0.05~0.16	3.75

Catalog Number ● : J Series (Available-on-request)	Pitch mm (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
●**MRGCPFD5-500J**	**CP5** (1.5915)	100	RD	500	15	20	18.41	8	25	150	4	M5
●**MRGCPFD10-500J**	**CP10** (3.1831)	50			30	35	31.82	14				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	5380	5000	548	509	0.04~0.14	1.06	●**MRGCPFD5-500J**
10.8	17.5	11	21500	20100	2190	2050	0.05~0.16	3.61	●**MRGCPFD10-500J**

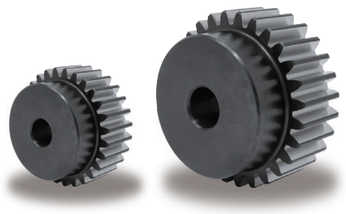
Surface durability is 4 times higher than SRGCP Hardened Ground Racks, 2 times higher than KRGCP-H Hardened Ground Racks.

[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 274
Precautions for Standard Machined Products → Pages 42~44

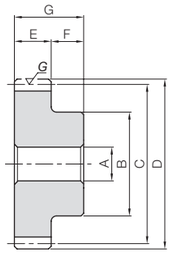
You can download CAD data (DXF format) of KHK Products from the Website.

KSCPG Circular pitch 5, 10
CP Ground Spur Gears



Specifications	
Precision grade	JIS grade N6 (JIS B 1702-1: 1998) *
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 coated except for teeth
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

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info@zahnrad24.com
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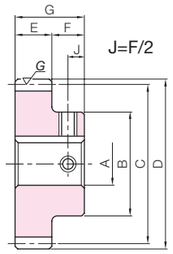
Oberes Dorf 1
95152 Selbitz

J Series



S1K

Catalog Number	Pitch mm (Module)	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 (mm)	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
KSCPG5-25	**CP5** (1.5915)	25	+0.438	39	10	35	39.79	44.37				125	58.6	35.6	5.98	3.63		0.25
KSCPG5-30		30	+0.451	43	15	40	47.75	52.37	15	15	30	150	72.8	54.3	7.42	5.54	0.04~0.14	0.33
KSCPG5-40		40	+0.478	51	15	55	63.66	68.37				200	101	104	10.3	10.6		0.63
KSCPG10-25	**CP10** (3.1831)	25	+0.124	72	20	70	79.58	86.73				250	440	286	44.9	29.2		1.68
KSCPG10-30		30	+0.137	80	20	85	95.49	102.73	30	20	50	300	554	437	56.5	44.5	0.05~0.16	2.49
KSCPG10-40		40	+0.164	96	25	110	127.32	134.73				400	786	841	80.1	85.8		4.35

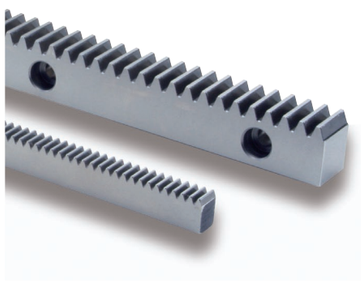
To order J Series products, please specify: Catalog No. + J + BORE.

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

Bore $_{H7}$	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Keyway $_{Js9}$	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Screw size	M4						M5				M6			M8			M10	
Catalog Number																		
KSCPG5-25 J BORE																		
KSCPG5-30 J BORE																		
KSCPG5-40 J BORE																		
KSCPG10-25 J BORE																		
KSCPG10-30 J BORE																		
KSCPG10-40 J BORE																		

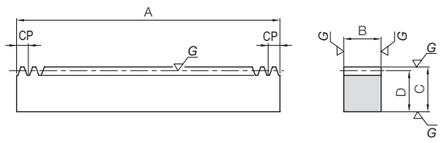
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

KRGCPF-H/KRGCPFD-H Circular pitch 5, 10
CP Hardened Ground Racks



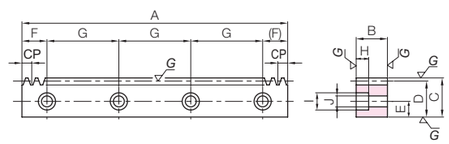
Specifications	
Precision grade	KHK R 001 Grade 1 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened **
Tooth hardness	50 to 60HRC

* 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).

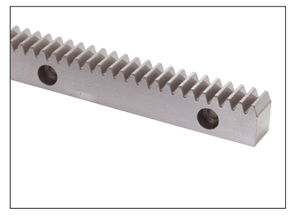


RF

J Series



RD



Catalog Number ● : J Series (Available-on-request)	Pitch mm (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
●**KRGCPFD5-500HJ**	**CP5** (1.5915)	100	RD	500	15	20	18.41	8	25	150	4	M5
●**KRGCPFD5-1000HJ**		200		1000					50	180	6	
●**KRGCPFD10-500HJ**	**CP10** (3.1831)	50		500	30	35	31.82	14	25	150	4	M10
●**KRGCPFD10-1000HJ**		100		1000					50	180	6	

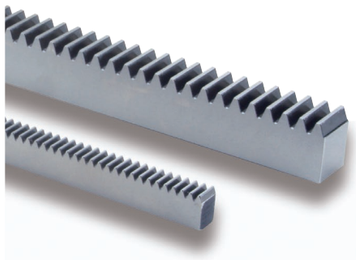
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Catalog Number	Pitch mm (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)
KRGCPF5-500H	**CP5** (1.5915)	100	RF	500	15	20	18.41	3170	2270	323	232	0.04~0.14	1.08
KRGCPF5-1000H		200		1000									2.17
KRGCPF10-500H	**CP10** (3.1831)	50		500	30	35	31.82	13400	9150	1370	933	0.05~0.16	3.75
KRGCPF10-1000H		100		1000									7.49

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	3170	2270	323	232	0.04~0.14	1.06	●**KRGCPFD5-500HJ**
								2.13	●**KRGCPFD5-1000HJ**
10.8	17.5	11	13400	9150	1370	933	0.05~0.16	3.61	●**KRGCPFD10-500HJ**
								7.28	●**KRGCPFD10-1000HJ**

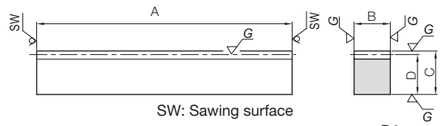
Product Precautions → Page 274
Precautions for Standard Machined Products → Pages 42~44

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



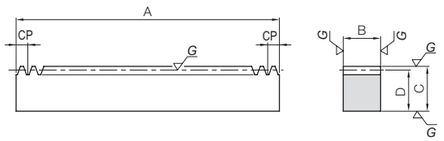
Specifications	
Precision grade	KHK R 001 grade 1 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refining only
Tooth hardness	225 to 352HB

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



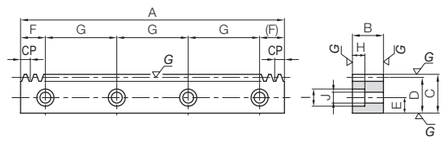
SW: Sawing surface

R1



RF

J Series



RD

Catalog Number	Pitch mm (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
KRGCP5-100	**CP5** (1.5915)	18	R1	98	15	20	18.41	3120	1430	318	145	0.04~0.14	0.21	**KRGCP5-100**
KRGCP10-100	**CP10** (3.1831)	8		98	30	35	31.82	13200	5740	1350	585	0.05~0.16	0.73	**KRGCP10-100**

Catalog Number	Pitch mm (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
KRGCPF5-500 **KRGCPF5-1000**	**CP5** (1.5915)	100 200	RF	500 1000	15	20	18.41	3120	1430	318	145	0.04~0.14	1.08 2.17	**KRGCPF5-500** **KRGCPF5-1000**
KRGCPF10-500 **KRGCPF10-1000**	**CP10** (3.1831)	50 100		500 1000	30	35	31.82	13200	5740	1350	585	0.05~0.16	3.75 7.49	**KRGCPF10-500** **KRGCPF10-1000**

Catalog Number ● : J Series (Available-on-request)	Pitch mm (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)
●**KRGCPFD5-500J** ●**KRGCPFD5-1000J**	**CP5** (1.5915)	100 200	RD	500 1000	15	20	18.41	8	25.00 50.00	150 180	4 6	M5	6	10	6	3120	1430	318	145	0.04~0.14	1.06 2.13	●**KRGCPFD5-500J** ●**KRGCPFD5-1000J**
●**KRGCPFD10-500J** ●**KRGCPFD10-1000J**	**CP10** (3.1831)	50 100		500 1000	30	35	31.82	14	25.00 50.00	150 180	4 6	M10	10.8	17.5	11	13200	5740	1350	585	0.05~0.16	3.61 7.28	●**KRGCPFD10-500J** ●**KRGCPFD10-1000J**

[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.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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Oberes Dorf 1
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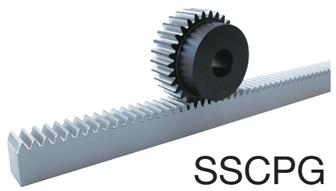
Recommended Mating Pinions



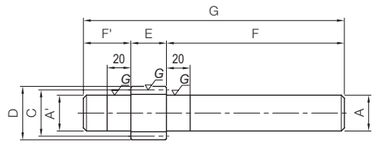
SSCPG

Please see Page 286 for more details.

SSCPGS Circular pitch 5, 10
CP Ground Spur Pinion Shafts

Specifications	
Precision grade	JIS grade N7 (JIS B1702-1: 1998)
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Thermal refined, gear teeth induction hardened *
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).

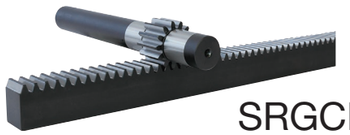


S7

Catalog Number	Pitch mm (Module)	No. of teeth	Profile shift coefficient	Shape	Shaft diameter (L) A'	Shaft length (L) F'	Pitch dia. C	Outside dia. D	Face width E	Shaft diameter (R) A	Shaft length (R) F
SSCPGS5-15	**CP5** (1.5915)	15	0	S7	19.2	25	23.87	27.06	15	19.2	100
SSCPGS5-20		20	0		27.2		31.83	35.01		27.2	
SSCPGS10-10	**CP10** (3.1831)	10	+0.5		25.2	40	31.83	41.38	30	25.2	150
SSCPGS10-15		15	0		35.2		47.75	54.11		35.2	
SSCPGS10-20		20	0		40.2		63.66	70.03		40.2	

[Caution on Product Characteristics] ① For the center distance of the profile shifted gear, please refer to “Center distance of stock spur gear meshing with profile shifted gear” on page 60.

Recommended mating rack



SRGCP

Please see Page 288 for more details.

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info@zahnrad24.com
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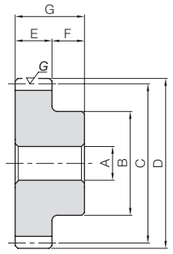
Total Length G	Distance traveled in one turn (mm)	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number
140	75	21.2	8.49	2.16	0.87	0.04~0.19	0.34	**SSCPGS5-15**
	100	32.0	16.6	3.26	1.70		0.66	**SSCPGS5-20**
220	100	121	25.9	12.4	2.64	0.05~0.21	0.97	**SSCPGS10-10**
	150	169	67.9	17.3	6.93		1.87	**SSCPGS10-15**
	200	256	133	26.1	13.6		2.64	**SSCPGS10-20**

SSCPG 5, 10, 15, 20
CP Ground Spur Gears

Specifications	
Precision grade	JIS grade N7 (JIS B 1702-1: 1998)*
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).



S1

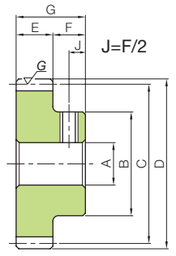
Catalog Number	Pitch mm (Module)	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Distance traveled in one turn (mm)	Allowable torque (N·m) Bending strength	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Bending strength	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SSCPG5-20		20	S1	8	25	31.83	35.01	15	15	30	100	24.8	13.7	2.53	1.40	0.04~0.19	0.14
SSCPG5-25	**CP5**	25		10	32	39.79	42.97				125	33.5	23.0	3.41	2.34		0.22
SSCPG5-30	(1.5915)	30		10	38	47.75	50.93				150	42.3	35.0	4.32	3.57		0.33
SSCPG5-40		40		12	50	63.66	66.85				200	60.4	66.9	6.16	6.82		0.58
SSCPG10-20		20		15	50	63.66	70.03	30	20	50	200	198	110	20.2	11.2	0.05~0.21	0.99
SSCPG10-25	**CP10**	25		20	60	79.58	85.94				250	268	184	27.3	18.7		1.49
SSCPG10-30	(3.1831)	30		20	75	95.49	101.86				300	339	280	34.5	28.5		2.26
SSCPG10-40		40		25	80	127.32	133.69				400	483	535	49.3	54.6		3.59
SSCPG15-25	**CP15**	25		25	100	119.37	128.92	50	27	77	375	1005	667	102	68.0	0.05~0.22	5.76
SSCPG15-30	(4.7746)	30		25	110	143.24	152.79				450	1270	1020	130	104		8.04
SSCPG20-25	**CP20**	25		30	130	159.15	171.89	60	30	90	500	2140	1470	219	150	0.05~0.22	12.0
SSCPG20-30	(6.3662)	30		30	150	190.99	203.72				600	2710	2240	276	228		17.2

Recommended mating rack

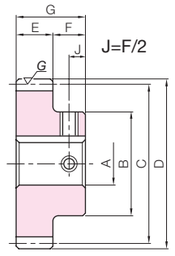
SRGCP

Please see Page 288 for more details.

J Series



S1T



S1K

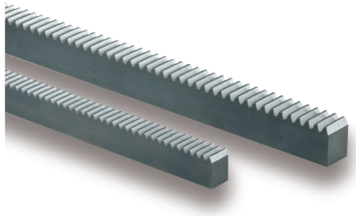
To order J Series products, please specify: Catalog No. + J + BORE.

Bore H7	* The product shapes of J Series items are identified by background color.																								
Keyway Js9	8	10	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	M5	M4						M5				M6			M8			M10		M12			M16		
SSCPG5-20 J BORE																									
SSCPG5-25 J BORE																									
SSCPG5-30 J BORE																									
SSCPG5-40 J BORE																									
SSCPG10-20 J BORE																									
SSCPG10-25 J BORE																									
SSCPG10-30 J BORE																									
SSCPG10-40 J BORE																									
SSCPG15-25 J BORE																									
SSCPG15-30 J BORE																									
SSCPG20-25 J BORE																									
SSCPG20-30 J 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.

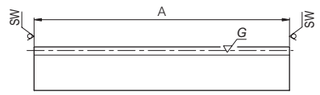
Product Precautions → Page 274 | Precautions for Standard Machined Products → Pages 42~44

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



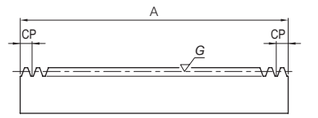
Specifications	
Precision grade	KHK R 001 Grade 3 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened **
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for teeth

* 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).



SW: Sawing surface

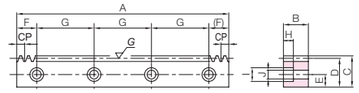
R1



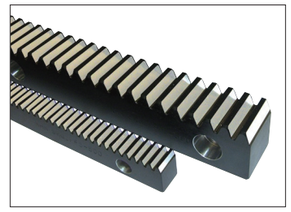
RF

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



RD



Catalog Number	Pitch mm (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
SRGCP5-100	**CP5** (1.5915)	18	R1	98	15	20	18.41	2290	1460	233	149	0.04~0.19	0.21	**SRGCP5-100**
SRGCP10-100	**CP10** (3.1831)	8		98	30	35	31.82	9150	5860	933	597	0.05~0.21	0.73	**SRGCP10-100**
SRGCP15-100	**CP15** (4.7746)	5		103	50	50	45.23	22900	14200	2330	1450	0.05~0.22	1.83	**SRGCP15-100**
SRGCP20-100	**CP20** (6.3662)	3		98	60	60	53.63	36600	23400	3730	2390	0.05~0.22	2.48	**SRGCP20-100**

Catalog Number	Pitch mm (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
SRGCPF5-500	**CP5** (1.5915)	100	RF	500	15	20	18.41	2290	1460	233	149	0.04~0.19	1.08	**SRGCPF5-500**
SRGCPF5-1000		200		1000									2.17	**SRGCPF5-1000**
SRGCPF10-500	**CP10** (3.1831)	50		500	30	35	31.82	9150	5860	933	597	0.05~0.21	3.75	**SRGCPF10-500**
SRGCPF10-1000		100		1000									7.49	**SRGCPF10-1000**
SRGCPF15-1000	**CP15** (4.7746)	67		1005	50	50	45.23	22900	14200	2330	1450	0.05~0.22	17.8	**SRGCPF15-1000**
SRGCPF20-1000	**CP20** (6.3662)	50		1000	60	60	53.63	36600	23400	3730	2390	0.05~0.22	25.3	**SRGCPF20-1000**

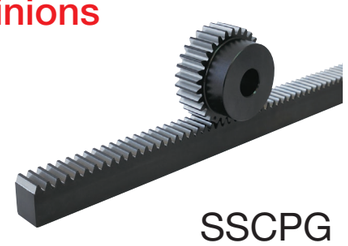
Catalog Number ● : J Series (Available-on-request)	Pitch mm (Module)	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of holes	Screw size	Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
●**SRGCPFD5-500J**	**CP5** (1.5915)	100	RD	500	15	20	18.41	8	25	150	4	M5	6	10	6	2290	1460	233	149	0.04~0.19	1.06	●**SRGCPFD5-500J**
●**SRGCPFD5-1000J**		200		1000					50	180	6										2.13	●**SRGCPFD5-1000J**
●**SRGCPFD10-500J**	**CP10** (3.1831)	50		500	30	35	31.82	14	25	150	4	M10	10.8	17.5	11	9150	5860	933	597	0.05~0.21	3.61	●**SRGCPFD10-500J**
●**SRGCPFD10-1000J**		100		1000					50	180	6										7.29	●**SRGCPFD10-1000J**
●**SRGCPFD15-1000J**	**CP15** (4.7746)	67		1005	50	50	45.23	20	62.5	220	5	M14	15.2	23	16	22900	14200	2330	1450	0.05~0.22	17.3	●**SRGCPFD15-1000J**
●**SRGCPFD20-1000J**	**CP20** (6.3662)	50		1000	60	60	53.63	23	60	220	5	M16	17.5	26	18	36600	23400	3730	2390	0.05~0.22	24.5	●**SRGCPFD20-1000J**

[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

SSCPGS

Please see Page 286 for more details.



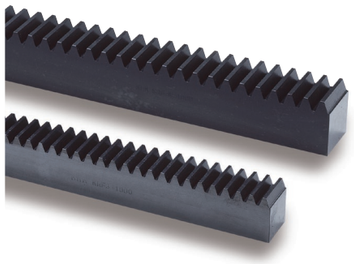
SSCPG

Please see Page 286 for more details.

Product Precautions → Page 274
Precautions for Standard Machined Products → Pages 42~44

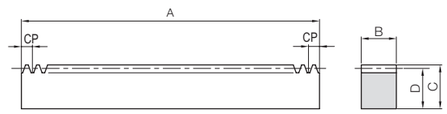
You can download CAD data (DXF format) of KHK Products from the Website.

KRCPF-H/KRCPFD-H Circular pitch 5, 10
CP Hardened Racks



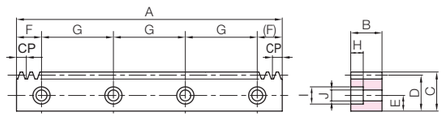
Specifications	
Precision grade	KHK R 001 grade 5 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened **
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* The precision grade of these 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).

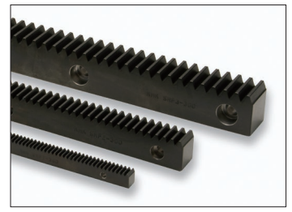


RF

J Series



RD



Catalog Number	Pitch mm (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
KRCPF5-1000H	**CP5** (1.5915)	200	RF	1000	15	20	18.41	3120	1850	318	189
KRCPF10-1000H	**CP10** (3.1831)	100			30	35	31.82	12500	7710	1270	786

Backlash (mm)	Weight (kg)	Catalog Number
0.05~0.31	2.17	**KRCPF5-1000H**
0.10~0.41	7.49	**KRCPF10-1000H**

Catalog Number ● : J Series (Available-on-request)	Pitch mm (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
●**KRCPFD5-1000HJ**	**CP5** (1.5915)	200	RD	1000	15	20	18.41	8	50	180	6	M5
●**KRCPFD10-1000HJ**	**CP10** (3.1831)	100			30	35	31.82	14	50	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 ● : J Series (Available-on-request)
6	10	6	3120	1850	318	189	0.05~0.31	2.13	●**KRCPFD5-1000HJ**
10.8	17.5	11	12500	7710	1270	786	0.10~0.41	7.29	●**KRCPFD10-1000HJ**

[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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Recommended Mating Pinions

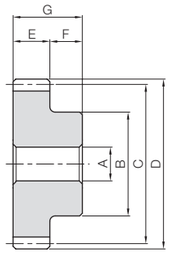
KSSCP-H

Please see Page 292 for more details.

KSSCP Circular pitch 5, 10
CP Thermal Refined Spur Gears

Specifications	
Precision grade	JIS grade N8 (JIS B 1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined
Tooth hardness	225 to 352HB
Surface treatment	Black oxide coating
Shape	S1

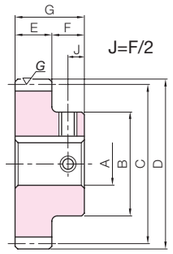
* The precision grade of J Series products is equivalent to the value shown in the table.



S1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



S1K

To order Hardened Plus, please specify Catalog No. + H. **Example: KSSCP5-30H**

Catalog Number	Pitch mm (Module)	No. of teeth	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Distance traveled in one turn (mm)	Allowable torque						Backlash (mm)	Weight (kg)
											Bending strength		Surface durability		Surface durability (H)			
			A_{H7}	B	C	D	E	F	G		N·m	kgf·m	N·m	kgf·m	N·m	kgf·m		
KSSCP5-30 (H)	**CP5** (1.5915)	30	10	38	47.75	50.93	15	15	30	150	65.8	6.71	21.0	2.15	44.3	4.52	0.09~0.27	0.33
KSSCP5-40 (H)		40	12	50	63.66	66.85				200	93.8	9.57	41.7	4.25	86.2	8.79		0.58
KSSCP10-25 (H)	**CP10** (3.1831)	25	20	60	79.58	85.94	30	20	50	250	416	42.5	117	11.9	239	24.4	0.14~0.37	1.49
KSSCP10-30 (H)		30	20	75	95.49	101.86				300	527	53.7	182	18.6	368	37.5		2.26
KSSCP10-40 (H)		40	20	80	127.32	133.69				400	751	76.5	362	36.9	718	73.2		3.66

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

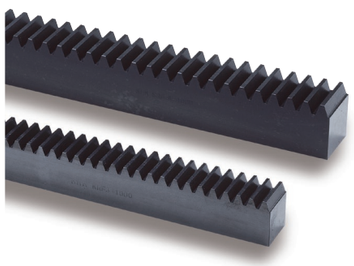
To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: KSSCP5-30J10**

Bore H7	* The product shapes of J Series items are identified by background color.																			
Keyway Js9	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	
Screw size	—	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8		
Catalog Number	M5	M4						M5				M6			M8			M10		
KSSCP5-30 J BORE		*																		
KSSCP5-40 J BORE			*																	
KSSCP10-25 J BORE										*										
KSSCP10-30 J BORE										*										
KSSCP10-40 J BORE										*										

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE. **Example: KSSCP5-30HJ12**

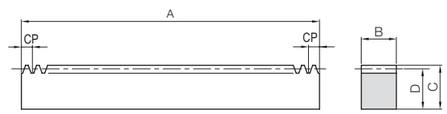
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

KRCPF/KRCPFD Circular pitch 5, 10
CP Thermal Refined Racks



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

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



RF

Catalog Number	Pitch mm (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
KRCPF5-500 **KRCPF5-1000**	**CP5** (1.5915)	100 200	RF	500 1000	15	20	18.41	3370	881	344	89.9
KRCPF10-500 **KRCPF10-1000**	**CP10** (3.1831)	50 100		500 1000	30	35	31.82	13500	3820	1380	389

Backlash (mm)	Weight (kg)	Catalog Number
0.09~0.27	1.08 2.17	**KRCPF5-500** **KRCPF5-1000**
0.14~0.37	3.75 7.49	**KRCPF10-500** **KRCPF10-1000**

Catalog Number ● : J Series (Available-on-request)	Pitch mm (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
●**KRCPFD5-500J** ●**KRCPFD5-1000J**	**CP5** (1.5915)	100 200	RD	500 1000	15	20	18.41	8	25 50	150 180	4 6	M5
●**KRCPFD10-500J** ●**KRCPFD10-1000J**	**CP10** (3.1831)	50 100		500 1000	30	35	31.82	14	25 50	150 180	4 6	M10

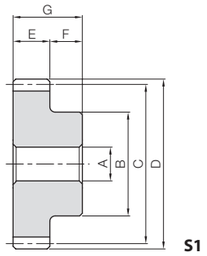
Counterbore dimensions			Allowable force (N)		Allowable force (kgf)		Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
H	I	J	Bending strength	Surface durability	Bending strength	Surface durability			
6	10	6	3370	881	344	89.9	0.09~0.27	1.06 2.13	●**KRCPFD5-500J** ●**KRCPFD5-1000J**
10.8	17.5	11	13500	3820	1380	389	0.14~0.37	3.61 7.29	●**KRCPFD10-500J** ●**KRCPFD10-1000J**

[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.

Product Precautions → Page 274
Precautions for Standard Machined Products → Pages 42~44

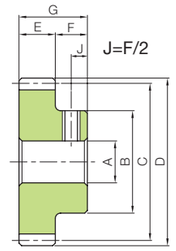
Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating
Shape	S1

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

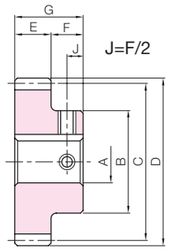


S1

J Series



S1T



S1K

To order Hardened Plus, please specify Catalog No. + H. Example: SSCP2.5-20H

Catalog Number	Pitch mm (Module)	No. of teeth	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Distance traveled in one turn (mm)	Allowable torque: Bending strength N·m	Bending strength kgf·m	Surface durability N·m	Surface durability kgf·m	Surface durability (H) N·m	Surface durability (H) kgf·m	Backlash (mm)	Weight (kg)
			A_{H7}	B	C	D	E	F	G		N·m	kgf·m	N·m	kgf·m	N·m	kgf·m		
SSCP2.5-20 (H)	CP2.5 (0.7958)	20	6	13	15.92	17.51	10	10	20	50	4.14	0.42	0.48	0.049	1.60	0.16	0~0.14	0.022
SSCP2.5-30 (H)		30	8	21	23.87	25.46				75	7.06	0.72	1.30	0.13	4.20	0.43		0.054
SSCP2.5-40 (H)		40	10	28	31.83	33.42				100	10.1	1.03	2.64	0.27	8.30	0.85		0.098
SSCP5-20 (H)	CP5 (1.5915)	20	8	25	31.83	35.01	15	15	30	100	24.8	2.53	3.52	0.36	11.0	1.12	0.09~0.25	0.14
SSCP5-25 (H)		25	10	32	39.79	42.97				125	33.5	3.42	6.06	0.62	18.6	1.89		0.22
SSCP5-30 (H)		30	10	38	47.75	50.93				150	42.3	4.32	9.45	0.96	28.6	2.92		0.33
SSCP5-40 (H)		40	12	45	63.66	66.85				200	60.4	6.16	18.7	1.91	55.7	5.68		0.54
SSCP10-20 (H)	CP10 (3.1831)	20	15	50	63.66	70.03	30	20	50	200	198	20.2	30.8	3.14	91.1	9.29	0.14~0.35	0.99
SSCP10-25 (H)		25	20	60	79.58	85.94				250	268	27.3	52.7	5.37	154	15.7		1.49
SSCP10-30 (H)		30	20	75	95.49	101.86				300	339	34.5	81.7	8.33	238	24.2		2.26
SSCP10-40 (H)		40	20	80	127.32	133.69				400	483	49.3	160	16.4	464	47.3		3.66
SSCP15-20 (H)	CP15 (4.7746)	20	22	75	95.49	105.04	50	27	77	300	744	75.9	116	11.9	338	34.5	0.20~0.47	3.52
SSCP15-25 (H)		25	25	100	119.37	128.92				375	1000	102	199	20.3	573	58.5		5.76
SSCP15-30 (H)		30	25	110	143.24	152.79				450	1270	130	308	31.4	885	90.2		8.04
SSCP20-20 (H)	CP20 (6.3662)	20	25	100	127.32	140.06	60	30	90	400	1590	162	264	26.9	759	77.4	0.22~0.54	7.50
SSCP20-25 (H)		25	30	130	159.15	171.89				500	2140	219	449	45.8	1290	131		12.0
SSCP20-30 (H)		30	30	150	190.99	203.72				600	2710	276	693	70.7	1990	202		17.2

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

To order J Series products, please specify: Catalog No. + J + BORE. Example: SSCP2.5-20J6

Bore H7	* The product shapes of J Series items are identified by background color.																												
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30	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	M4						M5				M6			M8			M10		M12			M14		M16			
SSCP2.5-20 J BORE	*																												
SSCP2.5-30 J BORE		*																											
SSCP5-20 J BORE			*																										
SSCP5-25 J BORE		*																											
SSCP5-30 J BORE			*																										
SSCP5-40 J BORE				*																									
SSCP10-20 J BORE						*																							
SSCP10-25 J BORE											*																		
SSCP10-30 J BORE											*																		
SSCP10-40 J BORE											*																		
SSCP15-20 J BORE												*																	
SSCP15-25 J BORE													*																
SSCP15-30 J BORE													*																
SSCP20-20 J BORE													*																
SSCP20-25 J BORE															*														
SSCP20-30 J BORE															*														

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SSCP2.5-40HJ12

[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.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

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info@zahnrad24.com
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SSCP-(H) CP hardened spur gear recommended mating rack

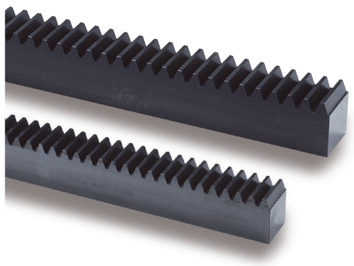
SRCPF-H/SRCPFD-H
CP Hardened Racks

Please see Page 296 for more details.

SSCP CP spur gear recommended mating rack

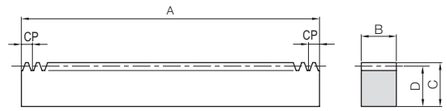
SRCP/SRCPF/SRCPFD(K)
CP Racks

Please see Page 300 for more details.



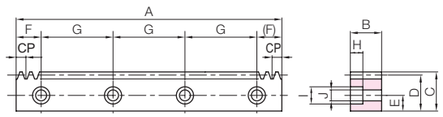
Specifications	
Precision grade	KHK R 001 grade 5 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened **
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* The precision grade of these 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).

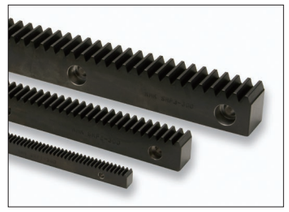


RF

J Series



RD



Catalog Number	Pitch mm (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
SRCPF5-1000H	**CP5** (1.5915)	200	RF	1000	15	20	18.41	2080	1200	212	122
SRCPF10-1000H	**CP10** (3.1831)	100		1000	30	35	31.82	8320	4980	848	508
SRCPF15-1000H	**CP15** (4.7746)	67		1005	50	50	45.23	20800	12400	2120	1260
SRCPF20-1000H	**CP20** (6.3662)	50		1000	60	60	53.63	33300	20800	3390	2120

Backlash (mm)	Weight (kg)	Catalog Number
0.05~0.29	2.17	**SRCPF5-1000H**
0.10~0.39	7.49	**SRCPF10-1000H**
0.16~0.51	17.8	**SRCPF15-1000H**
0.18~0.58	25.3	**SRCPF20-1000H**

Catalog Number ● : J Series (Available-on-request)	Pitch mm (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
●**SRCPFD5-1000HJ**	**CP5** (1.5915)	200	RD	1000	15	20	18.41	8	50	180	6	M5
●**SRCPFD10-1000HJ**	**CP10** (3.1831)	100		1000	30	35	31.82	14	50	180	6	M10
●**SRCPFD15-1000HJ**	**CP15** (4.7746)	67		1005	50	50	45.23	20	62.5	220	5	M14
●**SRCPFD20-1000HJ**	**CP20** (6.3662)	50		1000	60	60	53.63	23	60	220	5	M16

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	2080	1200	212	122	0.05~0.29	2.13	●**SRCPFD5-1000HJ**
10.8	17.5	11	8320	4980	848	508	0.10~0.39	7.29	●**SRCPFD10-1000HJ**
15.2	23	16	20800	12400	2120	1260	0.16~0.51	17.3	●**SRCPFD15-1000HJ**
17.5	26	18	33300	20800	3390	2120	0.18~0.58	24.5	●**SRCPFD20-1000HJ**

[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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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FEINWERKTECHNIK GmbH
Oberes Dorf 1
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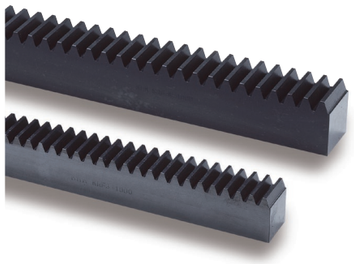
Recommended Mating Pinions

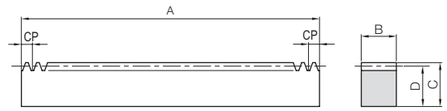
SSCP-H

Please see Page 294 for more details.



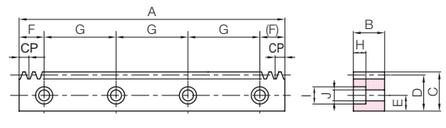
Specifications	
Precision grade	KHK R 001 Grade 4 *
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth laser hardened **
Tooth hardness	55 to 65HRC
Surface treatment	Black oxide coating

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

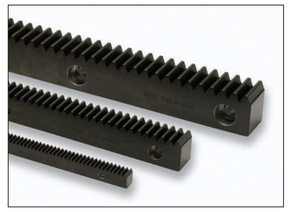


RF

J Series



RD



Catalog Number	Pitch mm (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
SRCPF5-1000HL	**CP5** (1.5915)	200	RF	1000	15	20	18.41	2290	1040	232	106	0.09~0.25	2.17	**SRCPF5-1000HL**
SRCPF5-1500HL		300		1500									3.25	**SRCPF5-1500HL**
SRCPF5-2000HL		410		2050									4.44	**SRCPF5-2000HL**
SRCPF10-1000HL	**CP10** (3.1831)	100		1000	30	35	31.82	9150	4330	933	441	0.14~0.35	7.49	**SRCPF10-1000HL**
SRCPF10-1500HL		150		1500									11.2	**SRCPF10-1500HL**
SRCPF10-2000HL		205		2050									15.4	**SRCPF10-2000HL**
SRCPF15-1000HL	**CP15** (4.7746)	67		1005	50	50	45.23	22900	10700	2333	1095	0.20~0.47	17.8	**SRCPF15-1000HL**
SRCPF15-1500HL		100		1500									26.6	**SRCPF15-1500HL**
SRCPF15-2000HL		136		2040									36.2	**SRCPF15-2000HL**
SRCPF20-1000HL	**CP20** (6.3662)	50		1000	60	60	53.63	36600	18100	3732	1843	0.22~0.54	25.3	**SRCPF20-1000HL**
SRCPF20-1500HL		75		1500									37.9	**SRCPF20-1500HL**
SRCPF20-2000HL		102		2040									51.5	**SRCPF20-2000HL**

Catalog Number ● : J Series (Available-on-request)	Pitch mm (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)
●**SRCPFD5-1000HLJ**	**CP5** (1.5915)	200	RD	1000	15	20	18.41	8	50	180	6	M5	6	10	6	2290	1040	232	106	0.09~0.25	2.13	●**SRCPFD5-1000HLJ**
●**SRCPFD5-1500HLJ**		300		1500					30		9										3.20	●**SRCPFD5-1500HLJ**
●**SRCPFD5-2000HLJ**		410		2050					35		12										4.38	●**SRCPFD5-2000HLJ**
●**SRCPFD10-1000HLJ**	**CP10** (3.1831)	100		1000	30	35	31.82	14	50	180	6	M10	10.8	17.5	11	9150	4330	933	441	0.14~0.35	7.29	●**SRCPFD10-1000HLJ**
●**SRCPFD10-1500HLJ**		150		1500					30		9										10.9	●**SRCPFD10-1500HLJ**
●**SRCPFD10-2000HLJ**		205		2050					35		12										14.9	●**SRCPFD10-2000HLJ**
●**SRCPFD15-1000HLJ**	**CP15** (4.7746)	67		1005	50	50	45.23	20	62.5	220	5	M14	15.2	23	16	22900	10700	2333	1095	0.20~0.47	17.3	●**SRCPFD15-1000HLJ**
●**SRCPFD15-1500HLJ**		100		1500					90		7										25.9	●**SRCPFD15-1500HLJ**
●**SRCPFD15-2000HLJ**		136		2040					30		10										35.2	●**SRCPFD15-2000HLJ**
●**SRCPFD20-1000HLJ**	**CP20** (6.3662)	50		1000	60	60	53.63	23	60	220	5	M16	17.5	26	18	36600	18100	3732	1843	0.22~0.54	24.5	●**SRCPFD20-1000HLJ**
●**SRCPFD20-1500HLJ**		75		1500					90		7										36.8	●**SRCPFD20-1500HLJ**
●**SRCPFD20-2000HLJ**		102		2040					30		10										50.0	●**SRCPFD20-2000HLJ**

[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.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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Recommended Mating Pinions

SSCP-H

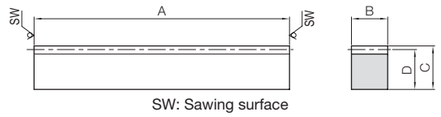
Please see Page 294 for more details.

Product Precautions → Page 274
Precautions for Standard Machined Products → Pages 42~44

CP 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.



SW: Sawing surface

R1

Catalog Number	Pitch mm (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)
SRCP2.5-100	**CP2.5** (0.7958)	38	R1	98	10	12	11.2	763	143	77.8	14.5	0.00~0.14	0.086
SRCP5-100	**CP5** (1.5915)	18		98	15	20	18.41	2290	468	233	47.7	0.09~0.25	0.21
SRCP10-100	**CP10** (3.1831)	8		98	30	35	31.82	9150	1870	933	191	0.14~0.35	0.73
SRCP15-100	**CP15** (4.7746)	5		103	50	50	45.23	22900	4530	2330	462	0.20~0.47	1.83
SRCP20-100	**CP20** (6.3662)	3		98	60	60	53.63	36600	7480	3730	763	0.22~0.54	2.48

Catalog Number	Pitch mm (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)
SRCPF2.5-500	**CP2.5** (0.7958)	200	RF	500	10	12	11.2	763	143	77.8	14.5	0.00~0.14	0.44
SRCPF2.5-1000		400		1000									0.88
SRCPF5-500	**CP5** (1.5915)	100		500	15	20	18.41	2290	468	233	47.7	0.09~0.25	1.08
SRCPF5-1000		200		1000									2.17
SRCPF5-1500		300		1500									3.25
SRCPF5-2000		410		2050									4.44
SRCPF10-500	**CP10** (3.1831)	50		500	30	35	31.82	9150	1870	933	191	0.14~0.35	3.75
SRCPF10-1000		100		1000									7.49
SRCPF10-1500		150		1500									11.2
SRCPF10-2000		205		2050									15.4
SRCPF15-1000	**CP15** (4.7746)	67		1005	50	50	45.23	22900	4530	2330	462	0.20~0.47	17.8
SRCPF15-1500		100		1500									26.6
SRCPF15-2000		136		2040									36.2
SRCPF20-1000	**CP20** (6.3662)	50		1000	60	60	53.63	36600	7480	3730	763	0.22~0.54	25.3
SRCPF20-1500		75		1500									37.9
SRCPF20-2000		102		2040									51.5

Catalog Number ● : J Series (Available-on-request)	Pitch mm (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
●**SRCPFK2.5-500J**	**CP2.5** (0.7958)	200	RA	500	10	12	11.2	5	25	150	4	M4
●**SRCPFD5-500J**	**CP5** (1.5915)	100	RD	500	15	20	18.41	8	25	150	4	M5
SRCPFD5-1000		200		1000					50	180	6	
SRCPFD5-1500		300		1500					30	180	9	
SRCPFD5-2000		410		2050					35	180	12	
●**SRCPFD10-500J**	**CP10** (3.1831)	50		500	30	35	31.82	14	25	150	4	M10
SRCPFD10-1000		100		1000					50	180	6	
SRCPFD10-1500		150		1500					30	180	9	
SRCPFD10-2000		205		2050					35	180	12	
SRCPFD15-1000	**CP15** (4.7746)	67		1005	50	50	45.23	20	62.5	220	5	M14
SRCPFD15-1500		100		1500					90		7	
SRCPFD15-2000		136		2040					30		10	
SRCPFD20-1000	**CP20** (6.3662)	50		1000	60	60	53.63	23	60	220	5	M16
SRCPFD20-1500		75		1500					90		7	
SRCPFD20-2000		102		2040					30		10	

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

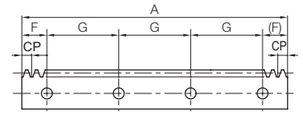
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Recommended Mating Pinions

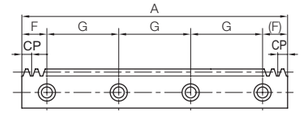
SSCP

Please see Page 294 for more details.

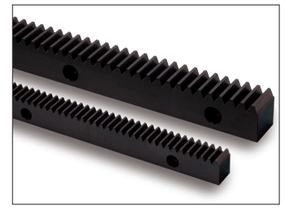
J Series

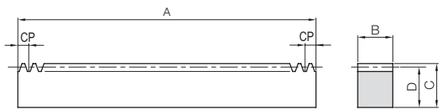


RA



RD





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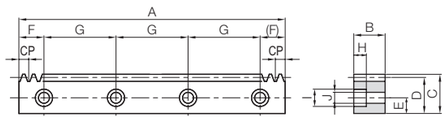
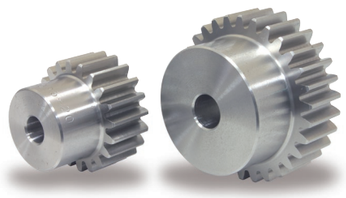


RD

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
-	-	4.5	763	143	77.8	14.5	0.00~0.14	0.43	●**SRCPFK2.5-500J**
6	10	6	2290	468	233	47.7	0.09~0.25	1.06	●**SRCPFD5-500J**
								2.13	**SRCPFD5-1000**
								3.20	**SRCPFD5-1500**
								4.38	**SRCPFD5-2000**
10.8	17.5	11	9150	1870	933	191	0.14~0.35	3.61	●**SRCPFD10-500J**
								7.29	**SRCPFD10-1000**
								10.9	**SRCPFD10-1500**
								14.9	**SRCPFD10-2000**
15.2	23	16	22900	4530	2330	462	0.20~0.47	17.3	**SRCPFD15-1000**
								25.9	**SRCPFD15-1500**
								35.2	**SRCPFD15-2000**
17.5	26	18	36600	7480	3730	763	0.22~0.54	24.5	**SRCPFD20-1000**
								36.8	**SRCPFD20-1500**
								50.0	**SRCPFD20-2000**

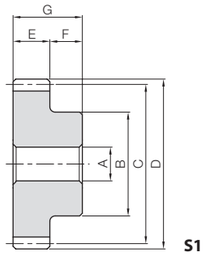
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz



Specifications	
Precision grade	JIS grade N8 (JIS B1702-1: 1998)*
Gear teeth	Standard full depth
Pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)

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

J



S1

Catalog Number	Pitch mm (Module)	No. of teeth	Shape	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 (mm)	Allowable torque (N-m) Bending strength	Allowable torque (N-m) Surface durability	Allowable torque (kgf-m) Bending strength	Allowable torque (kgf-m) Surface durability	Backlash (mm)	Weight (kg)
SUSCP5-20	**CP5** (1.5915)	20	S1	8	25	31.83	35.01	15	15	30	100	13.7	2.50	1.40	0.25	0.09~0.27	0.14
SUSCP5-25		25		10	32	39.78	42.97				125	18.5	4.31	1.89	0.44		0.22
SUSCP5-30		30		10	38	47.74	50.93				150	23.4	6.72	2.39	0.68		0.33
SUSCP10-20	**CP10** (3.1831)	20		15	50	63.66	70.03	30	20	50	200	110	21.9	11.2	2.23	0.14~0.37	1.00
SUSCP10-30		30		20	75	95.49	101.86				300	187	58.0	19.1	5.92		2.28

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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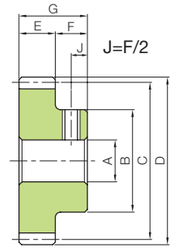
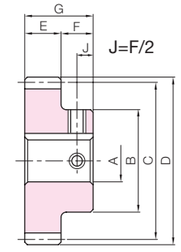
Oberes Dorf 1
95152 Selbitz

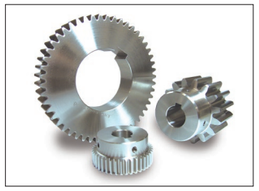
J Series



S1T



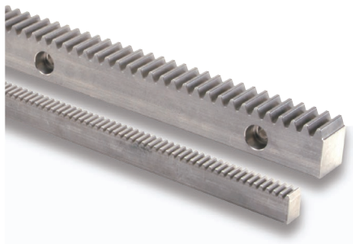
S1K



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

Bore $_{H7}$	* The product shapes of J Series items are identified by background color.																		
Keyway $_{Js9}$	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	
Screw size	—	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M5	M4						M5				M6			M8			M10	
SUSCP5-20 J BORE																			
SUSCP5-25 J BORE																			
SUSCP5-30 J BORE																			
SUSCP10-20 J BORE																			
SUSCP10-30 J BORE																			

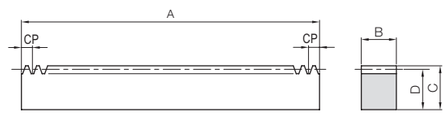
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.



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)

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

J

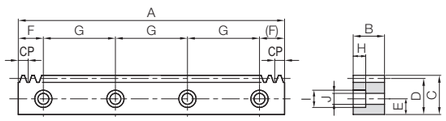


RF

Catalog Number	Pitch mm (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
SURCPF5-500	**CP5** (1.5915)	100	RF	500	15	20	18.41	1090	263	111	26.8
SURCPF5-1000		200		1000							
SURCPF10-500	**CP10** (3.1831)	50		500	30	35	31.82	4370	1050	445	107
SURCPF10-1000		100		1000							

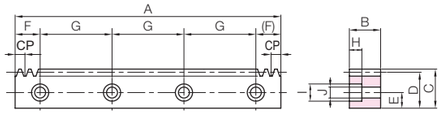
Catalog Number ● : J Series (Available-on-request)	Pitch mm (Module)	No. of teeth	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Mounting hole dimensions E	F	G	No. of holes	Screw size
●**SURCPFD5-500J**	**CP5** (1.5915)	100	RD	500	15	20	18.41	8	25	150	4	M5
SURCPFD5-1000		200		1000					50	180	6	
●**SURCPFD10-500J**	**CP10** (3.1831)	50		500	30	35	31.82	14	25	150	4	M10
SURCPFD10-1000		100		1000					50	180	6	

[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



RD

J Series



RD

Backlash (mm)	Weight (kg)	Catalog Number
0.09~0.27	1.09	**SURCPF5-500**
	2.19	**SURCPF5-1000**
0.14~0.37	3.78	**SURCPF10-500**
	7.57	**SURCPF10-1000**

Counterbore dimensions H	I	J	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
6	10	6	1090	263	111	26.8	0.09~0.27	1.07	●**SURCPFD5-500J**
								2.16	**SURCPFD5-1000**
10.8	17.5	11	4370	1050	445	107	0.14~0.37	3.65	●**SURCPFD10-500J**
								7.36	**SURCPFD10-1000**

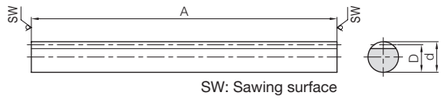
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 274
Precautions for Standard Machined Products → Pages 42~44

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

SROCP Circular pitch 2.5, 5, 10
CP Round Racks

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



SW: Sawing surface

R2

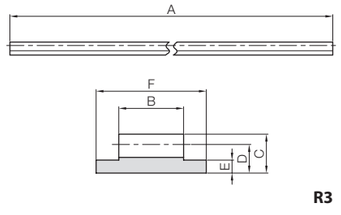
Catalog Number	Pitch mm (Module)	Effective number of teeth	Shape	Total Length A	Outside dia. d_{h9}	Height to pitch line D	Allowable force (N) Bending strength	Allowable force (N) Surface durability	Allowable force (kgf) Bending strength	Allowable force (kgf) Surface durability	Backlash (mm)	Weight (kg)
SROCP2.5-500	**CP2.5**(0.7958)	200	R2	505	10	9.2	474	91.8	48.3	9.36	0.00~0.14	0.30
SROCP5-500	**CP5** (1.5915)	99		505	15	13.41	1650	324	169	33.1	0.09~0.25	0.65
SROCP10-1000	**CP10** (3.1831)	99		1010	30	26.82	6610	1300	674	132	0.14~0.35	5.16

[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.

FRCP Circular pitch 5
CP Metal Flexible Racks

Specifications	
Precision grade	KHK R 001 grade 8
Gear teeth	Standard full depth
Pressure angle	20°
Material	SS400
Heat treatment	—
Tooth hardness	(less than 187HB)
Surface treatment	Black oxide coating

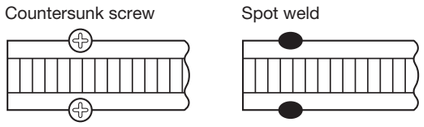


R3

Catalog Number	Pitch mm (Module)	Shape	Total Length A	Face width B	Height C	Height to pitch line D	Base thickness E	Base width F	Allowable force (N) Bending strength	Allowable force (kgf) Bending strength	Weight (kg)
FRCP5-2000 *	**CP5** (1.5915)	R3	2000	10	6	4.41	2	17	801	81.7	0.91
FRCP5-3000 *			3000								1.37
FRCP5-4000 *			4000								1.83

[Caution on Product Characteristics] ① When using the metal flexible rack in an arc, the minimum bending radius (R) is 150 mm for both the external and internal teeth.
Using a smaller radius increases the pitch errors and tooth profile errors which prevent the teeth from meshing at the normal center distance, so be sure to make adjustments before use.
② The tolerance of height (size C) is 0 to -0.15, and the tolerance of base width (size F) is 0 to -0.1.
③ It cannot be used where positioning accuracy is required.

■ Installation Example of FRCP Metal Flex Rack



(View of Flexible Rack from the top)

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

Recommended Mating Pinions

SSCP

Please see Page 294 for more details.

Product Precautions → Page 274

Miter Gears

MMSGQ Ground Spiral Miter Gears	MMSG Ground Spiral Miter Gears	SMSG Ground Spiral Miter Gears	MMSA/MMSB Finished Bore Spiral Miter Gears	MMS Spiral Miter Gears	SMS Spiral Miter Gears	SMA/SMB/SMC Finished Bore Miter Gears	MM Miter Gears
Material: SCM415	Material: SCM415	Material: S45C	Material: SCM415	Material: SCM415	Material: S45C	Material: S45C	Material: SCM415
*m*2~4 Page 314	*m*2~4 Page 316	*m*1~4 Page 318	*m*1~10 Page 320	*m*2~5 Page 322	*m*1~8 Page 324	*m*1~5 Page 326	*m*2~5 Page 328

LM Sintered Metal Miter Gears	SM-H Hardened Miter Gears	SM Miter Gears	SAM-H Hardened Angular Miter Gears	SAM Angular Miter Gears	SUM Stainless Steel Miter Gears	SUMA Finished Bore Stainless Steel Miter Gears	PM Plastic Miter Gears
	NEW		NEW				
Material: SMF5040	Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: SUS303	Material: SUS303	Material: MC901
*m*0.8~1.5 Page 328	*m*1~8 Page 330	*m*1~8 Page 330	*m*1.5~3 Page 332	*m*1.5~3 Page 332	*m*1~4 Page 334	*m*1~4 Page 334	*m*1~4 Page 336

DM Injection Molded Miter Gears	BB Sintered Metal Bushings	Nissei KSP Ground Spiral Miter
Material: Duracon (R) (M90-44)	Material: Oil-free copper alloy	Material: SCM415
*m*0.5~1.5 Page 336	*φ* 5~8 Page 338	*m*1.5~6 Page 374

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) Miter Gears

M MS G 2 - 20 R

- R — Direction of Helix (Right)
- 20 — No. of Teeth (20)
- 2 — Module (2)
- G — Other Products (Ground Gears)
- MS — Type (Spiral Miter)
- M — Material (SCM415)

Material

S	S45C
M	SCM415
SU	Stainless Steel
L	Sintered Metal Alloy
P	MC901
D	Polyacetal

Type

M	Straight Miter Gears
MS	Spiral Miter Gears
AM	Angular Miter Gears

Other Information

G,GQ	Ground Gears

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Features

Miter gears are a special class of bevel gears where the shafts intersect at 90° and the gear ratio is 1:1.
KHK stock miter gears are available in two types, straight miter and spiral miter, with high precision grade for demanding torques and speeds, and commercial grade for economical applications. The following table lists the main features for easy selection.

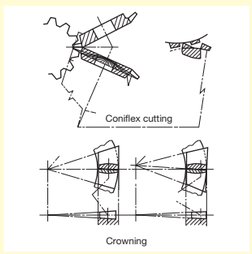
Type	Catalog Number	Module	No. of Teeth ( ) Shaft Angle	Material	Heat Treatment	Tooth Surface Finish	Precision JIS B 1704: 1978	Secondary Operations	Features
Spiral Miter Gears	**MMSGQ**	2~4	20, 30	SCM415	Carburized Note 1	Ground	0	△	Gears that have been hardened and ground that has grade-0 accuracy, strength, abrasion resistance and quietness. Secondary operations can be given except for the teeth.
	MMSG	2~4	20, 25, 30	SCM415	Carburized Note 1	Ground	1	△	Gears that have been hardened and ground that has excellent accuracy, strength and abrasion resistance. Secondary operations can be given except for the teeth.
	SMSG	1~4	20, 25, 30	S45C	Gear teeth induction hardened	Ground	2	△	Gears that have been hardened and ground that has excellent abrasion resistance. Secondary operations can be given except for the teeth.
	KSP	1.5~6	20~30	SCM415	Carburized Note 1	Ground	0	△	Gears that have been hardened and ground that has grade-0 accuracy, strength, abrasion resistance and quietness. Secondary operations can be given except for the teeth.
	MMSA/MMSB	1~10	20	SCM415	Carburized Note 1	Cut	4	×	Gears that have been fully hardened that have excellent strength and wear resistance. Can be used in the finished shape.
	MMS	2~5	20, 25, 30	SCM415	Carburized Note 1	Cut	4	△	Gears that have been hardened that have excellent strength and wear resistance. Secondary operations are possible except for the teeth.
	SMS	1~5	20, 25, 30	S45C	Gear teeth induction hardened	Cut	4	△	Gears that have been hardened with excellent wear resistance. Secondary operations are possible except for the teeth.
Straight Miter Gears	**SMA/SMB/ SMC**	1~8	20, 25, 30	S45C	Gear teeth induction hardened	Cut	4	△	Gears that have been hardened with excellent wear resistance. Can be used in the finished shape.
	MM	2~5	20, 25, 30	SCM415	Carburized Note 1	Cut	4	△	Gears that have been hardened that have excellent strength and wear resistance. Secondary operations are possible except for the teeth.
	LM	0.8~1.5	20	SMF5040 (S45C equivalent)	—	Sintered	5	○	Small gears made through sintering.
	SM	1~8	16, 20, 25, 30	S45C	—	Cut	3	○	Many lineups are available. The teeth can be additionally hardened.
	SAM	1.5~3	20 (45°, 60°, 120°)	S45C	—	Cut	3	○	3 types of angular miter are available for shafts at 45°, 60° and 120°.
	SUM	1~4	20, 25, 30	SUS303	—	Cut	3	○	Stainless steel gears with rust resistance.
	SUMA	1~4	20, 25	SUS303	—	Cut	3	△	Stainless steel gears with rust resistance. Keyways and tapping provided.
	PM	1~4	20, 25	MC901	—	Cut	4	○	Nylon gears can be used with no lubrication.
	DM	0.5~1.5	20	Duracon (R) (M90-44) NOTE 2	—	Injection Molded	6	△	Low-priced gears made through injection molding. Suitable for light loads.

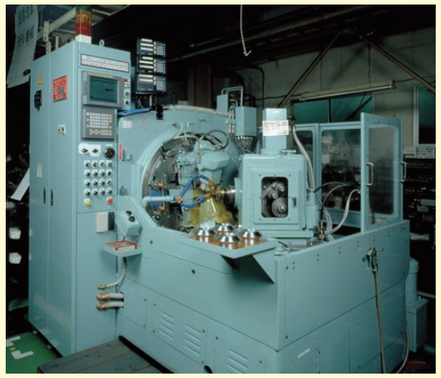
[NOTE 1] Although these are carburized products, secondary operations can be performed on the areas where are masked during the carburization. However, note that high hardness (HRC40 at maximum) occurs in some cases.
[NOTE 2] "Duracon (R)" is a registered trademark of Polyplastics Co., Ltd. in Japan as well as other countries.

○ Possible △ Partly possible × Not possible

We use the Crowning method for gear cutting

KHK utilizes Gleason Coniflex No.104 and 114 bevel gear generating machinery, and is equipped for mass production of straight miter gears. You can count on a stable supply of straight miter gears from KHK





Gleason Coniflex No.104

Application Examples

Miter gears are used in driving components with intersecting axes in transport devices, industrial machines, etc.

■ Masdac Dorayaki Machine

SM miter gears used for reversing fabrics

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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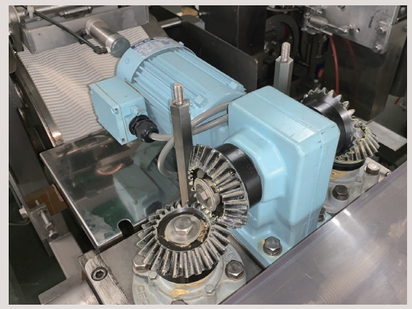
■ Carton former

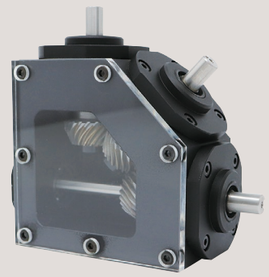
SM and SMB miters used to drive X/Y axes and transmit mechanical power

■ Fish processing machine manufactured by TOYO SUISAN KIKAI CO.,LTD.



SMB miter used for filleting fish

■ Angular Miter Gear Box

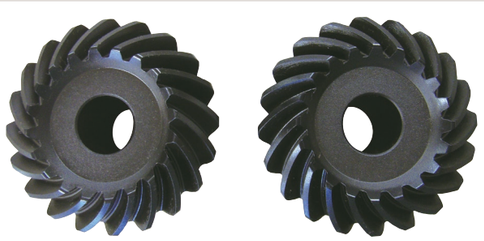


Selection Hints

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

Among KHK stock miter gears, there are products which are not interchangeable even when the module and the number of teeth are the same. Also, spiral miters require additional consideration since the right-hand mates with the left-hand spiral as shown in the table below.



Right (R) Left (L)

■ Straight Miter (○ Allowable × Not allowable)

Catalog Number	SMA SMB SMC	MM	SM	SUM	SUMA	PM	DM	LM	SAM
SMA/SMB/SMC	○	○	○	○	○	○	×	×	×
MM	○	○	○	○	○	○	×	×	×
SM	○	○	○	○	○	○	×	×	×
SUM	○	○	○	○	○	○	×	×	×
SUMA	○	○	○	○	○	○	×	×	×
PM	○	○	○	○	○	○	×	×	×
DM	×	×	×	×	×	×	○	×	×
LM	×	×	×	×	×	×	×	○	×
SAM	×	×	×	×	×	×	×	×	○

■ Spiral Miter (○ Allowable × Not allowable)

Catalog Number	Series	MMSGQ	MMSG	SMSG	MMSA MMSB	MMS	SMS
Series	Direction of spiral	R	R	R	R	R	R
MMSGQ	L	○	×	×	×	×	×
MMSG	L	×	○	×	×	×	×
SMSG	L	×	×	○	×	×	×
MMSA/MMSB	L	×	×	×	○	×	×
MMS	L	×	×	×	×	○	×
SMS	L	×	×	×	×	×	○

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	MMSGQ,MMSG MMSA,MMSB MMS,MM	SMSG/SMS SMA/SMB/ SMC	SM SAM	SM-H SAM-H	SUM SUMA LM NOTE 2	PM	DM
Formula NOTE 1	Formula of bevel gears on bending strength (JGMA403-01)					The Lewis formula	
No. of teeth of mating gears	Same no. of teeth					—	
Rotational Speed	100rpm (600rpm for MMSGQ, MMSG and SMSG)					100rpm	
Design Life (Durability)	Over 10^7 cycles					—	
Impact from motor	Uniform load					Allowable bending stress (kgf/mm²)	
Impact from load	Uniform load					1.15 (40°C with No Lubrication)	*m* 0.5 4.0 *m* 0.8 4.0 *m* 1.0 3.5 *m* 1.5 1.8 NOTE 2 (40°C with Grease Lubrication)
Direction of load	Bidirectional load (calculated with allowable bending stress of 2/3)						
Allowable bending stress at root σ_{Flim} (kgf/mm²)	47	21	19	19	10.5		
Safety factor K_R	1.2						

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

Item					
Formula NOTE 1	Formula of bevel gears on surface durability (JGMA404-01)				
Kinematic viscosity of lubricant	100cSt (50°C)				
Gear support	Shafts & gear box have normal stiffness, and gears are supported on one end				
Allowable Hertz stress σ_{Hlim} (kgf/mm²)	166	90	49	90	41.3
Safety factor C_R	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] The values of the allowable bending stresses for DM *m*1.5 gears and the allowable root bending stress for LM gears are our own estimates.

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	Gear Ratio	No. of teeth	Shape	Bore A/a	B	C	D	E	F	G	H	I	J	K	Allowable torque (N·m) Bending strength	Surface durability	Allowable torque (kgf·m) Bending strength	Surface durability	Backlash (mm)
MMSG2-20R MMSG2-20L	1	20	B3	12	35	40	42.7	35	21.98	16.35	12.5	20	9	24.54	17.0	23.5	1.73	2.40	0.04~0
MMSG2.5-20R MMSG2.5-20L				14	42	50	53.2	45	28.63	21.6	16	26	11	30.89	32.7	46.1	3.33	4.70	0.05~0
MMSG3-20R MMSG3-20L				16	52	60	63.99	50	30.78	21.99	16	27	14	34.4	58.5	83.7	5.97	8.54	0.06~0
MMSG3.5-20R MMSG3.5-20L			B4	20	50	70	74.53	55	32.45	22.26	14	29	16	42.75	91.8	133	9.36	13.6	0.07~0
MMSG4-20R MMSG4-20L				20	55	80	84.99	65	39.13	27.5	17	35	18	49.08	136	199	13.8	20.3	0.09~0
MMSG2-25R MMSG2-25L	1	25	B4	12	38	50	52.5	40	23.43	16.25	11	21	11	30.89	27.5	47.0	2.80	4.79	0.04~0
MMSG2.5-25R MMSG2.5-25L				16	45	62.5	65.54	50	29.57	20.27	14	26	14	37.4	54.3	94.5	5.54	9.64	0.05~0
MMSG3-25R MMSG3-25L				20	55	75	78.78	60	35.6	24.39	17	31	17	43.92	94.5	167	9.64	17.0	0.06~0
MMSG3.5-25R MMSG3.5-25L				25	65	87.5	91.81	70	41.65	28.41	19	37	20	52.43	151	270	15.4	27.5	0.07~0
MMSG4-25R MMSG4-25L				28	75	100	104.7	80	47.8	32.35	22	42	23	58.95	216	392	22.1	40.0	0.09~0

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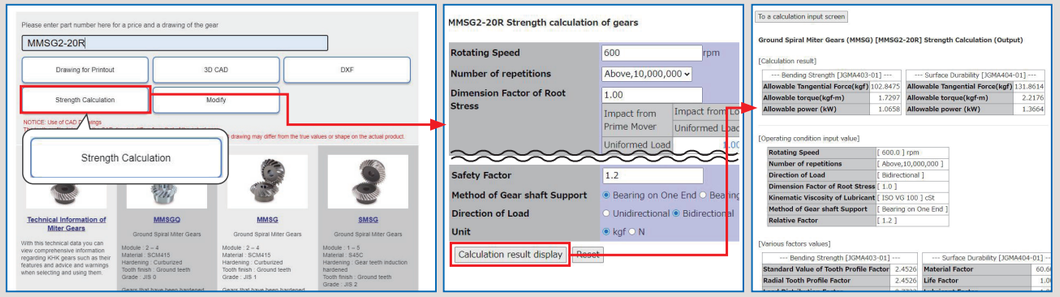
Step 3 Calculate the strength under the actual usage conditions.

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.

■ Surface durability;

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

When selecting KHK standard gears, glance over the Product Precautions on page 310 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

Product Precautions

Common Notes

[Caution on Product Characteristics]

(1) The allowable torque shown in the table are calculated values according to the assumed usage conditions. Please see page 308 for more details.
(2) The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.
(3) A set of spiral miter gears must be identical in module and number of teeth, but opposite in spiral hands.
(4) Dimensions of the outside diameter, the total length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.
(5) These bevel gears produce axial thrust forces. Please see page 312 for more details.
(6) Variations in temperature or humidity can cause dimensional changes in plastic gears, including tooth diameter, bore, and backlash. The accuracy and tolerances shown in the catalog are values obtained when machining is performed.
(7) Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.
(8) For products having a tapped hole, a set screw is included. (excludes B7)
(9) 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 being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

[J Series]

(1) Certain products which would otherwise have a very long tapped hole are counterbored. For details, please see the KHK website.
(2) Black oxide is not re-applied to parts undergoing secondary operations.
(3) For bores over ϕ 50, the bore tolerance is H8.

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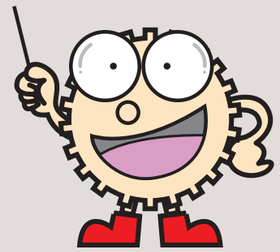
MEMO



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Application Hints

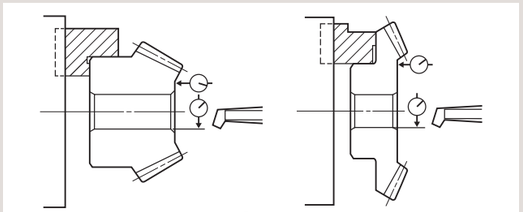
In order to use KHK stock miters safely, carefully read the Application Hints before proceeding. If there are questions or you require clarifications, please contact our technical department or your nearest distributor. E-mail: info@khkgears.net
Please read “Cautions on Performing Secondary Operations” 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. Resin gears and ring gears deform particularly easily, so please handle with care.

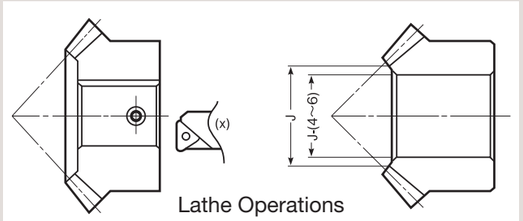
2. Caution on Performing Secondary Operations

① If reboring, it is important to pay special attention to locating the center in order to avoid runout.
② The reference datum for gear machining is the bore. Therefore, use the bore for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface.
③ If reworking using scroll chucks, we recommend the use of new or rebored jaws for improved precision. Please exercise caution not to crush the teeth.



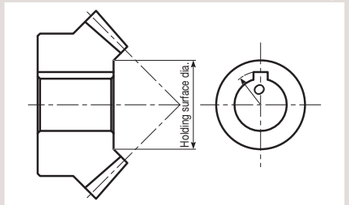
Lathe Operations

④ For items with induction hardened teeth, the hardness is high near the tooth root. When machining the front face, the machined area should be 4 to 6mm smaller than the holding surface diameter dimensions.



Lathe Operations

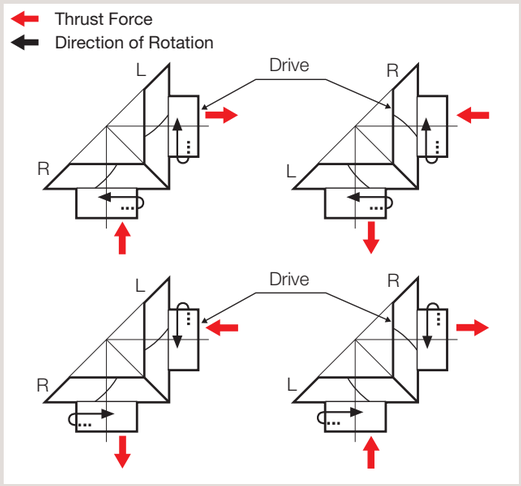
⑤ For tapping and keyway operations, see the examples given in “Caution on Performing Secondary Operations” in KHK Stock Spur Gear section. When providing keyway operations, to avoid stress concentration, always round the corners. Make sure that the diameter (O) of the keyway angle is smaller than the diameter of the holding surface.



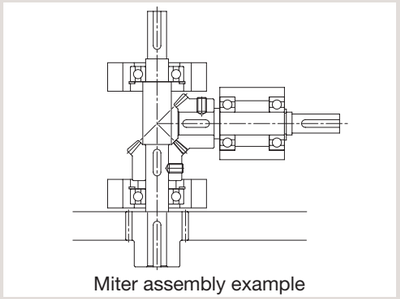
⑥ PM plastic miter gears are susceptible to changes due to temperature and humidity. Dimensions may change between, during, and after re-machining operations.
⑦ When induction-hardening S45C products, thermal stress cracks may appear. Also, note that the precision grade of the product declines by 1 or 2 grades, as deformation on material may occur. If you require tolerance for bore or other parts, machining is necessary after heat treatment.

3. Points of Caution during Assembly

① Since miter gears are cone shaped, they produce axial thrust forces. Specifically with regard to spiral miter gears, the directions of thrust change with the hand of helix and the direction of rotation. This is illustrated below. The bearings must be selected properly to be able to handle these thrust forces. For details, use gear calculation software GCSW.

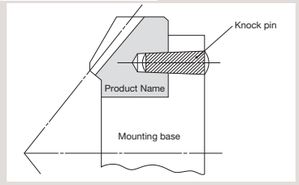


② If a gear is mounted on a shaft far from the bearings, the shaft may bend. We recommend designing bevel gears to be as close to the bearings as possible. Design the gear box, shaft and bearing with high rigidity.



Miter assembly example

③ Be sure to fasten the miter to prevent the gears from moving, as thrust acts on it while rotating.
④ When installing MMSA or MMSB finished bore spiral miter gears produced as B7 style (ring gear), always secure the gears onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only. (See the top of the right page for reference figure)

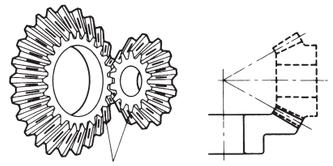


⑤ The recommended assemble distance tolerance of KHK stock miters is H7 for ground gears and H8 for cut gears.
Mounting distance error, offset error and shaft angle error must be minimized to avoid excessive noise and wear. Inaccurate assembly will lead to irregular noises and uneven wear. Various conditions of tooth contact are shown below. Also, when changing the normal direction backlash, adjust the mounting distance according to the amount of axial movement shown in the table on the right so as not to change the tooth contact.

Shaft angle (°)	Normal direction Backlash	Travel in axial direction	
		Drive gear	Driven gear
90	j_n	$1.03 \times j_n$	$1.03 \times j_n$
60		$1.46 \times j_n$	$1.46 \times j_n$
120		$0.84 \times j_n$	$0.84 \times j_n$

Correct Tooth Contact

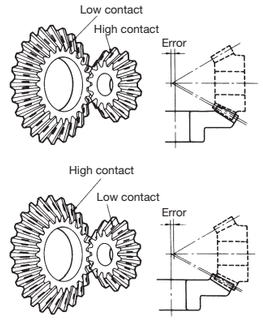
● When assembled correctly, the contact will occur on both gears in the middle of the flank and center of face width but somewhat closer to the toe.



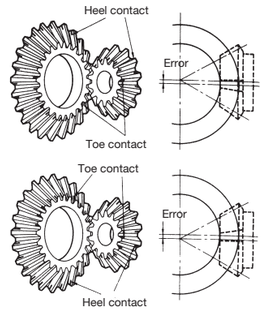
Center contact closer to toes

Incorrect Tooth Contact

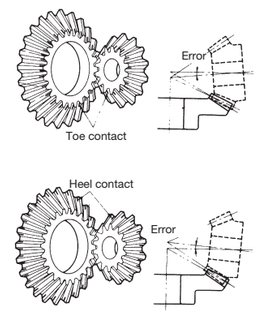
■ Mounting Distance Error
● When the mounting distance of the pinion is incorrect, the contact will occur too high on the flank on one gear and too low on the other.



■ Offset Error
● When the pinion shaft is offset, the contact surface is near the toe of one gear and near the heel of the other.



■ Shaft Angle Error
● When there is an angular error of shafts, the gears will contact at the toes or heels depending on whether the angle is greater or less than 90°.



4. Cautions on Starting

① Check the following items before starting.
- Are the gears fastened 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

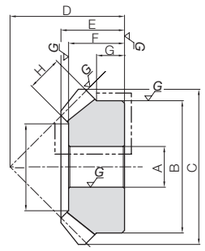
1. When using KHK products, follow relevant safety regulations (Occupational Safety and Health Regulations, etc.).
2. Pay attention to the following items when installing, removing, or performing maintenance and inspection of the product.
   ① Turn off the power switch.
   ② Do not reach or crawl under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

Specifications	
Precision grade	JIS B 1704: 1978 grade 0*
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
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.



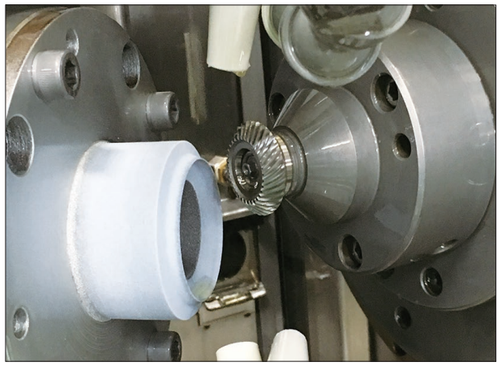
B3

Catalog Number	Gear Ratio	No. of teeth	Shape	Direction of spiral	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Mounting distance E	Total length F	Crown to back G	Hub width H	Hole length I	Face width J	Holding surface dia. K	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)
MMSGQ2-20R	1	20	B3	R	12	35	40	40	35	21	16.35	12.5	20	9	24.54	17.0	23.5	1.73	2.40	0~0.05	0.14
MMSGQ2-20L				L																	
MMSGQ2.5-20R				R	14	42	50	51	45	28	21.6	16	26	11	30.89	32.7	46.1	3.33	4.70	0.05~0.10	0.27
MMSGQ2.5-20L				L																	
MMSGQ3-20R				R	16	52	60	61	50	30	21.99	16	27	14	34.4	58.5	83.7	5.97	8.54		0.43
MMSGQ3-20L				L																	
MMSGQ3.5-20R			B4	R	20	50	70	71	55	31.5	22.26	14	29	16	42.75	91.8	133	9.36	13.6		0.51
MMSGQ3.5-20L				L																	
MMSGQ4-20R				R	20	55	80	81	65	38	27.5	17	35	18	49.08	136	199	13.8	20.3		0.80
MMSGQ4-20L				L																	
MMSGQ2-30R	1	30	B4	R	14	45	60	60	50	28.5	21.21	15	26	12	38.06	38.5	78.6	3.93	8.02	0~0.05	0.36
MMSGQ2-30L				L																	
MMSGQ2.5-30R				R	16	55	75	76	60	33	24.02	16	30	15	47.57	75.3	156	7.68	16.0	0.05~0.10	0.66
MMSGQ2.5-30L				L																	
MMSGQ3-30R				R	20	65	90	91	70	39.5	26.8	18	36	20	55.43	139	294	14.2	30.0		1.11
MMSGQ3-30L				L																	
MMSGQ3.5-30R				R	25	80	105	106	80	43.5	29.6	20	40	22	67.77	204	436	20.8	44.5		1.75
MMSGQ3.5-30L				L																	
MMSGQ4-30R				R	28	90	120	121	90	48	32.35	22	44	25	77.29	303	657	30.9	67.0		2.49
MMSGQ4-30L				L																	

Product Precautions → Page 310

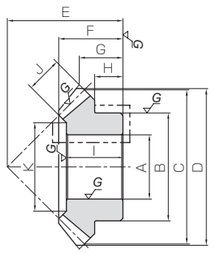
Precautions for Standard Machined Products → Pages 42~44

JIS grade 0 Ground bevel gears
Custom Gears are also available.

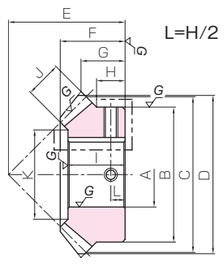


CNC Bevel Gear Grinding Machine (PH-280HG)

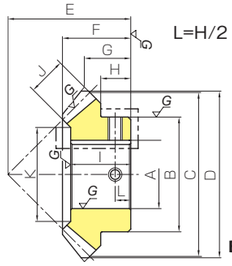
J Series



B4



B3K



B4K

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

Bore H7	* The product shapes of J Series items are identified by background color.																
Keyway Js9	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M4					M5				M6			M8			M10	
MMSGQ2-20R J BORE																	
MMSGQ2-20L J BORE																	
MMSGQ2.5-20R J BORE																	
MMSGQ2.5-20L J BORE																	
MMSGQ3-20R J BORE																	
MMSGQ3-20L J BORE																	
MMSGQ3.5-20R J BORE																	
MMSGQ3.5-20L J BORE																	
MMSGQ4-20R J BORE																	
MMSGQ4-20L J BORE																	
MMSGQ2-30R J BORE																	
MMSGQ2-30L J BORE																	
MMSGQ2.5-30R J BORE																	
MMSGQ2.5-30L J BORE																	
MMSGQ3-30R J BORE																	
MMSGQ3-30L J BORE																	
MMSGQ3.5-30R J BORE																	
MMSGQ3.5-30L J BORE																	
MMSGQ4-30R J BORE																	
MMSGQ4-30L J 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.

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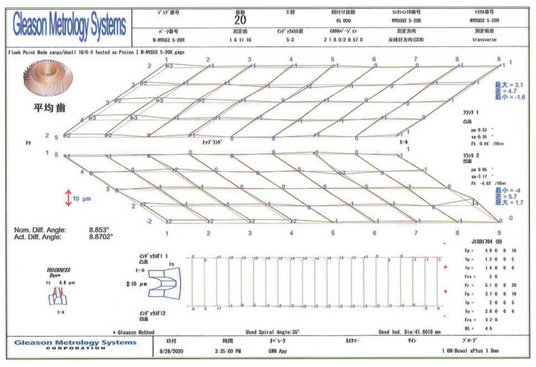
All machining datum planes are cut and locating the center is made easy to maintain accuracy KHK's highest-grade spiral miter with excellent quietness

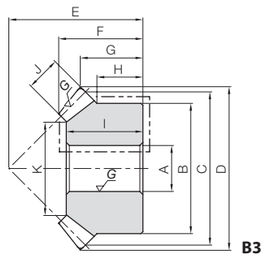
Gear Measuring System (350GMS)



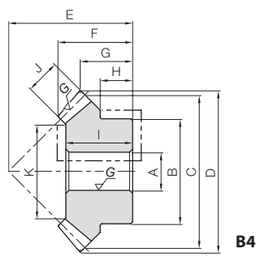
Gear Measurement Data

Specifications	
Precision grade	JIS B 1704: 1978 grade 1*
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
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.

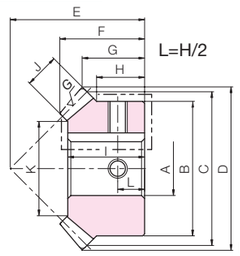


B3

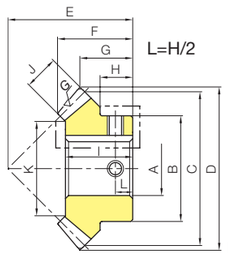


B4

J Series



B3K



B4K

Catalog Number	Gear Ratio	No. of teeth	Shape	Direction of spiral	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Mounting distance E	Total length F	Crown to back G	Hub width H	Hole length I	Face width J	Holding surface dia. K	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)
MMSG2-20R MMSG2-20L	1	20	B3	R L	12	35	40	42.7	35	21.98	16.35	12.5	20	9	24.54	17.0	23.5	1.73	2.40	0.04~0.10	0.14
MMSG2.5-20R MMSG2.5-20L				R L	14	42	50	53.2	45	28.63	21.6	16	26	11	30.89	32.7	46.1	3.33	4.70	0.05~0.11	0.27
MMSG3-20R MMSG3-20L				R L	16	52	60	63.99	50	30.78	21.99	16	27	14	34.4	58.5	83.7	5.97	8.54	0.06~0.12	0.43
MMSG3.5-20R MMSG3.5-20L			B4	R L	20	50	70	74.53	55	32.45	22.26	14	29	16	42.75	91.8	133	9.36	13.6	0.07~0.13	0.51
MMSG4-20R MMSG4-20L				R L	20	55	80	84.99	65	39.13	27.5	17	35	18	49.08	136	199	13.8	20.3	0.09~0.15	0.80
MMSG2-25R MMSG2-25L	1	25	B4	R L	12	38	50	52.5	40	23.43	16.25	11	21	11	30.89	27.5	47.0	2.80	4.79	0.04~0.10	0.21
MMSG2.5-25R MMSG2.5-25L				R L	16	45	62.5	65.54	50	29.57	20.27	14	26	14	37.4	54.3	94.5	5.54	9.64	0.05~0.11	0.37
MMSG3-25R MMSG3-25L				R L	20	55	75	78.78	60	35.6	24.39	17	31	17	43.92	94.5	167	9.64	17.0	0.06~0.12	0.65
MMSG3.5-25R MMSG3.5-25L				R L	25	65	87.5	91.81	70	41.65	28.41	19	37	20	52.43	151	270	15.4	27.5	0.07~0.13	1.04
MMSG4-25R MMSG4-25L				R L	28	75	100	104.7	80	47.8	32.35	22	42	23	58.95	216	392	22.1	40.0	0.09~0.15	1.57
MMSG2-30R MMSG2-30L	1	30	B4	R L	14	45	60	62.42	50	29.27	21.21	15	26	12	38.06	38.5	78.6	3.93	8.02	0.04~0.10	0.36
MMSG2.5-30R MMSG2.5-30L				R L	16	55	75	78.04	60	34.08	24.02	16	30	15	47.57	75.3	156	7.68	16.0	0.05~0.11	0.66
MMSG3-30R MMSG3-30L				R L	20	65	90	93.61	70	40.25	26.8	18	36	20	55.43	139	294	14.2	30.0	0.06~0.12	1.11
MMSG3.5-30R MMSG3.5-30L				R L	25	80	105	109.21	80	44.4	29.6	20	40	22	67.77	204	436	20.8	44.5	0.07~0.13	1.75
MMSG4-30R MMSG4-30L				R L	28	90	120	124.7	90	49.27	32.35	22	44	25	77.29	303	657	30.9	67.0	0.09~0.15	2.49

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

Bore H_7	* The product shapes of J Series items are identified by background color.																	
Keyway J_{S9}	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	
Screw size	4 × 1.8	5 × 2.3				6 × 2.8				8 × 3.3			10 × 3.3		12 × 3.3	14 × 3.8		
Catalog Number	M4					M5				M6			M8			M10		
MMSG2-20R J BORE																		
MMSG2-20L J BORE																		
MMSG2.5-20R J BORE																		
MMSG2.5-20L J BORE																		
MMSG3-20R J BORE																		
MMSG3-20L J BORE																		
MMSG3.5-20R J BORE																		
MMSG3.5-20L J BORE																		
MMSG4-20R J BORE																		
MMSG4-20L J BORE																		
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MMSG3-30L J BORE																		
MMSG3.5-30R J BORE																		
MMSG3.5-30L J BORE																		
MMSG4-30R J BORE																		
MMSG4-30L J 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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

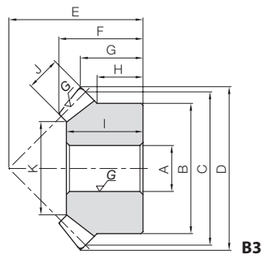
Spur Gears
Helical Gears
Internal Gears
Racks
CP Racks & Pinions
Miter Gears
Bevel Gears
Screw Gears
Worm Gears
Gearboxes
Other Products

Ground Spiral Miter Gears

Specifications	
Precision grade	JIS B 1704: 1978 grade 2*
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
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).

J



B3

Catalog Number	Gear Ratio	No. of teeth	Shape	Direction of spiral	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Mounting distance E	Total length F	Crown to back G	Hub width H	Hole length I	Face width J	Holding surface dia. K	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)
SMSG1-20R	1	20	B3	R	6	16	20	21.30	20	13.84	10.65	8	12	5	9.86	1.17	0.97	0.12	0.099	0.02~0.08	0.019
SMSG1-20L				L																	
SMSG1.5-20R				R	8	26	30	31.74	30	21.18	15.87	13	19	8	15.37	4.10	3.47	0.42	0.35	0.04~0.10	0.074
SMSG1.5-20L				L																	
SMSG2-20R				R	12	34	40	42.4	37	24.75	18.2	14	22	10	21.72	7.83	6.79	0.80	0.69	0.05~0.11	0.15
SMSG2-20L				L																	
SMSG2.5-20R				R	14	42	50	52.94	48	32.42	24.47	19	29	12	28.06	14.9	13.2	1.52	1.35	0.06~0.12	0.30
SMSG2.5-20L				L																	
SMSG3-20R				R	16	50	60	63.72	58	39.6	29.86	23	35	15	31.57	26.4	23.7	2.69	2.42	0.07~0.13	0.52
SMSG3-20L				L																	
SMSG3.5-20R				R	20	60	70	74.47	65	43.81	32.23	25	40	18	39.09	42.6	38.8	4.35	3.96	0.08~0.14	0.82
SMSG3.5-20L				L																	
SMSG4-20R				R	20	64	80	84.88	75	50.51	37.44	27	45	20	43.43	62.6	57.8	6.39	5.90	0.10~0.16	1.15
SMSG4-20L				L																	
SMSG1-25R	1	25	B3	R	6	20	25	26.22	23	15.08	11.11	8	14	6	15.03	1.88	1.91	0.19	0.19	0.02~0.08	0.035
SMSG1-25L				L																	
SMSG1.5-25R				R	10	30	37.5	39.31	34	22.14	16.16	11.5	19	9	19.54	5.29	5.52	0.54	0.56	0.04~0.10	0.11
SMSG1.5-25L				L																	
SMSG2-25R				R	12	40	50	52.4	40	24.19	16.2	10	20	12	26.06	12.6	13.5	1.28	1.37	0.05~0.11	0.21
SMSG2-25L				L																	
SMSG2.5-25R				R	16	50	62.5	65.54	50	30.24	20.27	12.5	26	15	34.57	24.5	26.8	2.50	2.74	0.06~0.12	0.42
SMSG2.5-25L				L																	
SMSG3-30R	1	30	B3	R	20	70	90	93.61	75	45.25	31.8	20	40	20	53.43	60.3	80.4	6.15	8.20	0.07~0.13	1.32
SMSG3-30L				L																	
SMSG3.5-30R				R	25	90	105	109.21	85	49.4	34.6	25	45	22	67.77	85.1	115	8.68	11.8	0.08~0.14	2.19
SMSG3.5-30L				L																	
SMSG4-30R				R	28	100	120	124.71	95	54.28	37.35	25	50	25	79.29	127	174	12.9	17.8	0.10~0.16	3.07
SMSG4-30L				L																	

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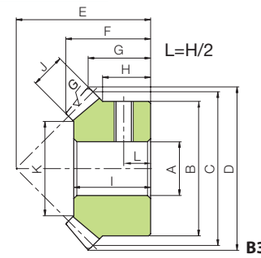
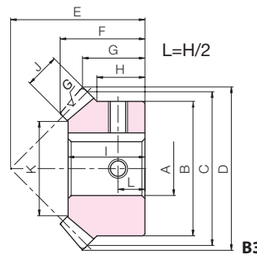
J Series



B3T



B3K

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

Bore H7	* The product shapes of J Series items are identified by background color.																			
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	-		4 × 1.8		5 × 2.3				6 × 2.8				8 × 3.3			10 × 3.3		12 × 3.3	14 × 3.8	
Catalog Number	M4	M5	M4						M5				M6			M8			M10	
SMSG1-20R J BORE																				
SMSG1-20L J BORE																				
SMSG1.5-20R J BORE																				
SMSG1.5-20L J BORE																				
SMSG2-20R J BORE																				
SMSG2-20L J BORE																				
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SMSG2.5-20L J BORE																				
SMSG3-20R J BORE																				
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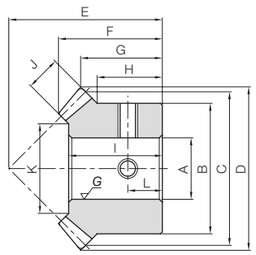
SMSG3.5-30L J BORE																				
SMSG4-30R J BORE																				
SMSG4-30L J BORE																				

[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.

Product Precautions → Page 310
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS B 1704: 1978 grade 4
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
Material	SCM415
Heat treatment	Carburized *
Tooth hardness	55 to 60HRC

* No secondary operations can be performed on these finished gears due to the applied carburizing process.



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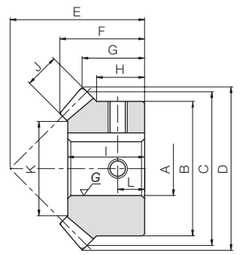

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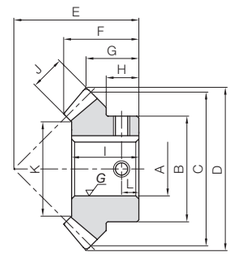
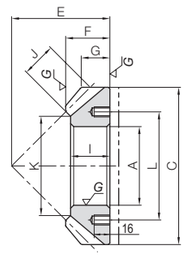


B4



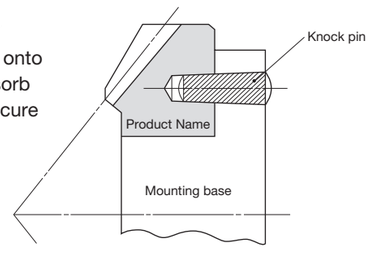
B7

Catalog Number	Gear Ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width	Hole length
						A_{H7}	B	C	D	E	F	G	H	I
MMSA1-20R **MMSB1-20R**	1	***m*1**	20	R	BT	8 10	17	20	21.29	20	13.53	10.64	8.5	12.2
MMSA1-20L **MMSB1-20L**				L		8 10								
MMSA1.5-20R **MMSB1.5-20R**		***m*1.5**		R	BT BK	10 12	25	30	31.9	28	18.48	13.95	10.5	16.5
MMSA1.5-20L **MMSB1.5-20L**				L	BT BK	10 12								
MMSA2-20R **MMSB2-20R**		***m*2**		R	BK	14 16	35	40	42.52	35	22.09	16.26	12.5	20
MMSA2-20L **MMSB2-20L**				L		14 16								
MMSA2.5-20R **MMSB2.5-20R**		***m*2.5**		R		18 20	42	50	53.2	45	28.63	21.6	16	26
MMSA2.5-20L **MMSB2.5-20L**				L		18 20								
MMSA3-20R **MMSB3-20R**		***m*3**		R		20 22	52	60	63.99	50	30.78	21.99	16	27
MMSA3-20L **MMSB3-20L**				L		20 22								
MMSA3.5-20R **MMSB3.5-20R**		***m*3.5**		R		25 28	50	70	74.53	55	32.45	22.26	14	29
MMSA3.5-20L **MMSB3.5-20L**				L		25 28								
MMSA4-20R **MMSB4-20R**		***m*4**		R	B4	28 30	55	80	84.99	65	39.13	27.5	17	35
MMSA4-20L **MMSB4-20L**				L		28 30								
MMSA5-20R **MMSB5-20R**		***m*5**		R		30 35	70	100	106.25	75	42.99	28.13	17	38
MMSA5-20L **MMSB5-20L**				L		30 35								
MMSA6-20R **MMSB6-20R**		***m*6**		R		40 45	80	120	127.59	90	51.13	33.8	20	45
MMSA6-20L **MMSB6-20L**				L		40 45								
MMSA8-20R **MMSA8-20L**		***m*8**		R L	B7	80 80	—	160	—	100	45	29.16	—	40
MMSA10-20R **MMSA10-20L**		***m*10**		R L		100 100	—	200	—	125	58	36.48	—	50

[Caution on Product Characteristics] ① The keyway tolerance is the value before hardening.

Face width	Holding surface dia.	Keyway	Socket head screw		Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
J	K	Width × Depth	Size	L	Bending strength	Surface durability	Bending strength	Surface durability			
4.5	11.67	—	2-M4	4.5	2.24	2.09	0.23	0.21	0.03~0.13	0.018 0.015	**MMSA1-20R** **MMSB1-20R**
										0.018 0.015	**MMSA1-20L** **MMSB1-20L**
7	17.2	— 4 x 1.8		6	7.74	7.34	0.79	0.75	0.05~0.15	0.057 0.052	**MMSA1.5-20R** **MMSB1.5-20R**
		— 4 x 1.8								0.057 0.052	**MMSA1.5-20L** **MMSB1.5-20L**
9	24.54	5 x 2.3		7	18.0	17.3	1.83	1.76	0.06~0.16	0.13 0.12	**MMSA2-20R** **MMSB2-20R**
										0.13 0.12	**MMSA2-20L** **MMSB2-20L**
11	30.89	6 x 2.8	2-M5	8	34.6	33.7	3.52	3.44	0.07~0.17	0.24 0.23	**MMSA2.5-20R** **MMSB2.5-20R**
										0.24 0.23	**MMSA2.5-20L** **MMSB2.5-20L**
14	34.4				61.9	61.1	6.32	6.23	0.08~0.18	0.40 0.39	**MMSA3-20R** **MMSB3-20R**
										0.40 0.39	**MMSA3-20L** **MMSB3-20L**
16	42.75	8 x 3.3	2-M6		97.1	96.7	9.90	9.86	0.10~0.25	0.46 0.43	**MMSA3.5-20R** **MMSB3.5-20R**
										0.46 0.43	**MMSA3.5-20L** **MMSB3.5-20L**
18	49.08			9	144	144	14.6	14.7	0.12~0.27	0.70 0.68	**MMSA4-20R** **MMSB4-20R**
										0.70 0.68	**MMSA4-20L** **MMSB4-20L**
23	60.95	8 x 3.3 10 x 3.3	2-M6 2-M8		284	288	29.0	29.4	0.14~0.34	1.32 1.25	**MMSA5-20R** **MMSB5-20R**
		8 x 3.3 10 x 3.3	2-M6 2-M8							1.32 1.25	**MMSA5-20L** **MMSB5-20L**
27	73.63	12 x 3.3 14 x 3.8	2-M8 2-M10	10	475	496	48.4	50.6	0.16~0.36	2.11 1.99	**MMSA6-20R** **MMSB6-20R**
		12 x 3.3 14 x 3.8	2-M8 2-M10							2.11 1.99	**MMSA6-20L** **MMSB6-20L**
35	101	—	6-M10	110	1080	1170	111	119	0.20~0.45	3.98 3.98	**MMSA8-20R** **MMSA8-20L**
45	122.72			130	1660	1840	169	188	0.25~0.50	7.88 7.88	**MMSA10-20R** **MMSA10-20L**

When installing products produced in B7 style (ring type), always secure the gears onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
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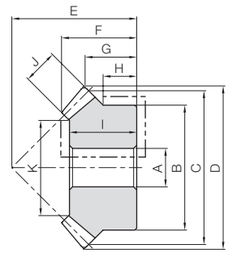
Product Precautions → Page 310

Specifications	
Precision grade	JIS B 1704: 1978 grade 4
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
Material	SCM415
Heat treatment	Carburized *
Tooth hardness	55 to 60HRC
Surface treatment	Black oxide coating

* In the illustration, the area surrounded with ----- line is masked during the carburization process (max. HRC40 or so) and can be modified.



B3

Catalog Number	Gear Ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back
						A_{H7}	B	C	D	E	F	G
MMS2-20R MMS2-20L	1	***m*2**	20	R L	B3	12	34	40	42.31	35	22.14	16.15
MMS2.5-20R MMS2.5-20L		***m*2.5**		R L		15	42	50	53.2	45	28.63	21.6
MMS3-20R MMS3-20L		***m*3**		R L		16	52	60	63.99	50	30.78	21.99
MMS4-20R MMS4-20L		***m*4**		R L		20	65	80	84.99	65	39.13	27.5
MMS5-20R MMS5-20L		***m*5**		R L		25	85	100	106.25	75	42.99	28.13
MMS2-25R MMS2-25L	1	***m*2**	25	R L	B3	12	45	50	52.4	40	24.19	16.2
MMS2.5-25R MMS2.5-25L		***m*2.5**		R L		16	55	62.5	65.54	50	30.24	20.27
MMS3-25R MMS3-25L		***m*3**		R L		20	65	75	78.77	60	37.57	24.39
MMS4-25R MMS4-25L		***m*4**		R L		25	85	100	104.7	80	49.14	32.35
MMS5-25R MMS5-25L		***m*5**		R L		28	100	125	130.86	100	60.59	40.43
MMS4-30R MMS4-30L	1	***m*4**	30	R L	B3	28	100	120	124.71	95	54.28	37.35
MMS5-30R MMS5-30L		***m*5**		R L		28	130	150	155.9	120	68.2	47.95

Hub width	Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
H	I	J	K	Bending strength	Surface durability	Bending strength	Surface durability			
12	20	9	24.54	17.0	17.3	1.73	1.76	0.06~0.16	0.13	**MMS2-20R MMS2-20L**
16	26	11	30.89	32.7	33.7	3.34	3.44	0.07~0.17	0.26	**MMS2.5-20R MMS2.5-20L**
16	27	14	34.4	58.7	61.1	5.98	6.23	0.08~0.18	0.43	**MMS3-20R MMS3-20L**
17.5	35	18	49.08	136	144	13.9	14.7	0.12~0.27	0.92	**MMS4-20R MMS4-20L**
17.5	38	23	60.95	269	288	27.5	29.4	0.14~0.34	1.65	**MMS5-20R MMS5-20L**
12.5	21	12	28.06	29.1	36.3	2.96	3.70	0.06~0.16	0.25	**MMS2-25R MMS2-25L**
15	27	15	36.57	56.7	71.8	5.79	7.32	0.07~0.17	0.47	**MMS2.5-25R MMS2.5-25L**
17.5	33	20	39.43	104	133	10.6	13.6	0.08~0.18	0.81	**MMS3-25R MMS3-25L**
22.5	44	25	57.29	238	309	24.3	31.5	0.12~0.27	1.88	**MMS4-25R MMS4-25L**
25	50	30	65.15	454	595	46.3	60.7	0.14~0.34	3.39	**MMS5-25R MMS5-25L**
25	50	25	79.29	348	488	35.5	49.8	0.12~0.27	3.07	**MMS4-30R MMS4-30L**
35	62	30	99.15	662	941	67.5	96.0	0.14~0.34	6.44	**MMS5-30R MMS5-30L**

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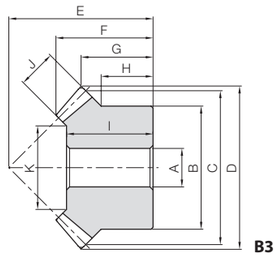
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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

Specifications	
Precision grade	JIS B 1704: 1978 grade 4
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
Material	S45C
Heat treatment	Gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

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



B3

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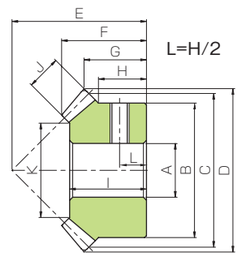
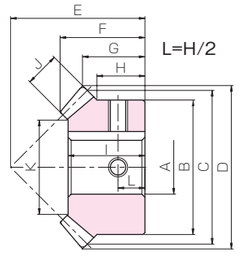
J Series



B3T



B3K

Catalog Number	Gear Ratio	No. of teeth	Shape	Direction of spiral	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Mounting distance E	Total length F	Crown to back G	Hub width H	Hole length I	Face width J	Holding surface dia. K	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)
SMS1-20R SMS1-20L	1	20	B3	R	6	16	20	21.3	20	13.84	10.65	8	12	5	9.86	1.07	0.65	0.11	0.067	0.03~0.13	0.019
SMS1.5-20R SMS1.5-20L				R L	8	26	30	31.74	30	21.18	15.87	13	19	8	15.37	3.73	2.33	0.38	0.24	0.05~0.15	0.074
SMS2-20R SMS2-20L				R L	12	34	40	42.4	37	24.75	18.2	14	22	10	21.72	8.54	5.40	0.87	0.55	0.06~0.16	0.15
SMS2.5-20R SMS2.5-20L				R L	14	42	50	52.94	48	32.42	24.47	19	29	12	28.06	16.3	10.5	1.66	1.07	0.07~0.17	0.30
SMS3-20R SMS3-20L				R L	16	50	60	63.72	58	39.6	29.86	23	35	15	31.57	28.8	18.7	2.94	1.91	0.08~0.18	0.52
SMS3.5-20R SMS3.5-20L				R L	20	60	70	74.47	65	43.81	32.23	25	40	18	39.09	46.5	30.4	4.74	3.10	0.10~0.25	0.82
SMS4-20R SMS4-20L				R L	20	64	80	84.88	75	50.51	37.44	27	45	20	43.43	68.3	45.0	6.97	4.59	0.12~0.27	1.15
SMS5-20R SMS5-20L				R L	25	80	100	105.9	90	60.16	42.95	30	54	26	54.46	136	90.9	13.9	9.27	0.14~0.34	2.13
SMS6-20R SMS6-20L				R L	28	100	120	127.16	104	67.35	47.58	34	60	30	67.15	226	155	23.0	15.8	0.16~0.36	3.65
SMS8-20R SMS8-20L				R L	30	130	160	169.94	125	72.6	49.97	30	62	35	95	484	344	49.4	35.1	0.20~0.45	7.00
SMS1-25R SMS1-25L	1	25	B3	R L	6	20	25	26.22	23	15.08	11.11	8	14	6	15.03	1.71	1.28	0.17	0.13	0.03~0.13	0.035
SMS1.5-25R SMS1.5-25L				R L	10	30	37.5	39.31	34	22.14	16.16	11.5	19	9	19.54	5.78	4.42	0.59	0.45	0.05~0.15	0.11
SMS2-25R SMS2-25L				R L	12	40	50	52.38	40	24.2	16.19	10	20	12	26.06	13.7	10.7	1.40	1.09	0.06~0.16	0.21
SMS2.5-25R SMS2.5-25L				R L	16	50	62.5	65.54	50	30.24	20.27	12.5	26	15	34.57	26.8	21.1	2.73	2.15	0.07~0.17	0.42
SMS3-25R SMS3-25L				R L	20	60	75	78.77	60	37.57	24.39	15	32	20	37.43	49.1	39.1	5.00	3.98	0.08~0.18	0.74
SMS3.5-25R SMS3.5-25L				R L	25	70	87.5	91.81	70	42.98	28.41	17.5	37	22	46.77	75.4	60.6	7.69	6.18	0.10~0.25	1.14
SMS4-25R SMS4-25L				R L	28	80	100	104.7	80	49.14	32.35	20	43	25	55.29	112	90.7	11.5	9.25	0.12~0.27	1.71
SMS5-25R SMS5-25L				R L	28	100	125	130.86	100	60.59	40.43	25	50	30	65.15	214	175	21.8	17.8	0.14~0.34	3.39
SMS6-25R SMS6-25L				R L	28	120	150	157.17	120	71.97	48.58	30	61	35	83	357	300	36.4	30.6	0.16~0.36	5.99
SMS2-30R SMS2-30L	1	30	B3	R L	12	45	60	62.42	50	29.27	21.21	12.5	25	12	36.06	18.2	16.9	1.86	1.72	0.06~0.16	0.37
SMS2.5-30R SMS2.5-30L				R L	16	60	75	78.04	62	36.08	26.02	17	32	15	47.57	35.6	33.4	3.63	3.40	0.07~0.17	0.76
SMS3-30R SMS3-30L				R L	20	70	90	93.61	75	45.25	31.8	20	40	20	53.43	65.8	62.3	6.71	6.35	0.08~0.18	1.32
SMS3.5-30R SMS3.5-30L				R L	25	90	105	109.21	85	49.4	34.6	25	45	22	67.77	101	96.0	10.3	9.79	0.10~0.25	2.19
SMS4-30R SMS4-30L				R L	28	100	120	124.71	95	54.28	37.35	25	50	25	79.29	150	144	15.3	14.7	0.12~0.27	3.07
SMS5-30R SMS5-30L				R L	28	130	150	155.90	120	68.2	47.95	35	62	30	99.15	284	276	29.0	28.1	0.14~0.34	6.44

[Caution on Product Characteristics] ① The bore may slightly vary due to the effect of heat treatment. When using with the listed bore diameter, you may need to ream the bore prior to use.

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

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

Bore H7	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	55	60	65	70	75	80	85
Keyway Js9		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	
Screw size	M5	M4						M5				M6			M8			M10		M12			M16			
Catalog Number																										
SMS1-20R J BORE SMS1-20L J BORE																										
SMS1.5-20R J BORE SMS1.5-20L J BORE																										
SMS2-20R J BORE SMS2-20L J BORE																										
SMS2.5-20R J BORE SMS2.5-20L J BORE																										
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SMS5-30R J BORE SMS5-30L J BORE																										

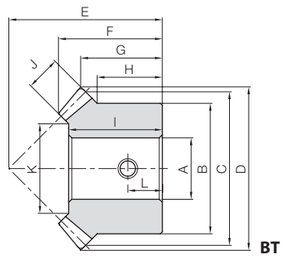
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 310
Precautions for Standard Machined Products → Pages 42~44

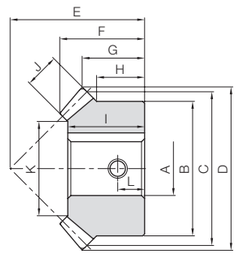
Finished Bore Miter Gears

Specifications	
Precision grade	JIS B 1704: 1978 grade 4
Gear teeth	Gleason
Pressure angle	20°
Helix angle	—
Material	S45C
Heat treatment	Gear teeth induction hardened *
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* 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).



BT



BK

Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width	Hole length
					A_{H7}	B	C	D	E	F	G	H	I
SMA1-20 **SMB1-20**	1	***m*1**	20	BT	8 10	16	20	21.41	20	13.95	10.71	8	12 12.07
SMA1.5-20 **SMB1.5-20**		***m*1.5**		BT BK	10 12	26	30	32.12	30	21.24	16.06	13	19
SMA2-20 **SMB2-20**		***m*2**		BK	14 15	34	40	42.83	37	24.89	18.41	14	22
SMA2.5-20 **SMB2.5-20**		***m*2.5**			18 20	42	50	53.54	48	32.54	24.77	19	29
SMA3-20 **SMB3-20** **SMC3-20**		***m*3**			22 25 20	50	60	64.24	58	39.84	30.12	23	35
SMA4-20 **SMB4-20** **SMC4-20**		***m*4**			30 32 25	64	80	85.65	75	50.78	37.83	27	45
SMA5-20 **SMB5-20** **SMC5-20**		***m*5**			40 30 35	80	100	107.07	90	60.38	43.54	30	54
SMA1-25	1	***m*1**	25	BT	10	20	25	26.41	23	15.16	11.21	8	14
SMA1.5-25		***m*1.5**		BK	12	30	37.5	39.62	34	22.25	16.31	11.5	19
SMA2-25 **SMB2-25**		***m*2**			18 15	40	50	52.83	40	24.33	16.41	10	20
SMA2.5-25 **SMB2.5-25**		***m*2.5**			20 18	50	62.5	66.04	50	30.41	20.52	12.5	26
SMA3-25 **SMB3-25**		***m*3**			30 25	60	75	79.24	60	37.81	24.62	15	32
SMA4-25 **SMB4-25**		***m*4**			35 30	80	100	105.66	80	49.32	32.83	20	43
SMA5-25		***m*5**			50	100	125	132.07	100	60.82	41.04	25	50
SMA1-30	1	***m*1**	30	BK	12	24	30	31.41	28	17.71	13.71	10	16
SMA1.5-30		***m*1.5**			15	36	45	47.12	43	28.24	21.56	16	25
SMA2-30 **SMB2-30**		***m*2**			20 15	45	60	62.83	50	29.42	21.41	12.5	25
SMA2.5-30 **SMB2.5-30**		***m*2.5**			25 20	60	75	78.54	62	36.28	26.27	17	32
SMA3-30 **SMB3-30**		***m*3**			32 25	70	90	94.24	75	45.47	32.12	20	40
SMA4-30 **SMB4-30**		***m*4**			40 30	100	120	125.66	95	54.52	37.83	25	50
SMA5-30		***m*5**			55	130	150	157.07	120	68.56	48.54	35	62

Face width	Holding surface dia.	Keyway	Socket head screw		Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
J	K	Width × Depth	Size	L	Bending strength	Surface durability	Bending strength	Surface durability			
5	9.86 10	— —	M4	4	0.90	0.37	0.091	0.038	0.03~0.13	0.016 0.014	**SMA1-20** **SMB1-20**
8	15.37	— 4 x 1.8	M4 M5	6.5	3.13	1.31	0.32	0.13	0.05~0.15	0.069 0.06	**SMA1.5-20** **SMB1.5-20**
10	21.72	5 x 2.3 5 x 2.3	M5	7	7.17	3.05	0.73	0.31	0.06~0.16	0.14 0.13	**SMA2-20** **SMB2-20**
12	28.06	5 x 2.3** 6 x 2.8	M6	9.5	13.7	5.90	1.39	0.60	0.07~0.17	0.27 0.26	**SMA2.5-20** **SMB2.5-20**
15	31.57	7 x 3* 7 x 3* 6 x 2.8	M6 M8 M6	11.5	24.2	10.5	2.47	1.08	0.08~0.18	0.47 0.44 0.49	**SMA3-20** **SMB3-20** **SMC3-20**
20	43.43	7 x 3* 10 x 3.3 8 x 3.3	M8	13.5	57.3	25.4	5.85	2.59	0.12~0.27	1.00 0.96 1.07	**SMA4-20** **SMB4-20** **SMC4-20**
26	54.46	10 x 3.3** 8 x 3.3 10 x 3.3	M8	15	114	51.3	11.7	5.23	0.14~0.34	1.80 2.04 1.93	**SMA5-20** **SMB5-20** **SMC5-20**
6	15.03	—	M4	4	1.48	0.71	0.15	0.072	0.03~0.13	0.029	**SMA1-25**
9	19.54	4 x 1.8	M5	5.75	4.98	2.44	0.51	0.25	0.05~0.15	0.10	**SMA1.5-25**
12	26.06	6 x 2.8 5 x 2.3	M6 M5	5	11.8	5.90	1.20	0.60	0.06~0.16	0.19 0.20	**SMA2-25** **SMB2-25**
15	34.57	5 x 2.3** 6 x 2.8	M6	6	23.1	11.7	2.35	1.19	0.07~0.17	0.39 0.40	**SMA2.5-25** **SMB2.5-25**
20	37.43	7 x 3* 8 x 3.3	M8	7.5	42.3	21.6	4.31	2.20	0.08~0.18	0.63 0.69	**SMA3-25** **SMB3-25**
25	55.29	10 x 3.3 8 x 3.3	M8	10	96.8	50.2	9.87	5.12	0.12~0.27	1.59 1.68	**SMA4-25** **SMB4-25**
30	65.15	12 x 3.3**	M8	12.5	185	96.8	18.8	9.87	0.14~0.34	2.86	**SMA5-25**
6	19.03	4 x 1.8	M5	5	2.00	1.11	0.20	0.11	0.03~0.13	0.047	**SMA1-30**
10	25.71	5 x 2.3	M5	8	7.22	4.08	0.74	0.42	0.05~0.15	0.19	**SMA1.5-30**
12	36.06	6 x 2.8 5 x 2.3	M6 M5	6.25	16.0	9.20	1.63	0.94	0.06~0.16	0.32 0.35	**SMA2-30** **SMB2-30**
15	47.57	8 x 3.3 6 x 2.8	M8 M6	8.5	31.2	18.2	3.19	1.86	0.07~0.17	0.68 0.73	**SMA2.5-30** **SMB2.5-30**
20	53.43	10 x 3.3 8 x 3.3	M8	10	57.8	34.0	5.89	3.46	0.08~0.18	1.15 1.25	**SMA3-30** **SMB3-30**
25	79.29	12 x 3.3 8 x 3.3	M8	12.5	131	78.3	13.4	7.99	0.12~0.27	2.81 3.03	**SMA4-30** **SMB4-30**
30	99.15	16 x 4.3	M10	17.5	250	150	25.5	15.3	0.14~0.34	5.56	**SMA5-30**

[Caution on Product Characteristics] ① The dimensions of the keyway marked with * (depth) are made to old JIS Standards.
The dimensions of the keyway marked with ** are different from the JIS Standards for the bore.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

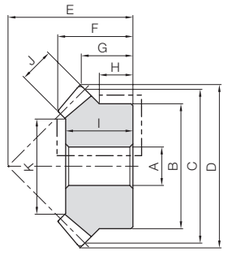
Product Precautions → Page 310

MM Module 2~5 Miter Gears

Specifications	
Precision grade	JIS B 1704: 1978 grade 4
Gear teeth	Gleason
Pressure angle	20°
Material	SCM415
Heat treatment	Carburized **
Tooth hardness	55 to 60HRC
Surface treatment	Black oxide coating

* 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.

J

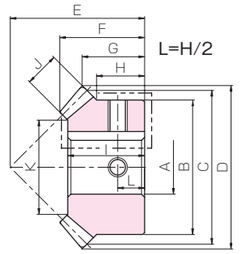


B3

Catalog Number	Gear Ratio	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width	Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)
				A_{H7}	B	C	D	E	F	G	H	I	J		Bending strength	Surface durability	Bending strength	Surface durability		
MM2-20	1	20	B3	12	34	40	42.83	35	22.24	16.41	12	20	9	24.54	15.1	9.74	1.54	0.99	0.06~0.16	0.13
MM2.5-20				15	42	50	53.54	45	28.89	21.77	16	26	11	30.89	29.0	19.0	2.96	1.94	0.07~0.17	0.27
MM3-20				16	52	60	64.24	50	31.19	22.12	16	27	14	34.4	52.0	34.5	5.30	3.52	0.08~0.18	0.43
MM4-20				20	65	80	85.66	65	39.49	27.83	17.5	35	18	49.09	121	81.2	12.3	8.28	0.12~0.27	0.93
MM5-20				25	80	100	107.07	90	60.38	43.54	30	54	26	54.46	256	175	26.1	17.8	0.14~0.34	2.15
MM2-25	1	25	B3	12	45	50	52.83	40	24.33	16.41	12.5	21	12	28.06	26.4	20.1	2.70	2.05	0.06~0.16	0.25
MM2.5-25				16	55	62.5	66.03	50	30.41	20.52	15	27	15	36.57	51.6	39.7	5.27	4.05	0.07~0.17	0.47
MM3-25				20	65	75	79.24	60	37.81	24.62	17.5	33	20	39.43	94.7	73.5	9.66	7.49	0.08~0.18	0.81
MM4-25				25	85	100	105.66	80	49.32	32.83	22.5	44	25	57.29	217	171	22.1	17.4	0.12~0.27	1.89
MM5-25				28	100	125	132.07	100	60.82	41.04	25	50	30	65.15	413	329	42.1	33.6	0.14~0.34	3.41
MM2-30	1	30	B3	12	45	60	62.83	50	29.43	21.41	12.5	25	12	36.06	35.7	31.1	3.64	3.17	0.06~0.16	0.37
MM2.5-30				16	60	75	78.54	62	36.28	26.27	17	32	15	47.57	69.7	61.5	7.11	6.27	0.07~0.17	0.76
MM3-30				20	70	90	94.24	75	45.47	32.12	20	40	20	53.43	129	115	13.2	11.7	0.08~0.18	1.32
MM4-30				28	100	120	125.66	95	54.52	37.83	25	50	25	79.29	293	266	29.9	27.1	0.12~0.27	3.09
MM5-30				28	130	150	157.07	120	68.56	48.54	35	62	30	99.15	558	513	56.9	52.3	0.14~0.34	6.47

[Caution on Product Characteristics] ① Steam treatment (where the surface is rusted using steam) is provided.
② The product is not impregnated with lubricating oil.

J Series



B3K

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	85
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			
MM2-20 J BORE																								
MM2.5-20 J BORE																								
MM3-20 J BORE																								
MM4-20 J BORE																								
MM5-20 J BORE																								
MM2-25 J BORE																								
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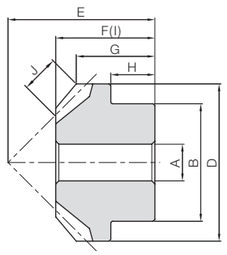
MM3-25 J BORE																								
MM4-25 J BORE																								
MM5-25 J BORE																								
MM2-30 J BORE																								
MM2.5-30 J BORE																								
MM3-30 J BORE																								
MM4-30 J BORE																								
MM5-30 J BORE																								

[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.

LM Module 0.8~1.5 Sintered Metal Miter Gears

Specifications	
Precision grade	JIS B 1704: 1978 grade 5
Gear teeth	Gleason
Pressure angle	20°
Material	SMF5040
Heat treatment	—
Tooth hardness	(70 to 95HRB)



B1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width
					A_{H8}	B		D	E	F	G	H
LM0.8-20	1	***m*0.8**	20	B1	4	12	16	17.13	16	11	8.57	5.5
LM1-20		***m*1**			5	16	20	21.41	20	13.5	10.71	6
LM1.25-20		***m*1.25**			6	22	25	26.77	23	15	11.38	6
LM1.5-20		***m*1.5**			6	26	30	32.12	30	21	16.06	9

Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (g)	Catalog Number
I	J		Bending strength	Surface durability	Bending strength	Surface durability			
11	4.24	—	0.22	0.027	0.022	0.0027	0~0.16	9.67	**LM0.8-20**
13.5	4.95		0.41	0.050	0.042	0.0051	0~0.18	20.7	**LM1-20**
15	6.36		0.81	0.099	0.083	0.010	0~0.20	38.8	**LM1.25-20**
21	8.48		1.48	0.19	0.15	0.019	0~0.22	78.6	**LM1.5-20**

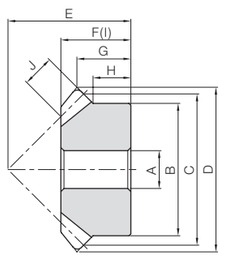
[Caution on Product Characteristics] ① Steam treatment (where the surface is rusted using steam) is provided.
② The product is not impregnated with lubricating oil.

Product Precautions → Page 310
Precautions for Standard Machined Products → Pages 42~44

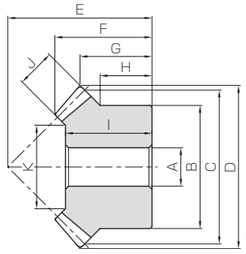
Contact us on the website!

Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating

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

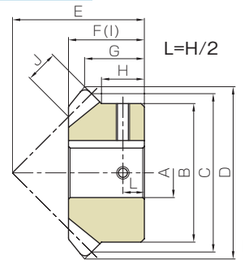


B2

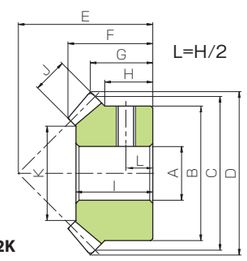


B3

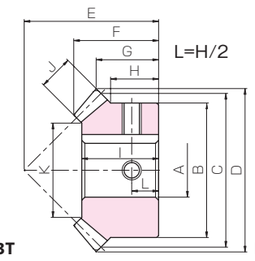
J Series



B2K



B3T



B3K

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

To order Hardened Plus, please specify Catalog No. + H. Example: SM2-16H

Catalog Number	Gear Ratio	No. of teeth	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Mounting distance E	Total length F	Crown to back G	Hub width H	Hole length I	Face width J	Holding surface dia. K	Allowable torque: Bending strength N·m	Bending strength kgf·m	Surface durability N·m	Surface durability kgf·m	Surface durability (H) N·m	Surface durability (H) kgf·m	Weight (kg)
SM2-16 (H)	1	16	B2	10	27	32	34.83	30	19	15.41	11.5	19	7	—	3.84	0.39	0.33	0.034	1.42	0.15	0.076
SM2.5-16 (H)				12	34	40	43.53	35	21	16.77	12	21	9		7.63	0.78	0.68	0.069	2.86	0.29	0.14
SM3-16 (H)				14	42	48	52.24	40	23	18.12	13	23	11		13.3	1.36	1.21	0.12	5.06	0.52	0.22
SM1-20 (H)	1	20	B3	6	16	20	21.41	20	13.94	10.71	8	12	5	9.86	0.89	0.091	0.084	0.0086	0.37	0.038	0.019
SM1.25-20 (H)				8	22	25	26.77	23	15.27	11.38	9	13	6	13.03	1.70	0.17	0.16	0.017	0.71	0.072	0.036
SM1.5-20 (H)				8	26	30	32.12	30	21.24	16.06	13	19	8	15.37	3.12	0.32	0.30	0.031	1.31	0.13	0.074
SM2-20 (H)				12	34	40	42.83	37	24.89	18.41	14	22	10	21.72	7.13	0.73	0.72	0.073	3.05	0.31	0.15
SM2.5-20 (H)				14	42	50	53.54	48	32.54	24.77	19	29	12	28.06	13.6	1.39	1.41	0.14	5.90	0.60	0.30
SM3-20 (H)				16	50	60	64.24	58	39.84	30.12	23	35	15	31.57	24.1	2.45	2.54	0.26	10.5	1.08	0.53
SM3.5-20 (H)				20	60	70	74.95	65	44.13	32.47	25	40	18	39.09	38.8	3.96	4.15	0.42	17.2	1.75	0.82
SM4-20 (H)				20	64	80	85.65	75	50.78	37.83	27	45	20	43.43	57.0	5.82	6.19	0.63	25.4	2.59	1.15
SM5-20 (H)				25	80	100	107.07	90	60.38	43.54	30	54	26	54.46	114	11.6	12.6	1.29	51.3	5.23	2.15
SM6-20 (H)				28	100	120	128.48	104	67.67	48.24	34	60	30	67.15	191	19.4	21.8	2.22	87.5	8.92	3.68
SM8-20 (H)				30	130	160	171.31	125	73.33	50.66	30	62	35	95	413	42.1	49.6	5.06	194	19.8	7.05
SM1-25 (H)	1	25	B3	6	20	25	26.41	23	15.16	11.21	8	14	6	15.03	1.47	0.15	0.16	0.017	0.71	0.072	0.035
SM1.25-25 (H)				8	25	31.25	33.02	28	17.88	13.26	9.25	16	7	18.7	2.75	0.28	0.31	0.032	1.35	0.14	0.063
SM1.5-25 (H)				10	30	37.5	39.62	34	22.25	16.31	11.5	19	9	19.54	4.96	0.51	0.57	0.059	2.44	0.25	0.11
SM2-25 (H)				12	40	50	52.83	40	24.33	16.41	10	20	12	26.06	11.8	1.20	1.41	0.14	5.90	0.60	0.22
SM2.5-25 (H)				16	50	62.5	66.04	50	30.41	20.52	12.5	26	15	34.57	23.0	2.34	2.81	0.29	11.7	1.19	0.42
SM3-25 (H)				20	60	75	79.24	60	37.81	24.62	15	32	20	37.43	42.1	4.29	5.24	0.53	21.6	2.20	0.74
SM3.5-25 (H)				25	70	87.5	92.45	70	43.23	28.72	17.5	37	22	46.77	64.7	6.60	8.19	0.83	33.5	3.42	1.15
SM4-25 (H)				28	80	100	105.66	80	49.32	32.83	20	43	25	55.29	96.3	9.82	12.4	1.26	50.2	5.12	1.73
SM5-25 (H)				28	100	125	132.07	100	60.82	41.04	25	50	30	65.15	184	18.7	24.2	2.47	96.8	9.87	3.41
SM6-25 (H)				28	120	150	158.48	120	72.32	49.24	30	61	35	83	309	31.5	42.1	4.29	166	16.9	6.03
SM1-30 (H)	1	30	B3	8	24	30	31.41	28	17.71	13.71	10	16	6	19.03	1.99	0.20	0.26	0.026	1.11	0.11	0.057
SM1.25-30 (H)				10	30	37.5	39.27	36	23.47	18.13	13.5	21	8	22.37	4.05	0.41	0.54	0.055	2.28	0.23	0.12
SM1.5-30 (H)				10	36	45	47.12	43	28.24	21.56	16	25	10	25.71	7.19	0.73	0.97	0.099	4.08	0.42	0.21
SM2-30 (H)				12	45	60	62.83	50	29.42	21.41	12.5	25	12	36.06	15.9	1.62	2.22	0.23	9.20	0.94	0.37
SM2.5-30 (H)				16	60	75	78.54	62	36.28	26.27	17	32	15	47.57	31.1	3.17	4.43	0.45	18.2	1.86	0.76
SM3-30 (H)				20	70	90	94.24	75	45.47	32.12	20	40	20	53.43	57.5	5.87	8.33	0.85	34.0	3.46	1.32
SM3.5-30 (H)				25	90	105	109.95	85	49.66	34.97	25	45	22	67.77	88.0	8.97	13.0	1.32	52.3	5.34	2.20
SM4-30 (H)				28	100	120	125.66	95	54.52	37.83	25	50	25	79.29	131	13.3	19.6	2.00	78.3	7.99	3.09
SM5-30 (H)				28	130	150	157.07	120	68.56	48.54	35	62	30	99.15	249	25.4	38.3	3.91	150	15.3	6.47

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

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

Bore H7	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	55	60	65	70	75	80	85
Keyway Js9																											
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	M4						M5				M6			M8			M10		M12			M16			
SM2-16 J BORE			■	■																							
SM2.5-16 J BORE				■	■	■	■	■																			
SM3-16 J BORE					■	■	■	■	■	■	■																
SM1-20 J BORE	■																										
SM1.25-20 J BORE		■																									
SM1.5-20 J BORE		■	■																								
SM2-20 J BORE			■	■	■	■	■																				
SM2.5-20 J BORE					■	■	■	■	■	■	■																
SM3-20 J BORE							■	■	■	■	■	■															
SM3.5-20 J BORE											■	■	■	■	■												
SM4-20 J BORE											■	■	■	■	■	■	■										
SM5-20 J BORE													■	■	■	■	■	■									
SM6-20 J BORE														■	■	■	■	■	■	■							
SM8-20 J BORE															■	■	■	■	■	■	■	■	■	■	■		
SM1-25 J BORE	■																										
SM1.25-25 J BORE		■	■	■																							
SM1.5-25 J BORE			■	■	■																						
SM2-25 J BORE				■	■	■	■	■	■	■																	
SM2.5-25 J BORE							■	■	■	■	■	■															
SM3-25 J BORE											■	■	■	■													
SM3.5-25 J BORE													■	■	■	■	■										
SM4-25 J BORE														■	■	■	■	■	■								
SM5-25 J BORE														■	■	■	■	■	■	■							
SM6-25 J BORE														■	■	■	■	■	■	■	■	■					
SM1-30 J BORE		■	■	■																							
SM1.25-30 J BORE			■	■	■	■	■																				
SM1.5-30 J BORE			■	■	■	■	■	■	■																		
SM2-30 J BORE				■	■	■	■	■	■	■	■	■															
SM2.5-30 J BORE						■	■	■	■	■	■	■	■	■	■												
SM3-30 J BORE											■	■	■	■	■	■	■										
SM3.5-30 J BORE													■	■	■	■	■	■	■	■							
SM4-30 J BORE														■	■	■	■	■	■	■	■	■					
SM5-30 J 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.
② Hardened Plus is not available for products listed in the J Series lineup.

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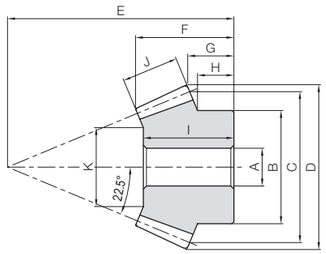
Product Precautions → Page 310
Precautions for Standard Machined Products → Pages 42~44

Angular Miter Gears NEW

Shaft angle 45°

Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating



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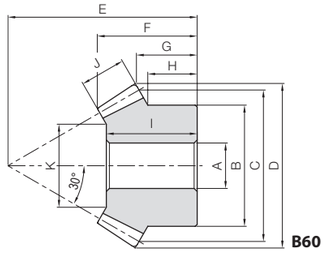

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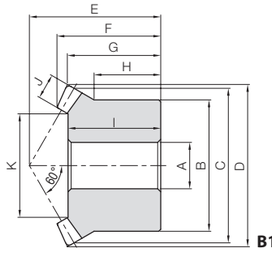

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H To order Hardened Plus, please specify Catalog No. + H. **Example: SAM1.5-20045H**

Catalog Number	Gear Ratio	Module	No. of teeth	Shaft angle	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Hub width	Hole length
						A_{H7}	B	C	D	E	F	H	I
SAM1.5-20045 H	1	***m*1.5**	20	45°	B45	8	25	30	32.77	45	19.33	7.75	18
SAM2-20045 H		***m*2**				10	30	40	43.69	60	26.08	9.65	24
SAM2.5-20045 H		***m*2.5**				12	40	50	54.62	75	31.92	12.58	30
SAM3-20045 H		***m*3**				14	50	60	65.54	90	38.66	15.51	36
SAM1.5-20060 H	1	***m*1.5**	20	60°	B60	8	25	30	32.59	40	22.3	12.58	21
SAM2-20060 H		***m*2**				12	32	40	43.46	50	26.39	13.05	24
SAM2.5-20060 H		***m*2.5**				14	40	50	54.33	60	30.49	13.82	28
SAM3-20060 H		***m*3**				16	50	60	65.19	70	34.59	15.16	32
SAM1.5-20120 H	1	***m*1.5**	20	120°	B120	8	26	30	31.5	26	20.69	13.88	18
SAM2-20120 H		***m*2**				12	34	40	42	34	26.86	17.26	24
SAM2.5-20120 H		***m*2.5**				14	42	50	52.5	42	33.22	20.64	29
SAM3-20120 H		***m*3**				16	50	60	63	50	39.39	24.02	35

Face width	Holding surface dia.	Allowable torque						Backlash (mm)	Weight (kg)	Catalog Number
		Bending strength		Surface durability		Surface durability H				
J	K	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m			
11	17	4.30	0.44	0.38	0.039	1.60	0.16	0.05~0.15	0.067	**SAM1.5-20045** H
15	20.92	10.3	1.05	0.95	0.097	3.92	0.40	0.06~0.16	0.15	**SAM2-20045** H
18	30.07	19.6	2.00	1.85	0.19	7.54	0.77	0.07~0.17	0.31	**SAM2.5-20045** H
22	34	34.4	3.51	3.30	0.34	13.3	1.36	0.08~0.18	0.55	**SAM3-20045** H
9	18.18	3.54	0.36	0.32	0.033	1.35	0.14	0.05~0.15	0.077	**SAM1.5-20060** H
12	21.93	8.39	0.86	0.78	0.080	3.25	0.33	0.06~0.16	0.15	**SAM2-20060** H
15	29.15	16.4	1.67	1.56	0.16	6.43	0.66	0.07~0.17	0.27	**SAM2.5-20060** H
18	36.36	28.3	2.89	2.74	0.28	11.2	1.14	0.08~0.18	0.47	**SAM3-20060** H
5	19.22	2.43	0.25	0.29	0.030	1.28	0.13	0.05~0.15	0.073	**SAM1.5-20120** H
6.5	26.78	5.66	0.58	0.70	0.072	3.02	0.31	0.06~0.16	0.16	**SAM2-20120** H
8.5	32.03	11.4	1.16	1.45	0.15	6.14	0.63	0.07~0.17	0.31	**SAM2.5-20120** H
10	39.59	19.4	1.98	2.53	0.26	10.6	1.08	0.08~0.18	0.53	**SAM3-20120** H

[Caution on Product Characteristics] ① The shaft angle is where the same products are set together. The shaft angle cannot be changed by using it with a different product.

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

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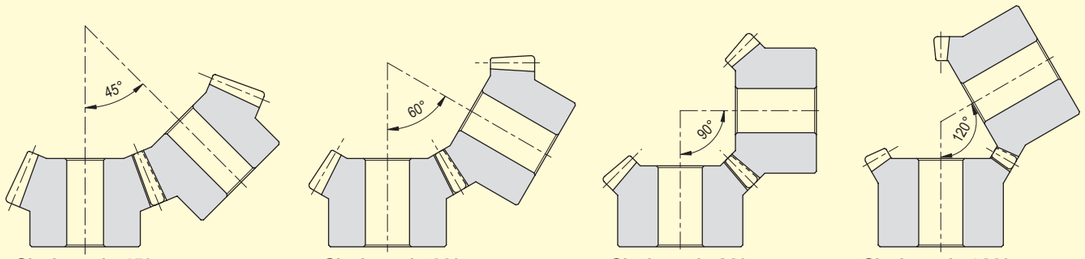
■ Angular miter

The axis angle of a normal miter is set to 90°, but the angle is set arbitrarily for the angular miter. The SAM Angular Miters are products with standardized axial angles of 45°, 60° and 120°. Be sure to pair products with the same model number. Custom items of other shaft angles are available, but may not be manufacturable due to the capabilities of the machine.



Shaft angle 45° Shaft angle 60° Shaft angle 90° Shaft angle 120°

Shaft angle 60°

Shaft angle 120°

■ Angular Miter Gear Box Example

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info@zahnrad24.com
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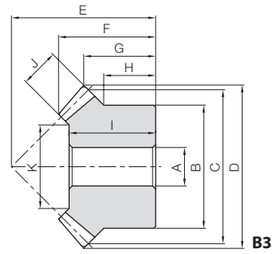
SUM Module 1~4 Stainless Steel Miter Gears

Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)



B3

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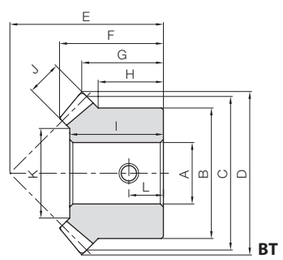
Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width
					A_{H7}	B	C	D	E	F	G	H
SUM1-20	1	***m*1**	20	B3	6	16	20	21.41	20	13.95	10.71	8
SUM1.5-20		***m*1.5**			8	26	30	32.12	30	21.24	16.06	13
SUM2-20		***m*2**			12	34	40	42.83	37	24.89	18.41	14
SUM2.5-20		***m*2.5**			14	42	50	53.54	48	32.54	24.77	19
SUM3-20		***m*3**			16	50	60	64.24	58	39.84	30.12	23
SUM4-20		***m*4**			20	64	80	85.65	75	50.78	37.83	27
SUM1-25	1	***m*1**	25	B3	6	20	25	26.41	23	15.16	11.21	8
SUM1.5-25		***m*1.5**			10	30	37.5	39.62	34	22.25	16.31	11.5
SUM2-25		***m*2**			12	45	50	52.83	40	24.33	16.41	12.5
SUM2.5-25		***m*2.5**			16	55	62.5	66.04	50	30.41	20.52	15
SUM3-25		***m*3**			20	65	75	79.24	60	37.81	24.62	17.5
SUM4-25		***m*4**			28	80	100	105.66	80	49.32	32.83	20
SUM2-30	1	***m*2**	30	B3	12	45	60	62.83	50	29.43	21.41	12.5
SUM2.5-30		***m*2.5**			16	60	75	78.54	62	36.28	26.27	17
SUM3-30		***m*3**			20	70	90	94.24	75	45.47	32.12	20

Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
I	J	K	Bending strength	Surface durability	Bending strength	Surface durability			
12	5	9.86	0.49	0.060	0.050	0.0061	0.03~0.13	0.019	**SUM1-20**
19	8	15.37	1.72	0.22	0.18	0.022	0.05~0.15	0.075	**SUM1.5-20**
22	10	21.72	3.94	0.51	0.40	0.052	0.06~0.16	0.15	**SUM2-20**
29	12	28.06	7.52	1.00	0.77	0.10	0.07~0.17	0.30	**SUM2.5-20**
35	15	31.57	13.3	1.80	1.36	0.18	0.08~0.18	0.53	**SUM3-20**
45	20	43.43	31.5	4.39	3.22	0.45	0.12~0.27	1.17	**SUM4-20**
14	6	15.03	0.81	0.12	0.083	0.012	0.03~0.13	0.035	**SUM1-25**
19	9	19.54	2.74	0.41	0.28	0.042	0.05~0.15	0.11	**SUM1.5-25**
20	12	26.06	6.50	1.00	0.66	0.10	0.06~0.16	0.25	**SUM2-25**
26	15	34.57	12.7	2.00	1.29	0.20	0.07~0.17	0.47	**SUM2.5-25**
32	20	37.43	23.3	3.73	2.37	0.38	0.08~0.18	0.81	**SUM3-25**
43	25	55.29	53.2	8.79	5.43	0.90	0.12~0.27	1.75	**SUM4-25**
25	12	36.06	8.77	1.55	0.89	0.16	0.06~0.16	0.37	**SUM2-30**
32	15	47.57	17.1	3.10	1.75	0.32	0.07~0.17	0.77	**SUM2.5-30**
40	20	53.43	31.7	5.86	3.23	0.60	0.08~0.18	1.34	**SUM3-30**

SUMA Module 1~4 Finished Bore Stainless Steel Miter Gears

Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)



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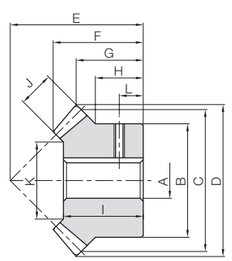


BK

Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width	Hole length
					A_{H7}	B	C	D	E	F	G	H	I
SUMA1-20	1	***m*1**	20	BT	6	16	20	21.41	20	13.95	10.71	8	12
SUMA1.5-20		***m*1.5**		BT	8	26	30	32.12	30	21.24	16.06	13	19
SUMA2-20		***m*2**		BK	12	34	40	42.83	37	24.89	18.41	14	22
SUMA2.5-20		***m*2.5**		BK	14	42	50	53.54	48	32.54	24.77	19	29
SUMA3-20		***m*3**		BK	16	50	60	64.24	58	39.84	30.12	23	35
SUMA4-20		***m*4**		BK	20	64	80	85.65	75	50.78	37.83	27	45
SUMA1-25	1	***m*1**	25	BT	6	20	25	26.41	23	15.16	11.21	8	14
SUMA1.5-25		***m*1.5**		BT	10	30	37.5	39.62	34	22.25	16.31	11.5	19
SUMA2-25		***m*2**		BK	12	45	50	52.83	40	24.33	16.41	12.5	20
SUMA2.5-25		***m*2.5**		BK	16	55	62.5	66.04	50	30.41	20.52	15	26
SUMA3-25		***m*3**		BK	20	65	75	79.24	60	37.81	24.62	17.5	32
SUMA4-25		***m*4**		BK	30	80	100	105.66	80	49.32	32.83	20	43

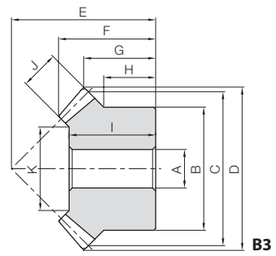
Face width	Holding surface dia.	Keyway	Socket head screw		Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
J	K	Width × Depth	Size	L	Bending strength	Surface durability	Bending strength	Surface durability			
5	9.86	—	M4	4	0.49	0.060	0.050	0.0061	0.03~0.13	0.018	**SUMA1-20**
8	15.37	—	M4	6.5	1.72	0.22	0.18	0.022	0.05~0.15	0.074	**SUMA1.5-20**
10	21.72	4 x 1.8	M4	7	3.94	0.51	0.40	0.052	0.06~0.16	0.15	**SUMA2-20**
12	28.06	5 x 2.3	M5	9.5	7.52	1.00	0.77	0.10	0.07~0.17	0.30	**SUMA2.5-20**
15	31.57	5 x 2.3	M5	11.5	13.3	1.80	1.36	0.18	0.08~0.18	0.53	**SUMA3-20**
20	43.43	6 x 2.8	M5	13.5	31.5	4.39	3.22	0.45	0.12~0.27	1.16	**SUMA4-20**
6	15.03	—	M4	4	0.81	0.12	0.083	0.012	0.03~0.13	0.034	**SUMA1-25**
9	19.54	—	M4	6	2.74	0.41	0.28	0.042	0.05~0.15	0.11	**SUMA1.5-25**
12	26.06	4 x 1.8	M4	6.5	6.50	1.00	0.66	0.10	0.06~0.16	0.25	**SUMA2-25**
15	34.57	5 x 2.3	M5	7.5	12.7	2.00	1.29	0.20	0.07~0.17	0.47	**SUMA2.5-25**
20	37.43	6 x 2.8	M5	9	23.3	3.73	2.37	0.38	0.08~0.18	0.81	**SUMA3-25**
25	55.29	8 x 3.3	M6	10	53.2	8.79	5.43	0.90	0.12~0.27	1.70	**SUMA4-25**

Product Precautions → Page 310

PM Module 1~4 Plastic Miter Gears

Specifications	
Precision grade	JIS B 1704: 1978 grade 4*
Gear teeth	Gleason
Pressure angle	20°
Material	MC901
Heat treatment	—
Tooth hardness	(115 to 120HRR)

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



Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width
					A_{H8}	B	C	D	E	F	G	H
PM1-20	1	***m*1**	20	B3	6	16	20	21.41	20	13.95	10.71	8
PM1.25-20		***m*1.25**			8	22	25	26.77	23	15.27	11.38	9
PM1.5-20		***m*1.5**			8	26	30	32.12	30	21.24	16.06	13
PM2-20		***m*2**			10	34	40	42.83	37	24.89	18.41	14
PM2.5-20		***m*2.5**			12	42	50	53.54	48	32.54	24.77	19
PM3-20		***m*3**			14	50	60	64.24	58	39.84	30.12	23
PM3.5-20		***m*3.5**			20	60	70	74.95	65	44.13	32.47	25
PM4-20		***m*4**			20	64	80	85.66	75	50.78	37.83	27
PM1-25	1	***m*1**	25	B3	6	20	25	26.41	23	15.16	11.21	8
PM1.5-25		***m*1.5**			8	30	37.5	39.62	34	22.25	16.31	11.5
PM2-25		***m*2**			10	40	50	52.83	40	24.33	16.41	10
PM2.5-25		***m*2.5**			14	50	62.5	66.04	50	30.41	20.52	12.5
PM3-25		***m*3**			15	60	75	79.24	60	37.81	24.62	15

[Caution on Product Characteristics] ① To reduce heat generation, it is recommended to mate plastic gears with steel gears.

* In regard to MC Nylon gears, other materials are available for plastic gears, including Ultra High Molecular Weight Polyethylene (U-PE), which has excellent abrasion resistance and resin conforming to the Plastic Implementation Measure (PIM).
A single piece order is acceptable and will be produced as a custom-made gear.
Please see Page 26 for more details on quotations and orders.

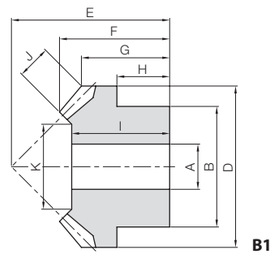
Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (g)	Catalog Number
I	J	K	Bending strength	Surface durability	Bending strength	Surface durability			
12	5	9.86	0.22	—	0.022	—	0~0.23	2.77	**PM1-20**
13	6	13.03	0.42		0.043		0~0.24	5.31	**PM1.25-20**
19	8	15.37	0.76		0.077		0~0.25	11.0	**PM1.5-20**
22	10	21.72	1.74		0.18		0~0.26	22.5	**PM2-20**
29	12	28.06	3.34		0.34		0~0.27	45.9	**PM2.5-20**
35	15	31.57	5.89		0.60		0~0.28	79.8	**PM3-20**
40	18	39.09	9.47		0.97		0~0.30	121	**PM3.5-20**
45	20	43.43	14.0		1.42		0~0.32	170	**PM4-20**
14	6	15.03	0.36	—	0.036	—	0~0.23	5.13	**PM1-25**
19	9	19.54	1.20		0.12		0~0.25	17.0	**PM1.5-25**
20	12	26.06	2.84		0.29		0~0.26	32.7	**PM2-25**
26	15	34.57	5.55		0.57		0~0.27	63.9	**PM2.5-25**
32	20	37.43	10.0		1.02		0~0.28	115	**PM3-25**

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

DM Module 0.5~1.5 Injection Molded Miter Gears

Specifications	
Precision grade	JIS B 1704: 1978 grade 6*
Gear teeth	Gleason
Pressure angle	20°
Material	Duracon (R) (M90-44) **
Heat treatment	—
Tooth hardness	(110 to 120HRR)

* The precision grade is equivalent to the value shown in the table.
** "Duracon (R)" is a registered trademark of Polyplastics Co., Ltd. in Japan as well as other countries.



Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back
					A	B		D	E	F	G
DM0.5-20	1	***m*0.5**	20	B1	3	8	10	10.71	11	7.97	6.35
DM0.8-20		***m*0.8**			5	12	16	17.13	16	10.83	8.56
DM1-20		***m*1**			6	16	20	21.41	21	14.62	11.71
DM1.5-20		***m*1.5**			8	20	30	32.12	30	20.59	16.06

[Caution on Product Characteristics] ① The bore tolerance is -0.05 to -0.30, but it may be slightly higher at the center of the hole.
② For the dimensional accuracy of each part, see the dimensional tolerance of molded items in the table at right.
[Caution on Secondary Operations] ① As it is a molded item, bubbles may form inside the material. Avoid performing secondary operations.

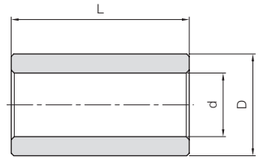
When using the injection molded bevel gear as an idler gear and a shaft diameter smaller than the inside diameter of the molded gear, please press fit one of the standard bushings. For details on bushings, please see Page 338.

■ Dimensional tolerance of 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

Hub width	Hole length	Face width	Holding surface dia.	Allowable torque (N·m)	Allowable torque (kgf·m)	Backlash (mm)	Weight (g)	Catalog Number
H	I	J	K	Bending strength	Bending strength			
4	7	2.5	4.93	0.082	0.0083	0~0.30	0.57	**DM0.5-20**
5	10	3.5	10.1	0.31	0.032	0~0.48	1.93	**DM0.8-20**
7	13	4.5	11.27	0.54	0.055	0~0.60	4.28	**DM1-20**
10	19	7	18.2	0.96	0.098	0~0.60	11.8	**DM1.5-20**

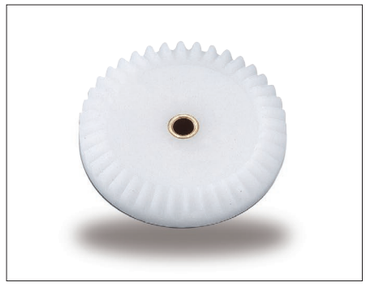
When using the injection molded bevel gear as an idler gear and a shaft diameter smaller than the inside diameter of the molded gear, please press fit one of the following standard bushings.



Catalog Number	Inner dia. $d^{+0.02}_{0}$	Outside dia. $D^{+0.02}_{-0.01}$	Length $L^{0}_{-0.3}$	Gear example
BB30507	3	5	7	DM0.8
BB30608	3	6	8	DM1
BB40609	4	6	9	DM1
BB50814	5	8	14	DM1.5

Material: Oil-free copper alloy

T8



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Bevel Gears

MHP High-Ratio Hypoid Gears	MBSG Ground Spiral Bevel Gears	SBSG Ground Spiral Bevel Gears	MBSA/MBSB Finished Bore Spiral Bevel Gears	SBS Spiral Bevel Gears	SB-H Hardened Bevel Gears	SB Bevel Gears	SBY-H Hardened Bevel Gears
Gear Ratio 15~60	Gear Ratio 2	Gear Ratio 1.5~3	Gear Ratio 1.5~3	Gear Ratio 1.5~4	Gear Ratio 1.5~4 NEW H	Gear Ratio 1.5~4	Gear Ratio 2~4 NEW H
Material: SCM415 ***m*1, 1.5 Page 346**	Material: SCM415 ***m*2~4 Page 350**	Material: S45C ***m*2~4 Page 352**	Material: SCM415 ***m*2~6 Page 354**	Material: S45C ***m*1~5 Page 358**	Material: S45C ***m*1~6 Page 362**	Material: S45C ***m*1~6 Page 362**	Material: S45C ***m*5~8 Page 362**

SBY Bevel Gears	SB-H Hardened Steel Bevel Gears & Pinion Shafts	SB Steel Bevel Gears & Pinion Shafts	SUB Stainless Steel Bevel Gears	PB Plastic Bevel Gears	DB Injection Molded Bevel Gears	BB Sintered Metal Bushings	Nissei KSP Ground Spiral Bevel Gears
Gear Ratio 2~4	Gear Ratio 5 NEW H	Gear Ratio 5	Gear Ratio 1.5~3	Gear Ratio 1.5~3	Gear Ratio 2		Gear Ratio 1~2
Material: S45C ***m*5~8 Page 362**	Material: S45C ***m*1.5~3 Page 366**	Material: S45C ***m*1.5~3 Page 366**	Material: SUS303 ***m*1.5~3 Page 368**	Material: MC901 ***m*1~2 Page 370**	Material: Duracon (R) (M90-44) ***m*0.5~1 Page 372**	Material: Oil-free copper alloy **ϕ 5~6 Page 372**	Material: SCM415 ***m*1.5~6 Page 374**

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) Bevel Gears

M BS G 2 - 40 20 R

- R — Direction of Helix (Right)
- 20 — No. of teeth of mating gears (20)
- 40 — No. of Teeth (40)
- 2 — Module (2)
- G — Other Products (Ground Gears)
- BS — Type (Spiral Bevel Gears)
- M — Material (SCM415)

Material		Type	
S	S45C	B	Straight Bevel Gears
M	SCM415	BS	Spiral Bevel Gears
SU	Stainless Steel	HP	High-Ratio Hypoid Gears
P	MC901		
D	Polyacetal	**Other Information**	
		G	Ground Gears

Features

KHK stock bevel gears are available in two types, spiral bevel gears and straight bevel gears, in gear ratios of 1.5 through 5, and are offered in a large variety of modules, numbers of teeth, materials and styles. The following table lists the main features for easy selection.

Type	Catalog Number	Module	Gear Ratio	Material	Heat Treatment	Tooth Surface Finish	Precision JIS B 1704: 1978	Secondary Operations	Features
Hypoid Gear	**MHP**	1, 1.5	15~60	SCM415	Carburized Note 1	Cut	3	△	Hypoid gears that have been tempered and hardened that are capable of rapid deceleration.
Spiral Bevel Gears	**MBSG**	2~4	2	SCM415	Carburized Note 1	Ground	1	△	Gears that have been hardened and ground that has excellent accuracy, strength and abrasion resistance. Secondary operations are possible except for the teeth.
	SBSG	2~4	1.5~3	S45C	Gear teeth induction hardened	Ground	2	△	Gears that has been hardened and ground with a good balance of accuracy, wear resistance and cost. Secondary operations are possible except for the teeth.
	KSP	1.5~6	1~2	SCM415	Carburized Note 1	Ground	0	△	Gears that have been hardened and ground that has grade-0 accuracy, strength, abrasion resistance and quietness. Secondary operations can be given except for the teeth.
	MBSA/MBSB	2~6	1.5~3	SCM415	Carburized Note 1	Cut	4	×	Gears that have been fully hardened that have excellent strength and wear resistance. Can be used in the finished shape.
	SBS	1~5	1.5~4	S45C	Gear teeth induction hardened	Cut	4	△	Gears that have been hardened with excellent wear resistance. Secondary operations are possible except for the teeth.
Straight Bevel Gears	**SB/SBY**	1~8	1.5~5	S45C	—	Cut	3	○	Many lineups are available at a low price. The teeth can be additionally hardened.
	SUB	1.5~3	1.5~3	SUS303	—	Cut	3	○	Stainless steel gears with rust resistance.
	PB	1~2	1.5~3	MC901	—	Cut	4	○	Nylon gears can be used with no lubrication.
	DB	0.5~1	2	Duracon (R) (M90-44) NOTE 2	—	Injection Molded	6	△	Low-priced gears made through injection molding. Suitable for light loads.

[NOTE 1] Although these are carburized products, secondary operations can be performed on the areas that are masked during the carburization. However, note that high hardness (HRC40 at maximum) occurs in some cases.
[NOTE 2] "Duracon (R)" is a registered trademark of Polyplastics Co., Ltd. in Japan as well as other countries.

○ Possible △ Partly possible × Not possible

Application Examples

Bevel gears are used as power transmission components of intersecting axes.

■ Differential Gear Mechanism Example

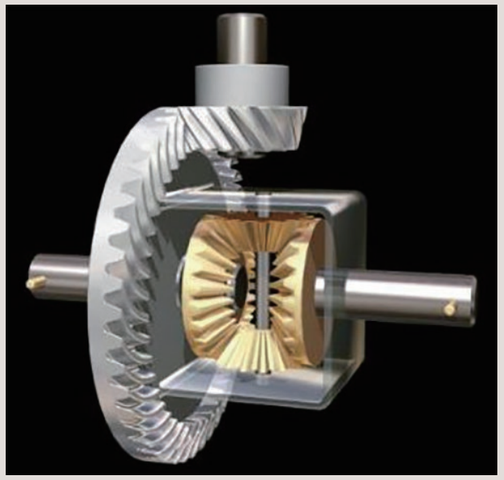


Image provided by: PK Design

■ SHESCO 2WD Bike

SB Bevel Gears are used in the driving components in both the front and rear wheels

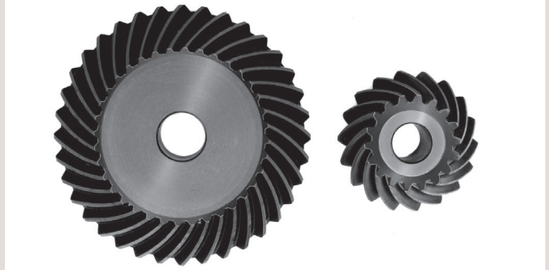
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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

Basically, KHK stock bevel gears should be selected as shown in the catalog in pairs (e.g. MBSG2-4020R should mate with MBSG2-2040L). But, for straight tooth bevel gears, there is some interchangeability with different series. For plastic bevel gears, we recommend metal mating gears for good heat conductivity.



Right (R) Left (L)

■ Selection Chart for Straight Bevel Gears (○ Allowable × Not allowable)

Pinion \ Gears	SB SBY	SUB	PB	DB
SB·SBY	○	○	○	×
SUB	○	○	○	×
PB	○	○	○	×
DB	×	×	×	○

■ Selection Chart for Spiral Bevel Gears (○ Allowable × Not allowable)

Pinion \ Gears	MBSG	SBSG	MBSA MBSB	SBS
MBSG	○	×	×	×
SBSG	×	○	×	×
MBSA/MBSB	×	×	○	×
SBS	×	×	×	○

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	MBSG MBSA MBSB	SBSG/SBS	SB NOTE 2 SBY	SB-H SBY-H	SUB	PB	DB
Formula NOTE 1	Formula of bevel gears on bending strength (JGMA403-01)					The Lewis formula	
No. of teeth of mating gears	No. of teeth of the mating gear of the set					—	
Rotational Speed of Pinion	100rpm (600rpm for MBSG and SBSG)					100rpm	
Design Life (Durability)	Over 10^7 cycles					—	
Impact from motor	Uniform load					Allowable bending stress (kgf/mm²)	
Impact from load	Uniform load					1.15 (40°C with No Lubrication)	*m* 0.5 4.0 *m* 0.8 4.0 *m* 1.0 3.5 (40°C with Grease Lubrication)
Direction of load	Bidirectional load (calculated with allowable bending stress of 2/3)						
Allowable bending stress at root σ_{Flim} (kgf/mm²)	47	21	19 (24.5)	19	10.5		
Safety factor K_R	1.2						

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

Formula NOTE 1	Formula of bevel gears on surface durability (JGMA404-01)				
Kinematic viscosity of lubricant	100cSt (50°C)				
Gear support	Shafts & gear box have normal stiffness, and gears are supported on one end				
Allowable Hertz stress σ_{Hlim} (kgf/mm²)	166	90	49 (62.5)	90	41.3
Safety factor C_R	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] Since SB Bevel Pinion Shafts are thermally refined, the allowable tooth-root bending stress and allowable hertz stress are the value shown in parentheses.

Product Precautions

Common Notes

[Caution on Product Characteristics]

(1) The allowable torque shown in the table are calculated values according to the assumed usage conditions. Please see Page 341 for more details.

(2) Dimensions of the outside diameter, the total length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

(3) These bevel gears produce axial thrust forces. Please see Page 344 for more details.

(4) Variations in temperature or humidity can cause dimensional changes in plastic gears, including tooth diameter, bore, and backlash. The accuracy and tolerances shown in the catalog are values obtained when machining is performed.

(5) Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.

(6) For products having a tapped hole, a set screw is included. (excludes B7)

(7) 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 being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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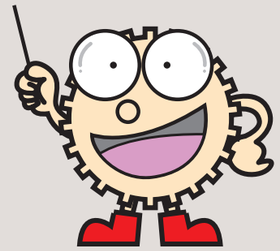
MEMO



Application Hints

In order to use KHK stock bevel gears safely, carefully read the Application Hints before proceeding.
If there are questions or you require clarifications, please contact our technical department or your nearest distributor.
E-mail: info@khkgears.net

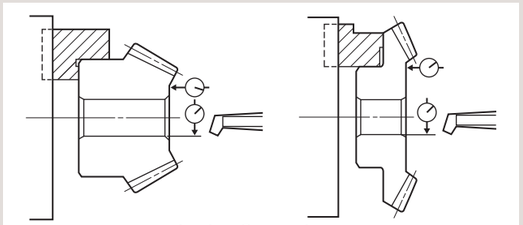
Please read "Cautions on Performing Secondary Operations" below when performing modifications and/or secondary operations for safety concerns.

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. Plastic gears and ring gears deform particularly easily, so please handle with care.

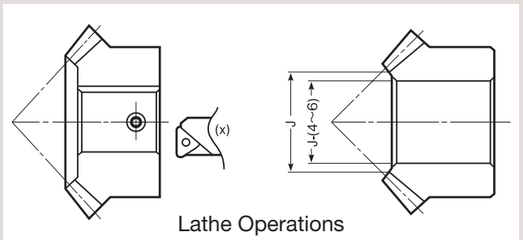
2. Caution on Performing Secondary Operations

① If reboring, it is important to pay special attention to locating the center in order to avoid runout.
② The reference datum for gear machining is the bore. Therefore, use the bore for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface.
③ If reworking using scroll chucks, we recommend the use of new or rebored jaws for improved precision. Please exercise caution not to crush the teeth.



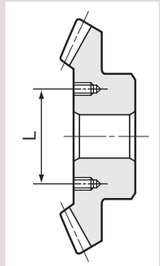
Lathe Operations

④ For items with induction hardened teeth, the hardness is high near the tooth root. When machining the front face, the machined area should be 4 to 6mm smaller than the holding surface diameter dimensions.



Lathe Operations

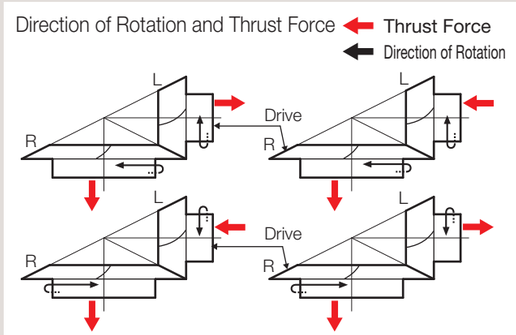
⑤ For tapping and keyway operations, see the examples given in “Caution on Performing Secondary Operations” in KHK Stock Spur Gear section. When cutting keyways, to avoid stress concentration, always round the corners.
⑥ PB plastic bevel gears are susceptible to changes due to temperature and humidity. Dimensions may change between, during, and after re-machining operations.
⑦ When induction-hardening S45C products, thermal stress cracks may appear. Also, note that the precision grade of the product declines by 1 or 2 grades, as deformation on material may occur. If you require tolerance for bore or other parts, machining is necessary after heat treatment.
⑧ For the handling conveniences, the SB and SBY series listed below have the tapped holes (180° apart, 2 places) on the holding surface. We appreciate your understanding.
Please pay attention to the machining position.



Catalog Number	L(mm)	Tap Size
SB6-4515	130	M10 deep 20
SBY8-4020	160	M10 deep 20
SBY8-4515	210	M10 deep 20
SBY5-6015	160	M10 deep 20
SBY6-6015	220	M10 deep 20

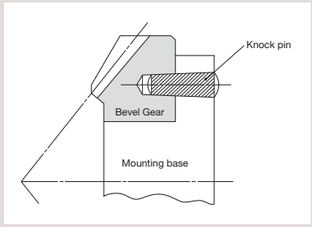
3. Points of Caution during Assembly

① Since bevel gears are cone shaped, they produce axial thrust forces. Especially for spiral bevel gears, the directions of thrust change with the hand of helix and the direction of rotation. This is illustrated below. The bearings must be selected properly to be able to handle these thrust forces. For details, use gear calculation software GCSW.



[NOTE] Bevel gears with the gear ratio 1.57 or less, produce a thrust force which is the same as miter gears. For details, please see Page 308.

② If a gear is mounted on a shaft far from the bearings, the shaft may bend. We recommend designing bevel gears to be as close to the bearings as possible. Design the gear box, shaft and bearing with high rigidity.
③ Be sure to fasten the bevel gear to prevent the gears from moving, as thrust acts on it while rotating.
④ When installing MBSA or MBSB spiral bevel gears produced in B7 style (ring gear), always secure the gears onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.



⑤ The recommended assemble distance tolerance of KHK stock bevel gears is H7 for ground gears and H8 for cut gears. Mounting distance error, offset error and shaft angle error must be minimized to avoid excessive noise and wear. Inaccurate assembly will lead to irregular noises and uneven wear. Various conditions of tooth contact are shown below.
Also, when changing the normal direction backlash, adjust the mounting distance according to the amount of axial movement shown in the table below so as not to change the tooth contact.

Gear Ratio (Reduction Ratio)	Normal direction backlash	Travel in axial direction	
		Pinion	Gears
1.5	j_n	$0.81\times j_n$	$1.22\times j_n$
2		$0.65\times j_n$	$1.31\times j_n$
2.5		$0.54\times j_n$	$1.36\times j_n$
3		$0.46\times j_n$	$1.39\times j_n$
4		$0.35\times j_n$	$1.42\times j_n$
5		$0.29\times j_n$	$1.43\times j_n$
15 or more		$1.4\times j_n \div$ Gear Ratio	$1.4\times j_n$

4. Cautions on Starting

① Check the following items before starting.
- Are the gears fastened 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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
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Oberes Dorf 1
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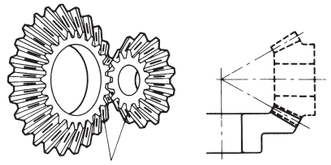
Correct Tooth Contact

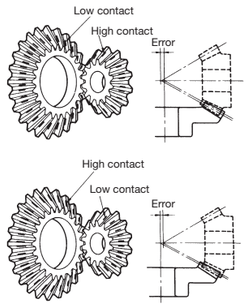
● When assembled correctly, the contact will occur on both gears in the middle of the flank and center of face width but somewhat closer to the toe.



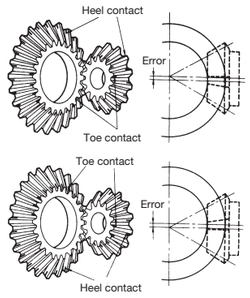
Center contact closer to toes

Incorrect Tooth Contact

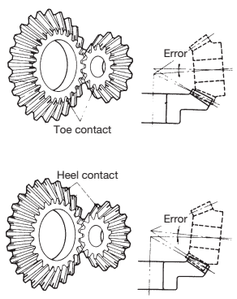
■ Mounting Distance Error
● When the mounting distance of the pinion is incorrect, the contact will occur too high on the flank on one gear and too low on the other.



■ Offset Error
● When the pinion shaft is offset, the contact surface is near the toe of one gear and near the heel of the other.



■ Shaft Angle Error
● When there is an angular error of shafts, the gears will contact at the toes or heels depending on whether the angle is greater or less than 90°.

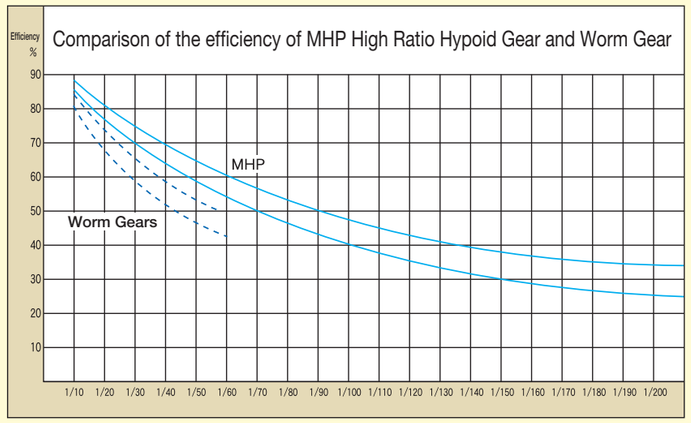


ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

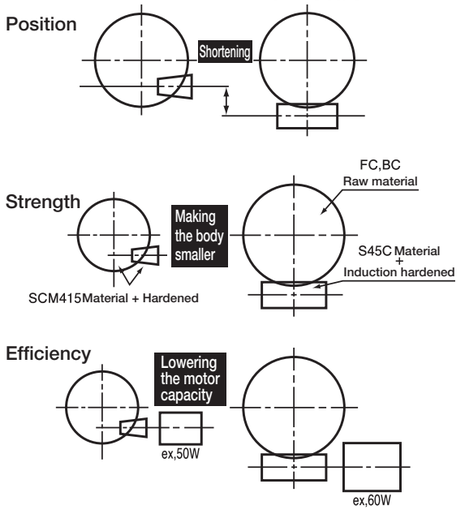
■ Features of MHP High Ratio Hypoid Gears

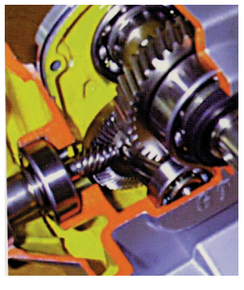
A pair of MHP high-ratio hypoid gears are able to produce an amazing reduction of speed of 60:1 in one stage.

1. Total-cost reduction
   The MHP provides a compact gearing body replacing several stages of reduction gears. This reduces the cost sharply.
2. High efficiency
   Compared to worm gear drives, the MHP has less sliding contact. The resulting higher efficiency allows the use of smaller motors. (See graph on the right)
3. High rigidity
   The carburized hypoid gears lead to smaller size than comparable worms gears.
4. Compact gear assembly
   The size of the gear housing is nearly the same as outer diameter of the large gear. (See the diagrams below)



Comparison of MHP and Worm Gear





■ How to determine the radial and thrust loads

Before using the MHP high-ratio hypoid gears, be sure to confirm the direction of radial and thrust loads. Following equations are used to compute these loads. The radial and thrust load coefficients are given on the product pages.

Radial load calculation

W_{RP} : Radial load on the pinion or L(N)

$$W_{RP} = W_{KP} \times T_G \times \frac{n}{z}$$

W_{KP} : Radial load coefficient of pinion or L (given on the product pages)
T_G : Torque of gear or R(N·m)
n : Number of teeth of pinion or L
z : Number of teeth of gear or R

W_{RG} : Radial load on the gear or R(N)

$$W_{RG} = W_{KG} \times T_G$$

W_{KG} : Radial load coefficient of gear or R (given on the product pages)
T_G : Torque of gear or R(N·m)

Thrust load

W_{XP} : Thrust load on the pinion or L(N)

$$W_{XP} = W_{NP} \times T_G \times \frac{n}{z}$$

W_{NP} : Thrust load coefficient of pinion or L (given on the product page)
T_G : Torque of gear or R(N·m)
n : Number of teeth of pinion or L
z : Number of teeth of gear or R

W_{XG} : Thrust load of gear or R(N)

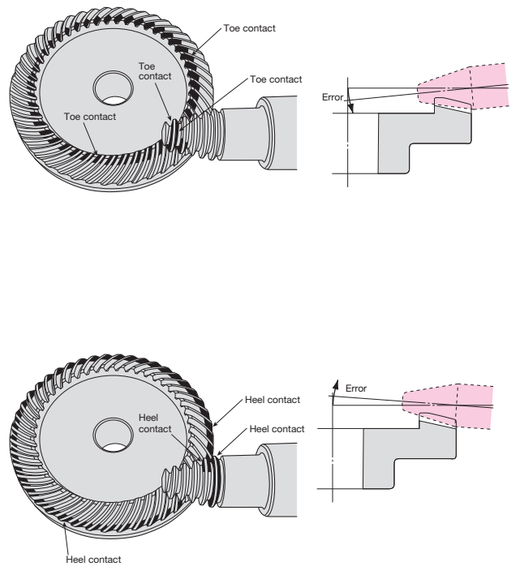
$$W_{XG} = W_{NG} \times T_G$$

W_{NG} : Thrust load coefficient of gear or R (given on the product pages)
T_G : Torque of gear or R(N·m)

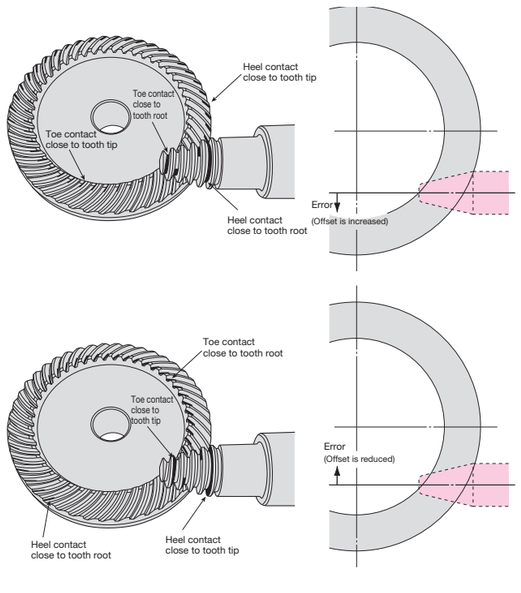
■ Variations in tooth contact due to poor alignment of gears

If the gear engagement position is out of the normal position, variations in tooth contact, as illustrated below, may appear.

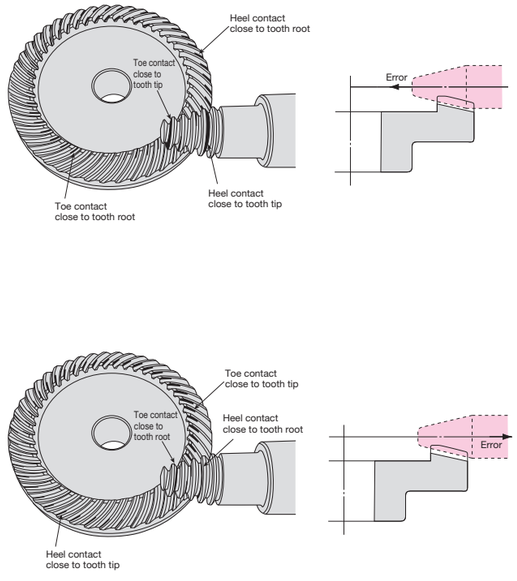
(1) Tooth contact in case of a shaft-angle error



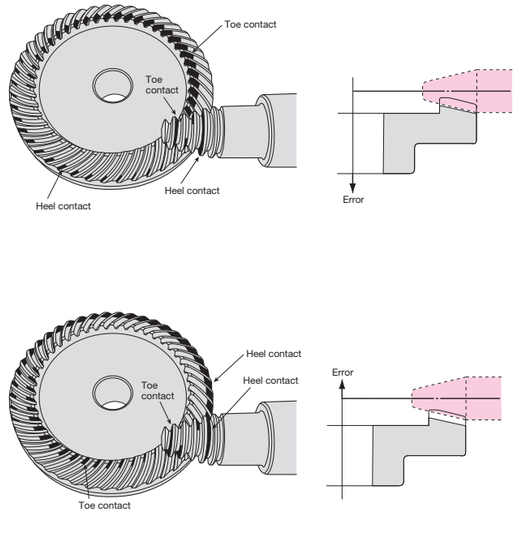
(2) Tooth contact in case of a shaft-offset error



(3) Tooth contact in case of a pinion set position error

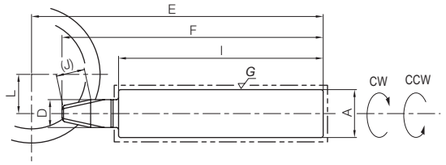


(4) Tooth contact in case of a gear set position error

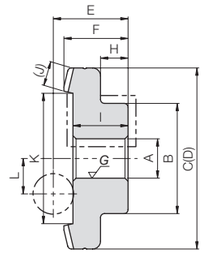


Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°*
Material	SCM415
Heat treatment	Carburized **
Tooth hardness	60 to 63HRC

* 22°30' for MHP1.5-0453R/3045L and MHP1.5-0451R/1045L
** In the illustration, the area surrounded with ---- line is masked during the carburization process (max. HRC40 or so) and can be modified.



B8



B9

Catalog Number	Reduction ratio	Nominal module	Actual module	No. of teeth	Direction of spiral	Shape	Bore/Shaft Dia.	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Hub width	Length of bore and shaft
							A (Bore: H7/Shaft: h7)	B	C	D	E	F	H	I
MHP1-0453R **MHP1-3045L**	15	***m*1**	1.067	45 3	R L	B9 B8	12 22.1	30 —	48 10.3	48 10.3	19 127	16.3 113	7 —	14 94
MHP1.5-0453R **MHP1.5-3045L**	15	***m*1.5**	1.733	45 3	R L	B9 B8	14 31.1	40 —	78 17.6	78 17.6	28 170	23.7 148	10 —	20 116
MHP1.5-0603R **MHP1.5-3060L**	20	***m*1.5**	1.633	60 3	R L	B9 B8	20 36.1	50 —	98 15.7	98 15.7	33 199	28.7 168	13 —	25 135
MHP1-0602R **MHP1-2060L**	30	***m*1**	1.05	60 2	R L	B9 B8	12 22.1	34 —	63 12.8	63 12.8	21 134	17.8 120	8 —	16 94
MHP1-0451R **MHP1-1045L**	45	***m*1**	1.067	45 1	R L	B9 B8	12 20.1	30 —	48 10.1	48 10.1	19 115	16.5 104	7 —	14 85
MHP1.5-0451R **MHP1.5-1045L**	45	***m*1.5**	1.733	45 1	R L	B9 B8	14 26.1	40 —	78 18.3	78 18.3	28 152	23.9 138	10 —	20 102
MHP1-0601R **MHP1-1060L**	60	***m*1**	1.05	60 1	R L	B9 B8	12 22.1	34 —	63 12.9	63 12.9	21 134	17.9 122	8 —	16 94
MHP1.5-0601R **MHP1.5-1060L**	60	***m*1.5**	1.633	60 1	R L	B9 B8	20 31.1	50 —	98 17.7	98 17.7	33 175	28.2 151	13 —	25 116

Face width	Holding surface dia.	Offset	Radial load coefficient		Thrust load coefficient		Backlash	Weight	Catalog Number
(J)	K	L	CW	CCW	CW	CCW	(mm)	(kg)	
(6)	35.1 —	10	48.48 147.3	-37.67 523.74	13 969.92	31.74 -831.16	0.05~0.15	0.15 0.29	**MHP1-0453R** **MHP1-3045L**
(10)	56.5 —	18	26.78 100.09	-18.67 338.45	8.98 566.72	21.19 -466.63	0.10~0.20	0.50 0.73	**MHP1.5-0453R** **MHP1.5-3045L**
(10)	76.8 —	22	20.44 119.32	-16.54 302.18	7.15 577.56	13.95 -511.77	0.10~0.20	0.94 1.15	**MHP1.5-0603R** **MHP1.5-3060L**
(8)	46.4 —	18	33.59 186.59	-24.15 784.31	8.21 1461.23	24.77 -1248.6	0.05~0.15	0.29 0.28	**MHP1-0602R** **MHP1-2060L**
(6)	34.9 —	14	48.04 400.81	-35.58 1579.79	11.13 3014.6	34.11 -2605.26	0.05~0.15	0.16 0.22	**MHP1-0451R** **MHP1-1045L**
(10)	56 —	25	26.36 233.59	-16.04 1034.08	6.88 1755.84	22.02 -1439.58	0.10~0.20	0.50 0.48	**MHP1.5-0451R** **MHP1.5-1045L**
(8)	46.3 —	20	33.34 357.61	-23.12 1564.81	7.41 2936.72	25.14 -2514.09	0.05~0.15	0.29 0.28	**MHP1-0601R** **MHP1-1060L**
(10)	76.8 —	30	22.63 303.06	-17.19 974.4	5.82 1912.11	15.81 -1675.65	0.10~0.20	0.94 0.77	**MHP1.5-0601R** **MHP1.5-1060L**

[Caution on Product Characteristics] ① Radial and thrust load coefficients are the factors used for calculation of those loads. As shown in the figure B8, CW and CCW stand for clockwise and counterclockwise rotation. A plus sign means that the two gears in a set move away each other when load is applied. A minus sign means that two gears in a set approach each other when load is applied. Please see Page 346 for more details.

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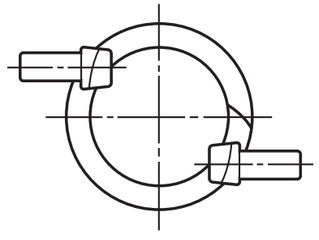
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Helix Hands and Offset Position

MHP High Ratio Hypoid Gears are designed to be right hand helix for gears, left hand helix for pinions. The opposite helix hand gears are not available for these products. Also, the offset position is already set, so please refer to the illustration bellow when designing or assembling.



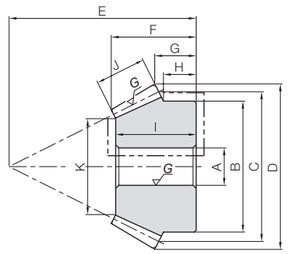
■ MHP allowable transmission torque table

Reduction ratio	Combination	Unit	Rotational speed of pinion / Allowable torque (Gear side)				
			600rpm	900rpm	1200rpm	1800rpm	3000rpm
15	MHP1-0453R MHP1-3045L	N·m	10.3	9.61	8.82	7.35	3.72
		kgf·m	1.05	0.98	0.9	0.75	0.38
15	MHP1.5-0453R MHP1.5-3045L	N·m	41.2	38.2	35.3	29.4	14.7
		kgf·m	4.2	3.9	3.6	3	1.5
20	MHP1.5-0603R MHP1.5-3060L	N·m	82.4	76.7	69.2	54.9	—
		kgf·m	8.4	7.82	7.06	5.6	—
30	MHP1-0602R MHP1-2060L	N·m	24.1	22.5	20.7	17.3	8.62
		kgf·m	2.46	2.29	2.11	1.76	0.88
45	MHP1-0451R MHP1-1045L	N·m	11.3	10.5	9.61	8.04	4.02
		kgf·m	1.15	1.07	0.98	0.82	0.41
45	MHP1.5-0451R MHP1.5-1045L	N·m	46.6	43.2	39.9	33.2	16.7
		kgf·m	4.75	4.41	4.07	3.39	1.7
60	MHP1-0601R MHP1-1060L	N·m	25.3	23.4	21.7	18	9.02
		kgf·m	2.58	2.39	2.21	1.84	0.92
60	MHP1.5-0601R MHP1.5-1060L	N·m	93.9	87.2	76.3	54.9	—
		kgf·m	9.58	8.89	7.78	5.6	—

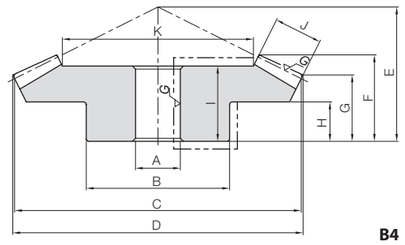
The allowable torques in the table are obtained from the results of experimentation lubricated with Kingstar SG-0 (NIHON GREASE).

Specifications	
Precision grade	JIS B 1704: 1978 grade 1
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
Material	SCM415
Heat treatment	Carburized *
Tooth hardness	55 to 60HRC

* In the illustration, the area surrounded with ---- line is masked during the carburization process (max. HRC40 or so) and can be modified.



B3



B4

Catalog Number	Gear Ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back
						A_{H7}	B	C	D	E	F	G
MBSG2-4020R	2	***m*2**	40	R	B4	15	45	80	81.1	45	31.78	26.1
MBSG2-2040L			20	L	B3	12	35	40	44.1	55	28.16	16.02
MBSG2.5-4020R		***m*2.5**	40	R	B4	16	55	100	101.29	50	33.35	26.29
MBSG2.5-2040L			20	L	B3	12	43	50	55.12	65	31.01	16.28
MBSG3-4020R		***m*3**	40	R	B4	20	65	120	121.57	60	39.81	31.57
MBSG3-2040L			20	L	B3	16	52	60	66.03	80	38.9	21.51
MBSG4-4020R		***m*4**	40	R	B4	25	80	160	162.06	75	48.27	37.06
MBSG4-2040L			20	L	B3	20	70	80	88.46	100	45.38	22.12

Hub width	Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
H	I	J	K	Bending strength	Surface durability	Bending strength	Surface durability			
18	29	14	52.7	56.5	94.2	5.76	9.61	0.04~0.10	0.57	**MBSG2-4020R**
13.75	27		25.39	28.2	47.1	2.88	4.80		0.18	**MBSG2-2040L**
16	30	17	66.99	108	184	11.0	18.7	0.05~0.11	1.01	**MBSG2.5-4020R**
13.25	29		29.97	54.1	91.8	5.52	9.37		0.31	**MBSG2.5-2040L**
20	35	20	80.28	185	318	18.8	32.4	0.06~0.12	1.64	**MBSG3-4020R**
18	36.5		36.56	92.4	159	9.42	16.2		0.56	**MBSG3-2040L**
22	42	27	106.63	441	778	45.0	79.3	0.09~0.15	3.55	**MBSG4-4020R**
17.5	43		51.25	221	389	22.5	39.7		1.20	**MBSG4-2040L**

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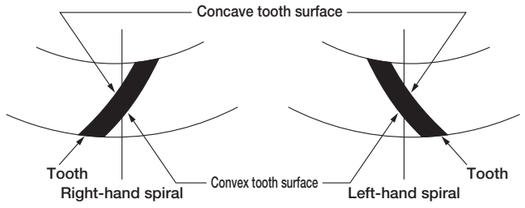
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Mating surface of spiral bevel gears

Spiral bevel gears have convex and concave tooth surfaces. If the direction of rotation of the drive gear differs, the meshing tooth surface will also change. The table on the right shows how to view the convex and concave tooth surfaces and the meshing tooth surface with respect to the direction of rotation of the drive gear.



For right-hand drive gear

Direction of rotation of drive gear NOTE 1	Meshing tooth surface	
	Right-hand drive gear	Left-hand driven gear
Clockwise	Convex tooth surface	Concave tooth surface
Counterclockwise	Concave tooth surface	Convex tooth surface

For left-hand drive gear

Direction of rotation of drive gear NOTE 1	Meshing tooth surface	
	Left-hand drive gear	Right-hand driven gear
Clockwise	Concave tooth surface	Convex tooth surface
Counterclockwise	Convex tooth surface	Concave tooth surface

[NOTE 1] The direction of rotation in the table is as seen from the hub of the gear.

■ The force applied to the teeth of the spiral bevel gear

The table below shows, for spiral bevel gears with an axis angle of $\Sigma = 90°$, pressure angle of $\alpha n = 20°$ and spiral angle of $\beta m = 35°$, the magnitudes of the axial force Fx and radial force Fr where the tangential force Ft at the center of the tooth width is 100.

$$\frac{\text{Thrust force } Fx}{\text{Radial force } Fr} \text{ value}$$

(1) Force applied to pinion

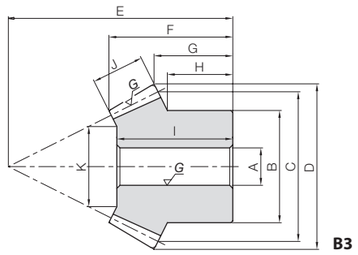
Meshing tooth surface	Gear Ratio z_2/z_1						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave tooth surface	80.9 / −18.1	82.9 / −1.9	82.5 / 8.4	81.5 / 15.2	80.5 / 20.0	78.7 / 26.1	77.4 / 29.8
Convex tooth surface	−18.1 / 80.9	−33.6 / 75.8	−42.8 / 71.1	−48.5 / 67.3	−52.4 / 64.3	−57.2 / 60.1	−59.9 / 57.3

(2) Force applied to gear

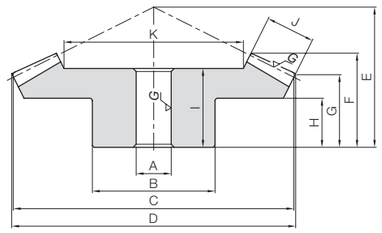
Meshing tooth surface	Gear Ratio z_2/z_1						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave tooth surface	80.9 / −18.1	75.8 / −33.6	71.1 / −42.8	67.3 / −48.5	64.3 / −52.4	60.1 / −57.2	57.3 / −59.9
Convex tooth surface	−18.1 / 80.9	−1.9 / 82.9	8.4 / 82.5	15.2 / 81.5	20.0 / 80.5	26.1 / 78.7	29.8 / 77.4

Specifications	
Precision grade	JIS B 1704: 1978 grade 2
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
Material	S45C
Heat treatment	Gear teeth induction hardened *
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



B3



B4

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Gear Ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back
						A_{H7}	B	C	D	E	F	G
SBSG2-3020R	1.5	***m*2**	30	R	B4	12	35	60	61.6	40	26.6	21.2
SBSG2-2030L			20	L	B3	10	30	40	43.55	45	24.91	16.18
SBSG2.5-3020R		***m*2.5**	30	R	B4	15	45	75	77.09	50	33.86	26.56
SBSG2.5-2030L			20	L	B3	12	40	50	54.43	55	30.88	18.98
SBSG3-3020R		***m*3**	30	R	B4	16	50	90	92.21	55	35.34	26.66
SBSG3-2030L			20	L	B3	16	45	60	65.58	70	40.17	26.86
SBSG4-3020R		***m*4**	30	R	B4	20	70	120	122.85	75	47.49	37.14
SBSG4-2030L			20	L	B3	20	60	80	87.34	90	48.17	32.45
SBSG2-4020R	2	***m*2**	40	R	B4	12	40	80	80.99	45	32.26	25.99
SBSG2-2040L			20	L	B3	12	32	40	44.1	60	34.04	21.02
SBSG2.5-4020R		***m*2.5**	40	R	B4	15	50	100	101.27	55	39.65	31.27
SBSG2.5-2040L			20	L	B3	12	40	50	55.21	75	43.61	26.3
SBSG3-4020R		***m*3**	40	R	B4	20	60	120	121.48	65	45.76	36.48
SBSG3-2040L			20	L	B3	16	50	60	66.06	90	50.63	31.52
SBSG4-4020R		***m*4**	40	R	B4	20	70	160	162.07	80	53.69	42.07
SBSG4-2040L			20	L	B3	20	60	80	88.5	120	66.24	42.12
SBSG2-4515R	3	***m*2**	45	R	B4	12	40	90	90.67	40	30.29	26.01
SBSG2-1545L			15	L	B3	10	24	30	34.78	60	29.66	15.8
SBSG2.5-4515R		***m*2.5**	45	R	B4	15	50	112.5	113.32	50	38.25	32.47
SBSG2.5-1545L			15	L	B3	12	30	37.5	43.36	75	38.27	19.73
SBSG3-4515R		***m*3**	45	R	B4	20	60	135	135.99	55	40.59	33.98
SBSG3-1545L			15	L	B3	15	38	45	52.08	90	44.98	23.68

Hub width	Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash	Weight	Catalog Number
H	I	J	K	Bending strength	Surface durability	Bending strength	Surface durability	(mm)	(kg)	
15	23	11	37.56	14.1	14.2	1.44	1.44	0.05~0.11	0.26	**SBSG2-3020R**
11.67	22		21.34	9.61	9.44	0.98	0.96		0.13	**SBSG2-2030L**
18	30	15	45.61	29.0	29.7	2.96	3.03	0.06~0.12	0.55	**SBSG2.5-3020R**
14.17	28		27.42	19.8	19.8	2.02	2.02		0.28	**SBSG2.5-2030L**
17	31	17	57.14	48.4	50.4	4.94	5.14	0.07~0.13	0.82	**SBSG3-3020R**
20	37		34.71	33.1	33.6	3.37	3.42		0.49	**SBSG3-2030L**
25	40	20	78.59	106	113	10.8	11.5	0.10~0.16	1.90	**SBSG4-3020R**
23.33	43		46.89	72.2	75.3	7.36	7.68		1.05	**SBSG4-2030L**
18	27	15	48.46	25.5	26.7	2.60	2.73	0.05~0.11	0.51	**SBSG2-4020R**
18	32		20.92	12.8	13.4	1.30	1.36		0.19	**SBSG2-2040L**
20	34	20	59.28	51.7	55.1	5.27	5.62	0.06~0.12	1.06	**SBSG2.5-4020R**
22.5	40		20.56	25.9	27.6	2.64	2.81		0.42	**SBSG2.5-2040L**
24	38	22	73.81	84.8	91.9	8.65	9.38	0.07~0.13	1.67	**SBSG3-4020R**
27.5	47		29.61	42.5	46.0	4.33	4.69		0.69	**SBSG3-2040L**
28	45	28	102.39	195	217	19.9	22.2	0.10~0.16	3.33	**SBSG4-4020R**
35	62		42.78	97.9	109	9.98	11.1		1.53	**SBSG4-2040L**
17	26	15	59.04	34.8	28.1	3.55	2.87	0.05~0.11	0.60	**SBSG2-4515R**
14	29		19.13	11.2	9.38	1.14	0.96		0.095	**SBSG2-1545L**
22	35	20	72.84	59.0	48.3	6.01	4.93	0.06~0.12	1.21	**SBSG2.5-4515R**
17.5	37		20.51	18.9	16.1	1.93	1.64		0.19	**SBSG2.5-1545L**
20	35	23	88.18	99.3	82.5	10.1	8.41	0.07~0.13	1.99	**SBSG3-4515R**
21.33	44		28.54	31.8	27.5	3.24	2.80		0.34	**SBSG3-1545L**

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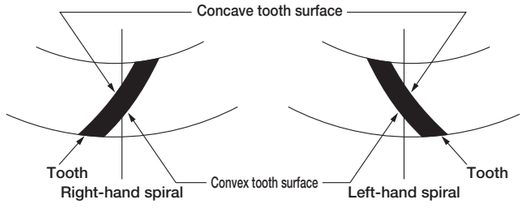
■ Mating surface of spiral bevel gears

Spiral bevel gears have convex and concave tooth surfaces. If the direction of rotation of the drive gear differs, the meshing tooth surface will also change. The table on the right shows how to view the convex and concave tooth surfaces and the meshing tooth surface with respect to the direction of rotation of the drive gear.



For right-hand drive gear

Direction of rotation of drive gear NOTE 1	Meshing tooth surface	
	Right-hand drive gear	Left-hand driven gear
Clockwise	Convex tooth surface	Concave tooth surface
Counterclockwise	Concave tooth surface	Convex tooth surface

For left-hand drive gear

Direction of rotation of drive gear NOTE 1	Meshing tooth surface	
	Left-hand drive gear	Right-hand driven gear
Clockwise	Concave tooth surface	Convex tooth surface
Counterclockwise	Convex tooth surface	Concave tooth surface

[NOTE 1] The direction of rotation in the table is as seen from the hub of the gear.

■ The force applied to the teeth of the spiral bevel gear

The table below shows, for spiral bevel gears with an axis angle of $\Sigma = 90°$, pressure angle of $\alpha n = 20°$ and spiral angle of $\beta m = 35°$, the magnitudes of the axial force Fx and radial force Fr where the tangential force Ft at the center of the tooth width is 100.

$$\frac{\text{Thrust force } Fx}{\text{Radial force } Fr} \text{ value}$$

(1) Force applied to pinion

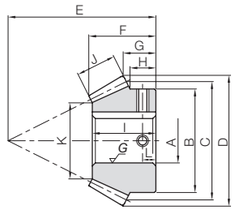
Meshing tooth surface	Gear Ratio z_2/z_1						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave tooth surface	80.9 / −18.1	82.9 / −1.9	82.5 / 8.4	81.5 / 15.2	80.5 / 20.0	78.7 / 26.1	77.4 / 29.8
Convex tooth surface	−18.1 / 80.9	−33.6 / 75.8	−42.8 / 71.1	−48.5 / 67.3	−52.4 / 64.3	−57.2 / 60.1	−59.9 / 57.3

(2) Force applied to gear

Meshing tooth surface	Gear Ratio z_2/z_1						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave tooth surface	80.9 / −18.1	75.8 / −33.6	71.1 / −42.8	67.3 / −48.5	64.3 / −52.4	60.1 / −57.2	57.3 / −59.9
Convex tooth surface	−18.1 / 80.9	−1.9 / 82.9	8.4 / 82.5	15.2 / 81.5	20.0 / 80.5	26.1 / 78.7	29.8 / 77.4

Specifications	
Precision grade	JIS B 1704: 1978 grade 4
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
Material	SCM415
Heat treatment	Carburized *
Tooth hardness	55 to 60HRC

* No secondary operations can be performed on these finished gears due to the applied carburizing process.



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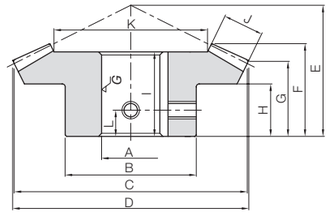

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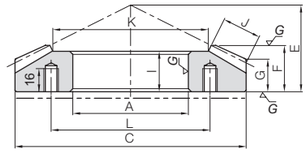


B7

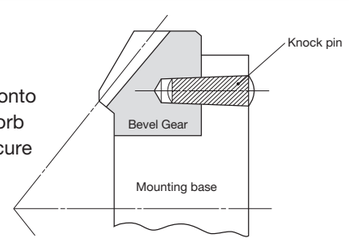
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Gear Ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width	Hole length
						A_{H7}	B	C	D	E	F	G	H	I
MBSA2-3020R **MBSB2-3020R**	1.5	***m*2**	30	R	B4	20 22	40	60	61.36	40	26.8	21.02	14	23
MBSA2-2030L **MBSB2-2030L**		***m*2**	20	L	BK	15 18	35	40	43.49	45	24.96	16.16	13.33	23
MBSA2.5-3020R **MBSB2.5-3020R**		***m*2.5**	30	R	B4	22 25	48	75	76.74	50	33.6	26.31	18	30
MBSA2.5-2030L **MBSB2.5-2030L**		***m*2.5**	20	L	BK	18 20	43	50	54.43	55	30.08	18.98	15.17	28
MBSA3-3020R **MBSB3-3020R**		***m*3**	30	R	B4	25 30	60	90	92.21	60	40.34	31.66	21	36
MBSA3-2030L **MBSB3-2030L**		***m*3**	20	L	BK	22 25	53	60	65.58	65	35.17	21.86	17.67	32.5
MBSA4-3020R **MBSB4-3020R**		***m*4**	30	R	B4	35 40	75	120	122.91	70	43.99	32.18	21	39
MBSA4-2030L **MBSB4-2030L**		***m*4**	20	L	BK	30 35	70	80	87.34	85	45.53	27.45	21.67	42
MBSA5-3020R		***m*5**	30	R	B7	80	—	150	—	70	35.53	23.8	—	31
MBSA5-2030L **MBSB5-2030L**		***m*5**	20	L	BK	35 40	87	100	109.2	105	55.05	33.07	25.67	51
MBSA6-3020R		***m*6**	30	R	B7	90	—	180	—	80	38.86	24.37	—	33
MBSA6-2030L **MBSB6-2030L**		***m*6**	20	L	BK	45 50	105	120	130.48	125	65.57	38.49	30	60
MBSA2-4020R **MBSB2-4020R**	2	***m*2**	40	R	B4	20 22	45	80	81.06	45	31.83	26.06	18	29
MBSA2-2040L **MBSB2-2040L**		***m*2**	20	L	BK	15 18	35	40	44.2	55	28.16	16.05	13.75	27
MBSA2.5-4020R **MBSB2.5-4020R**		***m*2.5**	40	R	B4	25 28	55	100	101.29	50	33.35	26.29	16	30
MBSA2.5-2040L **MBSB2.5-2040L**		***m*2.5**	20	L	BK	20 22	43	50	55.12	65	31.01	16.28	13.25	29
MBSA3-4020R **MBSB3-4020R**		***m*3**	40	R	B4	30 35	65	120	121.57	60	39.81	31.57	21	35
MBSA3-2040L **MBSB3-2040L**		***m*3**	20	L	BK	22 25	53	60	66.03	80	38.9	21.51	18.25	36.5
MBSA4-4020R		***m*4**	40	R	B7	80	—	160	—	60	32.08	22.53	—	28
MBSA4-2040L **MBSB4-2040L**		***m*4**	20	L	BK	30 35	70	80	88.46	100	45.38	22.12	17.5	43
MBSA5-4020R		***m*5**	40	R	B7	90	—	200	—	70	35.2	22.98	—	30
MBSA5-2040L **MBSB5-2040L**		***m*5**	20	L	BK	40 45	87	100	109.91	125	57.11	27.48	21.75	53.5
MBSA6-4020R		***m*6**	40	R	B7	110	—	240	—	80	37.89	23.62	—	32
MBSA6-2040L **MBSB6-2040L**		***m*6**	20	L	BK	50 55	105	120	132.04	150	67.8	33.01	26.25	64

[Caution on Product Characteristics] ① The keyway tolerance is the value before hardening.

Face width	Holding surface dia.	Keyway	Socket head screw		Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
J	K	Width × Depth	Size	L	Bending strength	Surface durability	Bending strength	Surface durability			
11	37.56	6 x 2.8 6 x 2.8	2-M5 2-M5	7	34.4	38.4	3.51	3.91	0.06~0.16	0.26 0.24	**MBSA2-3020R** **MBSB2-3020R**
11	24.34	5 x 2.3 6 x 2.8	2-M4 2-M5	6.5	23.5	25.6	2.39	2.61		0.14 0.13	**MBSA2-2030L** **MBSB2-2030L**
14	48.01	6 x 2.8 8 x 3.3	2-M5 2-M6	9	68.0	76.8	6.93	7.84	0.07~0.17	0.52 0.49	**MBSA2.5-3020R** **MBSB2.5-3020R**
14	31.02	6 x 2.8 6 x 2.8	2-M5 2-M5	7.5	46.4	51.2	4.73	5.22		0.26 0.25	**MBSA2.5-2030L** **MBSB2.5-2030L**
17	57.14	8 x 3.3 8 x 3.3	2-M6 2-M6	11	118	135	12.1	13.8	0.08~0.18	0.96 0.90	**MBSA3-3020R** **MBSB3-3020R**
17	36.2	6 x 2.8 8 x 3.3	2-M5 2-M6	9	80.7	90.1	8.23	9.19		0.46 0.43	**MBSA3-2030L** **MBSB3-2030L**
23	76.72	10 x 3.3 12 x 3.3	2-M8 2-M8	10	283	328	28.9	33.5	0.12~0.27	1.77 1.68	**MBSA4-3020R** **MBSB4-3020R**
23	48.07	8 x 3.3 10 x 3.3	2-M6 2-M8	11	193	219	19.7	22.3		1.03 0.95	**MBSA4-2030L** **MBSB4-2030L**
28	97.36	—	6-M10	110	544	637	55.4	64.9	0.14~0.34	2.80	**MBSA5-3020R**
28	62.04	10 x 3.3 12 x 3.3	2-M8 2-M8	13	371	425	37.8	43.3		2.01 1.89	**MBSA5-2030L** **MBSB5-2030L**
34	115.61	—	6-M10	120	927	1120	94.6	114	0.16~0.36	4.55	**MBSA6-3020R**
34	72.41	14 x 3.8 14 x 3.8	2-M10 2-M10	15	633	745	64.5	76.0		3.56 3.38	**MBSA6-2030L** **MBSB6-2030L**
14	52.7	6 x 2.8 6 x 2.8	2-M5 2-M5	9	59.6	69.6	6.08	7.09	0.06~0.16	0.53 0.51	**MBSA2-4020R** **MBSB2-4020R**
14	25.39	5 x 2.3 6 x 2.8	2-M4 2-M5	7	29.9	34.8	3.05	3.55		0.16 0.14	**MBSA2-2040L** **MBSB2-2040L**
17	66.99	8 x 3.3 8 x 3.3	2-M6 2-M6	8	114	135	11.7	13.8	0.07~0.17	0.93 0.90	**MBSA2.5-4020R** **MBSB2.5-4020R**
17	29.97	6 x 2.8 6 x 2.8	2-M5 2-M5	7	57.3	67.6	5.84	6.89		0.26 0.25	**MBSA2.5-2040L** **MBSB2.5-2040L**
20	80.28	8 x 3.3 10 x 3.3	2-M6 2-M8	11	195	233	19.9	23.7	0.08~0.18	1.47 1.40	**MBSA3-4020R** **MBSB3-4020R**
20	36.56	6 x 2.8 8 x 3.3	2-M5 2-M6	9.5	97.7	116	9.97	11.9		0.51 0.48	**MBSA3-2040L** **MBSB3-2040L**
27	107.63	—	6-M10	110	466	564	47.5	57.5	0.12~0.27	3.11	**MBSA4-4020R**
27	51.25	8 x 3.3 10 x 3.3	2-M6 2-M8	9	234	282	23.8	28.8		1.05 0.96	**MBSA4-2040L** **MBSB4-2040L**
34	133.97	—	6-M10	120	915	1120	93.3	114	0.14~0.34	5.59	**MBSA5-4020R**
34	61.95	12 x 3.3 14 x 3.8	2-M8 2-M10	11	458	559	46.7	57.0		1.96 1.82	**MBSA5-2040L** **MBSB5-2040L**
40	162.56	—	6-M10	140	1530	1920	156	196	0.16~0.36	8.48	**MBSA6-4020R**
40	77.11	14 x 3.8 16 x 4.3	2-M10 2-M10	14	766	961	78.1	97.9		3.33 3.11	**MBSA6-2040L** **MBSB6-2040L**

When installing products produced in B7 style (ring type), always secure the gears onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.



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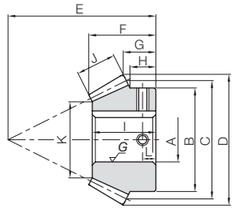
Specifications	
Precision grade	JIS B 1704: 1978 grade 4
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
Material	SCM415
Heat treatment	Carburized *
Tooth hardness	55 to 60HRC

* No secondary operations can be performed on these finished gears due to the applied carburizing process.



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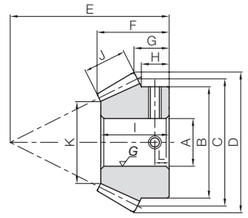

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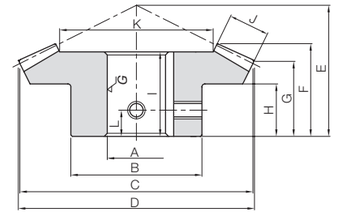

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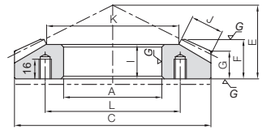

B7

Catalog Number	Gear Ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width	Hole length
						A_{H7}	B	C	D	E	F	G	H	I
MBSA2-4515R **MBSB2-4515R**	3	***m*2**	45	R	B4	20 22	48	90	90.66	40	30.01	25.99	18	27
MBSA2-1545L **MBSB2-1545L**		***m*2**	15	L	BT BK	10 12	26	30	34.59	55	23.78	10.77	9.33	22.5
MBSA2.5-4515R **MBSB2.5-4515R**		***m*2.5**	45	R	B4	22 25	55	112.5	113.28	45	32.43	27.42	18	28
MBSA2.5-1545L **MBSB2.5-1545L**		***m*2.5**	15	L	BK	12 15	32	37.5	43.06	70	30.51	14.68	12.84	29
MBSA3-4515R **MBSB3-4515R**		***m*3**	45	R	B4	30 32	65	135	136.03	55	39.94	34.05	22	35
MBSA3-1545L **MBSB3-1545L**		***m*3**	15	L	BK	18 20	38	45	52	85	38.12	18.67	16.33	36.5
MBSA4-4515R		***m*4**	45	R	B7	80	—	180	—	50	28.85	22.14	—	25
MBSA4-1545L **MBSB4-1545L**		***m*4**	15	L	BK	22 25	52	60	69.24	110	47.51	21.54	18.67	45.5
MBSA5-4515R		***m*5**	45	R	B7	90	—	225	—	60	33.57	25.16	—	28
MBSA5-1545L **MBSB5-1545L**		***m*5**	15	L	BK	28 32	65	75	86.55	135	56.89	24.43	20.83	54
MBSA6-4515R		***m*6**	45	R	B7	110	—	270	—	70	38.28	28.05	—	32
MBSA6-1545L **MBSB6-1545L**		***m*6**	15	L	BK	35 40	78	90	103.13	160	66.39	27.19	23	63

[Caution on Product Characteristics] ① The keyway tolerance is the value before hardening.

Face width	Holding surface dia.	Keyway	Socket head screw		Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
J	K	Width × Depth	Size	L	Bending strength	Surface durability	Bending strength	Surface durability			
14	61.82	6 x 2.8 6 x 2.8	2-M5 2-M5	9	67.8	61.3	6.91	6.25	0.06~0.16	0.61 0.60	**MBSA2-4515R** **MBSB2-4515R**
14	16.46	— 4 x 1.8	2-M4 2-M4	5	21.7	20.4	2.22	2.08		0.081 0.073	**MBSA2-1545L** **MBSB2-1545L**
17	77.83	6 x 2.8 8 x 3.3	2-M5 2-M6	9	130	119	13.3	12.1	0.07~0.17	1.01 0.98	**MBSA2.5-4515R** **MBSB2.5-4515R**
17	21.48	4 x 1.8 5 x 2.3	2-M4 2-M4	7	41.6	39.6	4.24	4.04		0.16 0.15	**MBSA2.5-1545L** **MBSB2.5-1545L**
21	92.39	8 x 3.3 10 x 3.3	2-M6 2-M8	11	229	211	23.3	21.6	0.08~0.18	1.78 1.75	**MBSA3-4515R** **MBSB3-4515R**
21	26.18	6 x 2.8 6 x 2.8	2-M5 2-M5	9	73.3	70.5	7.48	7.18		0.26 0.24	**MBSA3-1545L** **MBSB3-1545L**
28	124.3	—	6-M10	110	542	508	55.3	51.8	0.12~0.27	3.93	**MBSA4-4515R**
28	35.91	6 x 2.8 8 x 3.3	2-M5 2-M6	10	174	169	17.7	17.3		0.63 0.58	**MBSA4-1545L** **MBSB4-1545L**
35	154.88	—	6-M10	120	1060	1000	108	102	0.14~0.34	7.38	**MBSA5-4515R**
35	42.64	8 x 3.3 10 x 3.3	2-M6 2-M8	11	339	334	34.6	34.1		1.16 1.07	**MBSA5-1545L** **MBSB5-1545L**
42	186.12	—	6-M10	140	1790	1740	183	178	0.16~0.36	12.0	**MBSA6-4515R**
42	52.37	10 x 3.3 12 x 3.3	2-M8 2-M8	12	575	581	58.6	59.3		1.90 1.75	**MBSA6-1545L** **MBSB6-1545L**

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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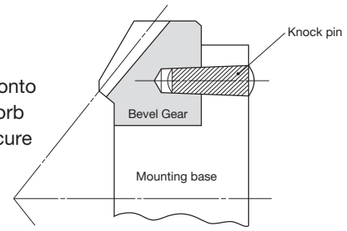
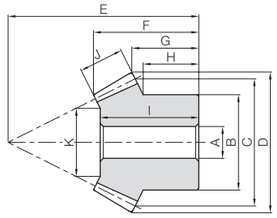
When installing products produced in B7 style (ring type), always secure the gears onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.



Product Precautions → Page 342

Specifications	
Precision grade	JIS B 1704: 1978 grade 4
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
Material	S45C
Heat treatment	Gear teeth induction hardened *
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* 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).



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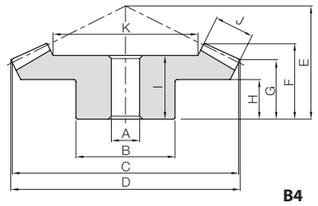

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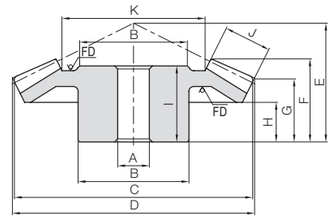


B5

* FD has a forged finish surface.

Catalog Number	Gear Ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back
						A	B	C	D	E	F	G
SBS2-3020R	1.5	***m*2**	30	R	B4	12	35	60	61.36	40	26.8	21.02
SBS2-2030L			20	L	B3	10	30	40	43.49	45	24.96	16.16
SBS2.5-3020R		***m*2.5**	30	R	B4	15	45	75	77.09	50	33.86	26.56
SBS2.5-2030L			20	L	B3	12	40	50	54.43	55	30.88	18.98
SBS3-3020R		***m*3**	30	R	B4	16	50	90	92.21	55	35.34	26.66
SBS3-2030L			20	L	B3	16	45	60	65.58	70	40.17	26.86
SBS4-3020R		***m*4**	30	R	B4	20	70	120	122.85	75	47.49	37.14
SBS4-2030L			20	L	B3	20	60	80	87.34	90	48.17	32.45
SBS5-3020R		***m*5**	30	R	B4	25	90	150	153.67	90	58.08	42.75
SBS5-2030L			20	L	B3	22	80	100	109.2	110	61.62	38.07
SBS1-4020R	2	***m*1**	40	R	B4	8	25	40	40.52	22	15.02	12.52
SBS1-2040L			20	L	B3	6	16	20	22.08	28	13.73	8.52
SBS1.5-4020R		***m*1.5**	40	R	B4	10	38	60	60.75	35	24.93	20.75
SBS1.5-2040L			20	L	B3	8	25	30	33.08	46	25.45	16.77
SBS2-4020R		***m*2**	40	R	B4	12	40	80	81	45	32.27	26
SBS2-2040L			20	L	B3	12	32	40	44.1	60	34.04	21.02
SBS2.5-4020R		***m*2.5**	40	R	B4	15	50	100	101.27	55	39.65	31.27
SBS2.5-2040L			20	L	B3	12	40	50	55.2	75	43.61	26.3
SBS3-4020R		***m*3**	40	R	B4	20	60	120	121.48	65	45.76	36.47
SBS3-2040L			20	L	B3	16	50	60	66.07	90	50.63	31.52
SBS4-4020R		***m*4**	40	R	B4	20	70	160	162.07	80	53.69	42.07
SBS4-2040L			20	L	B3	20	60	80	88.5	120	66.24	42.12
SBS5-4020R		***m*5**	40	R	B5	25	100	200	202.54	90	55.02	42.54
SBS5-2040L			20	L	B3	22	80	100	110.45	140	68.48	42.61
SBS3-3618R	2	***m*3**	36	R	B4	20	60	108	109.53	52	34.82	26.53
SBS3-1836L			18	L	B3	16	46	54	60.28	75	39.78	22.57
SBS4-3618R		***m*4**	36	R	B4	20	70	144	145.99	72	48.84	37.99
SBS4-1836L			18	L	B3	20	60	72	80.19	100	52.51	30.05
SBS2-4518R	2.5	***m*2**	45	R	B4	12	48	90	90.79	40	27.67	22.98
SBS2-1845L			18	L	B3	10	32	36	40.42	60	28.54	15.88
SBS2.5-4518R		***m*2.5**	45	R	B4	15	55	112.5	113.49	50	34.94	28.74
SBS2.5-1845L			18	L	B3	12	40	45	50.35	72	33.19	16.82
SBS3-4518R		***m*3**	45	R	B4	20	65	135	136.24	60	41.65	34.55
SBS3-1845L			18	L	B3	16	48	54	60.69	85	37.82	18.84
SBS4-4518R		***m*4**	45	R	B4	25	80	180	181.57	75	50.98	40.96
SBS4-1845L			18	L	B3	20	62	72	80.86	110	48.03	21.77
SBS5-4518R		***m*5**	45	R	B4	30	100	225	225.81	90	57.9	46.01
SBS5-1845L			18	L	B3	22	80	90	103.87	135	56.02	25.27

[Caution on Product Characteristics] ① The bore may slightly vary due to the effect of heat treatment. When using with the listed bore diameter, you may need to ream the bore prior to use.

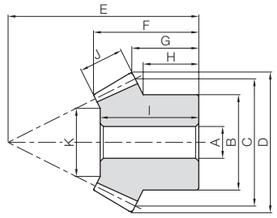
Hub width	Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
H	I	J	K	Bending strength	Surface durability	Bending strength	Surface durability			
15	23	11	37.56	15.4	11.3	1.57	1.15	0.06~0.16	0.26	**SBS2-3020R**
11.67	22		21.34	10.5	7.52	1.07	0.77		0.13	**SBS2-2030L**
18	30	15	45.61	31.7	23.6	3.23	2.40	0.07~0.17	0.55	**SBS2.5-3020R**
14.17	28		27.42	21.6	15.7	2.20	1.60		0.28	**SBS2.5-2030L**
17	31	17	57.14	52.9	39.7	5.39	4.05	0.08~0.18	0.82	**SBS3-3020R**
20	37		34.71	36.1	26.5	3.68	2.70		0.49	**SBS3-2030L**
25	40	20	78.59	115	88.1	11.8	8.99	0.12~0.27	1.90	**SBS4-3020R**
23.33	43		46.89	78.7	58.8	8.03	5.99		1.05	**SBS4-2030L**
24	50	30	91.22	253	195	25.8	19.9	0.14~0.34	4.11	**SBS5-3020R**
28.33	56		54.83	173	130	17.6	13.3		2.29	**SBS5-2030L**
8	12	6	26.58	3.01	2.22	0.31	0.23	0.03~0.13	0.068	**SBS1-4020R**
7	12		9.17	1.51	1.11	0.15	0.11		0.019	**SBS1-2040L**
15	22	10	39.64	10.9	8.22	1.11	0.84	0.05~0.15	0.27	**SBS1.5-4020R**
14.75	24		17.28	5.46	4.11	0.56	0.42		0.088	**SBS1.5-2040L**
18	27	15	48.46	27.8	21.3	2.83	2.17	0.06~0.16	0.51	**SBS2-4020R**
18	32		20.92	13.9	10.7	1.42	1.09		0.19	**SBS2-2040L**
20	34	20	59.28	56.4	43.7	5.75	4.46	0.07~0.17	1.06	**SBS2.5-4020R**
22.5	40		20.56	28.2	21.9	2.88	2.23		0.40	**SBS2.5-2040L**
24	38	22	73.81	92.5	72.6	9.44	7.40	0.08~0.18	1.67	**SBS3-4020R**
27.5	47		29.61	46.4	36.3	4.73	3.70		0.69	**SBS3-2040L**
28	45	28	102.39	213	170	21.7	17.3	0.12~0.27	3.33	**SBS4-4020R**
35	62		42.78	107	84.8	10.9	8.65		1.46	**SBS4-2040L**
26	50	30	138.92	376	302	38.3	30.8	0.14~0.34	5.67	**SBS5-4020R**
35	63		57.84	188	151	19.2	15.4		2.61	**SBS5-2040L**
17	30	20	68.27	74.0	52.4	7.54	5.35	0.08~0.18	1.15	**SBS3-3618R**
19	37		28.56	37.0	26.2	3.78	2.67		0.44	**SBS3-1836L**
25	42	26	91.87	173	124	17.6	12.7	0.12~0.27	2.65	**SBS4-3618R**
25	49		39.72	86.4	62.1	8.81	6.33		1.03	**SBS4-1836L**
15	25	14	62.24	31.0	21.9	3.16	2.23	0.06~0.16	0.65	**SBS2-4518R**
14.2	27.5		23.11	12.2	8.74	1.24	0.89		0.15	**SBS2-1845L**
18	31	18	76.53	61.6	44.0	6.28	4.49	0.07~0.17	1.23	**SBS2.5-4518R**
14.75	31.5		26.82	24.2	17.6	2.47	1.80		0.28	**SBS2.5-1845L**
22	37	21	92.96	104	75.4	10.7	7.69	0.08~0.18	2.05	**SBS3-4518R**
16.3	36		33.41	41.0	30.2	4.18	3.07		0.45	**SBS3-1845L**
24	45	29	122.33	253	185	25.8	18.9	0.12~0.27	4.62	**SBS4-4518R**
18	46		45.83	99.5	74.1	10.2	7.56		1.00	**SBS4-1845L**
28	51	34	156.56	474	350	48.4	35.7	0.14~0.34	8.11	**SBS5-4518R**
20.5	52.5		56.9	186	140	19.0	14.3		1.94	**SBS5-1845L**

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Product Precautions → Page 342

Specifications	
Precision grade	JIS B 1704: 1978 grade 4
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°*
Material	S45C
Heat treatment	Gear teeth induction hardened **
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* 6015R and 1560L of SBS1.5 and 2 are 39°.
** 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).



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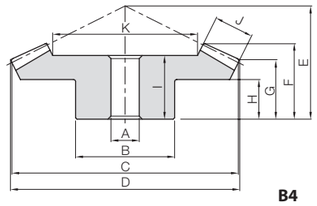

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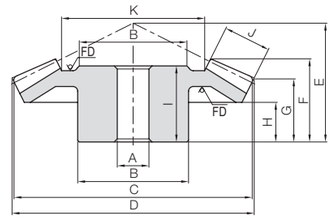

B5

* FD has a forged finish surface.

Catalog Number	Gear Ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width	Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
						A	B	C	D	E	F	G	H	I	J	K	Bending strength	Surface durability	Bending strength	Surface durability			
SBS2-4515R	3	***m*2**	45	R	B4	12	40	90	90.67	40	30.29	26.01	17	26	15	59.04	31.7	18.8	3.23	1.92	0.06~0.16	0.60	**SBS2-4515R**
SBS2-1545L			15	L	B3	10	24	30	34.78	60	29.66	15.8	14	29		19.13	10.1	6.27	1.03	0.64		0.095	**SBS2-1545L**
SBS2.5-4515R		***m*2.5**	45	R	B4	15	50	112.5	113.32	50	38.25	32.47	22	35	20	72.82	64.3	38.7	6.56	3.94	0.07~0.17	1.21	**SBS2.5-4515R**
SBS2.5-1545L			15	L	B3	12	30	37.5	43.36	75	38.27	19.73	17.5	37		20.51	20.6	12.9	2.10	1.31		0.19	**SBS2.5-1545L**
SBS3-4515R		***m*3**	45	R	B4	20	60	135	135.99	55	40.59	33.98	20	35	23	88.18	108	65.8	11.1	6.71	0.08~0.18	1.99	**SBS3-4515R**
SBS3-1545L			15	L	B3	15	38	45	52.08	90	44.98	23.68	21.33	44		28.54	34.7	21.9	3.54	2.24		0.34	**SBS3-1545L**
SBS4-4515R		***m*4**	45	R	B5	20	80	180	181.3	70	50.62	41.95	24	45	30	118.08	253	156	25.8	15.9	0.12~0.27	4.04	**SBS4-4515R**
SBS4-1545L			15	L	B3	16	50	60	69.3	115	54.37	26.55	23.33	52		32.26	81.1	52.0	8.27	5.30		0.76	**SBS4-1545L**
SBS5-4515R		***m*5**	45	R	B5	30	90	225	226.61	75	50.05	39.92	20	44	35	152.88	473	295	48.3	30.0	0.14~0.34	6.08	**SBS5-4515R**
SBS5-1545L			15	L	B3	20	60	75	86.55	145	66.89	34.43	30	65		48.64	152	98.2	15.5	10.0		1.44	**SBS5-1545L**
SBS1.5-6015R	4	***m*1.5**	60	R	B4	12	60	90	90.36	32	24.08	21.48	12	21	12	65.39	17.9	12.9	1.83	1.31	0.05~0.15	0.70	**SBS1.5-6015R**
SBS1.5-1560L			15	L	B3	8	18	22.5	26.09	56	22.95	11.45	10.43	22.5		15.55	4.22	3.21	0.43	0.33		0.042	**SBS1.5-1560L**
SBS2-6015R		***m*2**	60	R	B4	15	80	120	120.46	42	31.5	27.91	16	27	16	87.02	42.5	30.9	4.33	3.15	0.06~0.16	1.59	**SBS2-6015R**
SBS2-1560L			15	L	B3	10	24	30	34.68	75	30.94	15.58	14.25	30		18.06	10.0	7.73	1.02	0.79		0.10	**SBS2-1560L**
SBS2.5-6015R		***m*2.5**	60	R	B4	20	100	150	150.5	53	39.68	35.24	20	34	20	108.64	96.1	58.4	9.79	5.95	0.07~0.17	3.13	**SBS2.5-6015R**
SBS2.5-1560L			15	L	B3	12	30	37.5	44.16	94	38.9	19.83	18.06	37.5		20.58	22.6	14.6	2.31	1.49		0.20	**SBS2.5-1560L**
SBS3-6015R		***m*3**	60	R	B4	20	120	180	180.57	64	47.61	42.64	25	41	22	134.4	156	95.7	15.9	9.76	0.08~0.18	5.38	**SBS3-6015R**
SBS3-1560L			15	L	B3	15	38	45	52.64	112	44.01	22.96	21.12	43		31.58	36.8	23.9	3.75	2.44		0.35	**SBS3-1560L**

[Caution on Product Characteristics] ① The bore may slightly vary due to the effect of heat treatment. When using with the listed bore diameter, you may need to ream the bore prior to use.

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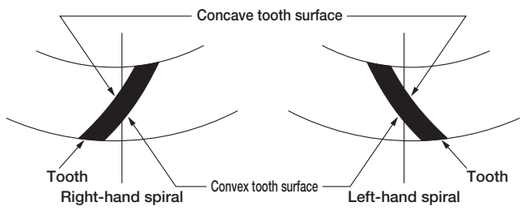
■ Mating surface of spiral bevel gears

Spiral bevel gears have convex and concave tooth surfaces. If the direction of rotation of the drive gear differs, the meshing tooth surface will also change. The table on the right shows how to view the convex and concave tooth surfaces and the meshing tooth surface with respect to the direction of rotation of the drive gear.



For right-hand drive gear

Direction of rotation of drive gear NOTE 1	Meshing tooth surface	
	Right-hand drive gear	Left-hand driven gear
Clockwise	Convex tooth surface	Concave tooth surface
Counterclockwise	Concave tooth surface	Convex tooth surface

For left-hand drive gear

Direction of rotation of drive gear NOTE 1	Meshing tooth surface	
	Left-hand drive gear	Right-hand driven gear
Clockwise	Concave tooth surface	Convex tooth surface
Counterclockwise	Convex tooth surface	Concave tooth surface

[NOTE 1] The direction of rotation in the table is as seen from the hub of the gear.

■ The force applied to the teeth of the spiral bevel gear

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

The table below shows, for spiral bevel gears with an axis angle of $\Sigma = 90°$, pressure angle of $\alpha n = 20°$ and spiral angle of $\beta m = 35°$, the magnitudes of the axial force Fx and radial force Fr where the tangential force Ft at the center of the tooth width is 100.

$$\frac{\text{Thrust force } Fx}{\text{Radial force } Fr} \text{ value}$$

(1) Force applied to pinion

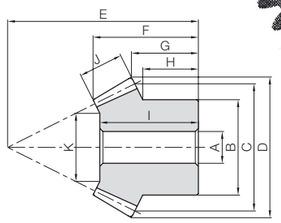
Meshing tooth surface	Gear Ratio z_2/z_1						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave tooth surface	80.9 −18.1	82.9 −1.9	82.5 8.4	81.5 15.2	80.5 20.0	78.7 26.1	77.4 29.8
Convex tooth surface	−18.1 80.9	−33.6 75.8	−42.8 71.1	−48.5 67.3	−52.4 64.3	−57.2 60.1	−59.9 57.3

(2) Force applied to gear

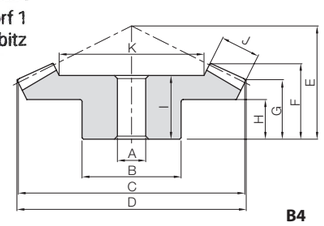
Meshing tooth surface	Gear Ratio z_2/z_1						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave tooth surface	80.9 −18.1	75.8 −33.6	71.1 −42.8	67.3 −48.5	64.3 −52.4	60.1 −57.2	57.3 −59.9
Convex tooth surface	−18.1 80.9	−1.9 82.9	8.4 82.5	15.2 81.5	20.0 80.5	26.1 78.7	29.8 77.4

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating



B3



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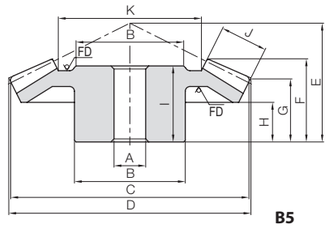

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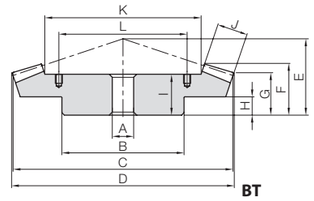


BT

To order Hardened Plus, please specify Catalog No. + H. **Example: SB1.5-3020H**

Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width
					A_{H7}	B	C	D	E	F	G	H
SB1.5-3020 H	1.5	*m*1.5	30	B4	10	30	45	46.24	28	18.53	13.93	8
SB1.5-2030 H			20	B3	8	25	30	33.13	33	18.63	11.54	8.83
SB2-3020 H		*m*2	30	B4	10	35	60	61.65	40	26.87	21.24	15
SB2-2030 H			20	B3	10	30	40	44.18	45	25.06	16.39	11.67
SB2.5-3020 H		*m*2.5	30	B4	15	45	75	77.07	50	34.22	26.55	18
SB2.5-2030 H			20	B3	12	35	50	55.22	55	31.06	19.24	12.5
SB3-3020 H		*m*3	30	B4	15	50	90	92.48	55	35.56	26.86	17
SB3-2030 H			20	B3	15	45	60	66.27	70	40.48	27.09	20
SB4-3020 H		*m*4	30	B4	20	70	120	123.3	75	47.71	37.48	25
SB4-2030 H			20	B3	15	60	80	88.32	90	48.53	32.77	23.33
SB5-3020 H		*m*5	30	B4	25	90	150	154.13	90	58.45	43.1	24
SB5-2030 H			20	B3	20	80	100	110.45	110	62.11	38.48	28.33
SB1.5-3015 H	2	*m*1.5	30	B4	8	25	45	45.88	25	17.85	14.63	9
SB1.5-1530 H			15	B3	6	16	22.5	26.11	32	17.23	10.4	7.88
SB2-3015 H		*m*2	30	B4	10	30	60	61.17	31	21.6	17.17	10
SB2-1530 H			15	B3	8	22	30	34.81	40	20.59	11.2	8
SB2.5-3015 H		*m*2.5	30	B4	15	40	75	76.46	40	28.75	22.71	15
SB2.5-1530 H			15	B3	12	30	37.5	43.51	55	31.81	19	15.63
SB3-3015 H		*m*3	30	B4	16	50	90	91.76	50	37.31	29.26	18
SB3-1530 H			15	B3	12	35	45	52.22	70	43.88	26.8	22.5
SB4-3015 H		*m*4	30	B4	20	60	120	122.34	60	42.4	32.34	20
SB4-1530 H			15	B3	16	50	60	69.62	85	48.74	27.41	22.5
SB5-3015 H		*m*5	30	B5	20	70	150	152.93	75	52.5	40.43	25
SB5-1530 H			15	B3	20	60	75	87.03	110	63.61	38.01	31.25
SB6-3015 H		*m*6	30	B5	25	80	180	183.5	90	62.56	48.49	28
SB6-1530 H			15	B3	25	70	90	104.44	125	68.48	38.6	30
SB2.5-3618 H	2	*m*2.5	36	B4	15	55	90	91.46	43	28.52	21.96	13
SB2.5-1836 H			18	B3	12	38	45	51.01	64	34.27	20.5	17.25
SB3-3618 H		*m*3	36	B4	20	60	108	109.76	52	34.95	26.76	17
SB3-1836 H			18	B3	16	46	54	61.22	75	40.01	22.8	19
SB4-3618 H		*m*4	36	B4	20	70	144	146.34	72	49	38.34	25
SB4-1836 H			18	B3	20	60	72	81.62	100	52.77	30.41	25
SB1-4020 H	2	*m*1	40	B4	8	25	40	40.59	22	15.07	12.59	8
SB1-2040 H			20	B3	6	16	20	22.41	28	13.78	8.6	7
SB1.25-4020 H		*m*1.25	40	B4	10	32	50	50.73	27	18.54	15.23	10
SB1.25-2040 H			20	B3	8	22	25	28.01	36	18.66	11.75	10.25
SB1.5-4020 H		*m*1.5	40	B4	10	38	60	60.88	35	25.01	20.88	15
SB1.5-2040 H			20	B3	8	25	30	33.61	46	25.54	16.9	14.75
SB2-4020 H		*m*2	40	B4	12	40	80	81.17	45	32.37	26.17	18
SB2-2040 H			20	B3	12	32	40	44.81	60	34.16	21.2	18
SB2.5-4020 H		*m*2.5	40	B4	15	50	100	101.46	55	39.73	31.46	20
SB2.5-2040 H			20	B3	12	40	50	56.01	75	43.78	26.5	22.5
SB3-4020 H		*m*3	40	B4	20	60	120	121.76	65	45.85	36.76	24
SB3-2040 H			20	B3	16	50	60	67.22	90	50.81	31.8	27.5
SB4-4020 H		*m*4	40	B4	20	70	160	162.34	80	53.92	42.34	28
SB4-2040 H			20	B3	20	60	80	89.62	120	66.59	42.41	35
SB5-4020 H		*m*5	40	B5	25	100	200	202.93	90	55.33	42.93	26
SB5-2040 H			20	B3	20	80	100	112.03	140	68.92	43.01	35
SB6-4020 H		*m*6	40	B5	25	85	240	243.52	105	65.05	48.52	28
SB6-2040 H			20	B3	25	90	120	134.44	160	78.16	43.6	32.5
SBY8-4020 H		*m*8	40	BT	35	180	320	324.69	130	75.36	54.69	25
SBY8-2040 H			20	B3	30	120	160	179.25	210	98	54.81	40

* FD has a forged finish surface.

Hole length	Face width	Holding surface dia.	Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability H		Backlash (mm)	Weight (kg)	Catalog Number
I	J	K	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m			
16	9	27.37	5.82	0.59	0.65	0.07	2.78	0.28	0.05~0.15	0.12	**SB1.5-3020** H
17		17.05	4.04	0.41	0.44	0.04	1.86	0.19		0.063	**SB1.5-2030** H
23	11	37.56	13.1	1.33	1.52	0.16	6.37	0.65	0.06~0.16	0.26	**SB2-3020** H
22		21.34	9.07	0.92	1.01	0.10	4.25	0.43		0.14	**SB2-2030** H
30	15	45.61	26.9	2.75	3.21	0.33	13.3	1.36	0.07~0.17	0.55	**SB2.5-3020** H
28		27.42	18.7	1.91	2.14	0.22	8.86	0.90		0.25	**SB2.5-2030** H
31	17	57.14	44.9	4.58	5.45	0.56	22.4	2.29	0.08~0.18	0.83	**SB3-3020** H
37		34.71	31.2	3.18	3.63	0.37	14.9	1.52		0.50	**SB3-2030** H
40	20	78.59	98.2	10.0	12.3	1.25	49.8	5.07	0.12~0.27	1.91	**SB4-3020** H
43		46.89	68.1	6.95	8.20	0.84	33.2	3.38		1.10	**SB4-2030** H
50	30	91.22	215	22.0	27.6	2.81	110	11.2	0.14~0.34	4.13	**SB5-3020** H
56		54.83	150	15.3	18.4	1.87	73.5	7.49		2.34	**SB5-2030** H
15	8	28.36	5.02	0.51	0.47	0.05	2.02	0.21	0.05~0.15	0.10	**SB1.5-3015** H
15.5		10.72	2.60	0.26	0.24	0.02	1.01	0.10		0.028	**SB1.5-1530** H
18	11	37.4	12.1	1.24	1.18	0.12	4.96	0.51	0.06~0.16	0.21	**SB2-3015** H
19		16.81	6.28	0.64	0.59	0.06	2.48	0.25		0.064	**SB2-1530** H
24	15	44.21	24.9	2.54	2.48	0.25	10.3	1.05	0.07~0.17	0.41	**SB2.5-3015** H
29		16.42	12.9	1.32	1.24	0.13	5.16	0.53		0.15	**SB2.5-1530** H
30	20	47.78	45.6	4.65	4.60	0.47	19.1	1.94	0.08~0.18	0.83	**SB3-3015** H
41		19.56	23.6	2.41	2.30	0.23	9.53	0.97		0.31	**SB3-1530** H
36	25	70.1	104	10.7	10.9	1.11	44.4	4.53	0.12~0.27	1.64	**SB4-3015** H
46		32.2	54.0	5.51	5.43	0.55	22.2	2.26		0.66	**SB4-1530** H
48	30	90.41	199	20.3	21.3	2.17	85.7	8.74	0.14~0.34	2.72	**SB5-3015** H
58		32.83	103	10.5	10.6	1.09	42.9	4.37		1.28	**SB5-1530** H
57	35	109.74	336	34.2	36.9	3.77	147	15.0	0.16~0.36	4.75	**SB6-3015** H
63		45.47	174	17.7	18.5	1.88	73.5	7.50		1.94	**SB6-1530** H
24	16	57.72	35.9	3.66	4.08	0.42	16.8	1.72	0.07~0.17	0.72	**SB2.5-3618** H
32		25.44	18.1	1.84	2.04	0.21	8.42	0.86		0.27	**SB2.5-1836** H
30	20	68.28	63.7	6.49	7.34	0.75	30.1	3.07	0.08~0.18	1.15	**SB3-3618** H
37		28.56	32.0	3.27	3.67	0.37	15.1	1.54		0.44	**SB3-1836** H
42	26	91.86	149	15.2	17.7	1.80	71.3	7.27	0.12~0.27	2.66	**SB4-3618** H
49		39.72	74.8	7.62	8.85	0.90	35.7	3.64		1.04	**SB4-1836** H
12	6	26.58	2.61	0.27	0.29	0.03	1.26	0.13	0.03~0.13	0.068	**SB1-4020** H
12		9.17	1.32	0.13	0.15	0.02	0.63	0.065		0.019	**SB1-2040** H
16	8	33.61	5.33	0.54	0.61	0.06	2.61	0.27	0.04~0.14	0.14	**SB1.25-4020** H
17		13.22	2.69	0.27	0.31	0.03	1.30	0.13		0.046	**SB1.25-2040** H
22	10	39.64	9.47	0.97	1.11	0.11	4.68	0.48	0.05~0.15	0.27	**SB1.5-4020** H
24		17.28	4.77	0.49	0.56	0.06	2.34	0.24		0.089	**SB1.5-2040** H
27	15	48.46	24.2	2.46	2.92	0.30	12.1	1.24	0.06~0.16	0.51	**SB2-4020** H
32		20.92	12.2	1.24	1.46	0.15	6.06	0.62		0.19	**SB2-2040** H
35	20	60.28	49.0	4.99	6.04	0.62	24.9	2.54	0.07~0.17	1.09	**SB2.5-4020** H
41		24.56	24.7	2.52	3.02	0.31	12.4	1.27		0.40	**SB2.5-2040** H
38	22	73.81	80.4	8.20	10.1	1.03	41.3	4.21	0.08~0.18	1.68	**SB3-4020** H
47		29.61	40.5	4.13	5.06	0.52	20.6	2.11		0.70	**SB3-2040** H
45	28	102.39	185	18.9	24.1	2.46	96.5	9.84	0.12~0.27	3.34	**SB4-4020** H
62		42.78	93.3	9.51	12.0	1.23	48.2	4.92		1.47	**SB4-2040** H
50	30	138.92	327	33.3	43.9	4.47	172	17.5	0.14~0.34	5.63	**SB5-4020** H
63		57.84	165	16.8	21.9	2.24	86.0	8.77		2.67	**SB5-2040** H
58	40	158.56	600	61.2	83.2	8.48	321	32.8	0.16~0.36	7.77	**SB6-4020** H
70		61.11	302	30.8	41.6	4.24	161	16.4		4.08	**SB6-2040** H
61	50	219.2	1350	138	196	20.0	739	75.4	0.20~0.45	25.75	**SBY8-4020** H
90		96.39	679	69.3	98.1	10.0	370	37.7		9.41	**SBY8-2040** H

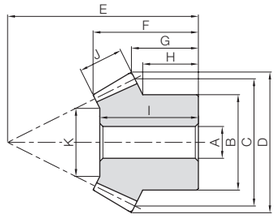
* Please see Page 364 for Caution on Product Characteristics and Caution on Secondary Operations.

Catalog Number	L (mm)	Tap Size
SBY8-4020	160	M10 deep 20

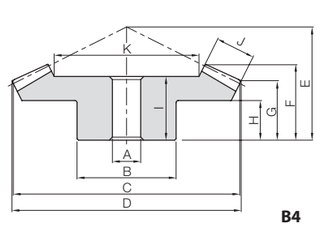
For the handling conveniences, the products listed on the left have the tapped holes (180° apart, 2 places) on the holding surface.

Product Precautions → Page 342
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating



B3



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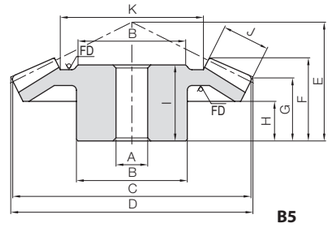

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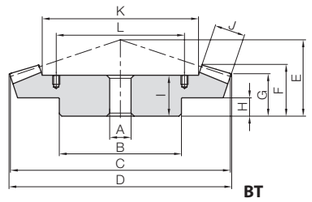


BT

* FD has a forged finish surface.

To order Hardened Plus, please specify Catalog No. + H. **Example: SB1-4518H**

Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width
					A_{H7}	B	C	D	E	F	G	H
SB1-4518	2.5	***m*1**	45	B4	8	30	45	45.46	23	16.95	14.57	10
SB1-1845			18	B3	6	15	18	20.57	32	16.34	10.02	8.9
SB1.5-4518		***m*1.5**	45	B4	10	36	67.5	68.18	30	21.1	17.35	10
SB1.5-1845			18	B3	8	23	27	30.86	45	21.97	12.02	10.45
SB2-4518		***m*2**	45	B4	12	48	90	90.91	40	27.91	23.14	15
SB2-1845			18	B3	10	32	36	41.15	60	28.69	16.03	14.2
SB2.5-4518		***m*2.5**	45	B4	15	55	112.5	113.64	50	35.06	28.92	18
SB2.5-1845			18	B3	12	40	45	51.44	72	33.31	17.04	14.75
SB3-4518		***m*3**	45	B4	20	65	135	136.37	60	41.86	34.71	22
SB3-1845			18	B3	16	48	54	61.72	85	38.04	19.05	16.3
SB4-4518		***m*4**	45	B4	20	80	180	181.82	75	51.16	41.28	24
SB4-1845			18	B3	20	62	72	82.3	110	48.28	22.06	18
SB5-4518		***m*5**	45	B4	25	100	225	227.28	90	59.43	47.85	28
SB5-1845			18	B3	20	80	90	102.87	135	55.82	25.07	20.5
SB1-4515	3	***m*1**	45	B4	8	30	45	45.37	17	11.77	10.06	5
SB1-1545			15	B3	6	12	15	17.67	29	12.51	6.95	6
SB1.25-4515		***m*1.25**	45	B4	10	34	56.25	56.72	21	14.61	12.33	6
SB1.25-1545			15	B3	8	15	18.75	22.09	36	15.85	8.43	7.25
SB1.5-4515		***m*1.5**	45	B4	10	36	67.5	68.06	28	20.44	17.59	11
SB1.5-1545			15	B3	8	18	22.5	26.54	47	23.19	13.92	12.5
SB2-4515		***m*2**	45	B4	12	40	90	90.75	40	30.4	26.12	17
SB2-1545			15	B3	10	24	30	35.35	60	29.8	15.89	14
SB2.5-4515		***m*2.5**	45	B4	15	50	112.5	113.43	50	38.35	32.65	22
SB2.5-1545			15	B3	12	30	37.5	44.18	75	38.41	19.86	17.5
SB3-4515		***m*3**	45	B4	20	60	135	136.12	55	40.74	34.18	20
SB3-1545			15	B3	15	38	45	53.02	90	45.17	23.84	21.33
SB4-4515		***m*4**	45	B5	20	80	180	181.5	70	50.79	42.24	24
SB4-1545			15	B3	16	50	60	70.69	115	54.6	26.78	23.33
SB5-4515		***m*5**	45	B5	25	90	225	226.87	75	50.28	40.3	20
SB5-1545			15	B3	20	60	75	88.37	145	67.19	34.73	30
SB6-4515		***m*6**	45	BT	30	160	270	272.24	100	72.62	58.36	30
SB6-1545			15	B3	25	70	90	106.03	175	89.04	42.67	36.67
SBY8-4515		***m*8**	45	BT	35	200	360	362.99	125	83.74	69.49	30
SBY8-1545			15	B3	30	100	120	141.39	230	99.93	53.56	46.67

Hole length	Face width	Holding surface dia.	Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability (H)		Backlash (mm)	Weight (kg)	Catalog Number
I	J	K	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m			
15	7	30.73	3.35	0.34	0.35	0.04	1.52	0.15	0.03~0.13	0.11	**SB1-4518**
15.5		10.31	1.33	0.14	0.14	0.01	0.61	0.062		0.019	**SB1-1845**
18	11	45	11.7	1.19	1.29	0.13	5.39	0.55	0.05~0.15	0.28	**SB1.5-4518**
21		16.51	4.64	0.47	0.51	0.05	2.16	0.22		0.063	**SB1.5-1845**
25	14	62.24	26.8	2.74	3.05	0.31	12.6	1.29	0.06~0.16	0.65	**SB2-4518**
27.5		23.11	10.7	1.09	1.22	0.12	5.05	0.52		0.16	**SB2-1845**
31	18	76.53	53.4	5.44	6.20	0.63	25.4	2.59	0.07~0.17	1.23	**SB2.5-4518**
31.5		26.82	21.2	2.16	2.48	0.25	10.2	1.04		0.28	**SB2.5-1845**
37	21	92.96	90.5	9.23	10.7	1.09	43.5	4.44	0.08~0.18	2.05	**SB3-4518**
36		33.41	36.0	3.67	4.29	0.44	17.4	1.78		0.46	**SB3-1845**
45	29	122.33	220	22.4	26.8	2.73	107	10.9	0.12~0.27	4.69	**SB4-4518**
46		45.83	87.3	8.91	10.7	1.09	42.8	4.37		1.01	**SB4-1845**
51	34	156.56	411	41.9	51.8	5.28	202	20.6	0.14~0.34	8.31	**SB5-4518**
52.5		56.9	164	16.7	20.7	2.11	81.0	8.26		1.95	**SB5-1845**
9	6	32.02	2.84	0.29	0.27	0.027	1.15	0.12	0.03~0.13	0.078	**SB1-4515**
12		10.05	0.98	0.10	0.09	0.0091	0.38	0.039		0.095	**SB1-1545**
12	8	39.63	5.80	0.59	0.56	0.057	2.38	0.24	0.04~0.14	0.15	**SB1.25-4515**
15		10.9	2.00	0.20	0.19	0.019	0.79	0.081		0.018	**SB1.25-1545**
17	10	46.58	10.3	1.05	1.02	0.10	4.27	0.44	0.05~0.15	0.25	**SB1.5-4515**
22.5		14.75	3.56	0.36	0.34	0.035	1.42	0.15		0.041	**SB1.5-1545**
26	15	59.04	26.4	2.69	2.68	0.27	11.1	1.13	0.06~0.16	0.60	**SB2-4515**
29		19.13	9.10	0.93	0.89	0.091	3.70	0.38		0.096	**SB2-1545**
35	20	72.84	53.6	5.46	5.55	0.57	22.8	2.33	0.07~0.17	1.22	**SB2.5-4515**
37		20.51	18.5	1.89	1.85	0.19	7.61	0.78		0.19	**SB2.5-1545**
35	23	88.18	90.2	9.20	9.53	0.97	38.9	3.96	0.08~0.18	1.99	**SB3-4515**
43		22.53	31.2	3.18	3.18	0.32	13.0	1.32		0.34	**SB3-1545**
45	30	118.09	211	21.5	23.0	2.35	92.1	9.40	0.12~0.27	3.89	**SB4-4515**
52		32.26	72.8	7.43	7.67	0.78	30.7	3.13		0.77	**SB4-1545**
44	35	152.88	394	40.2	44.3	4.52	174	17.7	0.14~0.34	6.10	**SB5-4515**
65		48.64	136	13.9	14.8	1.51	58.0	5.91		1.46	**SB5-1545**
62	50	169.26	751	76.6	87.0	8.87	337	34.3	0.16~0.36	18.0	**SB6-4515**
86		49.77	259	26.4	39.9	4.06	112	11.4		2.61	**SB6-1545**
67	50	255.92	1470	150	179	18.3	674	68.8	0.20~0.45	36.4	**SBY8-4515**
93		61.77	506	51.6	59.7	6.09	225	22.9		5.80	**SBY8-1545**

[Caution on Product Characteristics] ① For the handling conveniences, the BT series has the tapped holes on the holding surface. Please see the table on the right for L and tap sizes.

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

For the handling conveniences, the products listed in the table below have the tapped holes (180° apart, 2 places) on the holding surface.

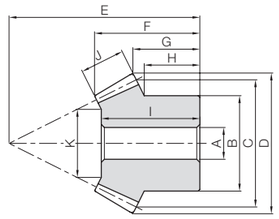
Catalog Number	L (mm)	Tap Size
SB6-4515	130	M10, 20mm deep
SBY8-4515	210	M10, 20mm deep

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Product Precautions → Page 342
Precautions for Standard Machined Products → Pages 42~44

SB/SBY Module 1.5~6 Bevel Gears NEW

Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating



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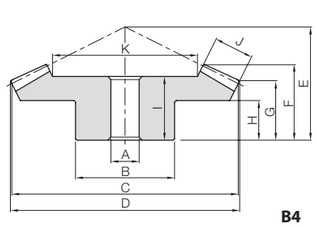

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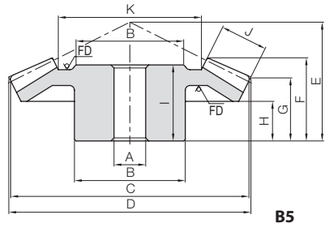

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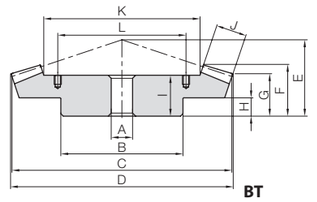


BT

* FD has a forged finish surface.

H To order Hardened Plus, please specify Catalog No. + H. Example: SB1.5-6015H

Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width
					A_{H7}	B	C	D	E	F	G	H
SB1.5-6015 H	4	***m*1.5**	60	B4	12	50	90	90.41	32	24.2	21.58	12
SB1.5-1560 H			15	B3	8	18	22.5	26.66	56	23.01	11.52	10.43
SB2-6015 H		***m*2**	60	B4	15	60	120	120.55	42	31.6	28.1	16
SB2-1560 H			15	B3	10	24	30	35.55	75	31.01	15.69	14.25
SB2.5-6015 H		***m*2.5**	60	B4	20	70	150	150.69	53	40	35.63	20
SB2.5-1560 H			15	B3	12	30	37.5	44.44	94	39.02	19.87	18.06
SB3-6015 H		***m*3**	60	B4	20	80	180	180.83	64	47.97	43.15	25
SB3-1560 H			15	B3	15	38	45	53.33	112	44.1	23.04	21.12
SB4-6015 H		***m*4**	60	B5	25	85	240	241.1	80	59.2	52.2	36
SB4-1560 H			15	B3	16	50	60	71.1	150	62.03	31.4	28.75
SBY5-6015 H		***m*5**	60	BT	30	180	300	301.36	80	53.97	45.22	20
SBY5-1560 H			15	B3	25	60	75	88.9	185	75.03	36.74	33.13
SBY6-6015 H		***m*6**	60	BT	35	200	360	361.66	100	68.16	58.31	25
SBY6-1560 H			15	B3	25	75	90	106.66	220	85.17	42.08	38.13

[Caution on Product Characteristics] ① For the handling conveniences, the BT series has the tapped holes on the holding surface. Please see the table on the right for L and tap sizes.

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

Hole length	Face width	Holding surface dia.	Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability H		Backlash (mm)	Weight (kg)	Catalog Number
I	J	K	N·m	kgf·m	N·m	kgf·m	N·m	kgf·m			
21	12	65.38	17.3	1.77	1.75	0.18	7.28	0.74	0.05~0.15	0.62	**SB1.5-6015** H
22.5		15.54	4.46	0.45	0.44	0.045	1.82	0.19		0.043	**SB1.5-1560** H
27	16	87.02	41.3	4.21	4.30	0.44	17.5	1.79	0.06~0.16	1.35	**SB2-6015** H
30		18.06	10.6	1.08	1.07	0.11	4.38	0.45		0.10	**SB2-1560** H
34	20	108.64	80.2	8.18	8.54	0.87	34.6	3.53	0.07~0.17	2.51	**SB2.5-6015** H
37.5		20.57	20.6	2.10	2.13	0.22	8.66	0.88		0.21	**SB2.5-1560** H
41	22	134.4	130	13.3	14.2	1.44	56.8	5.79	0.08~0.18	4.16	**SB3-6015** H
43		31.58	33.5	3.42	3.54	0.36	14.2	1.45		0.36	**SB3-1560** H
53	32	174.03	328	33.5	37.0	3.77	145	14.8	0.12~0.27	6.00	**SB4-6015** H
60		36.12	84.5	8.62	9.24	0.94	36.2	3.70		0.91	**SB4-1560** H
45	40	218.79	642	65.4	74.4	7.59	286	29.1	0.14~0.34	17.5	**SBY5-6015** H
73		49.15	165	16.8	18.6	1.90	71.4	7.28		1.58	**SBY5-1560** H
56	45	267.73	1050	107	126	12.8	475	48.4	0.16~0.36	30.7	**SBY6-6015** H
82		54.92	270	27.5	31.5	3.21	119	12.1		2.83	**SBY6-1560** H

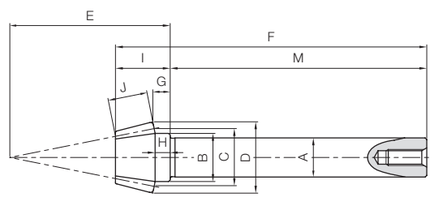
For the handling conveniences, the products listed in the table below have the tapped holes (180° apart, 2 places) on the holding surface.

Catalog Number	L (mm)	Tap Size
SBY5-6015	160	M10, 20mm deep
SBY6-6015	220	M10, 20mm deep

SB Module 1.5~3 Steel Bevel Gears & Pinion Shafts NEW

Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°
Material	S45C
Heat treatment	—*
Tooth hardness	(less than 194HB)*
Surface treatment	Black oxide coating

* B8 products use thermal refined materials, so the teeth hardness is 200 to 270 HB.



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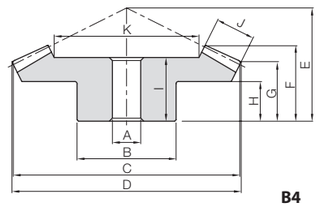

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

H To order Hardened Plus, please specify Catalog No. + H. Example: SB1.5-6012H

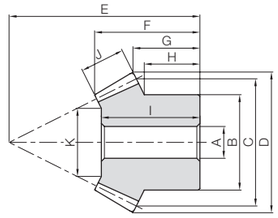
Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore/Shaft Dia.	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width	Length of bore and shaft
					A_{H7} (bore) A_{h7} (shaft)	B	C	D	E	F	G	H	I
SB1.5-6012 H	5	***m*1.5**	60	B4	12	50	90	90.33	30	23.89	21.82	12	21
SB1.5-1260 H			12	B8	12.2	15	18	22.24	50	97.06	5.42	4.7	17.06
SB2-6012 H		***m*2**	60	B4	15	60	120	120.43	40	31.85	29.09	16	27
SB2-1260 H			12	B8	15.2	20	24	29.65	66	117.08	6.56	5.6	22.08
SB2.5-6012 H		***m*2.5**	60	B4	20	70	150	150.54	50	39.81	36.36	20	34
SB2.5-1260 H			12	B8	20.2	25	30	37.06	83	143.1	8.7	7.5	28.1
SB3-6012 H		***m*3**	60	B4	20	80	180	180.65	60	47.43	43.64	25	41
SB3-1260 H			12	B8	25.25	30	36	44.48	100	172.19	10.85	9.4	32.19

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

Face width	Holding surface dia.	Length of shaft	Socket head screw Size	Allowable torque: Bending strength		Allowable torque: Surface durability		Allowable torque: Surface durability H		Backlash (mm)	Weight (kg)	Catalog Number
J	K	M		N·m	kgf·m	N·m	kgf·m	N·m	kgf·m			
12	65.52	—	—	18.0	1.83	1.41	0.14	5.85	0.60	0.05~0.15	0.62	**SB1.5-6012** H
	—	80	M5	4.01	0.41	0.46	0.047	1.17	0.12		0.097	**SB1.5-1260** H
16	86.96	—	—	42.6	4.34	3.43	0.35	14.1	1.44	0.06~0.16	1.34	**SB2-6012** H
	—	95	M6	9.50	0.97	1.12	0.11	2.82	0.29		0.19	**SB2-1260** H
20	108.8	—	—	83.2	8.48	6.85	0.70	27.9	2.84	0.07~0.17	2.54	**SB2.5-6012** H
	—	115	M8	18.5	1.89	2.23	0.23	5.57	0.57		0.40	**SB2.5-1260** H
22	134.73	—	—	135	13.8	11.4	1.16	45.7	4.66	0.08~0.18	4.18	**SB3-6012** H
	—	140	M8	30.1	3.07	3.70	0.38	9.13	0.93		0.74	**SB3-1260** H

Product Precautions → Page 342 | Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	JIS B 1704: 1978 grade 3
Gear teeth	Gleason
Pressure angle	20°
Material	SUS303
Heat treatment	–
Tooth hardness	(less than 187HB)



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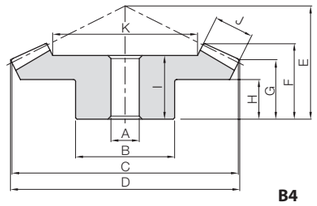

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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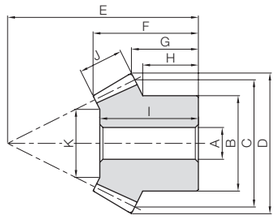
Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width
					A_{H7}	B	C	D	E	F	G	H
SUB1.5-3020	1.5	***m*1.5**	30	B4	10	30	45	46.24	28	18.53	13.93	8
SUB1.5-2030			20	B3	8	25	30	33.13	33	18.63	11.54	8.83
SUB2-3020		***m*2**	30	B4	10	35	60	61.65	40	26.87	21.24	15
SUB2-2030			20	B3	10	35	40	44.18	45	25.06	16.39	13.33
SUB2.5-3020		***m*2.5**	30	B4	15	45	75	77.07	50	34.22	26.55	18
SUB2.5-2030			20	B3	12	40	50	55.22	55	31.06	19.24	14.16
SUB3-3020		***m*3**	30	B4	15	60	90	92.48	55	35.56	26.86	17
SUB3-2030			20	B3	15	50	60	66.27	70	40.48	27.09	21.66
SUB1.5-4020	2	***m*1.5**	40	B4	10	38	60	60.88	35	25.01	20.88	15
SUB1.5-2040			20	B3	8	25	30	33.61	46	25.54	16.9	14.75
SUB2-4020		***m*2**	40	B4	12	50	80	81.17	45	32.37	26.17	18
SUB2-2040			20	B3	12	32	40	44.81	60	34.16	21.2	18
SUB2.5-4020		***m*2.5**	40	B4	15	60	100	101.46	55	39.73	31.46	20
SUB2.5-2040			20	B3	12	40	50	56.01	75	43.78	26.5	22.5
SUB3-4020		***m*3**	40	B4	20	70	120	121.76	65	45.85	36.76	24
SUB3-2040			20	B3	16	50	60	67.22	90	50.81	31.8	27.5
SUB1.5-4515	3	***m*1.5**	45	B4	10	36	67.5	68.06	28	20.44	17.59	11
SUB1.5-1545			15	B3	8	18	22.5	26.54	47	23.19	13.92	12.5
SUB2-4515		***m*2**	45	B4	12	60	90	90.75	40	30.4	26.12	17
SUB2-1545			15	B3	10	24	30	35.35	60	29.8	15.89	14
SUB2.5-4515		***m*2.5**	45	B4	15	60	112.5	113.43	50	38.35	32.65	22
SUB2.5-1545			15	B3	12	30	37.5	44.18	75	38.41	19.86	17.5
SUB3-4515		***m*3**	45	B4	20	80	135	136.12	55	40.74	34.18	20
SUB3-1545			15	B3	15	38	45	53.02	90	45.17	23.84	21.33

Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
I	J	K	Bending strength	Surface durability	Bending strength	Surface durability			
16	9	27.37	3.22	0.46	0.33	0.047	0.05~0.15	0.12	**SUB1.5-3020**
17		17.05	2.23	0.31	0.23	0.032		0.064	**SUB1.5-2030**
23	11	37.56	7.22	1.08	0.74	0.11	0.06~0.16	0.27	**SUB2-3020**
22		21.34	5.01	0.72	0.51	0.074		0.16	**SUB2-2030**
30	15	45.61	14.9	2.28	1.52	0.23	0.07~0.17	0.55	**SUB2.5-3020**
28		27.42	10.3	1.52	1.05	0.15		0.29	**SUB2.5-2030**
31	17	57.14	24.8	3.87	2.53	0.39	0.08~0.18	0.95	**SUB3-3020**
37		34.71	17.2	2.58	1.76	0.26		0.56	**SUB3-2030**
22	10	39.64	5.23	0.79	0.53	0.081	0.05~0.15	0.27	**SUB1.5-4020**
24		17.28	2.64	0.40	0.27	0.040		0.090	**SUB1.5-2040**
27	15	48.46	13.4	2.07	1.36	0.21	0.06~0.16	0.62	**SUB2-4020**
32		20.92	6.72	1.04	0.69	0.11		0.19	**SUB2-2040**
35	20	60.28	27.1	4.29	2.76	0.44	0.07~0.17	1.24	**SUB2.5-4020**
41		24.56	13.6	2.15	1.39	0.22		0.41	**SUB2.5-2040**
38	22	73.81	44.4	7.19	4.53	0.73	0.08~0.18	1.89	**SUB3-4020**
47		29.61	22.4	3.60	2.28	0.37		0.70	**SUB3-2040**
17	10	46.58	5.70	0.72	0.58	0.074	0.05~0.15	0.25	**SUB1.5-4515**
22.5		14.75	1.97	0.24	0.20	0.025		0.041	**SUB1.5-1545**
26	15	59.04	14.6	1.90	1.49	0.19	0.06~0.16	0.82	**SUB2-4515**
29		19.13	5.03	0.63	0.51	0.065		0.097	**SUB2-1545**
35	20	72.84	29.6	3.94	3.02	0.40	0.07~0.17	1.38	**SUB2.5-4515**
37		20.51	10.2	1.31	1.04	0.13		0.19	**SUB2.5-1545**
35	23	88.18	49.9	6.77	5.09	0.69	0.08~0.18	2.36	**SUB3-4515**
43		22.53	17.2	2.26	1.76	0.23		0.34	**SUB3-1545**

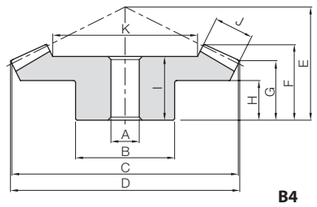
Spur Gears
Helical Gears
Internal Gears
Racks
CP Racks & Pinions
Miter Gears
Bevel Gears
Screw Gears
Worm Gears
Gearboxes
Other Products

Specifications	
Precision grade	JIS B 1704: 1978 grade 4*
Gear teeth	Gleason
Pressure angle	20°
Material	MC901
Heat treatment	—
Tooth hardness	(115 to 120HRR)

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



B3



B4

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back	Hub width
					A	B	C	D	E	F	G	H
PB1.5-3020	1.5	***m*1.5**	30	B4	10	30	45	46.24	28	18.53	13.93	8
PB1.5-2030			20	B3	8	25	30	33.13	33	18.63	11.54	8.83
PB2-3020		***m*2**	30	B4	10	35	60	61.65	40	26.87	21.24	15
PB2-2030			20	B3	10	35	40	44.18	45	25.06	16.39	13.33
PB1-4020	2	***m*1**	40	B4	8	25	40	40.59	22	15.07	12.59	8
PB1-2040			20	B3	6	16	20	22.41	28	13.78	8.6	7
PB1.25-4020		***m*1.25**	40	B4	10	32	50	50.73	27	18.54	15.23	10
PB1.25-2040			20	B3	8	22	25	28.01	36	18.66	11.75	10.25
PB1.5-4020		***m*1.5**	40	B4	10	38	60	60.88	35	25.01	20.88	15
PB1.5-2040			20	B3	8	25	30	33.61	46	25.54	16.9	14.75
PB2-4020		***m*2**	40	B4	12	40	80	81.17	45	32.37	26.17	18
PB2-2040			20	B3	12	32	40	44.81	60	34.16	21.2	18
PB1.5-4515	3	***m*1.5**	45	B4	10	40	67.5	68.06	28	20.44	17.59	11
PB1.5-1545			15	B3	8	18	22.5	26.54	47	23.19	13.92	12.5
PB2-4515		***m*2**	45	B4	12	60	90	90.75	40	30.4	26.12	17
PB2-1545			15	B3	10	24	30	35.35	60	29.8	15.89	14

Hole length	Face width	Holding surface dia.	Allowable torque (N·m)		Allowable torque (kgf·m)		Backlash (mm)	Weight (kg)	Catalog Number
I	J	K	Bending strength	Surface durability	Bending strength	Surface durability			
16	9	27.37	1.61	—	0.16	—	0~0.25	0.018	**PB1.5-3020**
17		17.05	0.87		0.089			0.0093	**PB1.5-2030**
23	11	37.56	3.65		0.37		0~0.26	0.039	**PB2-3020**
22		21.34	1.97		0.20			0.024	**PB2-2030**
12	6	26.58	0.74	—	0.075	—	0~0.23	0.010	**PB1-4020**
12		9.17	0.28		0.028			0.0029	**PB1-2040**
16	8	33.61	1.50		0.15		0~0.24	0.021	**PB1.25-4020**
17		13.22	0.56		0.058			0.0068	**PB1.25-2040**
22	10	39.64	2.66		0.27		0~0.25	0.039	**PB1.5-4020**
24		17.28	1.00		0.10			0.013	**PB1.5-2040**
27	15	48.46	6.72		0.69		0~0.26	0.076	**PB2-4020**
32		20.92	2.52		0.26			0.028	**PB2-2040**
17	10	46.58	3.18	—	0.32	—	0~0.25	0.040	**PB1.5-4515**
22.5		14.75	0.68		0.070			0.0061	**PB1.5-1545**
26	15	59.04	8.07		0.82		0~0.26	0.12	**PB2-4515**
29		19.13	1.73		0.18			0.014	**PB2-1545**

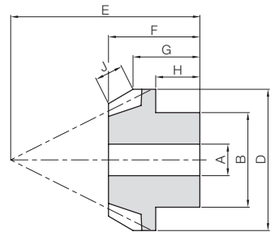
[Caution on Product Characteristics] ① To reduce heat generation, it is recommended to mate plastic gears with steel gears.

* In regard to MC Nylon gears, other materials are available for plastic gears, including Ultra High Molecular Weight Polyethylene (U-PE), which has excellent abrasion resistance and resin conforming to the Plastic Implementation Measure (PIM). A single piece order is acceptable and will be produced as a custom-made gear. Please see Page 26 for more details on quotations and orders.

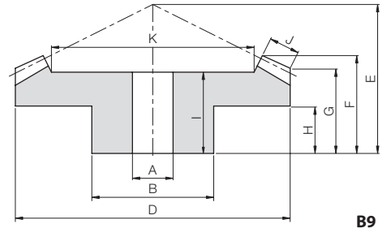
Spur Gears
Helical Gears
Internal Gears
Racks
CP Racks & Pinions
Miter Gears
Bevel Gears
Screw Gears
Worm Gears
Gearboxes
Other Products

Specifications	
Precision grade	JIS B 1704: 1978 grade 6
Gear teeth	Gleason
Pressure angle	20°
Material	Duracon (R) (M90-44) *
Heat treatment	—
Tooth hardness	(110 to 120HRR)

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



B1



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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
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Catalog Number	Gear Ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back
					A	B		D	E	F	G
DB0.5-4020	2	***m*0.5**	40	B9	4	12	20	20.29	12	8.33	7.29
DB0.5-2040			20	B1	3	8	10	11.2	16	8.46	6.3
DB0.8-4020		***m*0.8**	40	B9	5	15	32	32.47	18	11.91	10.47
DB0.8-2040			20	B1	4	12	16	17.92	24	11.5	8.48
DB1-4020		***m*1**	40	B9	6	18	40	40.59	22	14.45	12.59
DB1-2040			20	B1	5	15	20	22.4	30	14.49	10.6

Hub width	Hole length	Face width	Holding surface dia.	Allowable torque (N-m)	Allowable torque (kgf-m)	Backlash (mm)	Weight (g)	Catalog Number
H	I	J	K	Bending strength	Bending strength			
4	7	2.5	14.41	0.24	0.025	0~0.30	2.00	**DB0.5-4020**
4	—		—	0.092	0.0094		0.54	**DB0.5-2040**
6	10	3.5	24.17	0.91	0.093	0~0.48	6.26	**DB0.8-4020**
5	—		—	0.34	0.035		1.87	**DB0.8-2040**
7.5	12.5	4.5	30.44	1.59	0.16	0~0.60	11.9	**DB1-4020**
7	—		—	0.60	0.061		3.54	**DB1-2040**

[Caution on Product Characteristics] ① The bore tolerance is -0.05 to -0.30, but it may be slightly higher at the center of the hole.
② For the dimensional accuracy of each part, see the dimensional tolerance of molded items in the table at right.
[Caution on Secondary Operations] ① As it is a molded item, bubbles may form inside the material. Avoid performing secondary operations.

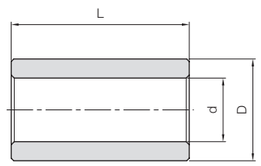
■ Dimensional tolerance of molded item (unit: mm)

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

BB
Sintered Metal Bushings

Sintered Metal Bushings

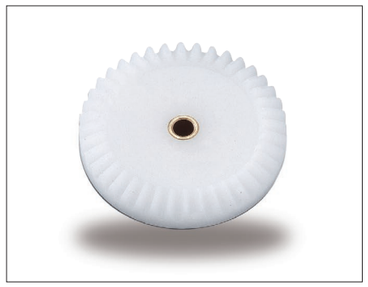
When using the injection molded bevel gear as an idler gear and a shaft diameter smaller than the inside diameter of the molded gear, please press fit one of the following standard bushings.



T8

Catalog Number	Inner dia.	Outside dia.	Length	Gear example
	$d^{+0.02}_{0}$	$D^{+0.02}_{-0.01}$	$L^{0}_{-0.3}$	
BB30507	3	5	7	DB0.8
BB40612	4	6	12	DB1

Material: Oil-free copper alloy



Product Precautions → Page 342

Catalog number

Note that the catalog numbers for KSP ground spiral bevel gears have a different configuration compared to other miters and bevel gears.

KSP 031 001 G U L

- L: Direction of spiral (left)
- U: Product shape (prevents carburizing)
- G: Tooth surface finish (ground)
- 001: Gear Ratio (1)
- 031: Gear outer diameter (31 mm)
- KSP: Type (Spiral Miter)

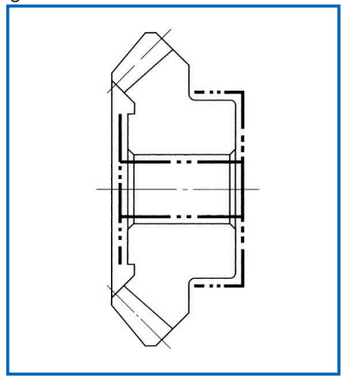
Features of KSP spiral bevel gears

1. High-strength, high-precision product of JIS grade 0.
2. Superior performance with regard to high speed, low noise, and low vibration.
3. Module is 1.5 to 6
4. Gear ratio types are 1, 1.5 and 2

Shape

Shape for secondary operations (with margin)

* The parts ---- in the figure below are protected from carburizing.



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Transmission capacity table

1. The values in the transmission capacity table below are where the service factor is 1. Be sure to correct the load torque according to the table on the right. The corrected load torque is calculated by multiplying the load torque applied to the output shaft by service factor (Sf).
2. When using at increased speed (where gear is drive and pinion is driven), the torque of the pinion is the value obtained by multiplying the value shown in the transmission capacity table by the speed ratio.

NOTE 1: When the speed ratio is 1/1.5, the pinion torque is 1/1.5 of the value shown in the transmission capacity table.

Service factor (Sf)

Impact from motor	Impact from load		
	Uniform load	Moderate impact	Severe impact
Uniform load (electric motor, turbine, hydraulic motor, etc.)	1.0	1.25	1.75
Mild impact (multi-cylinder engine)	1.25	1.5	2.0
Moderate impact (single-cylinder engine)	1.5	1.75	2.25

Transmission capacity table (speed ratio 1/1)

Upper transmission capacity (kw) Lower output torque (N·m)

Figure number \ Rotational speed (rpm)	50	100	300	600	900	1200	1800	3000
KSP031001	0.035	0.068	0.195	0.375	0.548	0.716	1.04	1.65
	6.65	6.51	6.20	5.98	5.82	5.69	5.51	5.25
KSP040001	0.092	0.179	0.511	0.980	1.43	1.86	2.69	4.25
	17.6	17.2	16.3	15.6	15.2	14.8	14.3	13.5
KSP053001	0.211	0.412	1.17	2.23	3.25	4.22	6.08	9.55
	40.4	39.3	37.3	35.6	34.5	33.6	32.3	30.4
KSP066001	0.367	0.715	2.02	3.85	5.59	7.26	10.4	16.3
	70.2	68.3	64.4	61.4	59.3	57.8	55.4	52.0
KSP078001	0.577	1.12	3.16	6.00	8.68	11.2	16.1	25.1
	109.8	106.9	101.0	95.5	92.2	89.5	85.5	79.8
KSP092001	0.901	1.75	4.91	9.31	13.5	17.4	24.9	38.6
	172.6	166.7	156.9	148.1	143.2	138.3	132.4	122.6
KSP105001	1.44	2.78	7.80	14.7	21.2	27.4	39.1	60.3
	274.6	265.8	248.1	234.4	225.6	218.7	207.9	192.2
KSP132001	2.33	4.50	12.6	23.6	34.0	43.7	62.0	95.0
	445.2	430.5	400.1	376.6	360.9	348.1	329.5	302.0
KSP157001	3.68	7.10	19.7	37.0	53.0	68.1	96.2	146
	704.1	678.6	628.6	589.4	562.9	542.3	510.9	466.8
KSP184001	5.31	10.2	28.3	52.8	75.5	96.8	136	206
	1010	976.7	901.2	841.4	801.2	770.8	722.8	656.1

Transmission capacity table (speed ratio 1/1.5)

Upper transmission capacity (kw) Lower output torque (N·m)

Figure number \ Rotational Speed of Pinion (rpm)	50	100	300	600	900	1200	1800	3000
KSP0481.5	0.077	0.151	0.432	0.830	1.21	1.58	2.29	3.64
	22.2	21.6	20.6	19.8	19.3	18.9	18.2	17.4
KSP0611.5	0.159	0.309	0.882	1.69	2.46	3.21	4.64	7.33
	45.4	44.3	42.2	40.4	39.2	38.3	37.0	35.0
KSP0741.5	0.277	0.540	1.53	2.93	4.27	5.55	8.00	12.6
	79.4	77.4	73.4	70.1	68.0	66.3	63.7	60.1
KSP0901.5	0.466	0.908	2.57	4.90	7.12	9.24	13.3	20.8
	133.4	130.4	122.6	116.7	113.8	110.8	105.9	99.0
KSP1051.5	0.700	1.36	3.84	7.31	10.6	13.7	19.7	30.7
	201.0	195.2	183.4	174.6	168.7	163.8	156.9	147.1
KSP1241.5	1.03	2.00	5.63	10.7	15.5	20.0	28.6	44.5
	295.2	286.4	268.7	255.0	246.1	239.3	227.5	212.8
KSP1411.5	1.56	3.03	8.51	16.1	23.2	30.1	42.9	66.4
	448.2	434.4	406.0	384.4	370.7	358.9	341.3	317.7
KSP1631.5	2.27	4.39	12.3	23.2	33.4	43.1	61.4	94.6
	650.2	628.6	587.4	554.1	532.5	514.8	489.4	452.1
KSP1811.5	2.92	5.64	15.8	29.7	42.7	55.1	78.3	120
	836.5	809.0	754.1	710.0	680.6	658.0	623.7	574.7

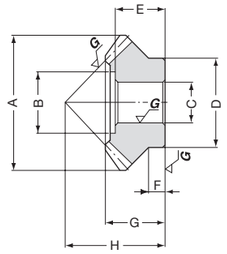
Transmission capacity table (speed ratio 1/2)

Upper transmission capacity (kw) Lower output torque (N·m)

Figure number \ Rotational Speed of Pinion (rpm)	50	100	300	600	900	1200	1800	3000
KSP039002	0.025	0.049	0.142	0.275	0.404	0.528	0.770	1.23
	9.63	9.45	9.07	8.76	8.57	8.41	8.17	7.83
KSP056002	0.075	0.147	0.423	0.814	1.19	1.55	2.26	3.59
	28.8	28.1	27.0	26.0	25.3	24.8	23.9	22.8
KSP075002	0.185	0.361	1.03	1.98	2.89	3.76	5.45	8.61
	70.7	69.0	65.7	63.1	61.3	59.9	57.9	54.8
KSP096002	0.364	0.710	2.02	3.86	5.62	7.31	10.5	16.6
	139.3	135.3	128.5	122.6	119.6	116.7	111.8	105.9
KSP119002	0.649	1.26	3.58	6.82	9.90	12.9	18.5	29.0
	248.1	241.2	227.5	217.7	209.9	205.0	196.1	184.4
KSP145002	1.07	2.08	5.87	11.2	16.2	21.0	30.1	46.9
	408.9	397.2	373.6	356.0	343.2	333.4	319.7	298.1
KSP172002	1.78	3.45	9.72	18.4	26.6	34.5	49.3	76.5
	680.6	660.0	618.8	587.4	565.8	549.2	523.7	487.4

Specifications	
Precision grade	JIS B 1704: 1978 grade 0
Gear teeth	Gleason
Pressure angle	20°
Helix angle	35°
Material	SCM415*
Heat treatment	Carburized (Bore and hub are carburized)
Tooth hardness	60 to 63HRC**

* The material of module 3.5 and above is SCM420.
** Modules 1.5 and 2 have the tooth hardness of 80 to 83 HRA.



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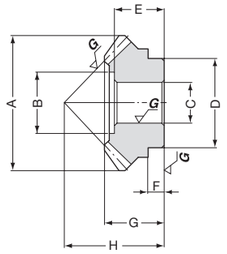

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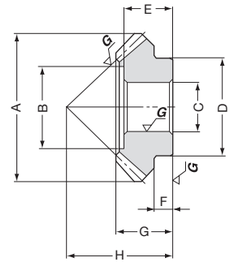

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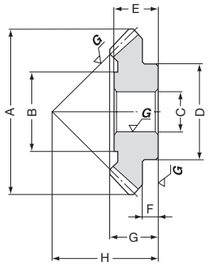

C

Catalog Number	Gear Ratio	Module	No. of teeth	Direction of spiral	Pitch dia.	Face width	Shape	Outside dia. A	Holding surface dia. B	Bore C^{H7}	Hub dia. D	Hole length E	Hub width F	Total length G	Mounting distance H	Machinable MAX bore	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog Number
KSP031001GU L **KSP031001GU R**	1	***m*1.5**	20	L R	30	7	A	30.5	16.5	10	22	13	6	15	25	12	0.61	0 ~0.05	0.04	**KSP031001GU L** **KSP031001GU R**
KSP040001GU L **KSP040001GU R**		***m*2**	20	L R	40	9	B	40	22.5	12	31	14	7	16.5	30	16	1.59	0 ~0.05	0.09	**KSP040001GU L** **KSP040001GU R**
KSP078001GU L **KSP078001GU R**		***m*3.5**	22	L R	77	18	B	78	43	20	54	27	12	32	57	32	9.74	0.05~0.10	0.59	**KSP078001GU L** **KSP078001GU R**
KSP105001GU L **KSP105001GU R**		***m*4.5**	23	L R	103.5	25	C	105	50	26	70	35	14	39	72	40	23.9	0.05~0.10	1.33	**KSP105001GU L** **KSP105001GU R**
KSP132001GU L **KSP132001GU R**		***m*5**	26	L R	130	29	C	132	64	30	82	41	14	45	88	48	38.4	0.05~0.10	2.49	**KSP132001GU L** **KSP132001GU R**
KSP157001GU L **KSP157001GU R**		***m*5.5**	28	L R	154	34	C	157	76	32	92	47	20	53.5	105	55	60.1	0.05~0.10	3.90	**KSP157001GU L** **KSP157001GU R**
KSP184001GU L **KSP184001GU R**		***m*6**	30	L R	180	38	C	184	84	40	101	51	17	56.5	118	62	85.8	0.05~0.10	5.79	**KSP184001GU L** **KSP184001GU R**
KSP0481.5GU P **KSP0481.5GU G**	1.5	***m*2**	16 24	L R	32 48	9	A' B	34 48	17.5 30	10 12	24 30	13 17	4.5 7	14.5 19	31 30	— 20	2.02	0 ~0.05	0.05 0.14	**KSP0481.5GU P** **KSP0481.5GU G**
KSP0741.5GU P **KSP0741.5GU G**		***m*2.75**	18 27	L R	49.5 74.25	15	A' B	52 74	27 44.5	14 20	40 50	20 25	6 12	22 29	46 45	20 35	7.15	0.05~0.10	0.20 0.49	**KSP0741.5GU P** **KSP0741.5GU G**
KSP075002GU P **KSP075002GU G**	2	***m*2.5**	15 30	L R	37.5 75	14	A' C	40 75	20 36	12 16	30 44	17 24	4.5 11	19.5 25.5	44 38	14 25	6.43	0.05~0.10	0.10 0.44	**KSP075002GU P** **KSP075002GU G**
KSP096002GU P **KSP096002GU G**		***m*3**	16 32	L R	48 96	18	B C	53 96	23.5 46	12 20	36 56	19 29	2.5 12	21.5 31	53 47	19 32	12.5	0.05~0.10	0.20 0.91	**KSP096002GU P** **KSP096002GU G**
KSP119002GU P **KSP119002GU G**		***m*3.5**	17 34	L R	59.5 119	22	A C	65 119	34 54	16 26	44 63	25 34	3.6 15	27.5 35.5	67 55	25 40	22.2	0.05~0.10	0.36 1.45	**KSP119002GU P** **KSP119002GU G**

[Caution on Product Characteristics] ① The allowable torque is the value at RPM 600. For other data, see the Transmission Capacity Table.

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

■ Adjustment of tooth contact

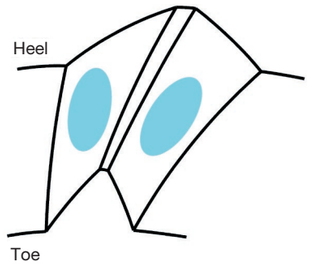
<Center of tooth contact>

(1) Near the center of the tooth length for the length direction

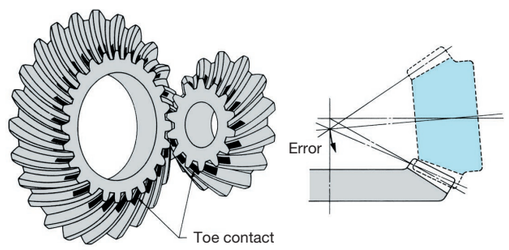
(2) Ideally, the tooth width direction should be at the center of the width or slightly closer to the toe.

When adjusting the backlash and mounting the gear in the case, adjust the case in order to achieve the tooth contact as shown in the figure below.

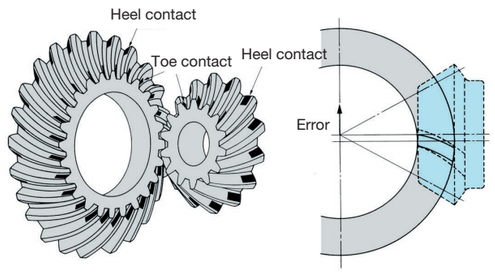
Deviation of the tooth contact from the normal position may adversely affect the strength and quietness.



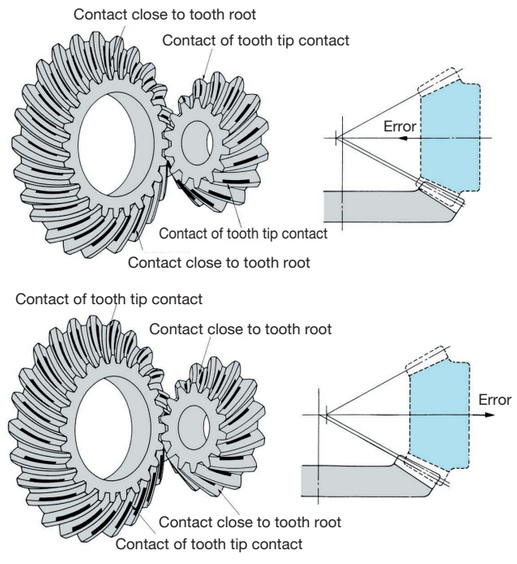
(1) Tooth contact in case of a shaft-angle error



(2) Tooth contact in case of a shaft-offset error



(3) Tooth contact in case of a pinion set position error



Screw Gears

SN-H Hardened Screw Gears	SN Screw Gears	SUN Stainless Steel Screw Gears	AN Screw Gears	PN Plastic Screw Gears
Material: S45C	Material: S45C	Material: SUS303	Material: CAC702 (AtBC2)	Material: MC901
*m*1~4 Page 384	*m*1~4 Page 384	*m*1~2.5 Page 388	*m*1~3 Page 390	*m*1~3 Page 392

M Includes Made to Order

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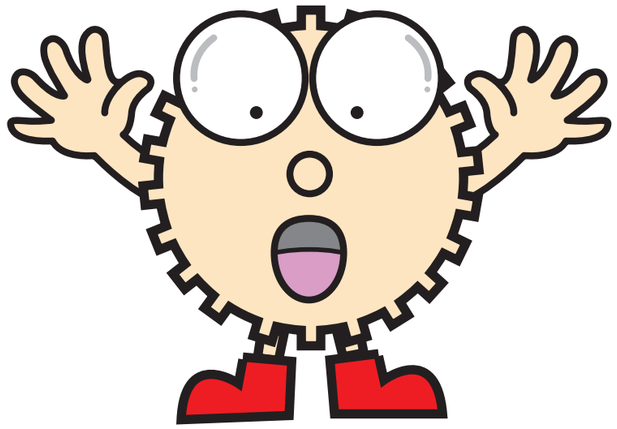


Catalog Number of KHK Stock Gears

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) Screw Gears

S N 1 - 13 R

- R — Direction of Helix (Right)
- 13 — No. of Teeth (13)
- 1 — Module (1)
- N — Type (Screw Gears)
- S — Material (S45C)

Material		Type	
S	S45C	N	Screw Gears
SU	Stainless Steel		
A	CAC702		
P	MC901		

Features

KHK stock screw gears come in four materials, S45C, SUS303, CAC702 (old JIS A ℓ BC2) and MC nylon, in modules 1~4 and numbers of teeth from 10 to 30.

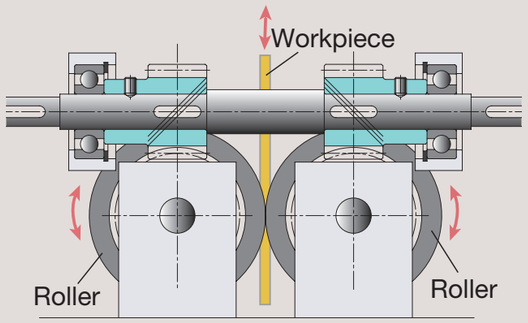
Catalog Number	Module	Material	Heat Treatment	Tooth Surface Finish	Precision JIS B 1702-1:1998	Secondary Operations	Features
SN	1~4	S45C	—	Cut	N9	○	Many lineups are available at a low price. The teeth can be hardened.
SUN	1~2.5	SUS303	—	Cut	N9	○	Stainless steel gears with rust resistance.
AN	1~3	CAC702 (A ℓ BC2)	—	Cut	N9	○	Aluminum bronze made gears with excellent wear resistance.
PN	1~3	MC901	—	Cut	N10	○	Nylon gears can be used with no lubrication.

○ Possible △ Partly possible × Not possible

Application Examples

KHK stock screw gears are used in various labor-saving machines including conveyor machine and transport.

■ **Design example of feeding device** (not a design for machinery or a device in actual use)



Rotate the roller in reverse with one input shaft and move the pinched workpiece vertically

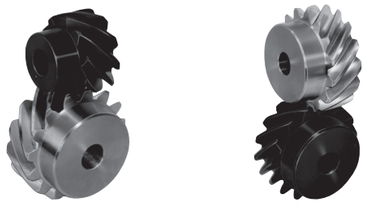
Selection Hints

Please select the most suitable products by carefully considering the characteristics of items and contents of the product tables. Since screw gears come in right- or left-hand helix, make sure to include the letter “R” or “L” in the catalog number when you order.

1. Caution in Selecting the Mating Gears

Screw gears are used for offset shafts. Whether the shafts are paralleled offset or skewed offset depends on the helix directions of the mating gears.

Direction of shaft	Arrangement of helix hands
Skewed Axes	RH-RH or LH-LH
Parallel Axes	RH-LH



Right (R) Left (L)

Arrangements of helix directions of screw gears

2. Caution in Selecting Gears Based on Gear Strength

The allowable surface strengths listed in the product pages were derived using the Niemann formula as reference values. (Used with skewed shafts) There is a paucity of data on the strength of screw gears. The values of constant K_0 used in the calculations, which depend on the material of the mating gears, are our estimates. The mathematic expression below shows the Niemann formula to determine allowable tangential force Ft (kgf) and allowable torque T (kgf·m) on a basic circle.

$$Ft = 1.43 d_1^2 fz Ks$$

$$T = \frac{Ft d_1}{2000}$$

Here, d_1 : standard pitch diameter of pinion (mm)
fz : coefficient based on no. of teeth combination
Ks : coefficient based on materials and sliding speed

$$Ks = K_0 \frac{2}{2+Vs}$$

Here, K_0 : coefficient based on material selection
Vs : sliding speed (m/s)

$$Vs = \frac{\pi n d_1}{60000 \cos\beta}$$

Here, n : rotational speed (rpm)
β : helix angle (45°)

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■ ***fz* value**

Z_2 \ Z_1	10	13	15	20	26	30
10	1.538					
13	2.005	1.538				
15	2.279	1.786	1.538			
20	2.963	2.329	2.053	1.538		
26	3.695	2.963	2.588	2.005	1.538	
30	4.161	3.350	2.963	2.279	1.786	1.538

■ **Setting values depending on usage conditions**

Catalog Number	Mating gear	K0 value	Maximum allowable sliding speed m/s	No. of teeth of mating gears	Rotational Speed
SN	SN	0.0030	2.5	Same no. of teeth	100rpm
SUN	SN	0.0030 Note 1	2.5 Note 1		
AN	SN	0.0050	5		
PN	SN	0.0030 Note 1 (0.0021)	2.5 Note 1 (1.0)		

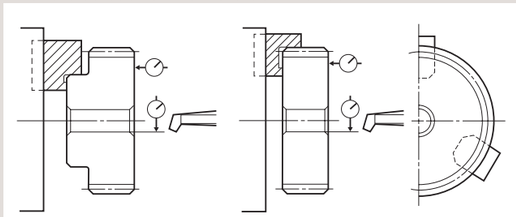
[NOTE 1] K0 values and the maximum allowable sliding speed of SUN & PN products are set by KHK. Screw gears are basically used with lubrication. In case of using PN products without lubrication, the parenthetical values shown in the table are applied.

Application Hints

In order to use KHK stock screw gears safely, read the Application Hints carefully before proceeding.
Please refer to Page 52 for “Cautions on Handling” and Page 53 for “Cautions on Starting”.
Please read "Cautions on Performing Secondary Operations" below when performing modifications and/or secondary operations for safety concerns.

1. Caution on Performing Secondary Operations

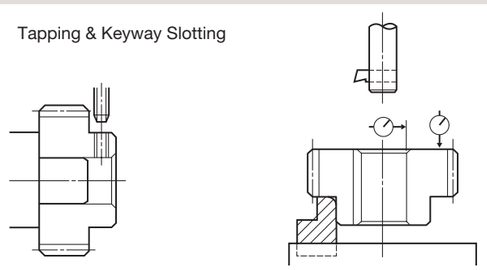
① If reboring, it is important to pay special attention to locating the center in order to avoid runout.
② The reference datum for gear machining is the bore. Therefore, use the bore for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface.
③ If reworking using scroll chucks, we recommend the use of new or rebored jaws for improved precision. Please exercise caution not to crush the teeth.



Lathe Operations

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

Tapping & Keyway Slotting

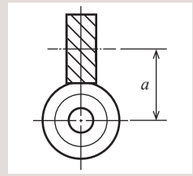


2. Points of Caution during Assembly

① The recommended center distance tolerance of KHK stock screw gears is H7 for ground gears and H8 for cut gears. The amount of backlash is given in the product table for each gear.

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

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



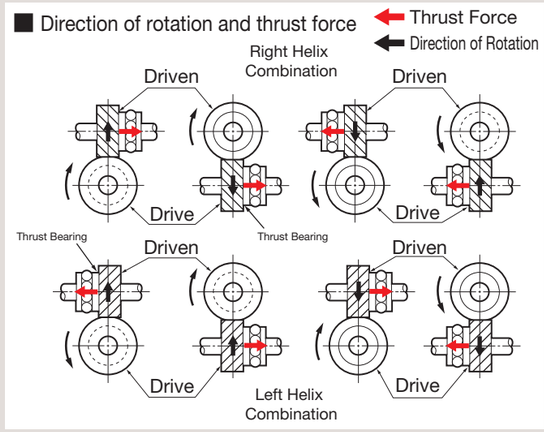
② Total Length Tolerance for Screw Gears

Total Length (mm)	Tolerance
30 or less	0 −0.10
31 to 100	0 −0.15

[NOTE] Hardened Plus, PN Plastic Screw Gears are excluded.

③ Due to the helix of screw gears, they produce axial thrust forces. The bearings must be selected properly to be able to handle these thrust forces. The directions of thrust change with the direction of helix and the direction of rotation as illustrated below.
For details, use gear calculation software GCSW.

■ **Direction of rotation and thrust force**



[NOTE] For parallel shaft applications, see the Application Hints for KHK Helical Gears (Page 195).

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.

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	No. of teeth	Direction of helix	Shape	Bore A	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque: Surface durability N·m	Allowable torque: Surface durability kgf·m	Allowable torque: Bending strength N·m	Allowable torque: Bending strength kgf·m	Backlash (mm)	Weight (kg)
SN1-13R SN1-13L	m1	13	R L	S1	6	15	18.38	20.38	10	10	20	0.19	0.019	0.41	0.04	0.08~0.18	0.030
SN1-15R SN1-15L		15	R L			18	21.21	23.21				0.29	0.029	0.62	0.06		0.043
SN1-20R SN1-20L		20	R L		8	25	28.28	30.28				0.66	0.068	1.44	0.15		0.080
SN1-26R SN1-26L		26	R L		10	30	36.77	38.77				1.42	0.14	3.08	0.31		0.13
SN1.5-10R SN1.5-10L	m1.5	10	R L	S1	8	16	21.21	24.21	15	10	25	0.29	0.029	0.62	0.06	0.10~0.22	0.048
SN1.5-13R SN1.5-13L		13	R L		10	23	27.58	30.58				0.62	0.063	1.34	0.14		0.088
SN1.5-15R SN1.5-15L		15	R L			25	31.82	34.82				0.93	0.095	2.03	0.21		0.12
SN1.5-20R SN1.5-20L		20	R L			30	42.43	45.43				2.14	0.22	4.64	0.47		0.20
SN1.5-26R SN1.5-26L		26	R L		12	40	55.15	58.15				4.51	0.46	9.80	1.00		0.36
SN1.5-30R SN1.5-30L		30	R L			45	63.64	66.64				6.75	0.69	14.7	1.50		0.48
SN2-10R SN2-10L		10	R L			22	28.28	32.28				0.66	0.068	1.44	0.15		0.11

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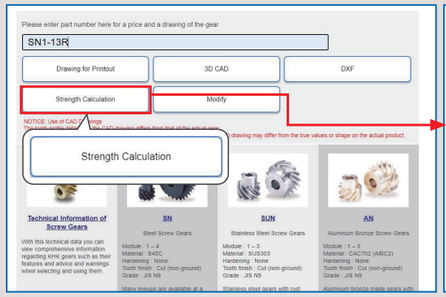
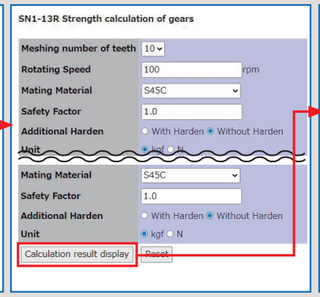
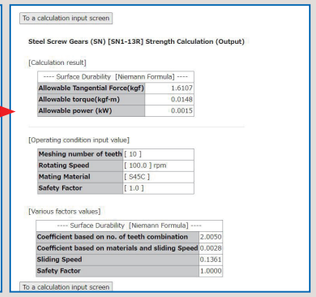
Step 3 Calculate the strength under the actual usage conditions.

Calculate the strength formally using the various gear strength formulas. We recommend using the simple strength calculation available on our website.

■ Use the strength calculation function on our website.







■ 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 torque shown in the table are calculated values according to the assumed usage conditions. Please see Page 380 for more details.

(2) The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.

(3) Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.

(4) For products having a tapped hole, a set screw is included.

(5) Variations in temperature or humidity can cause dimensional changes in plastic gears, including tooth diameter, bore, and backlash. The accuracy and tolerances shown in the catalog are values obtained when machining is performed.

(6) When mating screw gears are made of the same material, they may cause abrasion and scoring. It is recommended to mate screw gears composed of different materials.

(7) For offset shaft applications, match a RH with a RH, or LH with a LH, to make a set of screw gears. For parallel shaft applications, mesh opposite hands (RH and LH) of helical gear sets. See Page 380 for more details on selection precautions.

(8) For bores of ϕ 4 or below, the bore tolerance is H8. As well, the tolerance is H8 for ϕ 5 or ϕ 6 bores with hole length (total length) 3x the bore or more.

(9) These bevel gears produce axial thrust forces. Please see page 381 for more details.

(10) 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 being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

[J Series]

(1) Certain products which would otherwise have a very long tapped hole are counterbored. For details, see the KHK website.

(2) Black oxide is not re-applied to parts undergoing secondary operations.

When selecting KHK standard gears, glance over the Product Precautions above 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.

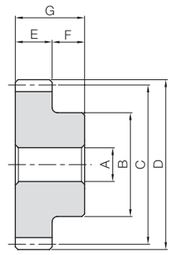
② The color and shape of the product images listed on the dimension table page of each product may differ from the actual product.
Be sure to confirm the shape in the dimension table before selection.

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

Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle	45°
Material	S45C
Heat treatment	—
Surface treatment	Black oxide coating

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



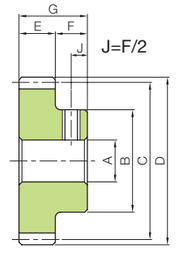
S1

To order Hardened Plus, please specify Catalog No. + H. **Example: SN1-13RH**

Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	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)
					A_{H7}	B	C	D	E	F	G						
SN1-13R (H)	*m*1	13	R	S1	6	15	18.38	20.38	10	10	20	0.19	0.019	0.41	0.04	0.08~0.18	0.030
SN1-13L (H)			L														
SN1-15R (H)		15	R			18	21.21	23.21				0.29	0.029	0.62	0.06		0.043
SN1-15L (H)			L														
SN1-20R (H)		20	R		8	25	28.28	30.28				0.66	0.068	1.44	0.15		0.080
SN1-20L (H)			L														
SN1-26R (H)		26	R		10	30	36.77	38.77				1.42	0.14	3.08	0.31		0.13
SN1-26L (H)			L														
SN1.5-10R (H)	*m*1.5	10	R	S1	8	16	21.21	24.21	15	10	25	0.29	0.029	0.62	0.06	0.10~0.22	0.048
SN1.5-10L (H)			L														
SN1.5-13R (H)		13	R		10	23	27.58	30.58				0.62	0.063	1.34	0.14		0.088
SN1.5-13L (H)			L														
SN1.5-15R (H)		15	R			25	31.82	34.82				0.93	0.095	2.03	0.21		0.12
SN1.5-15L (H)			L														
SN1.5-20R (H)		20	R		12	30	42.43	45.43				2.14	0.22	4.64	0.47		0.20
SN1.5-20L (H)			L														
SN1.5-26R (H)		26	R			40	55.15	58.15				4.51	0.46	9.80	1.00		0.36
SN1.5-26L (H)			L														
SN1.5-30R (H)		30	R			45	63.64	66.64				6.75	0.69	14.7	1.50		0.48
SN1.5-30L (H)			L														
SN2-10R (H)	*m*2	10	R	S1	12	22	28.28	32.28	20	15	35	0.66	0.068	1.44	0.15	0.12~0.26	0.11
SN2-10L (H)			L														
SN2-13R (H)		13	R			30	36.77	40.77				1.42	0.14	3.08	0.31		0.22
SN2-13L (H)			L														
SN2-15R (H)		15	R			35	42.43	46.43				2.14	0.22	4.64	0.47		0.30
SN2-15L (H)			L														
SN2-20R (H)		20	R		15	45	56.57	60.57				4.84	0.49	10.5	1.07		0.53
SN2-20L (H)			L														
SN2-26R (H)		26	R		20	60	73.54	77.54				10.1	1.03	22.0	2.24		0.91
SN2-26L (H)			L														
SN2-30R (H)		30	R			65	84.85	88.85				15.0	1.53	32.7	3.34		1.19
SN2-30L (H)			L														

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

J Series



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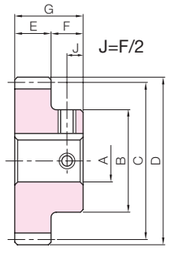

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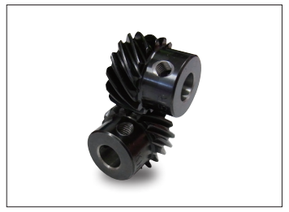

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SN1-13RJ6**

Bore H7	* The product shapes of J Series items are identified by background color.																
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35
Screw size	—		4×1.8		5×2.3				6×2.8				8×3.3			10×3.3	
Catalog Number	M4	M5	M4						M5				M6			M8	
SN1-13R J BORE	*																
SN1-13L J BORE	*																
SN1-15R J BORE	*																
SN1-15L J BORE	*																
SN1-20R J BORE		*															
SN1-20L J BORE		*															
SN1-26R J BORE			*														
SN1-26L J BORE			*														
SN1.5-10R J BORE		*															
SN1.5-10L J BORE		*															
SN1.5-13R J BORE			*														
SN1.5-13L J BORE			*														
SN1.5-15R J BORE			*														
SN1.5-15L J BORE			*														
SN1.5-20R J BORE				*													
SN1.5-20L J BORE				*													
SN1.5-26R J BORE				*													
SN1.5-26L J BORE				*													
SN1.5-30R J BORE				*													
SN1.5-30L J BORE				*													
SN2-10R J BORE				*													
SN2-10L J BORE				*													
SN2-13R J BORE				*													
SN2-13L J BORE				*													
SN2-15R J BORE				*													
SN2-15L J BORE				*													
SN2-20R J BORE						*											
SN2-20L J BORE						*											
SN2-26R J BORE											*						
SN2-26L J BORE											*						
SN2-30R J BORE											*						
SN2-30L J BORE											*						

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SN1-15RHJ8

[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.
② "*" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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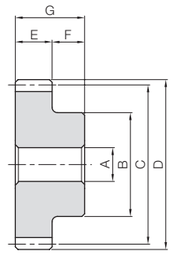
Screw gear (helical gear)

Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle	45°
Material	S45C
Heat treatment	—
Surface treatment	Black oxide coating

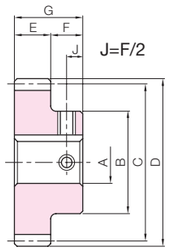
* The precision grade of J Series products is equivalent to the value shown in the table.

J H

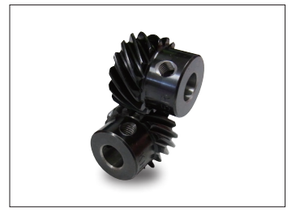


S1

J Series



S1K



H To order Hardened Plus, please specify Catalog No. + H. **Example: SN2.5-10RH**

Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	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)
					A_{H7}	B	C	D	E	F	G	N·m	kgf·m	N·m	kgf·m		
SN2.5-10R (H) SN2.5-10L (H)	*m*2.5	10	R L	S1	12	26	35.36	40.36	22	16	38	1.27	0.13	2.75	0.28	0.14~0.28	0.20
SN2.5-13R (H) SN2.5-13L (H)		13	R L		15	35	45.96	50.96				2.68	0.27	5.84	0.60		0.35
SN2.5-15R (H) SN2.5-15L (H)		15	R L			40	53.03	58.03				4.03	0.41	8.77	0.89		0.49
SN2.5-20R (H) SN2.5-20L (H)		20	R L		20	60	70.71	75.71				9.07	0.92	19.7	2.01		0.94
SN2.5-26R (H) SN2.5-26L (H)		26	R L			70	91.92	96.92				18.8	1.91	40.8	4.16		1.54
SN2.5-30R (H) SN2.5-30L (H)		30	R L			80	106.07	111.07				27.7	2.83	60.3	6.15		2.06
SN3-10R (H) SN3-10L (H)	*m*3	10	R L	S1	15	34	42.43	48.43	25	18	43	2.14	0.22	4.64	0.47	0.14~0.32	0.35
SN3-13R (H) SN3-13L (H)		13	R L		20	45	55.15	61.15				4.51	0.46	9.80	1.00		0.59
SN3-15R (H) SN3-15L (H)		15	R L			50	63.64	69.64				6.75	0.69	14.7	1.50		0.80
SN3-20R (H) SN3-20L (H)		20	R L			60	84.85	90.85				15.0	1.53	32.7	3.34		1.40
SN3-26R (H) SN3-26L (H)		26	R L			80	110.31	116.31				30.8	3.14	67.0	6.84		2.48
SN3-30R (H) SN3-30L (H)		30	R L			90	127.28	133.28				45.4	4.62	98.6	10.1		3.29
SN4-10R (H) SN4-10L (H)	*m*4	10	R L	S1	20	45	56.57	64.57	30	20	50	4.84	0.49	10.5	1.07	0.18~0.38	0.72
SN4-13R (H) SN4-13L (H)		13	R L			60	73.54	81.54				10.1	1.03	22.0	2.24		1.32
SN4-15R (H) SN4-15L (H)		15	R L			70	84.85	92.85				15.0	1.53	32.7	3.34		1.81
SN4-20R (H) SN4-20L (H)		20	R L			90	113.14	121.14				33.0	3.37	71.8	7.32		3.24
SN4-26R (H) SN4-26L (H)		26	R L			100	147.08	155.08				66.7	6.80	145	14.8		5.11

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

To order J Series products, please specify: **Catalog No. + J + BORE.** **Example: SN2.5-10RJ12**

Bore H7 / Keyway Js9 / Screw size / Catalog Number	12 / 4×1.8 / M4	15 / 5×2.3 / M4	16 / 5×2.3 / M4	17 / 5×2.3 / M4	18 / 6×2.8 / M5	19 / 6×2.8 / M5	20 / 6×2.8 / M5	22 / 6×2.8 / M5	25 / 8×3.3 / M6	28 / 8×3.3 / M6	30 / 8×3.3 / M6	32 / 10×3.3 / M8	35 / 10×3.3 / M8	40 / 12×3.3 / M8	45 / 14×3.8 / M10	50 / 14×3.8 / M10
SN2.5-10R J BORE	*															
SN2.5-10L J BORE	*															
SN2.5-13R J BORE		*														
SN2.5-13L J BORE		*														
SN2.5-15R J BORE		*														
SN2.5-15L J BORE		*														
SN2.5-20R J BORE							*									
SN2.5-20L J BORE							*									
SN2.5-26R J BORE							*									
SN2.5-26L J BORE							*									
SN2.5-30R J BORE							*									
SN2.5-30L J BORE							*									
SN3-10R J BORE		*														
SN3-10L J BORE		*														
SN3-13R J BORE							*									
SN3-13L J BORE							*									
SN3-15R J BORE							*									
SN3-15L J BORE							*									
SN3-20R J BORE							*									
SN3-20L J BORE							*									
SN3-26R J BORE							*									
SN3-26L J BORE							*									
SN3-30R J BORE							*									
SN3-30L J BORE							*									
SN4-10R J BORE							*									
SN4-10L J BORE							*									
SN4-13R J BORE							*									
SN4-13L J BORE							*									
SN4-15R J BORE							*									
SN4-15L J BORE							*									
SN4-20R J BORE							*									
SN4-20L J BORE							*									
SN4-26R J BORE							*									
SN4-26L J BORE							*									

To order J Series Hardened Plus products, please specify: Catalog No. + H + J + BORE.
Example: SN2.5-13RHJ16

[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.
② "✻" is a product with the original bore diameter, so Hardened Plus is not available. See Page 22 for more details on Hardened Plus.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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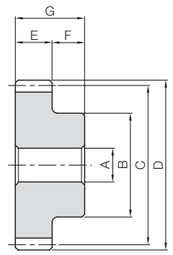
SUN Module 1~2.5

Stainless steel screw gear (helical gear)

Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998)
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle	45°
Material	SUS303
Heat treatment	—

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

J



S1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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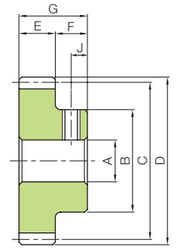
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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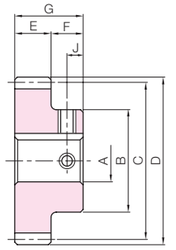

S1K

Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SUN1-13R **SUN1-13L**	***m*1**	13	R L	S1	6	15	18.38	20.38	10	10	20	0.19	0.019	0.08~0.18	0.031
SUN1-15R **SUN1-15L**		15	R L			18	21.21	23.21				0.29	0.029		0.044
SUN1.5-10R **SUN1.5-10L**	***m*1.5**	10	R L	S1	8	16	21.21	24.21	15	10	25	0.29	0.029	0.10~0.22	0.048
SUN1.5-13R **SUN1.5-13L**		13	R L		10	23	27.58	30.58				0.62	0.063		0.088
SUN1.5-15R **SUN1.5-15L**		15	R L			25	31.82	34.82				0.93	0.095		0.12
SUN1.5-20R **SUN1.5-20L**		20	R L		12	30	42.43	45.43				2.14	0.22		0.20
SUN2-10R **SUN2-10L**	***m*2**	10	R L	S1	12	22	28.28	32.28	20	15	35	0.66	0.068	0.12~0.26	0.11
SUN2-13R **SUN2-13L**		13	R L			30	36.77	40.77				1.42	0.14		0.22
SUN2-15R **SUN2-15L**		15	R L			35	42.43	46.43				2.14	0.22		0.31
SUN2-20R **SUN2-20L**		20	R L		15	45	56.57	60.57				4.84	0.49		0.54
SUN2.5-15R **SUN2.5-15L**	***m*2.5**	15	R L	S1	15	40	53.03	58.03	22	16	38	4.03	0.41	0.14~0.28	0.49
SUN2.5-20R **SUN2.5-20L**		20	R L		20	60	70.71	75.71				9.07	0.92		0.95

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

Bore H7	* The product shapes of J Series items are identified by background color.																	
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	
Screw size	—		4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		
Catalog Number	M4	M5	M4						M5				M6			M8		
SUN1-13RJ BORE																		
SUN1-13LJ BORE																		
SUN1-15RJ BORE																		
SUN1-15LJ BORE																		
SUN1.5-10RJ BORE																		
SUN1.5-10LJ BORE																		
SUN1.5-13RJ BORE																		
SUN1.5-13LJ BORE																		
SUN1.5-15RJ BORE																		
SUN1.5-15LJ BORE																		
SUN1.5-20RJ BORE																		
SUN1.5-20LJ BORE																		
SUN2-10RJ BORE																		
SUN2-10LJ BORE																		
SUN2-13RJ BORE																		
SUN2-13LJ BORE																		
SUN2-15RJ BORE																		
SUN2-15LJ BORE																		
SUN2-20RJ BORE																		
SUN2-20LJ BORE																		
SUN2.5-15RJ BORE																		
SUN2.5-15LJ BORE																		
SUN2.5-20RJ BORE																		
SUN2.5-20LJ 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.

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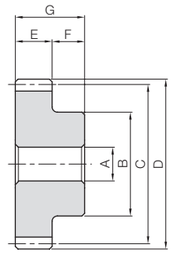
You can download CAD data (DXF format) of KHK Products from the Website.

Specifications	
Precision grade	JIS grade N9 (JIS B1702-1: 1998) *
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle	45°
Material	CAC702 (old JIS A ℓ BC2)
Heat Treatment	—

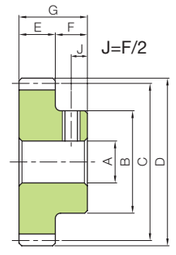
* The precision grade of J Series products is equivalent to the value shown in the table.



S1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



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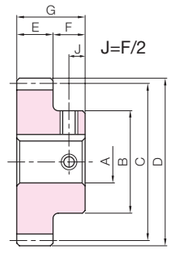


S1K

Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
AN1-13R **AN1-13L**	***m*1**	13	R L	S1	6	15	18.38	20.38	10	10	20	0.31	0.032	0.08~0.18	0.029
AN1-15R **AN1-15L**		15	R L			18	21.21	23.21				0.48	0.049		0.042
AN1.5-10R **AN1.5-10L**	***m*1.5**	10	R L	S1	8	16	21.21	24.21	15	10	25	0.48	0.049	0.10~0.22	0.046
AN1.5-13R **AN1.5-13L**		13	R L		10	23	27.58	30.58				1.03	0.10		0.085
AN1.5-15R **AN1.5-15L**		15	R L			25	31.82	34.82				1.55	0.16		0.11
AN2-10R **AN2-10L**	***m*2**	10	R L	S1	12	22	28.28	32.28	20	15	35	1.10	0.11	0.12~0.26	0.11
AN2-13R **AN2-13L**		13	R L			30	36.77	40.77				2.36	0.24		0.21
AN2-15R **AN2-15L**		15	R L			35	42.43	46.43				3.56	0.36		0.29
AN2.5-10R (Made to Order) **AN2.5-10L** (Made to Order)	***m*2.5**	10	R L	S1	12	26	35.36	40.36	22	16	38	2.11	0.22	0.14~0.28	0.20
AN2.5-13R (Made to Order) **AN2.5-13L** (Made to Order)		13	R L		15	35	45.96	50.96				4.47	0.46		0.34
AN2.5-15R (Made to Order) **AN2.5-15L** (Made to Order)		15	R L			40	53.03	58.03				6.72	0.69		0.47
AN3-10R (Made to Order) **AN3-10L** (Made to Order)	***m*3**	10	R L	S1	15	34	42.43	48.43	25	18	43	3.56	0.36	0.14~0.32	0.34
AN3-13R (Made to Order) **AN3-13L** (Made to Order)		13	R L		20	45	55.15	61.15				7.51	0.77		0.57
AN3-15R (Made to Order) **AN3-15L** (Made to Order)		15	R L			50	63.64	69.64				11.3	1.15		0.77

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

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

Bore H_7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30
Screw size	—		4×1.8		5×2.3				6×2.8				8×3.3		
Catalog Number	M4	M5	M4						M5				M6		
AN1-13RJ BORE															
AN1-13LJ BORE															
AN1-15RJ BORE															
AN1-15LJ BORE															
AN1.5-10RJ BORE															
AN1.5-10LJ BORE															
AN1.5-13RJ BORE															
AN1.5-13LJ BORE															
AN1.5-15RJ BORE															
AN1.5-15LJ BORE															
AN2-10RJ BORE															
AN2-10LJ BORE															
AN2-13RJ BORE															
AN2-13LJ BORE															
AN2-15RJ BORE															
AN2-15LJ BORE															

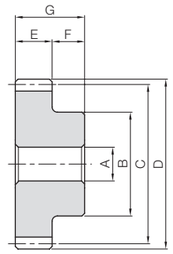
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 383
Precautions for Standard Machined Products → Pages 42~44

PN Module 1~3 Plastic screw gear (helical gear)

Specifications	
Precision grade	JIS grade N10 (JIS B1702-1: 1998)*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Helix angle	45°
Material	MC901
Heat treatment	—

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



S1

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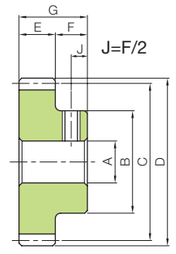
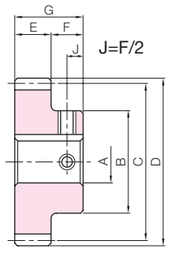
J Series



S1T



S1K

Catalog Number	Module	No. of teeth	Direction of helix	Shape	Bore A_{H8}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
PN1-13R **PN1-13L**	***m*1**	13	R L	S1	6	15	18.38	20.38	10	10	20	0.19	0.019	0.18~0.32	0.0045
PN1-15R **PN1-15L**		15	R L			18	21.21	23.21				0.29	0.029	0.20~0.34	0.0064
PN1-20R **PN1-20L**		20	R L		8	25	28.28	30.28				0.66	0.068		0.012
PN1.5-10R **PN1.5-10L**	***m*1.5**	10	R L	S1	6	16	21.21	24.21	15	10	25	0.29	0.029	0~0.38	0.0077
PN1.5-13R **PN1.5-13L**		13	R L		8	23	27.58	30.58				0.62	0.063		0.014
PN1.5-15R **PN1.5-15L**		15	R L			25	31.82	34.82				0.93	0.095		0.018
PN1.5-20R **PN1.5-20L**		20	R L		10	30	42.43	45.43				2.14	0.22		0.031
PN2-10R **PN2-10L**	***m*2**	10	R L	S1	10	22	28.28	32.28	20	15	35	0.66	0.068	0~0.42	0.018
PN2-13R **PN2-13L**		13	R L			30	36.77	40.77				1.42	0.14		0.034
PN2-15R **PN2-15L**		15	R L			35	42.43	46.43				2.14	0.22		0.046
PN2-20R **PN2-20L**		20	R L		12	45	56.57	60.57				4.84	0.49	0~0.44	0.081
PN2.5-13R **PN2.5-13L**	***m*2.5**	13	R L	S1	12	35	45.96	50.96	22	16	38	2.68	0.27	0~0.44	0.055
PN2.5-15R **PN2.5-15L**		15	R L			40	53.03	58.03				4.03	0.41	0~0.46	0.075
PN2.5-20R **PN2.5-20L**		20	R L			60	70.71	75.71				9.07	0.92		0.15
PN3-10R **PN3-10L**	***m*3**	10	R L	S1	12	34	42.43	48.43	25	18	43	2.14	0.22	0~0.52	0.054
PN3-15R **PN3-15L**		15	R L		15	50	63.64	69.64				6.75	0.69	0~0.54	0.12

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

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

Bore H8	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35
Keyway Js9	—		4×1.8		5×2.3				6×2.8				8×3.3			10×3.3	
Screw size	M4	M5	M4						M5				M6			M8	
Catalog Number																	
PN1-13RJ BORE																	
PN1-13LJ BORE																	
PN1-15RJ BORE																	
PN1-15LJ BORE																	
PN1-20RJ BORE																	
PN1-20LJ BORE																	
PN1.5-10RJ BORE																	
PN1.5-10LJ BORE																	
PN1.5-13RJ BORE																	
PN1.5-13LJ BORE																	
PN1.5-15RJ BORE																	
PN1.5-15LJ BORE																	
PN1.5-20RJ BORE																	
PN1.5-20LJ BORE																	
PN2-10RJ BORE																	
PN2-10LJ BORE																	
PN2-13RJ BORE																	
PN2-13LJ BORE																	
PN2-15RJ BORE																	
PN2-15LJ BORE																	
PN2-20RJ BORE																	
PN2-20LJ BORE																	
PN2.5-13RJ BORE																	
PN2.5-13LJ BORE																	
PN2.5-15RJ BORE																	
PN2.5-15LJ BORE																	
PN2.5-20RJ BORE																	
PN2.5-20LJ BORE																	
PN3-10RJ BORE																	
PN3-10LJ BORE																	
PN3-15RJ BORE																	
PN3-15LJ BORE																	

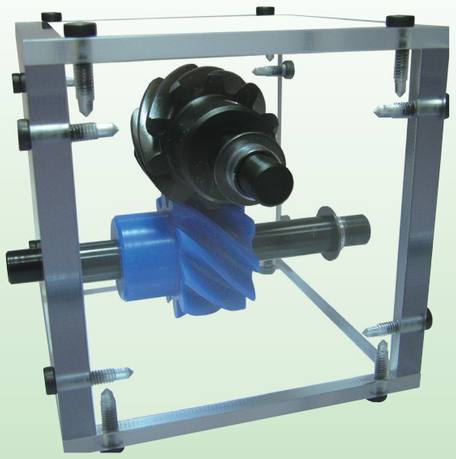
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
② Since tapped holes of plastic products are easily damaged, avoid overtightening when fastening screws. For products with a short tapped hole, tighten screws to a torque of less than 0.12 N·m for M4 threads, and 0.38 N·m for M5 threads.

* In regard to MC Nylon gears, other materials are available for plastic gears, including Ultra High Molecular Weight Polyethylene (U-PE), which has excellent abrasion resistance and resin conforming to the Plastic Implementation Measure (PIM). A single piece order is acceptable and will be produced as a custom-made gear. Please see Page 26 for more details on quotations and orders.

Product Precautions → Page 383
Precautions for Standard Machined Products → Pages 42~44

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

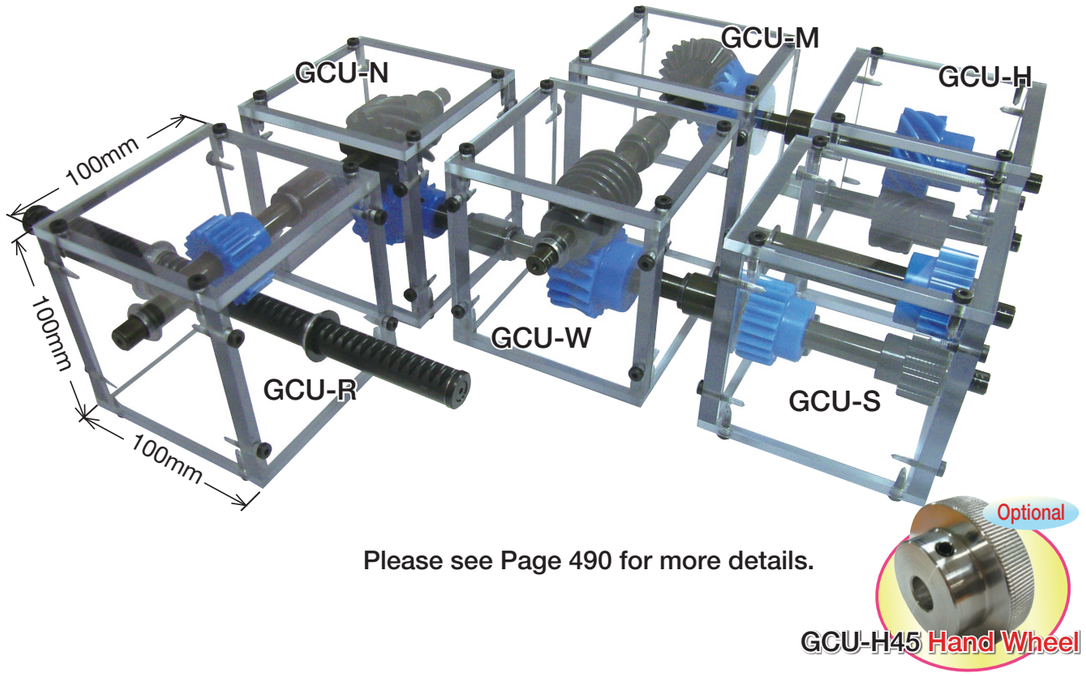
GCU-N Screw Gear Kit



Installation : Nonparallel and nonintersecting gears
Gear Type : Screw Gears
Gears : SN2.5-10R
PN2.5-10R equivalent
Gear Ratio : 1
Weight : Approx. 1kg

Screw Gears are helical gears used in nonparallel and nonintersecting situations. Applications include devices like conveyers with light loads.

* This is not a gear box for actual use to transmit power. Please use only as representations of gear systems.



Please see Page 490 for more details.

Worm Gears

KWGDL/KWGDLS Duplex Worms — Material: SCM440 — m1.5~6 Page 406
AGDL Duplex Worm Wheels — Material: CAC702(AℓBC2) — m1.5~6 Page 406
KWG Ground Worm Shafts — Material: SCM440 — m0.5~6 Page 416
AG Worm Wheels — Reduction Ratio 10~60 — Material: CAC702(AℓBC2) — m0.5~1.5 Page 416
AGF Worm Wheels — Reduction Ratio 10~60 — Material: CAC702(Aℓ BC2) — m2~6 Page 420
SWG Ground Worms — Material: S45C — m1~6 Page 426
AG Worm Wheels — Reduction Ratio 10~60 — Material: CAC702(AℓBC2) — m1~6 Page 426
SW Worms — Material: S45C — m0.5~10 Page 434
BG Worm Wheels — Reduction Ratio 10~60 — Material: CAC502(PBC2) — m0.5~6 Page 434
CG Worm Wheels — Material: FC200 — m1~10 Page 436
SUW Stainless Steel Worms — Material: SUS303 — m0.5~3 Page 454
PG Worm Wheels — Reduction Ratio 10~60 — Material: MC901 — m0.5~3 Page 454

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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Catalog Number of KHK Stock Gears

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

(Example) Worm Gear Pair

Worms

K W G DL 2 - R1

- R1: Number of Starts (Right-hand Lead 1)
- 2: Module (2)
- DL: Other Information (Duplex)
- G: Other Information (Ground Gears)
- W: Type (Worm)
- K: Material (SCM440)

Material: K SCM440; S S45C; SU Stainless Steel
Type: W Worms
Other Information: DL Duplex; G Ground Gears; S Pinion Shafts

Worm Wheels

A G DL 2 - 20 R1

- R1: Number of Starts (Right-hand Lead 1)
- 20: No. of Teeth (20)
- 2: Module (2)
- DL: Other Information (Duplex)
- G: Type (Worm Wheel)
- A: Material (CAC702)

Material: A CAC702; B CAC502; C FC200; P MC901
Type: G Worm Wheels
Other Information: DL Duplex; F Double Hubs or Ring Gears

Features

KHK stock worm gears are available in modules 0.5 to 6, reduction ratios of 1/10 to 1/120, and a wide range of materials and shapes. Duplex worm gears with adjustable backlash and highly accurate rotation are also available. The following table lists the main features.

Type		Catalog Number	Module	Number of Starts or Reduction Ratio	Material (Old JIS in parentheses)	Heat treatment	Tooth Surface Finish	Precision Grade (KHK W 001 / KHK W 002 Note 2)	Features
Duplex Worm Gears	Worms	**KWGDL**	2~4	Single Start	SCM440	Thermal refined, gear teeth induction hardened	Ground	1	Duplex worms that have been tempered, hardened and ground that has excellent accuracy, strength and abrasion resistance. Secondary operations can be given except for the teeth. Moving it in axial direction will adjust the backlash.
	Worms	**KWGDLS**	1.5~6	Single Start	SCM440	Thermal refined, gear teeth induction hardened	Ground	1	Duplex worms with shafts that have been tempered, hardened and ground that has excellent accuracy, strength and abrasion resistance. Secondary operations can be given except for the teeth. Moving it in axial direction will adjust the backlash.
	Wheels	**AGDL**	1.5~6	20~60	CAC702 (AℓBC2)	—	Cut	1	Duplex worm wheels made of aluminum bronze with excellent accuracy and a good balance between machinability and wear resistance. Used in combination with KWGDL or KWGDLS.
Worm Gears	Worms	**KWG**	0.5~6	Single or Double Start	SCM440	Thermal refined, gear teeth induction hardened	Ground	2	Worms with shafts that have been tempered, hardened and ground that has excellent accuracy, strength and abrasion resistance. Secondary operations can be performed except for the teeth.
	Wheels	**AGF** NOTE 1	2~6	10~60	CAC702 (AℓBC2)	—	Cut	2	Worm wheels made of aluminum bronze with a good balance between machinability and wear resistance. Used in combination with KWG.
	Worms	**SWG**	1~6	Single or Double Start	S45C	Gear teeth induction hardened	Ground	2	Worms that have been hardened and ground with a good balance of accuracy, wear resistance and cost. Secondary operations are possible except for the teeth.
	Wheels	**AG** NOTE 1	0.5~6	10~60	CAC702 (AℓBC2)	—	Cut	2	Worm wheels made of aluminum bronze with a good balance between machinability and wear resistance. Used in combination with SWG. Note 1
	Worms	**SW**	0.5~10	Single or Double Start	S45C	—	Cut (Rolling)	4	Many lineups are available at a low price and excellent usability.
	Worms	**SUW**	0.5~3	Single or Double Start	SUS303	—	Cut	4	Stainless steel worms with rust resistance.
	Wheels	**BG**	0.5~6	10~60	CAC502 (PBC2)	—	Cut	4	Worm wheels made of phosphorus bronze with excellent wear resistance. Used in combination with SW and SUW.
	Wheels	**CG**	1~10	10~120	FC200	—	Cut	4	Cast iron worm wheels that are inexpensive and suitable for light loads. Used in combination with SW and SUW.
	Wheels	**PG**	0.5~3	10~60	MC901	—	Cut	5	Worm wheels made of MC nylon. Can be used with no lubrication. Used in combination with SW and SUW.

[Note 1] FC200 is the material for the hubs of AGF and AG worm wheels. The AG worm wheels are normally combined with the SWG worms, but are also compatible with the KWG worms with module 1.5 and below .

[Note 2] The precision grade of KHK stock worm gears controls the product quality based on the KHK standards. Please see “Precision of Worm Gears” on Page 400 in the Selection Hints section for details.

High-precision ground gear worms are available.

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

CNC Screw Grinding Machine (TE-LM200)

Worm ground gear machining range	
Maximum gear accuracy	KHK Grade 1
Maximum module	*m*8
Maximum nominal lead angle	±35°
Maximum outer diameter	ϕ200mm
Maximum length	330mm

Application Examples

Worm gears are used in a wide range of fields, such as positioning mechanisms and reversing mechanisms.

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■ Wiper Drive Device

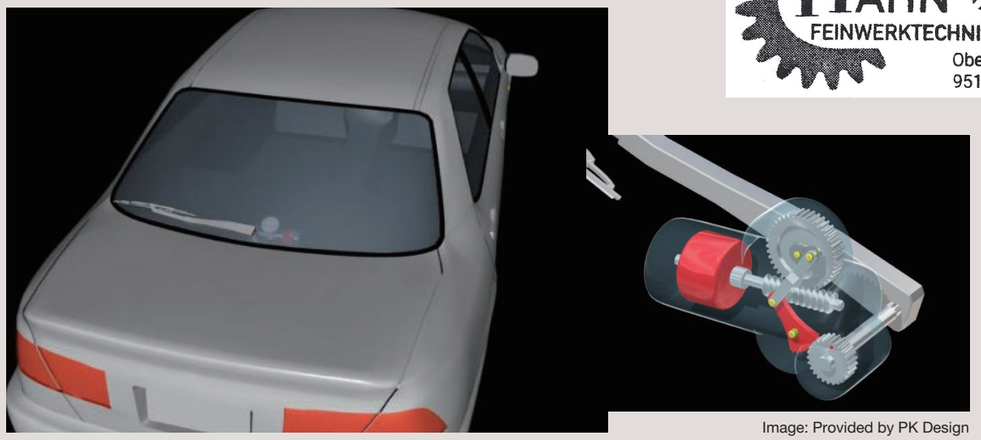


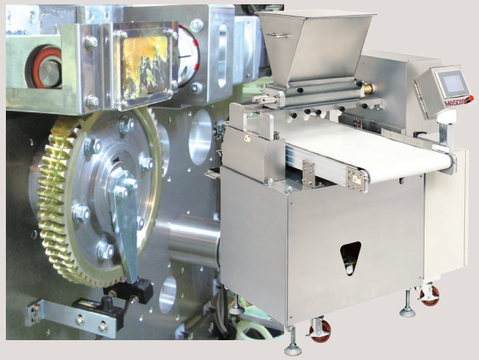
Image: Provided by PK Design

Worm gear used for the oscillating mechanism of wipers

■ Yaesu Steam Kettle

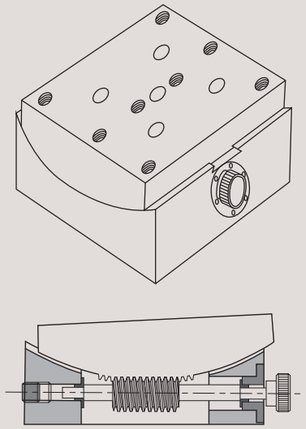
SW worm and CG worm wheel used for rotating large pans

■ Masdac Food Filling Device



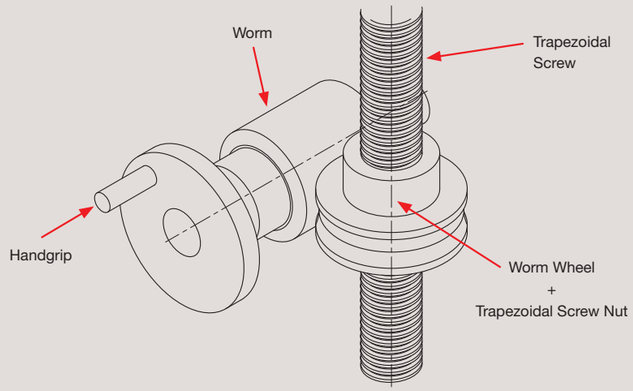
KWGDL Duplex Worm Wheels and AGDL Worm Wheels used for indexing and driving, for accurate filling of a fixed amount of ingredients

■ Gonio Stage Design Example



Worm gear used for rotating tables (design example)

■ Worm Jack



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

Worm gears are available in right-hand helix and left-hand helix. Worms and worm wheels of the same helix direction are combined. However, combination may not be possible due to the difference in the number of starts of the worm and the difference in pitch being normal and transverse (axial direction). Below is the Mating Helical Gear Selection Chart for KHK worm gears.

■ Mating Worm Wheel Selection Chart

Worms		KWGDL KWGDLS	KWG		SWG		SW				SUW	
Mating Wheel Note 1	Hand Number of Starts	R1	R1	R2	R1	R2	R1	R2	L1	L2	R1	R2
AGDL	R1	○										
AG0.5~1.5 AGF	R1		○									
	R2			○								
AG	R1				○							
	R2					○						
BG	R1						○				○	
	R2							○				○
	L1								○			
	L2									○		
CG	R1						○				○	
	R2							○				○
	L1								○			
	L2									○		
PG	R1						○				○	
	R2							○				○

[Note 1] The mating wheel must have the same module as the worm.

■ Helix direction of worm gears

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 Surface Durability ■ Calculation of Bending Strength of Gears

Item \ Catalog Number	KWGDL/KWGDLS/AGDL KWG/AGF, SWG/AG	SW/BG	SW/CG	SUW/PG
Formula NOTE 1	Formula of cylindrical worm gear strength (JGMA405-01)			The Lewis formula
Lubricating Oil	Lubricating oil with appropriate viscosity that contains extreme pressure additive for gears			Allowable bending stress (kgf/mm^2)
Lubrication Method	Oil Bath Lubrication (Oil Bath)			1.15 (40°C with No Lubrication)
Startup Status	The starting torque is 200% or less of the rated torque, and the number of starts per hour is under 2.			
Expected Service Life	26,000 hours			
Impact from motor	Uniform load			
Impact from load	Uniform load			
Allowable Stress Coefficient S_{lim}	0.67	0.70	0.42	

[NOTE 1] The gear strength formula is based on JGMA (Japanese Gear Manufacturers Association) specifications, “MC Nylon Technical Data” by Mitsubishi Chemical Advanced Materials. The units for the rotational speed (rpm) and the stress (kgf/mm^2) are adjusted to the units needed in the formula.

When selecting KHK standard gears, glance over the Product Precautions on page 402 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.

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

Step 1

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

■ Maximum allowable sliding speed due to friction

The maximum allowable sliding speed of each worm gear is shown in the table below. Sliding speed should be calculated when making a selection.

Sliding speed v_S (m/s)

$$v_S = \frac{dn}{19100 \cos \gamma}$$

d : Worm pitch dia.
n : Worm rotational speed
γ : Worm nominal lead angle

Catalog Number	Maximum allowable sliding speed (m/s)
AGDL	* 15
AGF	* 15
AG	* 15
BG	* 10
CG	* 2.5
PG	1 (No Lubrication)

* From JGMA405-01

■ Surface durability

Calculated values of the strength at which the worm wheel teeth do not wear due to surface fatigue damage. If the tooth surface is not sufficiently lubricated, the surface may be damaged even if the load is less than the tooth surface durability.

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info@zahnrad24.com
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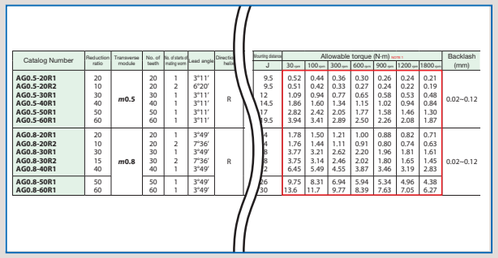
Step 2

Select provisionally from the allowable torque table in this catalog based on the load torque.

■ For provisional selection from this catalog

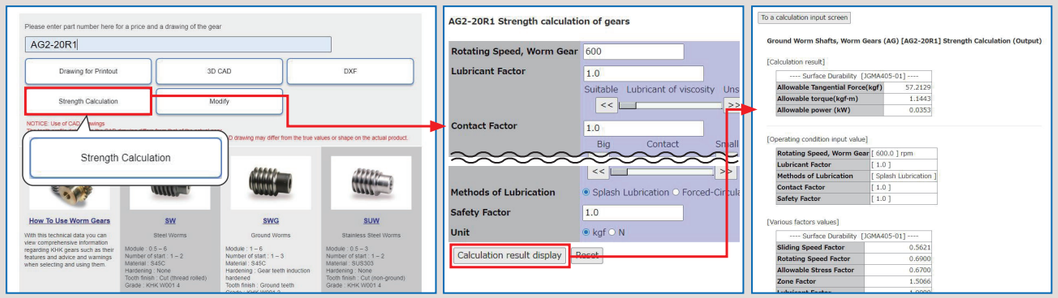


Catalog Number	Reduction ratio	Transverse module	No. of teeth	No. of starts & rotary direction	Lead angle	Direction helix	Bearing distance	Allowable torque (N·m) 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	Backlash (mm)
AG0.5-20R1	20	m0.5	20	1	3°11′	R	9.5	0.52	0.44	0.36	0.30	0.26	0.24	0.21	0.02~0.12
AG0.5-20R2	10		20	2	6°20′		9.5	0.51	0.42	0.33	0.27	0.24	0.22	0.19	
AG0.5-30R1	30		30	1	3°11′		12	1.09	0.94	0.77	0.65	0.58	0.53	0.48	
AG0.5-40R1	40		40	1	3°11′		14.5	1.86	1.60	1.34	1.15	1.02	0.94	0.84	
AG0.5-50R1	50		50	1	3°11′		17	2.82	2.42	2.05	1.77	1.58	1.46	1.30	
AG0.5-60R1	60		60	1	3°11′		19.5	3.94	3.41	2.89	2.50	2.26	2.08	1.87	
AG0.8-20R1	20	m0.8	20	1	3°49′	R	14	1.78	1.50	1.21	1.00	0.88	0.82	0.71	0.02~0.12
AG0.8-20R2	10		20	2	7°36′		14	1.76	1.44	1.11	0.91	0.80	0.74	0.63	
AG0.8-30R1	30		30	1	3°49′		18	3.77	3.21	2.62	2.20	1.96	1.81	1.61	
AG0.8-30R2	15		30	2	7°36′		18	3.75	3.14	2.46	2.02	1.80	1.65	1.45	
AG0.8-40R1	40		40	1	3°49′		22	6.45	5.49	4.55	3.87	3.46	3.19	2.83	
AG0.8-50R1	50		50	1	3°49′		26	9.75	8.31	6.94	5.94	5.34	4.96	4.38	
AG0.8-60R1	60		60	1	3°49′		30	13.6	11.7	9.77	8.39	7.63	7.05	6.27	

Step 3

Calculate the strength under the actual usage conditions.
Calculate the strength formally using the various gear strength formulas. We recommend using the simple strength calculation available on our website.

■ Use the strength calculation function on our website.



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

3. Cautions on Selecting Racks By Precision

The precision standards of KHK stock worm gears are established by us. Check the precision table below.

① Worm Precision (KHK W 001)

For the pitch error and lead error of the worm, the allowable values of 1 to 4 grades are set for each module with reference to the JIS standards. The lead error is the allowable value of the tooth trace error in one lead.

■ Worm Precision KHK W 001 (Unit: μ m)

Grade	Error	Module				
		Over *m*0.4 to 1	Over *m*1 to 1.6	Over *m*1.6 to 2.5	Over *m*2.5 to 4	Over *m*4 to 6
1	Pitch Error	8	12	16	20	25
	Lead Error	7	9	11	13	16
2	Pitch Error	12	16	20	24	29
	Lead Error	15	18	21	25	28
3	Pitch Error	16	23	30	37	50
	Lead Error	20	23	27	33	37
4	Pitch Error	20	30	40	50	70
	Lead Error	30	32	38	46	52

② Worm Wheel Accuracy (KHK W 002)

Our precision grades for pitch errors are established by referring to old JIS Standards. The precision grades are set from 1 to 5, 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 pitch diameter.

■ Worm Wheel Accuracy KHK W 002 Unit: μ m

Grade	Error	Over *m*0.4 to 1					Over *m*1 to 1.6					Over *m*1.6 to 2.5					Over *m*2.5 to 4					Over *m*4 to 6				
		Pitch dia. (mm)																								
		6 to 12	12 to 25	25 to 50	51 to 100	100 to 200	12 to 25	25 to 50	51 to 100	100 to 200	200 to 400	12 to 25	25 to 50	51 to 100	100 to 200	200 to 400	25 to 50	51 to 100	100 to 200	200 to 400	400 to 800	25 to 50	51 to 100	100 to 200	200 to 400	400 to 800
1	Single Pitch Error	5	6	7	7	9	6	7	8	9	10	7	7	8	9	11	8	9	10	11	13	9	10	11	13	14
	Total Pitch Error	21	24	26	30	34	25	28	31	35	41	27	30	33	37	43	33	36	40	46	53	37	40	45	50	57
2	Single Pitch Error	8	8	9	10	12	9	10	11	12	14	9	10	12	13	15	11	13	14	16	18	13	14	16	18	20
	Total Pitch Error	30	33	37	42	48	35	39	44	50	57	38	42	46	52	60	46	51	57	64	74	52	57	63	71	80
3	Single Pitch Error	11	12	13	15	17	12	14	16	18	20	13	15	16	19	21	16	18	20	23	26	19	20	22	25	29
	Total Pitch Error	43	47	53	60	68	50	55	62	71	81	53	59	66	74	85	65	72	81	91	105	74	81	90	100	115
4	Single Pitch Error	15	17	19	21	24	18	19	22	25	29	19	21	23	26	30	23	25	28	32	37	26	28	32	35	40
	Total Pitch Error	60	66	74	83	95	70	77	87	99	115	75	83	92	105	120	91	100	115	130	145	105	115	125	140	160
5	Single Pitch Error	21	24	26	30	34	25	28	31	35	41	27	30	33	37	43	33	36	40	46	53	37	40	45	50	57
	Total Pitch Error	86	94	105	120	135	100	110	125	140	165	105	120	130	150	170	130	145	160	185	210	150	160	180	200	230

③ Total Length Tolerance for Worm Gears

■ Total Length Tolerance for Worms

Series	Total Length (mm)	Tolerance
KWGDL	Uniform	0 −0.10
SWG SW SUW	100 or less	0 −0.15
	Over 100 200 or less	0 −0.20
KWGDLS KWG	Uniform	Normal Tolerance

■ Total Length Tolerance for Worm Wheels

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

[NOTE] PG Plastic Wheels are excluded.

4. Cautions in Selecting Worm Gears Based on Efficiency

The transmission efficiency of worm gears varies slightly depending on the assembled state, lubricating oil and the like, but the transmission efficiency (excludes bearing loss and loss of lubricating oil due to stirring) of worm wheels when driven from the worm is approximately 30% to 90%. The transmission efficiency table of the KHK stock worm gears is shown below (reference values).

① Efficiency of Various Worms

■ KWGDL/KWGDLS/AGDL Worm Gear Efficiency (%)

(rpm = Worm Rotational Speed)

Catalog Number \ Worm Rotational Speed	100	300	600	900	1200	1800
KWGDLS1.5-R1	35	42	47	51	53	57
KWGDL2-R1	38	45	51	55	56	61
KWGDL2.5-R1	40	48	54	57	60	63
KWGDL3-R1	41	49	55	58	62	65
KWGDL3.5-R1	42	50	56	61	62	65
KWGDL4-R1	42	51	56	61	63	67

■ KWG/AG/AGF Worm Gear Efficiency (%)

(rpm = Worm Rotational Speed)

Catalog Number \ Worm Rotational Speed	100	300	600	900	1200	1800
KWG0.5-R1	30	34	38	41	43	46
KWG0.8-R1	35	40	44	47	49	53
KWG1-R1	34	40	45	48	51	54
KWG1.5-R1	35	42	47	51	53	57
KWG2-R1	45	51	56	60	62	65
KWG2.5-R1	44	51	57	61	62	67
KWG3-R1	44	52	58	61	64	67
KWG4-R1	50	58	64	66	70	72
KWG5-R1	51	60	66	69	71	73
KWG6-R1	53	61	66	70	72	75
KWG0.5-R2	46	50	54	58	60	63
KWG0.8-R2	51	56	61	64	66	69
KWG1-R2	51	56	62	64	67	70
KWG1.5-R2	52	59	64	67	69	73
KWG2-R2	61	67	71	74	76	78
KWG2.5-R2	60	67	72	75	76	80
KWG3-R2	61	68	73	75	78	80
KWG4-R2	66	73	77	79	82	84

■ SWG/AG Worm Gear Efficiency (%)

(rpm = Worm Rotational Speed)

Catalog Number \ Worm Rotational Speed	100	300	600	900	1200	1800
SWG1-R1	34	40	45	48	51	54
SWG1.5-R1	35	42	47	51	53	57
SWG2-R1	38	45	51	55	56	61
SWG2.5-R1	40	48	54	57	60	63
SWG3-R1	41	49	55	58	62	65
SWG4-R1	42	51	56	61	63	67
SWG5-R1	46	54	60	64	66	70
SWG6-R1	48	57	64	66	68	73
SWG1-R2	51	56	62	64	67	70
SWG1.5-R2	52	59	64	67	69	73
SWG2-R2	55	62	67	70	72	75
SWG2.5-R2	57	64	69	72	75	77
SWG3-R2	58	66	71	73	76	78
SWG4-R2	59	67	72	75	77	80
SWG5-R2	62	70	75	78	79	82
SWG6-R2	65	72	77	80	81	84

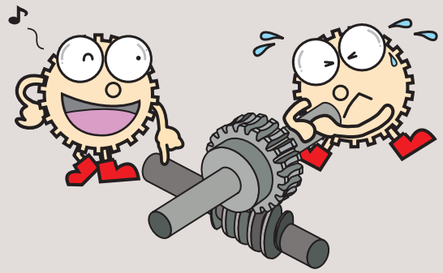
■ SW, SUW/CG, BG, PG Worm Gear Efficiency

The values shown in the table below are estimates and may vary slightly according to conditions such as assembled state, load, lubrication and rotation speed.

Catalog Number	Number of Starts	Efficiency (%)
SW/SUW	1 Start	30~50%
	2 Starts	50~60%

② Self-locking of worm gears

The state of the worm not being able to be rotated from the worm wheel is called self-locking. Self-locking happens due to the worm gear's material, lead angle, machining accuracy, bearing type, lubricating oil, etc.
There are various factors, so self-lock is not always determined only by the lead angle, but usually a single-start worm self-locks at a lead angle of 4° or less. If complete reverse prevention is required, use another braking mechanism or the like in combination.



Product Precautions

Worm Common Notes

[Caution on Product Characteristics]

(1) These worm gears produce axial thrust forces. Please see page 404 for more details.
(2) Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.
(3) For products having a tapped hole, a set screw is included.
(4) For bores of ϕ 4 or below, the bore tolerance is H8. As well, the tolerance is H8 for ϕ 5 or ϕ 6 bores with hole length (total length) 3x the bore or more.
(5) For hole lengths 3.5x the bore or more, the hole center is out of H7 tolerance.

[J Series]

(1) Black oxide is not re-applied to parts undergoing secondary operations.

Worm Wheel Common Notes

[Caution on Product Characteristics]

(1) The allowable torque shown in the table are calculated values according to the assumed usage conditions. Please see page 398 for more details.
(2) Variations in temperature or humidity can cause dimensional changes in plastic gears, including tooth diameter, bore, and backlash. The accuracy and tolerances shown in the catalog are values obtained when machining is performed.
(3) For bores of ϕ 4 or below, the bore tolerance is H8. As well, the tolerance is H8 for ϕ 5 or ϕ 6 bores with hole length (total length) 3x the bore or more.
(4) These worm gears produce axial thrust forces. Please see page 404 for more details.
(5) Some products have a slight gap in the casted section, but this does not affect the holding strength.
(6) Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.
(7) For products having a tapped hole, a set screw is included.
(8) FC200's tensile strength (200N/mm^2) is derived from test specimens and does not represent that of the boss.

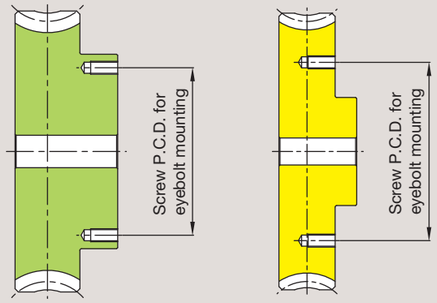
[Caution on Secondary Operations]

(1) Because it affects the cast portion, there is no additional modification other than to the boss part.
(2) As the worm wheel is casted, bubbles may form inside the material.
If the air bubbles found in secondary operations are problematic, contact the supplier.

[J Series]

(1) Certain products which would otherwise have a very long tapped hole are counterbored. For details, please see the KHK website.
(2) For bores over ϕ 50, the bore tolerance is H8.

Tapped Holes in Semi-Custom Standard Products



Shape A　　Shape B

Catalog Number	Shape	Screw P.C.D. for eyebolt mounting
AGDL5-50R1S	A	205
AGDL5-60R1S	A	255
AGDL6-40R1S	A	195
AGDL6-50R1S	A	255
AGDL6-60R1S	A	315

Catalog Number	Shape	Screw P.C.D. for eyebolt mounting
CG5-50L1S	B	155
CG5-60L1S	B	165
CG6-40L1S	B	165
CG6-50L1S	B	165
CG6-60L1S	B	185
CG8-30R1S	A	155
CG8-40R1S	A	195
CG8-50R1S	A	215
CG10-20R1S	A	140
CG10-30R1S	A	215
CG10-40R1S	A	255

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Application Hints

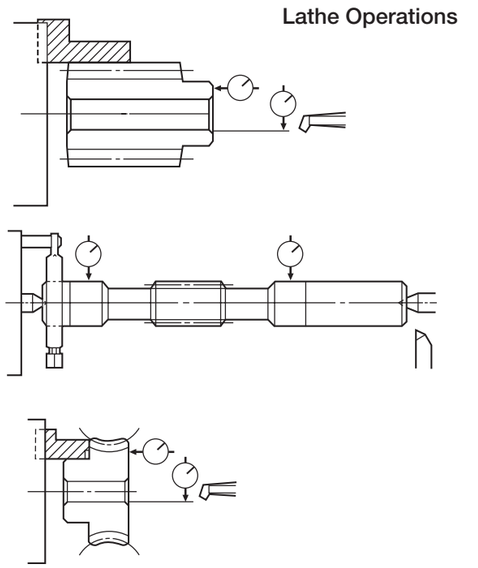
In order to use KHK stock worm gears safely, carefully read the Application Hints before proceeding.
If there are questions or you require clarifications, please contact our technical department or your nearest distributor. E-mail: info@khkgears.net
Please read “Cautions on Performing Secondary Operations” 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. Resin gears and ring gears deform particularly easily, so please handle with care.

2. Caution on Performing Secondary Operations

① Gears are machined based on the ground section of the hole or shaft. If machining, it is important to pay special attention to locating the center in order to avoid runout. (Fig.1)
If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the hub end surface.



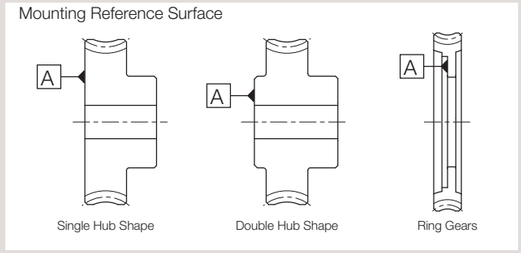
If reworking using scroll chucks, we recommend the use of new or rebored jaws for improved precision.

Fig. 1

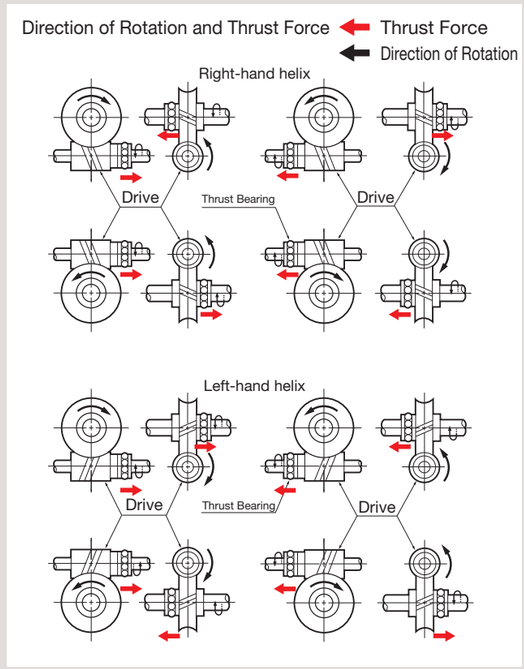
② If enlarging the bore diameter, the wall strength of the hub must be higher than that of the gear teeth. The maximum bore size should be 60% to 70% of the hub diameter (or tooth root diameter), and 50% to 60% for keyway applied modifications. Also, because the cast FC200 hub is weaker and more brittle than other steels, we recommend using a maximum bore diameter about 10% smaller.
③ As the worm wheel is casted, bubbles may form inside the material. If the air bubbles found in secondary operations are problematic, contact the supplier.

3. Points of Caution during Assembly

① The recommended center distance tolerance of KHK stock worm gears is H7 for ground gears and H8 for cut gears. The amount of backlash is given in the product table for each gear.
② The mounting reference surface of the worm wheel is as shown in the figure below.
Assemble the worm wheel so that the center of the worm shaft is at the center of its tooth width.



③ As the tooth trace of worm gears is spiraled, axial thrust force is generated. Also, the directions of thrust change with the hand of helix and the direction of rotation. This is illustrated below. The bearings must be selected properly to be able to handle these thrust forces. For details, use gear calculation software GCSW.

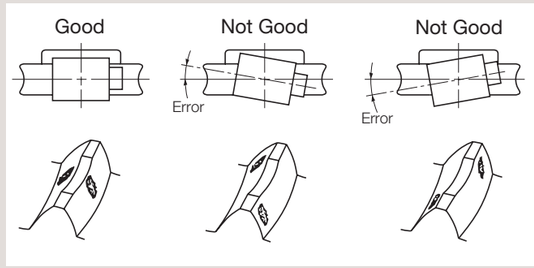


④ The worm may move due to a large thrust force that acts on the worm if it is not sufficiently attached to the shaft. Use a stepped shaft to secure the worm and shaft, and be careful not to loosen the bearing.

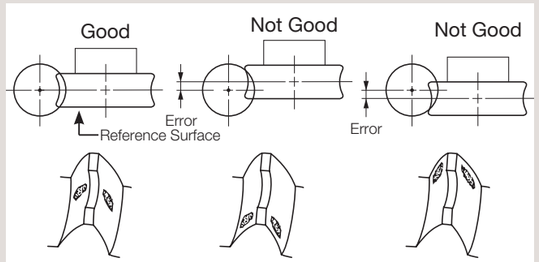
4. Confirming the installation

The wear of a worm gear is greatly affected by the quality of assembly. When assembling, confirm the following items for tooth contact and the like before use.

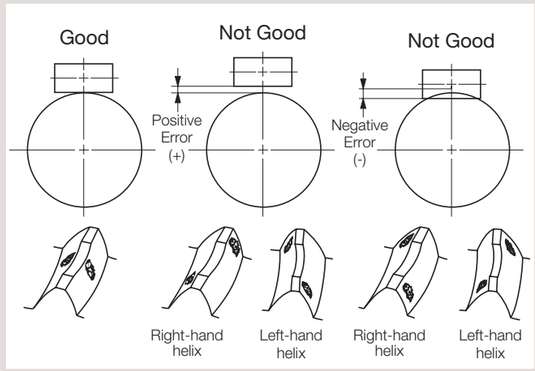
● The shaft angle tolerance between the worm shaft and worm wheel shaft is 90°±1’.



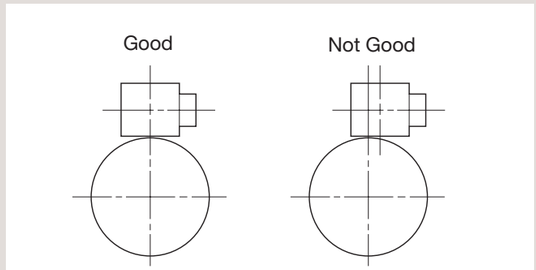
● The tolerance between the center of the worm shaft and center of the worm wheel tooth width is ±0.2 mm.



● The center distance tolerance recommended by the worm gear assembly distance is Ground Worm Gears…H7
Cut Worm Gears…H8.



● The tolerance between the center of the worm wheel shaft and center of the worm tooth width is ±2mm.



If the worm comes too close to one side, the worm wheel will not rotate correctly.

5. 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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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.

Description of duplex worm gears

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

Backlash adjustment mechanism and method of adjustment

The dual-lead worm is formed to give a difference between the right tooth surface and left tooth surface so that it provides a unique tooth profile in which the tooth thickness varies continuously, corresponding with the lead difference. (Fig.1)
The worm gear is also formed in its right and left tooth surface. When such a worm and worm gear are set up at a constant assembly distance and the worm is moved in the axial direction, the tooth thickness of the worm in mesh with the worm gear changes making backlash adjustment possible.

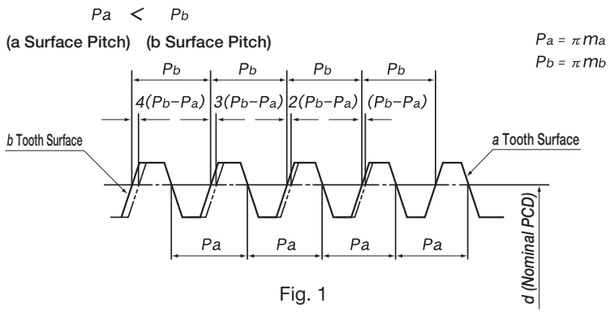


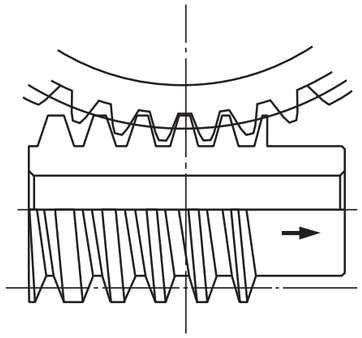
Fig. 1

[CAUTION] The amount of change in backlash (Δ j mm) in relation to the axial movement of the duplex worm shaft (V mm) can be calculated from the formula below.

$$\Delta j = 2V \frac{m_b - m_a}{m_a + m_b}$$

Where
m_a = Nominal Axial Module - (0.01× Nominal Axial Module)
m_b= Nominal Axial Module + (0.01× Nominal Axial Module)

An arrow marking on the outer circumference of the hub of the KHK duplex worm indicates the direction of assembly as well as acts as a direction for the backlash adjustment. When the worm is held with arrow mark pointing right, the tooth thickness is thinner on the right and thicker on the left. Therefore, moving the worm to the right causes the thicker teeth to come into actual engagement with the worm gear, thereby reducing the backlash. (Fig.2)



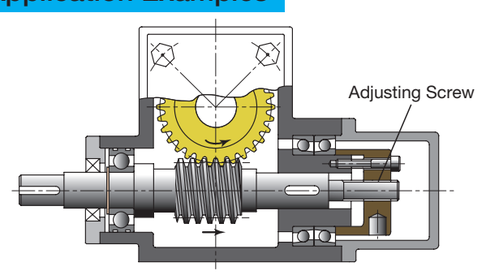
Reference Tooth
Moving the worm in the direction of the arrow diminishes the backlash.

Fig. 2

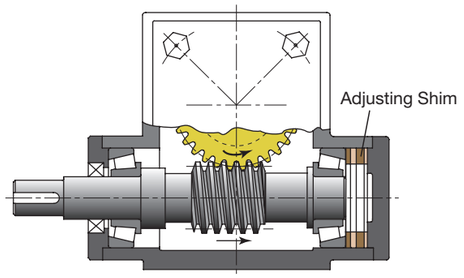
[CAUTION] The KHK duplex worm is designed so that, for all modules, the backlash reduces by 0.02 mm when the worm is shifted 1 mm.

Application Examples

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



Adjustment by using Screws



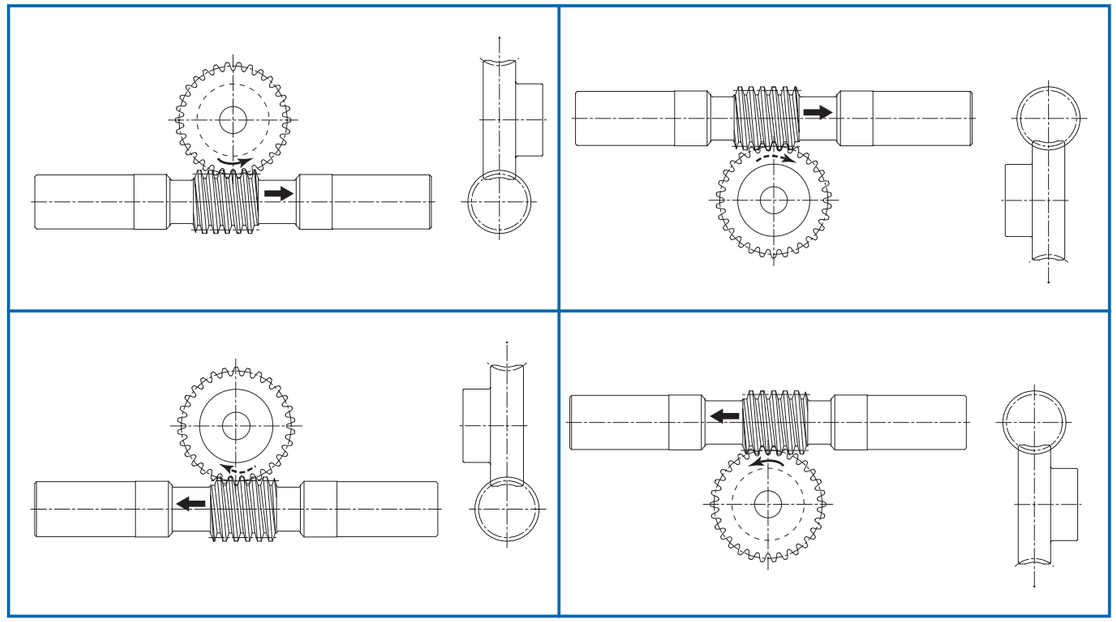
Adjustment by using Shims

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Points of caution during assembly

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

1. Verifying the orientation of assembly
   An arrow indicating the orientation of assembly is stamped on both the duplex worm and worm wheel. When assembling the worm and worm wheel, check the worm wheel of the arrow mark on the front such that the direction of arrow mark on the worm coincides with that on the worm wheel. Incorrect assembly results in difficulty of assembly and improper gear engagement. (Fig.3)



Arrow mark indicates the correct orientation of two gears when assembled. As shown, the two arrows must point in the same direction.
Fig. 3

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

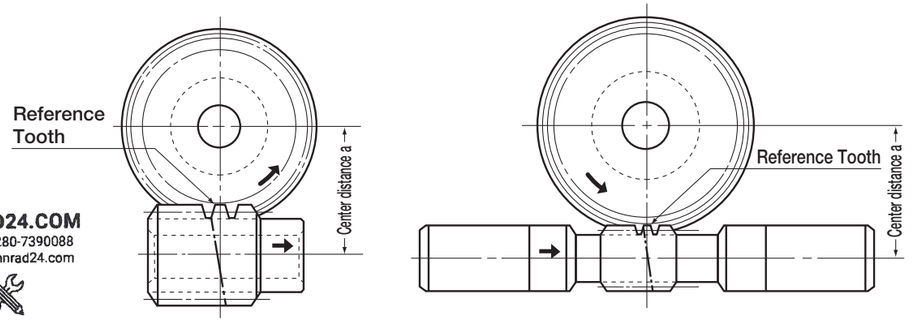
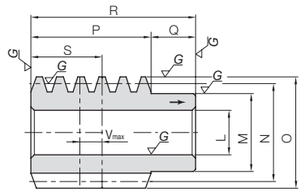


Fig. 4

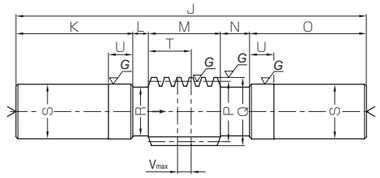
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Specifications	
Precision grade	KHK W 001 grade 1
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	17°30'
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



W4



W6

Catalog Number	Nominal axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						L_{H7}	M	N	O	P	Q	R
KWGDL2-R1	***m*2**	1	3°41′	R	W4	14	25	31	35	36	14	50

Position of reference tooth	Max. allowable shift	Weight	Catalog Number
S	Vmax	(kg)	
22	8	0.21	**KWGDL2-R1**

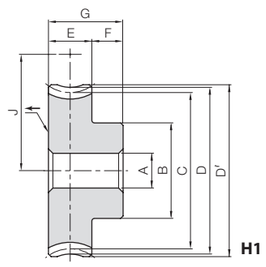
Catalog Number	Nominal axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Total Length	Shaft length (L)	Neck length (left)	Face width	Neck length (right)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWGDLS1.5-R1	***m*1.5**	1	3°26′	R	W6	190	66	12	28	18	66	25
KWGDLS2-R1	***m*2**	1	3°41′	R	W6	220	75	13	36	21	75	31

Outside dia.	Neck dia.	Shaft dia.	Position of reference tooth	Grinding length of shaft	Max. allowable shift	Weight	Catalog Number
Q	R	S	T	U	Vmax	(kg)	
28	21	26.2	17	20	6	0.74	**KWGDLS1.5-R1**
35	24	30.2	22	20	8	1.17	**KWGDLS2-R1**

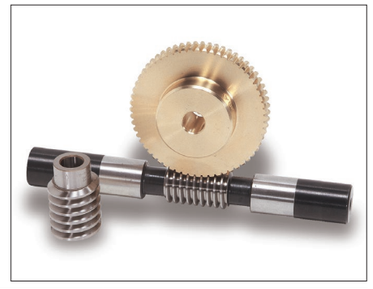
[Caution on Product Characteristics] ① When adjusting the worm to reduce the backlash, Vmax is the maximum amount of distance that you may shift it without causing problems with the gear mesh. Vmax is not the recommended value to use for adjustment during assembly.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Specifications	
Precision grade	KHK W 002 grade 1
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	17°30'
Material	CAC702 (old JIS A ℓ BC2)
Heat Treatment	—
Tooth hardness	—



H1



Catalog Number	Reduction ratio	Nominal transverse module	No. of teeth	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width
							A_{H7}	B	C	D	D'	E	F
AGDL1.5-20R1	20		20				8	22	30	33	34.5		
AGDL1.5-30R1	30		30				10	30	45	48	49.5		
AGDL1.5-40R1	40	***m*1.5**	40	3°26′	R	H1	12	35	60	63	64.5	14	10
AGDL1.5-50R1	50		50				12	45	75	78	79.5		
AGDL1.5-60R1	60		60				12	50	90	93	94.5		
AGDL2-20R1	20		20				12	33	40	44	46		
AGDL2-30R1	30		30				15	40	60	64	66		
AGDL2-40R1	40	***m*2**	40	3°41′	R	H1	15	45	80	84	86	18	15
AGDL2-50R1	50		50				15	50	100	104	106		
AGDL2-60R1	60		60				15	60	120	124	126		

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 1							Backlash	Weight	Catalog Number
G	(H)	(I)	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	(mm)	(kg)	
24	—	—	27.5	9.84	8.18	6.40	5.30	4.68	4.25	3.68	0±0.045	0.10	**AGDL1.5-20R1**
			35	20.8	17.5	13.9	11.7	10.4	9.40	8.28		0.22	**AGDL1.5-30R1**
			42.5	35.6	30.0	24.2	20.6	18.3	16.6	14.6		0.37	**AGDL1.5-40R1**
			50	53.8	45.4	36.9	31.6	28.3	25.8	22.6		0.59	**AGDL1.5-50R1**
			57.5	75.3	63.8	51.9	44.7	40.4	36.7	32.4		0.83	**AGDL1.5-60R1**
33	—	—	35.5	21.0	17.5	13.6	11.2	9.84	8.94	7.75	0±0.045	0.26	**AGDL2-20R1**
			45.5	44.3	37.3	29.6	24.8	21.9	19.8	17.4		0.51	**AGDL2-30R1**
			55.5	75.8	64.0	51.4	43.6	38.5	34.9	30.7		0.86	**AGDL2-40R1**
			65.5	115	96.8	78.4	66.9	59.5	54.2	47.6		1.30	**AGDL2-50R1**
			75.5	160	136	110	94.6	84.9	77.2	68.1		1.88	**AGDL2-60R1**

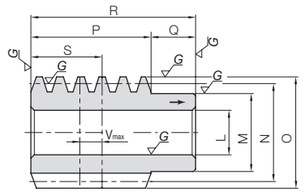
[Caution on Product Characteristics] ① For duplex worm gears, mount the worm and wheel with the arrows pointing in the same direction. The arrows on the wheels indicate the direction of assembly and do not determine the direction of rotation. See assembly instructions on page 404.

[NOTE 1] Allowable torque based on worm speed (rpm).

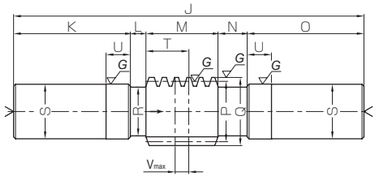
KWGDL/KWGDLS Duplex Worms

Specifications	
Precision grade	KHK W 001 grade 1
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	17°30’
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



W4



W6

Catalog Number	Nominal axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						L_{H7}	M	N	O	P	Q	R
KWGDL2.5-R1	***m*2.5**	1	3°52′	R	W4	18	30	37	42	48	17	65
KWGDL3-R1	***m*3**	1	3°54′	R	W4	20	35	44	50	54	20	74

Position of reference tooth	Max. allowable shift	Weight	Catalog Number
S	Vmax	(kg)	
29	10	0.37	**KWGDL2.5-R1**
32	10	0.61	**KWGDL3-R1**

Catalog Number	Nominal axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Total Length	Shaft length (L)	Neck length (left)	Face width	Neck length (right)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWGDLS2.5-R1	***m*2.5**	1	3°52′	R	W6	260	85	16	48	26	85	37
KWGDLS3-R1	***m*3**	1	3°54′	R	W6	300	100	18	54	28	100	44

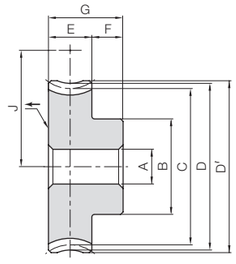
Outside dia.	Neck dia.	Shaft dia.	Position of reference tooth	Grinding length of shaft	Max. allowable shift	Weight	Catalog Number
Q	R	S	T	U	Vmax	(kg)	
42	30	36.2	29	25	10	2.00	**KWGDLS2.5-R1**
50	34	40.2	32	25	10	2.95	**KWGDLS3-R1**

[Caution on Product Characteristics] ① When adjusting the worm to reduce the backlash, Vmax is the maximum amount of distance that you may shift it without causing problems with the gear mesh. Vmax is not the recommended value to use for adjustment during assembly.

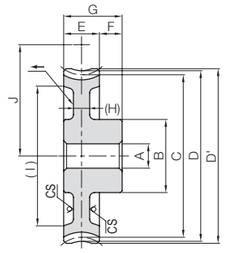
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

AGDL Duplex Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 1
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	17°30’
Material	CAC702 (old JIS A ℓ BC2)
Heat Treatment	—
Tooth hardness	—



H1



HB

* CS has a forged finish surface.

Catalog Number	Reduction ratio	Nominal transverse module	No. of teeth	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width
							A_{H7}	B	C	D	D’	E	F
AGDL2.5-36R1	36	***m*2.5**	36	3°52′	R	H1	15	45	90	95	97.5	22	15
AGDL2.5-40R1	40		40			HB		45	100	105	107.5		
AGDL2.5-50R1	50		50			HB		60	125	130	132.5		
AGDL2.5-60R1	60		60			HB		80	150	155	157.5		
AGDL3-30R1	30	***m*3**	30	3°54′	R	H1	20	55	90	96	99	28	17
AGDL3-36R1	36		36			H1		60	108	114	117		
AGDL3-40R1	40		40			HB		60	120	126	129		
AGDL3-50R1	50		50			HB		70	150	156	159		
AGDL3-60R1	60		60			HB		80	180	186	189		

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 1							Backlash	Weight	Catalog Number
G	(H)	(I)	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	(mm)	(kg)	
37	—	—	63.5	113	94.5	75.5	63.8	56.0	51.0	44.3	0±0.045	1.25	**AGDL2.5-36R1**
	(10)	(86)	68.5	138	115	92.4	78.3	68.8	62.7	54.4		1.14	**AGDL2.5-40R1**
	(12)	(108)	81	208	174	141	120	106	97.3	84.3		1.93	**AGDL2.5-50R1**
	(12)	(133)	93.5	291	245	198	170	152	139	121		2.90	**AGDL2.5-60R1**
45	—	—	67	137	114	90.0	74.7	65.5	59.5	51.2	0±0.045	1.65	**AGDL3-30R1**
	—	—	76	193	160	128	107	93.8	85.6	73.4		2.32	**AGDL3-36R1**
	(14)	(106)	82	235	195	157	131	115	105	90.1		2.19	**AGDL3-40R1**
	(14)	(134)	97	355	295	239	202	178	163	140		3.26	**AGDL3-50R1**
	(14)	(164)	112	497	415	336	285	254	233	200		4.48	**AGDL3-60R1**

[Caution on Product Characteristics] ① For duplex worm gears, mount the worm and wheel with the arrows pointing in the same direction. The arrows on the wheels indicate the direction of assembly and do not determine the direction of rotation. See assembly instructions on page 404.

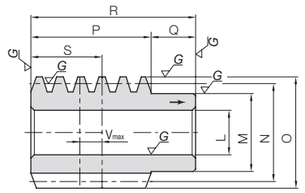
[NOTE 1] Allowable torque based on worm speed (rpm).

Product Precautions → Page 402

KWGDL/KWGDLS Duplex Worms

Specifications	
Precision grade	KHK W 001 grade 1
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	17°30'
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



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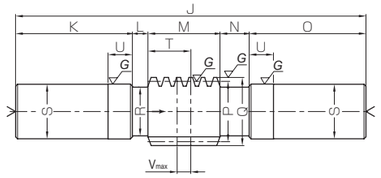

W6

Catalog Number	Nominal axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						L_{H7}	M	N	O	P	Q	R
KWGDL3.5-R1	***m*3.5**	1	3°47′	R	W4	24	44	53	60	62	23	85
KWGDL4-R1	***m*4**	1	3°41′	R	W4	28	50	62	70	74	26	100

Position of reference tooth	Max. allowable shift	Weight	Catalog Number
S	Vmax	(kg)	
37	12	1.05	**KWGDL3.5-R1**
44	14	1.67	**KWGDL4-R1**

Catalog Number	Nominal axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Total Length	Shaft length (L)	Neck length (left)	Face width	Neck length (right)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWGDLS3.5-R1	***m*3.5**	1	3°47′	R	W6	330	110	18	62	30	110	53
KWGDLS4-R1	***m*4**	1	3°41′	R	W6	360	120	16	74	30	120	62

Outside dia.	Neck dia.	Shaft dia.	Position of reference tooth	Grinding length of shaft	Max. allowable shift	Weight	Catalog Number
Q	R	S	T	U	Vmax	(kg)	
60	42	48.2	37	25	12	4.72	**KWGDLS3.5-R1**
70	50	56.2	44	25	14	7.10	**KWGDLS4-R1**

[Caution on Product Characteristics] ① When adjusting the worm to reduce the backlash, Vmax is the maximum amount of distance that you may shift it without causing problems with the gear mesh. Vmax is not the recommended value to use for adjustment during assembly.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
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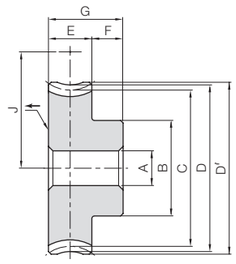
AGDL Duplex Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 1
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	17°30'
Material	CAC702 (old JIS AℓBC2)*
Heat treatment	—
Tooth hardness	—

*The hub material of H5 is S45C.



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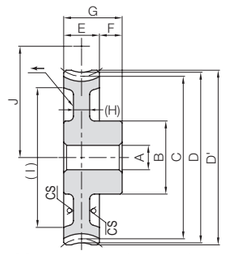
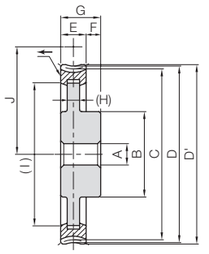
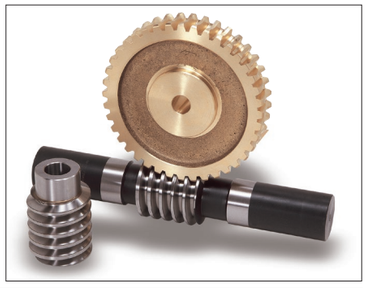


HB



H5

* CS has a forged finish surface.



Catalog Number	Reduction ratio	Nominal transverse module	No. of teeth	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width
							A_{H7}	B	C	D	D'	E	F
AGDL3.5-30R1	30	***m*3.5**	30	3°47'	R	H1	20	60	105	112	115.5	32	18
AGDL3.5-40R1 (Made to Order)	40	***m*3.5**	40	3°47'	R	HB	20	70	140	147	150.5	32	18
AGDL3.5-50R1	50	***m*3.5**	50	3°47'	R	HB	20	80	175	182	185.5	32	18
AGDL3.5-60R1	60		60			HB		90	210	217	220.5		
AGDL4-30R1 (Made to Order)	30	***m*4**	30	3°41'	R	HB	20	65	120	128	132	35	20
AGDL4-36R1 (Made to Order)	36		36			HB		75	144	152	156		
AGDL4-40R1	40	***m*4**	40	3°41'	R	HB	20	75	160	168	172	35	20
AGDL4-50R1	50		50			HB	20	90	200	208	212		
AGDL4-60R1	60		60			H5	30	120	240	248	252		

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 1							Backlash	Weight	Catalog Number
G	(H)	(I)	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	(mm)	(kg)	
50	—	—	79	208	172	136	111	98.1	88.3	75.7	0±0.045	2.51	**AGDL3.5-30R1**
50	(15)	(124)	96.5	356	295	236	196	173	156	133	0±0.045	3.34	AGDL3.5-40R1 (Made to Order)
50	(16)	(155)	114	538	446	360	301	267	243	207	0±0.045	5.02	**AGDL3.5-50R1**
	(16)	(189)	131.5	753	627	506	425	381	345	296		6.87	**AGDL3.5-60R1**
55	(17)	(99)	91	284	234	184	150	132	118	101	0±0.045	3.01	AGDL4-30R1 (Made to Order)
	(17)	(121)	103	400	329	262	215	190	170	144		4.18	AGDL4-36R1 (Made to Order)
55	(17)	(137)	111	486	400	320	264	233	208	177	0±0.045	4.78	**AGDL4-40R1**
	(17)	(177)	131	735	605	488	405	361	324	275		7.07	**AGDL4-50R1**
	(17)	(200)	151	1030	851	687	572	515	461	393		11.5	**AGDL4-60R1**

[NOTE 1] Allowable torque based on worm speed (rpm).

[Caution on Product Characteristics] ① For duplex worm gears, mount the worm and wheel with the arrows pointing in the same direction. The arrows on the wheels indicate the direction of assembly and do not determine the direction of rotation. See assembly instructions on page 404.

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

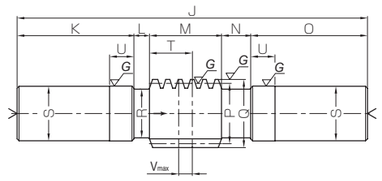
Product Precautions → Page 402

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

KWGDLS
Duplex Worms NEW

Specifications	
Precision grade	KHK W 001 grade 1
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	17°30'
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC
Surface treatment	—

* 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).



W6

Catalog Number		Nominal axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Total Length	Shaft length (L)	Neck length (left)	Face width	Neck length (right)	Shaft length (R)	Pitch dia.
							J	K	L	M	N	O	P
KWGDLS5-R1S	S	*m5*	1	4°05'	R	W6	400	130	17	90	33	130	70
KWGDLS6-R1S	S	*m6*	1	4°17'	R	W6	400	120	18	105	37	120	80

Outside dia.	Neck dia.	Shaft dia.	Position of reference tooth	Grinding length of shaft	Max. allowable shift	Weight	Catalog Number	
Q	R	S	T	U	Vmax	(kg)		
80	54	60	53	30	16	9.39	KWGDLS5-R1S	S
92	60	70	62	30	20	12.6	KWGDLS6-R1S	S

[Caution on Product Characteristics]
① When adjusting the worm to reduce the backlash, Vmax is the maximum amount of distance that you may shift it without causing problems with the gear mesh. Vmax is not the recommended value to use for adjustment during assembly.
② Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

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info@zahnrad24.com
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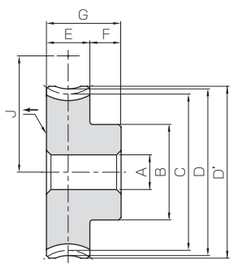
Oberes Dorf 1
95152 Selbitz

AGDL
Duplex Worm Wheels NEW

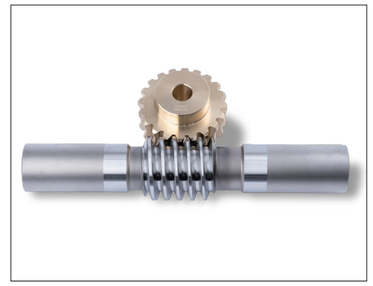
Specifications	
Precision grade	KHK W 002 grade 1
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	17°30'
Material	CAC702 (old JIS AℓBC2)
Heat treatment	—
Tooth hardness	—



H1

Catalog Number		Reduction ratio	Nominal transverse module	No. of teeth	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width
								A_{H7}	B	C	D	D'	E	F
AGDL5-20R1S	S	20	*m5*	20	4°05'	R	H1	25	70	100	110	115	42	23
AGDL5-30R1S	S	30		30				25	80	150	160	165		23
AGDL5-40R1S	S	40		40				25	90	200	210	215		23
AGDL5-50R1S	S	50		50				150	230	250	260	265		5
AGDL5-60R1S	S	60		60				200	280	300	310	315		5
AGDL6-20R1S	S	20	*m6*	20	4°17'	R	H1	30	85	120	132	138	46	24
AGDL6-30R1S	S	30		30				30	90	180	192	198		24
AGDL6-40R1S	S	40		40				130	220	240	252	258		5
AGDL6-50R1S	S	50		50				190	280	300	312	318		5
AGDL6-60R1S	S	60		60				250	340	360	372	378		5

[Caution on Product Characteristics]
① For duplex worm gears, mount the worm and wheel with the arrows pointing in the same direction. The arrows on the wheels indicate the direction of assembly and do not determine the direction of rotation. See assembly instructions on page 404.
② Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
③ For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.



Total length	Mounting distance	Allowable torque (N·m) NOTE 1							Backlash	Weight	Catalog Number	
G	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	(mm)	(kg)		
65	85	243	195	152	122	106	94.8	78.6		3.17	AGDL5-20R1S	S
65	110	513	418	330	269	236	210	177		6.62	AGDL5-30R1S	S
65	135	878	716	573	473	415	370	311	0±0.045	11.4	AGDL5-40R1S	S
47	160	1330	1080	875	726	641	575	482		11.5	AGDL5-50R1S	S
47	185	1860	1520	1230	1030	915	819	690		14.3	AGDL5-60R1S	S
70	100	362	290	225	180	155	139	115		4.93	AGDL6-20R1S	S
70	130	766	619	488	398	345	307	258		10.2	AGDL6-30R1S	S
51	160	1310	1060	848	700	607	543	453	0±0.045	12.7	AGDL6-40R1S	S
51	190	1980	1610	1290	1070	938	843	703		16.8	AGDL6-50R1S	S
51	220	2770	2260	1820	1520	1340	1200	1010		20.9	AGDL6-60R1S	S

[NOTE 1] Allowable torque based on worm speed (rpm).

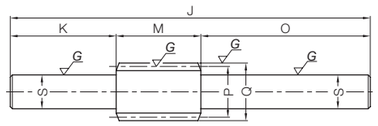
Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

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

KWG Module 0.5, 0.8
Ground Worm Shafts

Specifications	
Precision grade	KHK W 001 grade 2
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC

* 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).



W5

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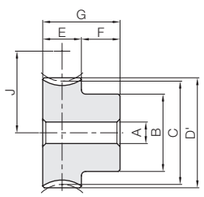
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Total Length J	Shaft length (L) K	Neck length (left) L	Face width M	Neck length (right) N	Shaft length (R) O	Pitch dia. P
KWG0.5-R1 **KWG0.5-R2**	***m*0.5**	1 2	3°11′ 6°20′	R	W5	65	19	—	12	—	34	9
KWG0.8-R1 **KWG0.8-R2**	***m*0.8**	1 2	3°49′ 7°36′	R	W5	85	25	—	20	—	40	12

Outside dia. Q	Neck dia. R	Shaft dia. S_{h7}	Grinding length of shaft U	Weight (kg)	Catalog Number
10	—	6	—	0.018	**KWG0.5-R1** **KWG0.5-R2**
13.6	—	8	—	0.043	**KWG0.8-R1** **KWG0.8-R2**

AG Module 0.5, 0.8
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 2
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC702 (old JIS A ℓ BC2)
Heat Treatment	—
Tooth hardness	—



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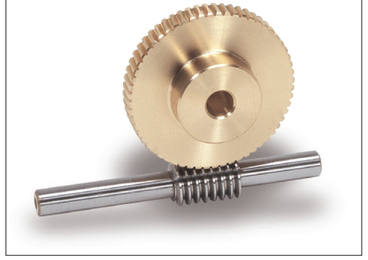


Catalog Number	Reduction ratio	Transverse module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Throat dia. D	Outside dia. D'	Face width E	Hub width F
AG0.5-20R1	20	***m*0.5**	20	1	3°11′	R	HA	4	9	10	—	11	5	7
AG0.5-20R2	10		20	2	6°20′			4	9	10		11		
AG0.5-30R1	30		30	1	3°11′			4	12	15		16		
AG0.5-40R1	40		40	1	3°11′			5	15	20		21		
AG0.5-50R1	50		50	1	3°11′			5	20	25		26		
AG0.5-60R1	60		60	1	3°11′			5	25	30		31		
AG0.8-20R1	20	***m*0.8**	20	1	3°49′	R	HA	5	12	16	—	17.6	8	8
AG0.8-20R2	10		20	2	7°36′			5	12	16		17.6		
AG0.8-30R1	30		30	1	3°49′			5	18	24		25.6		
AG0.8-30R2	15		30	2	7°36′			5	18	24		25.6		
AG0.8-40R1	40		40	1	3°49′			6	20	32		33.6		
AG0.8-50R1	50		50	1	3°49′			8	25	40		41.6		
AG0.8-60R1	60		60	1	3°49′			8	25	48		49.6		

Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	Backlash (mm)	Weight (kg)	Catalog Number
12	—	—	9.5	0.52	0.44	0.36	0.30	0.26	0.24	0.21	0.02~0.12	0.0056	**AG0.5-20R1**
			9.5	0.51	0.42	0.33	0.27	0.24	0.22	0.19		0.0056	**AG0.5-20R2**
			12	1.09	0.94	0.77	0.65	0.58	0.53	0.48		0.012	**AG0.5-30R1**
			14.5	1.86	1.60	1.34	1.15	1.02	0.94	0.84		0.020	**AG0.5-40R1**
			17	2.82	2.42	2.05	1.77	1.58	1.46	1.30		0.035	**AG0.5-50R1**
			19.5	3.94	3.41	2.89	2.50	2.26	2.08	1.87		0.053	**AG0.5-60R1**
16	—	—	14	1.78	1.50	1.21	1.00	0.88	0.82	0.71	0.02~0.12	0.018	**AG0.8-20R1**
			14	1.76	1.44	1.11	0.91	0.80	0.74	0.63		0.018	**AG0.8-20R2**
			18	3.77	3.21	2.62	2.20	1.96	1.81	1.61		0.043	**AG0.8-30R1**
			18	3.75	3.14	2.46	2.02	1.80	1.65	1.45		0.043	**AG0.8-30R2**
			22	6.45	5.49	4.55	3.87	3.46	3.19	2.83		0.068	**AG0.8-40R1**
			26	9.75	8.31	6.94	5.94	5.34	4.96	4.38		0.10	**AG0.8-50R1**
			30	13.6	11.7	9.77	8.39	7.63	7.05	6.27		0.14	**AG0.8-60R1**

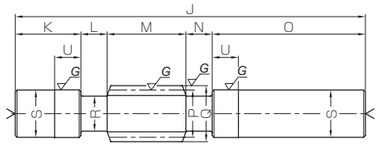
[NOTE 1] Allowable torque based on worm speed (rpm).

Product Precautions → Page 402

KWG Module 1, 1.5
Ground Worm Shafts

Specifications	
Precision grade	KHK W 001 grade 2
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



W6

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Total Length J	Shaft length (L) K	Neck length (left) L	Face width M	Neck length (right) N	Shaft length (R) O	Pitch dia. P
KWG1-R1 **KWG1-R2**	***m*1**	1 2	3°35′ 7°08′	R	W6	140	35	10	30	10	55	16
KWG1.5-R1 **KWG1.5-R2**	***m*1.5**	1 2	3°26′ 6°51′	R	W6	190	50	15	40	15	70	25

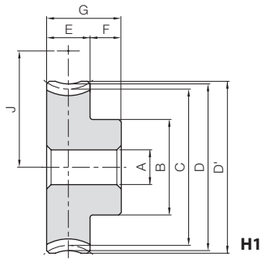
Outside dia. Q	Neck dia. R	Shaft dia. S	Grinding length of shaft U	Weight (kg)	Catalog Number
18	13	18.2	20	0.25	**KWG1-R1** **KWG1-R2**
28	21	26.2	20	0.74	**KWG1.5-R1** **KWG1.5-R2**

AG Module 1, 1.5
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 2*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC702 (old JIS A ℓ BC2)
Heat Treatment	—
Tooth hardness	—

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

A_{H7}	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
J	Mounting distance

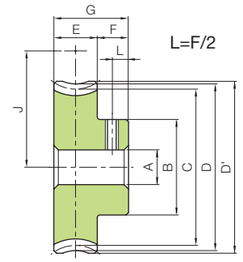


H1

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction	Shape	A_{H7}	B	C	D	D'	E	F	G	J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	Backlash (mm)	Weight (kg)
AG1-20R1	20	20	1	3°35′		6	16	20	22	23				18	3.35	2.79	2.23	1.83	1.63	1.50	1.30		0.038
AG1-20R2	10	20	2	7°08′		6	16	20	22	23				18	3.31	2.69	2.06	1.68	1.48	1.35	1.15		0.038
AG1-30R1	30	30	1	3°35′		6	20	30	32	33				23	7.08	5.98	4.84	4.05	3.63	3.31	2.92		0.078
AG1-30R2	15	30	2	7°08′	R	6	20	30	32	33	10	10	20	23	7.03	5.84	4.56	3.72	3.33	3.03	2.63	0.04~0.14	0.078
AG1-40R1	40	40	1	3°35′	H1	8	26	40	42	43				28	12.1	10.2	8.43	7.12	6.38	5.86	5.13		0.13
AG1-50R1	50	50	1	3°35′		8	30	50	52	53				33	18.3	15.5	12.9	10.9	9.87	9.09	7.95		0.20
AG1-60R1	60	60	1	3°35′		10	35	60	62	63				38	25.6	21.8	18.1	15.4	14.1	12.9	11.4		0.29
AG1.5-20R1	20	20	1	3°26′		8	22	30	33	34.5				27.5	9.84	8.18	6.40	5.30	4.68	4.25	3.68		0.10
AG1.5-20R2	10	20	2	6°51′		8	22	30	33	34.5				27.5	9.72	7.87	5.92	4.87	4.25	3.83	3.27		0.10
AG1.5-30R1	30	30	1	3°26′		10	30	45	48	49.5				35	20.8	17.5	13.9	11.7	10.4	9.40	8.28		0.22
AG1.5-30R2	15	30	2	6°51′	R	10	30	45	48	49.5	14	10	24	35	20.7	17.1	13.1	10.8	9.56	8.58	7.46	0.04~0.14	0.22
AG1.5-40R1	40	40	1	3°26′	H1	12	35	60	63	64.5				42.5	35.6	30.0	24.2	20.6	18.3	16.6	14.6		0.37
AG1.5-50R1	50	50	1	3°26′		12	45	75	78	79.5				50	53.8	45.4	36.9	31.6	28.3	25.8	22.6		0.59
AG1.5-60R1	60	60	1	3°26′		12	50	90	93	94.5				57.5	75.3	63.8	51.9	44.7	40.4	36.7	32.4		0.83

[NOTE 1] Allowable torque based on worm speed (rpm).

J Series



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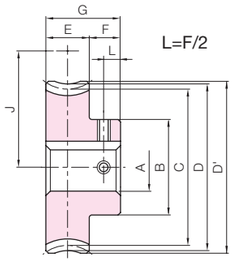


H1K

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

Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30
Screw size	—		4×1.8		5×2.3				6×2.8				8×3.3		
Catalog Number	M4	M5	M4						M5				M6		
AG1-20R1 J BORE															
AG1-20R2 J BORE															
AG1-30R1 J BORE															
AG1-30R2 J BORE															
AG1-40R1 J BORE															
AG1-50R1 J BORE															
AG1-60R1 J BORE															
AG1.5-20R1 J BORE															
AG1.5-20R2 J BORE															
AG1.5-30R1 J BORE															
AG1.5-30R2 J BORE															
AG1.5-40R1 J BORE															
AG1.5-50R1 J BORE															
AG1.5-60R1 J BORE															

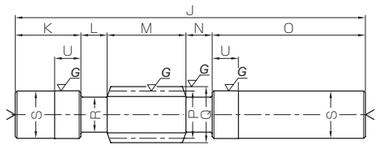
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 402 | Precautions for Standard Machined Products → Pages 42~44

KWG Module 2, 2.5
Ground Worm Shafts

Specifications	
Precision grade	KHK W 001 grade 2
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



W6

* For products not categorized in our KHK Stock Gear series, custom gear production services with short lead times are available. Please see Page 26 for more details about custom-made orders.

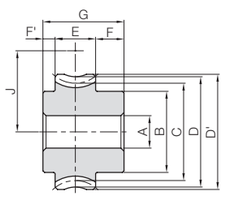
Catalog Number	Axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Total Length	Shaft length (L)	Neck length (left)	Face width	Neck length (right)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG2-R1 **KWG2-R2**	***m*2**	1 2	5°12′ 10°18′	R	W6	200	35	25	40	25	75	22
KWG2.5-R1 **KWG2.5-R2**	***m*2.5**	1 2	4°46′ 9°28′	R	W6	250	50	27	46	27	100	30

Outside dia.	Neck dia.	Shaft dia.	Grinding length of shaft	Weight	Catalog Number
Q	R	S	U	(kg)	
26	17	25.2	20	0.64	**KWG2-R1** **KWG2-R2**
35	23	30.2	20	1.27	**KWG2.5-R1** **KWG2.5-R2**

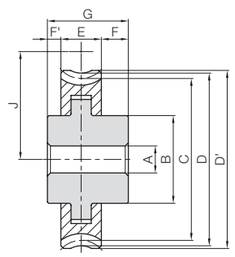
AGF Module 2, 2.5
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 2
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC702 (old JIS A ℓ BC2) *
Heat treatment	—
Tooth hardness	—

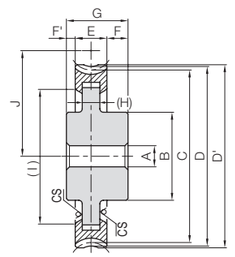
* The hub material of H8 and H9 is FC200.



H6



H8



H9

* CS has a forged finish surface.

Catalog Number	Reduction ratio	Transverse module	No. of teeth	No. of starts of mating worm	Profile shift coefficient	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width (right)	Hub width (left)
									A_{H7}	B	C	D	D'	E	F	F'
AGF2-20R1	20	***m*2**	20	1	−0.5	5°12′	R	H6	12	32	40	42	44	18	12	5
AGF2-20R2	10		20	2	−0.5	10°18′				32	40	42	44			
AGF2-30R1	30		30	1	−0.5	5°12′				38	60	62	64			
AGF2-30R2	15		30	2	−0.5	10°18′				38	60	62	64			
AGF2-36R1	36		36	1	0	5°12′				40	72	76	78			
AGF2-40R1	40		40	1	−0.5	5°12′		H8		45	80	82	84			
AGF2-50R1	50		50		−0.5			H9		50	100	102	104			
AGF2-60R1	60		60		−0.5			H9		50	120	122	124			
AGF2.5-20R1	20	***m*2.5**	20	1	0	4°46′	R	H6	12	35	50	55	57.5	20	15	5
AGF2.5-20R2	10		20	2		9°28′		H6		35	50	55	57.5			
AGF2.5-30R1	30		30	1		4°46′		H6		40	75	80	82.5			
AGF2.5-30R2	15		30	2		9°28′		H6		40	75	80	82.5			
AGF2.5-40R1	40		40	1		4°46′		H8		45	100	105	107.5			
AGF2.5-50R1	50		50	1		4°46′		H9		55	125	130	132.5			
AGF2.5-60R1	60		60							60	150	155	157.5			

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 1							Backlash	Weight	Catalog Number
G	(H)	(l)	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	(mm)	(kg)	
35	—	—	30	19.4	16.1	12.8	10.5	9.30	8.49	7.31	0.06~0.16	0.25	**AGF2-20R1**
			30	19.9	16.1	12.2	9.99	8.75	7.92	6.74		0.25	**AGF2-20R2**
			40	41.1	34.5	27.7	23.2	20.7	18.8	16.4		0.51	**AGF2-30R1**
			40	42.3	35.0	27.0	22.1	19.9	17.7	15.4		0.51	**AGF2-30R2**
			47	57.8	48.6	39.3	33.2	29.6	27.0	23.6		0.73	**AGF2-36R1**
	—	—	50	70.3	59.2	48.1	40.7	36.4	33.2	28.9		0.85	**AGF2-40R1**
	(12)	(81)	60	106	89.5	73.4	62.5	56.2	51.5	44.9		1.14	**AGF2-50R1**
	(12)	(96)	70	149	126	103	88.4	80.3	73.3	64.2		1.51	**AGF2-60R1**
40	—	—	40	35.1	29.0	22.6	18.6	16.3	14.8	12.8	0.06~0.16	0.44	**AGF2.5-20R1**
			40	34.6	27.9	20.9	17.1	14.8	13.4	11.3		0.44	**AGF2.5-20R2**
			52.5	74.1	62.0	49.1	41.2	36.7	32.8	28.7		0.87	**AGF2.5-30R1**
			52.5	73.6	60.6	46.2	37.8	33.2	29.9	25.8		0.87	**AGF2.5-30R2**
			65	127	106	85.4	72.4	63.7	57.9	50.5		1.42	**AGF2.5-40R1**
	(13)	(100)	77.5	192	161	130	111	98.4	90.0	78.3		1.92	**AGF2.5-50R1**
	(13)	(125)	90	268	226	183	157	141	128	112		2.59	**AGF2.5-60R1**

[NOTE 1] Allowable torque based on worm speed (rpm).

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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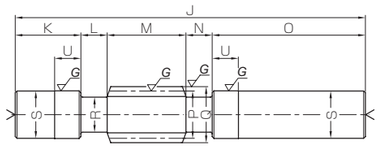
KWG Module 3, 4
Ground Worm Shafts

Specifications	
Precision grade	KHK W 001 grade 2
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



W6

* For products not categorized in our KHK Stock Gear series, custom gear production services with short lead times are available. Please see Page 26 for more details about custom-made orders.

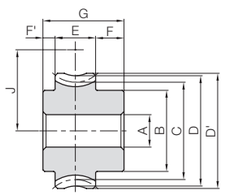
Catalog Number	Axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Total Length	Shaft length (L)	Neck length (left)	Face width	Neck length (right)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG3-R1 **KWG3-R2**	***m*3**	1 2	4°31′ 8°58′	R	W6	300	55	30	60	30	125	38
KWG4-R1 **KWG4-R2**	***m*4**	1 2	5°43′ 11°19′	R	W6	360	70	32.5	75	32.5	150	40

Outside dia.	Neck dia.	Shaft dia.	Grinding length of shaft	Weight	Catalog Number
Q	R	S	U	(kg)	
44	30	40.2	25	2.66	**KWG3-R1** **KWG3-R2**
48	29	45.2	25	3.85	**KWG4-R1** **KWG4-R2**

AGF Module 3, 4
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 2
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC702 (old JIS A ℓ BC2) *
Heat treatment	—
Tooth hardness	—

* The hub material of H8 and H9 is FC200.



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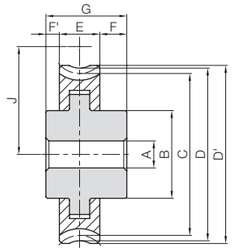

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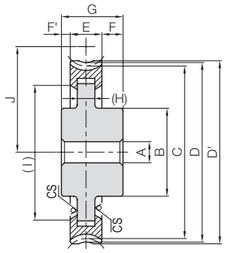
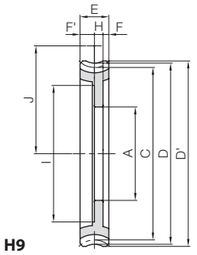
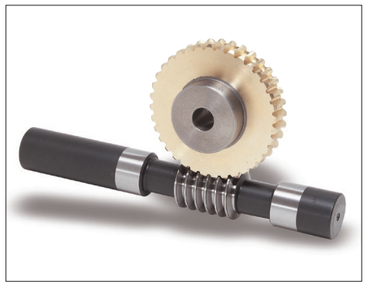


H9



H0

* CS has a forged finish surface.



Catalog Number	Reduction ratio	Transverse module	No. of teeth	No. of starts of mating worm	Profile shift coefficient	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width (right)	Hub width (left)
									A_{H7}	B	C	D	D'	E	F	F'
AGF3-20R1	20	***m*3**	20	1	+0.333	4°31'	R	H6	20	50	60	68	71	25	17.5	7.5
AGF3-20R2	10		20	2	+0.333	8°58'		H6		50	60	68	71			
AGF3-25R1	25		25	1	0	4°31'		H6		55	75	81	84			
AGF3-30R1	30		30	1	+0.333	4°31'		H8		55	90	98	101			
AGF3-40R1	40		40	1	+0.333	4°31'		H8		65	120	128	131			
AGF3-50R1	50		50	1	+0.333	4°31'		H9		75	150	158	161			
AGF3-60R1	60		60					H9		80	180	188	191			
AGF4-20R1	20	***m*4**	20	1	0	5°43'	R	H6	20	60	80	88	92	30	20	10
AGF4-20R2	10		20	2		11°19'		H6		60	80	88	92			
AGF4-25R1	25		25	1		5°43'		H6		65	100	108	112			
AGF4-30R1	30		30	1		5°43'		H8		65	120	128	132			
AGF4-30R2	15		30	2		11°19'		H8		65	120	128	132			
AGF4-40R1	40		40	1		5°43'		H9	20	80	160	168	172		20	10
AGF4-50R1	50		50					H9	20	90	200	208	212		20	10
AGF4-60R1	60		60					H0	160	—	240	248	252		7	15

[Caution on Product Characteristics] ① For H0 products with bore of ϕ 190 or larger, the bore tolerance is H8.

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 1							Backlash	Weight	Catalog Number
G	(H)	(I)	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	(mm)	(kg)	
50	—	—	50	59.7	49.1	38.3	31.5	27.5	25.1	21.5	0.06~0.16	0.88	**AGF3-20R1**
			50	60.2	48.2	36.1	29.5	25.4	23.0	19.4		0.88	**AGF3-20R2**
			56.5	90.2	74.3	58.8	48.9	42.6	39.0	33.5		1.24	**AGF3-25R1**
			65	126	105	83.1	69.6	61.0	55.4	48.2		1.63	**AGF3-30R1**
			80	216	180	145	122	108	98.0	84.9		2.76	**AGF3-40R1**
	(15)	(125)	95	326	272	220	188	166	152	132		3.62	**AGF3-50R1**
	(15)	(155)	110	457	383	310	265	237	217	188		4.76	**AGF3-60R1**
60	—	—	60	123	101	78.8	64.6	56.3	51.5	43.8	0.06~0.16	1.77	**AGF4-20R1**
			60	127	101	76.0	61.9	53.2	48.3	40.5		1.77	**AGF4-20R2**
			70	186	153	121	100	87.3	79.9	68.5		2.56	**AGF4-25R1**
			80	260	216	171	143	125	114	98.4		3.28	**AGF4-30R1**
			80	270	220	168	137	120	108	92.2		3.28	**AGF4-30R2**
60	(20)	(128)	100	445	370	297	251	220	201	173		5.25	**AGF4-40R1**
60	(20)	(168)	120	673	560	454	385	340	312	269		7.35	**AGF4-50R1**
30	8	204	140	941	788	638	544	486	444	385		3.60	**AGF4-60R1**

[NOTE 1] Allowable torque based on worm speed (rpm).

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

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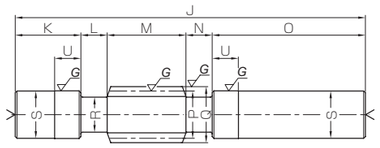
KWG Module 5, 6
Ground Worm Shafts

Specifications	
Precision grade	KHK W 001 grade 2
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	SCM440
Heat treatment	Thermal refined, gear teeth induction hardened*
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



W6

* For products not categorized in our KHK Stock Gear series, custom gear production services with short lead times are available. Please see Page 26 for more details about custom-made orders.

Catalog Number	Axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Total Length	Shaft length (L)	Neck length (left)	Face width	Neck length (right)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG5-R1	***m5***	1	5°43′	R	W6	400	75	30	90	30	175	50
KWG6-R1	***m6***	1	5°43′	R	W6	400	60	40	100	40	160	60

Outside dia.	Neck dia.	Shaft dia.	Grinding length of shaft	Weight	Catalog Number
Q	R	S	U	(kg)	
60	36	50.2	30	5.75	**KWG5-R1**
72	44	60.2	30	8.09	**KWG6-R1**

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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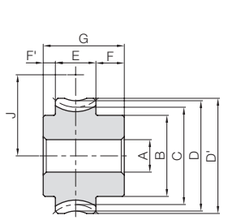
AGF Module 5, 6
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 2
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC702 (old JIS AℓBC2) *
Heat treatment	—
Tooth hardness	—

* The hub material of H8 and H9 is FC200.



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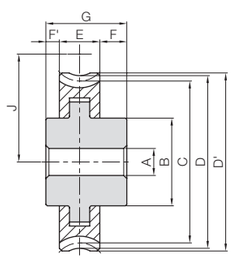

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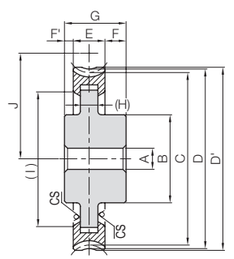
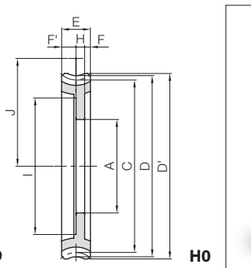
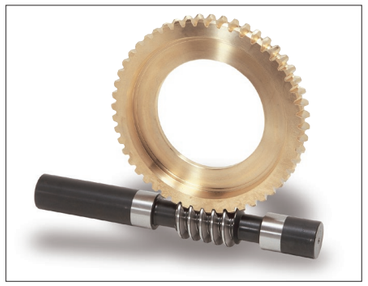


H9

* CS has a forged finish surface.



H0



Catalog Number	Reduction ratio	Transverse module	No. of teeth	No. of starts of mating worm	Profile shift coefficient	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width (right)	Hub width (left)
									A_{H7}	B	C	D	D'	E	F	F'
AGF5-20R1	20	***m5***	20	1	0	5°43'	R	H6	22	75	100	110	115	35	23	12
AGF5-30R1	30		30					H8		75	150	160	165			
AGF5-40R1	40		40					H9		110	200	210	215			
AGF5-50R1	50		50					H0	150	—	250	260	265		7.5	17.5
AGF5-60R1	60		60						200		300	310	315			
AGF6-20R1	20	***m6***	20	1	0	5°43'	R	H6	25	85	120	132	138	40	23	12
AGF6-30R1	30		30					H8		100	180	192	198			
AGF6-40R1	40		40					H0	130	—	240	252	258		8	20
AGF6-50R1	50		50						190		300	312	318			
AGF6-60R1	60		60						250		360	372	378			

[Caution on Product Characteristics] ① For H0 products with bore of ϕ 190 or larger, the bore tolerance is H8.

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 1							Backlash	Weight	Catalog Number
G	(H)	(I)	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	(mm)	(kg)	
70	—	—	75	211	172	134	108	95.0	86.2	72.7	0.07~0.19	3.26	**AGF5-20R1**
	—	—	100	446	369	291	239	211	191	164		5.79	**AGF5-30R1**
	(26)	(162)	125	763	632	506	421	371	337	288		9.97	**AGF5-40R1**
35	10	205	150	1150	956	772	646	574	523	446		5.28	**AGF5-50R1**
		255	175	1610	1340	1090	913	820	744	639		6.48	**AGF5-60R1**
75	—	—	90	329	268	208	167	146	131	110	0.07~0.19	4.95	**AGF6-20R1**
	—	—	120	696	572	451	368	325	290	248		9.66	**AGF6-30R1**
40	12	190	150	1190	981	784	648	572	513	436		6.20	**AGF6-40R1**
		250	180	1800	1480	1200	994	885	796	676		8.00	**AGF6-50R1**
		310	210	2520	2090	1680	1410	1260	1130	969		10.0	**AGF6-60R1**

[NOTE 1] Allowable torque based on worm speed (rpm).

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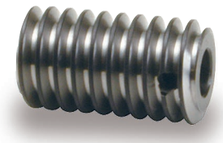
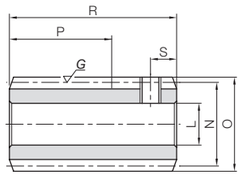
SWG Module 1, 1.5
Ground Worms

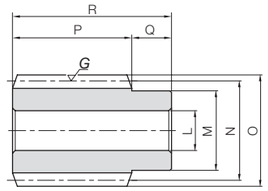


Specifications	
Precision grade	KHK W 001 grade 2*
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened**
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).

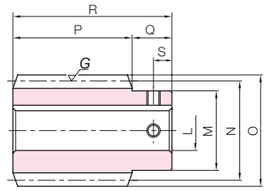


W2



W1

J Series



W1K

Catalog Number ● : J Series (Available-on-request)	Axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore L_{H7}	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width (right) Q	Hub width (left) Q'
SWG1-R1 **SWG1-R2**	***m*1**	1 2	3°35′ 7°08′	R	W2	8	—	16	18	(20)	—	—
SWG1.5-R1 **●SWG1.5-R1J10**	***m*1.5**	1	3°26′	R	W1 W1K	10	20	25	28	30	10	—
SWG1.5-R2 **●SWG1.5-R2J10**		2	6°51′		W1 W1K							

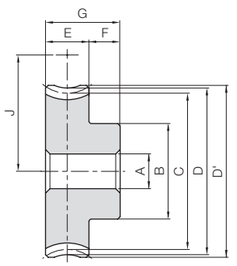
Total length R	Keyway Width × Depth	Socket head screw Size	S	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
32	—	M4	5	0.037	**SWG1-R1** **SWG1-R2**
40	— 4 x 1.8	— M4	— 5	0.12 0.11	**SWG1.5-R1** **●SWG1.5-R1J10**
	— 4 x 1.8	— M4	— 5	0.12 0.11	**SWG1.5-R2** **●SWG1.5-R2J10**

[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.

AG Module 1, 1.5
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 2*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC702 (old JIS A ℓ BC2)
Heat Treatment	—
Tooth hardness	—

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

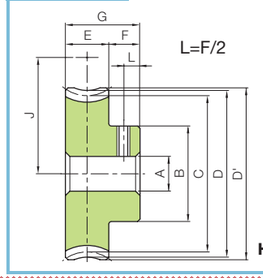


H1

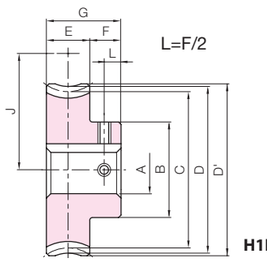
A_{H7}	Bore
B	Hub dia.
C	Pitch dia.
D	Throate dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
J	Mounting distance

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



H1T



H1K

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction		Shape	A_{H7}	B	C	D	D'	E	F	G	J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	Backlash (mm)	Weight (kg)
AG1-20R1	20	20	1	3°35′			6	16	20	22	23				18	3.35	2.79	2.23	1.83	1.63	1.50	1.30		0.038
AG1-20R2	10	20	2	7°08′			6	16	20	22	23				18	3.31	2.69	2.06	1.68	1.48	1.35	1.15		0.038
AG1-30R1	30	30	1	3°35′			6	20	30	32	33				23	7.08	5.98	4.84	4.05	3.63	3.31	2.92		0.078
AG1-30R2	15	30	2	7°08′	R	H1	6	20	30	32	33	10	10	20	23	7.03	5.84	4.56	3.72	3.33	3.03	2.63	0.04~0.14	0.078
AG1-40R1	40	40	1	3°35′			8	26	40	42	43				28	12.1	10.2	8.43	7.12	6.38	5.86	5.13		0.13
AG1-50R1	50	50	1	3°35′			8	30	50	52	53				33	18.3	15.5	12.9	10.9	9.87	9.09	7.95		0.20
AG1-60R1	60	60	1	3°35′			10	35	60	62	63				38	25.6	21.8	18.1	15.4	14.1	12.9	11.4		0.29
AG1.5-20R1	20	20	1	3°26′			8	22	30	33	34.5				27.5	9.84	8.18	6.40	5.30	4.68	4.25	3.68		0.10
AG1.5-20R2	10	20	2	6°51′			8	22	30	33	34.5				27.5	9.72	7.87	5.92	4.87	4.25	3.83	3.27		0.10
AG1.5-30R1	30	30	1	3°26′			10	30	45	48	49.5				35	20.8	17.5	13.9	11.7	10.4	9.40	8.28		0.22
AG1.5-30R2	15	30	2	6°51′	R	H1	10	30	45	48	49.5	14	10	24	35	20.7	17.1	13.1	10.8	9.56	8.58	7.46	0.04~0.14	0.22
AG1.5-40R1	40	40	1	3°26′			12	35	60	63	64.5				42.5	35.6	30.0	24.2	20.6	18.3	16.6	14.6		0.37
AG1.5-50R1	50	50	1	3°26′			12	45	75	78	79.5				50	53.8	45.4	36.9	31.6	28.3	25.8	22.6		0.59
AG1.5-60R1	60	60	1	3°26′			12	50	90	93	94.5				57.5	75.3	63.8	51.9	44.7	40.4	36.7	32.4		0.83

[NOTE 1] Allowable torque based on worm speed (rpm).

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

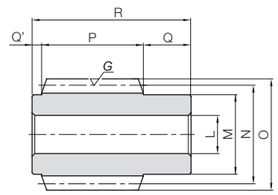
Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22	25	28	30
Screw size	—		4×1.8		5×2.3				6×2.8				8×3.3		
Catalog Number	M4	M5	M4						M5				M6		
AG1-20R1 J BORE															
AG1-20R2 J BORE															
AG1-30R1 J BORE															
AG1-30R2 J BORE															
AG1-40R1 J BORE															
AG1-50R1 J BORE															
AG1-60R1 J BORE															
AG1.5-20R1 J BORE															
AG1.5-20R2 J BORE															
AG1.5-30R1 J BORE															
AG1.5-30R2 J BORE															
AG1.5-40R1 J BORE															
AG1.5-50R1 J BORE															
AG1.5-60R1 J 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.

Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

SWG Module 2, 2.5
Ground Worms

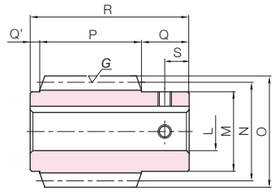
Specifications	
Precision grade	KHK W 001 grade 2*
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened**
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part



W3

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



W3K

* 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).

Catalog Number ● : J Series (Available-on-request)	Axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore L_{H7}	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width (right) Q	Hub width (left) Q'
SWG2-R1	*m*2	1	3°41′	R	W3	12	25	31	35	32	15	3
●SWG2-R1J12					W3K	12						
●SWG2-R1J14					W3K	14						
SWG2-R2		2	7°21′		W3	12						
●SWG2-R2J12					W3K	12						
●SWG2-R2J14					W3K	14						
SWG2.5-R1	*m*2.5	1	3°52′	R	W3	15	30	37	42	45	17	3
●SWG2.5-R1J15					W3K	15						
●SWG2.5-R1J16					W3K	16						
●SWG2.5-R1J17					W3K	17						
SWG2.5-R2		2	7°42′		W3	15						
●SWG2.5-R2J15					W3K	15						
●SWG2.5-R2J16					W3K	16						
●SWG2.5-R2J17					W3K	17						

Total length R	Keyway Width × Depth	Socket head screw Size	S	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
50	—	—	—	0.21	SWG2-R1
	4 x 1.8	M4	7.5	0.21	●SWG2-R1J12
	5 x 2.3	M4	7.5	0.19	●SWG2-R1J14
	—	—	—	0.21	SWG2-R2
	4 x 1.8	M4	7.5	0.21	●SWG2-R2J12
	5 x 2.3	M4	7.5	0.19	●SWG2-R2J14
65	—	—	—	0.40	SWG2.5-R1
	5 x 2.3	M4	8.5	0.39	●SWG2.5-R1J15
	5 x 2.3	M4	8.5	0.38	●SWG2.5-R1J16
	5 x 2.3	M4	8.5	0.37	●SWG2.5-R1J17
	—	—	—	0.40	SWG2.5-R2
	5 x 2.3	M4	8.5	0.39	●SWG2.5-R2J15
	5 x 2.3	M4	8.5	0.38	●SWG2.5-R2J16
	5 x 2.3	M4	8.5	0.37	●SWG2.5-R2J17

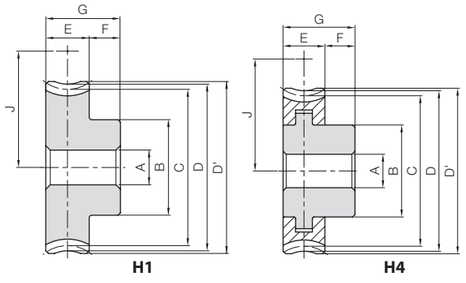
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

AG Module 2, 2.5
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 2*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC702 (old JIS A ℓ BC2) **
Heat treatment	—
Tooth hardness	—

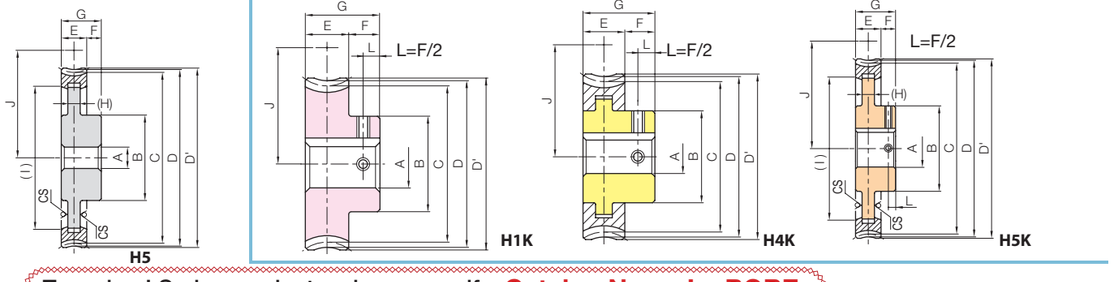
* The precision grade of J Series products is equivalent to the value shown in the table.
** The hub material of H4 and H5 is FC200.

A_{H7}	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
(H)	Web thickness
(I)	Web O.D.
J	Mounting distance



H1 H4

J Series



H5 H1K H4K H5K

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

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction	Shape	A_{H7}	B	C	D	D'	E	F	G	(H)	(I)	J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	Backlash (mm)	Weight (kg)
AG2-20R1	20	20	1	3°41′ R	H1	12	33	40	44	46	18	15	33	–	–	35.5	21.0	17.5	13.6	11.2	9.84	8.94	7.75	0.06~0.16	0.26
AG2-20R2	10	20	2	7°21′	H1		33	40	44	46						35.5	20.7	16.8	12.6	10.3	8.93	8.05	6.89		0.26
AG2-30R1	30	30	1	3°41′	H4		40	60	64	66						45.5	44.3	37.3	29.6	24.8	21.9	19.8	17.4		0.51
AG2-30R2	15	30	2	7°21′	H4		40	60	64	66						45.5	44.0	36.5	27.8	22.8	20.1	18.0	15.7		0.51
AG2-40R1	40	40	1	3°41′	H4		45	80	84	86						55.5	75.8	64.0	51.4	43.6	38.5	34.9	30.7		0.85
AG2-50R1	50	50	1	3°41′	H5		50	100	104	106				(8)	(83)	65.5	115	96.8	78.4	66.9	59.5	54.2	47.6		1.05
AG2-60R1	60	60	1	3°41′	H5		55	120	124	126				(11)	(100)	75.5	160	136	110	94.6	84.9	77.2	68.1		1.52
AG2.5-20R1	20	20	1	3°52′ R	H1	12	35	50	55	57.5	20	14	34	–	–	43.5	34.6	28.5	22.3	18.3	16.0	14.6	12.5	0.06~0.16	0.39
AG2.5-20R2	10	20	2	7°42′	H1	12	35	50	55	57.5				–	–	43.5	34.2	27.4	20.6	16.8	14.5	13.1	11.1		0.39
AG2.5-30R1	30	30	1	3°52′	H4	12	40	75	80	82.5				–	–	56	73.2	61.0	48.3	40.5	35.5	32.2	28.1		0.79
AG2.5-30R2	15	30	2	7°42′	H4	12	40	75	80	82.5				–	–	56	72.7	59.6	45.5	37.2	32.6	29.4	25.3		0.79
AG2.5-40R1	40	40	1	3°52′	H5	15	45	100	105	107.5				(11)	(81)	68.5	125	105	84.0	71.2	62.5	57.0	49.5		1.11
AG2.5-50R1	50	50	1	3°52′	H5	15	55	125	130	132.5				(12)	(106)	81	189	158	128	109	96.7	88.5	76.7		1.70
AG2.5-60R1	60	60	1	3°52′	H5	15	60	150	155	157.5				(12)	(130)	93.5	265	222	180	154	138	126	110		2.32

[NOTE 1] Allowable torque based on worm speed (rpm).

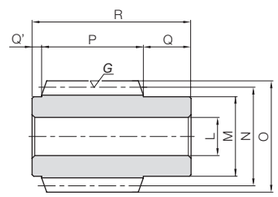
Bore H7	* The product shapes of J Series items are identified by background color.														
Keyway Js9	12	14	15	16	17	18	19	20	22	25	28	30	32	35	
Screw size	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		
Catalog Number	M4					M5				M6			M8		
AG2-20R1 J BORE															
AG2-20R2 J BORE															
AG2-30R1 J BORE															
AG2-30R2 J BORE															
AG2-40R1 J BORE															
AG2-50R1 J BORE															
AG2-60R1 J BORE															
AG2.5-20R1J BORE															
AG2.5-20R2J BORE															
AG2.5-30R1J BORE															
AG2.5-30R2J BORE															
AG2.5-40R1J BORE															
AG2.5-50R1J BORE															
AG2.5-60R1J 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.

Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

SWG Module 3, 4
Ground Worms

Specifications	
Precision grade	KHK W 001 grade 2*
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened**
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part



W3

* 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).

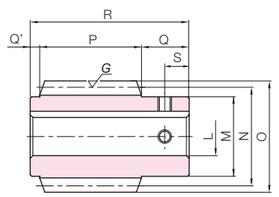
Catalog Number ● : J Series (Available-on-request)	Axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore L_{H7}	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width (right) Q	Hub width (left) Q'
SWG3-R1	***m3***	1	3°54′	R	W3	16	35	44	50	50	20	4
●SWG3-R1J17					W3K	17						
●SWG3-R1J18					W3K	18						
●SWG3-R1J19					W3K	19						
●SWG3-R1J20					W3K	20						
SWG3-R2		2	7°46′		W3	16						
●SWG3-R2J17					W3K	17						
●SWG3-R2J18					W3K	18						
●SWG3-R2J19					W3K	19						
●SWG3-R2J20					W3K	20						
SWG4-R1	***m4***	1	3°41′	R	W3	22	50	62	70	70	25	5
SWG4-R2		2	7°21′									

Total length R	Keyway Width × Depth	Socket head screw Size	S	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
74	—	—	—	0.66	**SWG3-R1**
	5 x 2.3	M4	10	0.64	**●SWG3-R1J17**
	6 x 2.8	M5	10	0.62	**●SWG3-R1J18**
	6 x 2.8	M5	10	0.60	**●SWG3-R1J19**
	6 x 2.8	M5	10	0.58	**●SWG3-R1J20**
	—	—	—	0.66	**SWG3-R2**
	5 x 2.3	M4	10	0.64	**●SWG3-R2J17**
	6 x 2.8	M5	10	0.62	**●SWG3-R2J18**
	6 x 2.8	M5	10	0.60	**●SWG3-R2J19**
	6 x 2.8	M5	10	0.58	**●SWG3-R2J20**
100	—	—	—	1.82	**SWG4-R1** **SWG4-R2**

[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.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



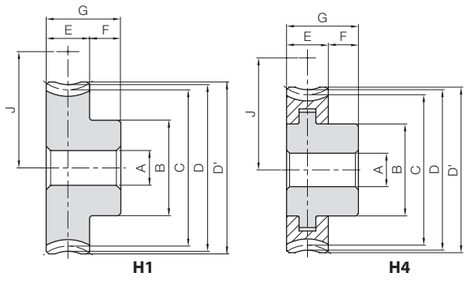
W3K

AG Module 3, 4
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 2*
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC702 (old JIS A ℓ BC2) **
Heat treatment	—
Tooth hardness	—

* The precision grade of J Series products is equivalent to the value shown in the table.
** The hub material of H4 and H5 is FC200.

A_{H7}	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
(H)	Web thickness
(I)	Web O.D.
J	Mounting distance

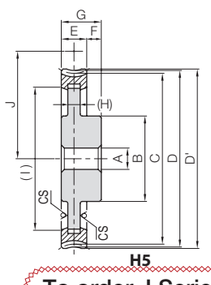


H1 H4

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction	Shape	A_{H7}	B	C	D	D'	E	F	G	(H)	(I)	J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	Backlash (mm)	Weight (kg)
AG3-20R1	20	20	1	3°54′	H1	20	50	60	66	69	25	18	43	—	—	52	59.5	48.8	38.0	30.9	27.0	24.7	20.9	0.06~0.16	0.75
AG3-20R2	10	20	2	7°46′	H1		50	60	66	69				—	—	52	58.7	46.9	35.1	28.4	24.5	22.2	18.5		0.75
AG3-30R1	30	30	1	3°54′	H4		55	90	96	99				—	—	67	126	104.3	82.4	68.4	59.9	54.5	46.9		1.46
AG3-30R2	15	30	2	7°46′	H4		55	90	96	99				—	—	67	125	102	77.6	62.8	55.1	49.7	42.2		1.46
AG3-40R1	40	40	1	3°54′	H5		65	120	126	129				(10)	(103)	82	215	179	143	120	106	96.4	82.5		2.03
AG3-50R1	50	50	1	3°54′	H5		75	150	156	159				(15)	(130)	97	325	270	219	185	163	150	128		3.22
AG3-60R1	60	60	1	3°54′			85	180	186	189				(15)	(155)	112	455	380	308	261	233	213	183		4.52
AG4-20R1	20	20	1	3°41′	H1	20	60	80	88	92	30	20	50	—	—	71	115	93.6	72.7	58.2	51.1	45.7	38.4	0.06~0.16	1.53
AG4-20R2	10	20	2	7°21′	H1		60	80	88	92				—	—	71	114	90.0	67.2	53.5	46.4	41.2	34.1		1.53
AG4-30R1	30	30	1	3°41′	H4		65	120	128	132				—	—	91	244	200	158	129	114	101	86.3		3.00
AG4-30R2	15	30	2	7°21′	H4		65	120	128	132				—	—	91	242	196	148	118	104	92.2	77.6		3.00
AG4-40R1	40	40	1	3°41′	H5		80	160	168	172				(15)	(133)	111	417	343	274	226	200	179	152		4.32
AG4-50R1	50	50	1	3°41′	H5		90	200	208	212				(16)	(173)	131	630	519	418	347	309	277	236		6.25
AG4-60R1	60	60	1	3°41′			100	240	248	252				(17)	(210)	151	881	730	589	491	441	395	337		8.74

[NOTE 1] Allowable torque based on worm speed (rpm).

J Series



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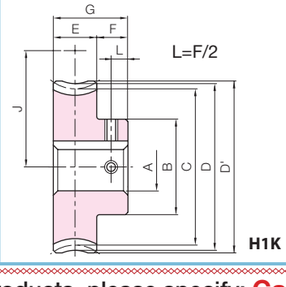

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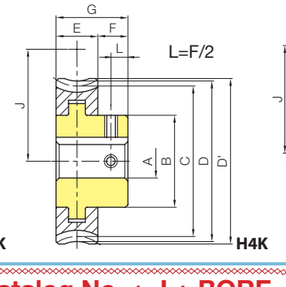

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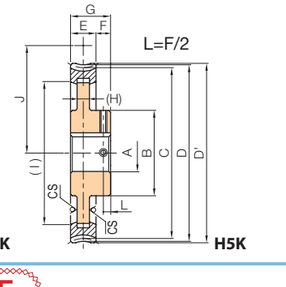


H5K

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

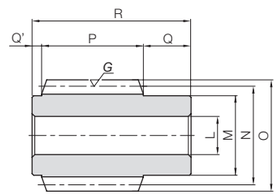
Bore H7	* The product shapes of J Series items are identified by background color.									
Keyway Js9	20	22	25	28	30	32	35	40	45	50
Screw size	6×2.8		8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	M5		M6			M8			M10	
AG3-20R1 J BORE										
AG3-20R2 J BORE										
AG3-30R1 J BORE										
AG3-30R2 J BORE										
AG3-40R1 J BORE										
AG3-50R1 J BORE										
AG3-60R1 J 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.

Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

Specifications	
Precision grade	KHK W 001 grade 2
Reference section of gear	Axial direction
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened *
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coated except for ground part

* 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).



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ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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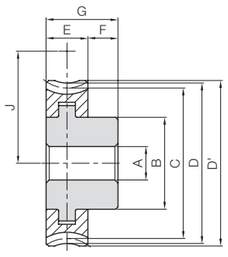
Catalog Number	Axial module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (right)	Hub width (left)
						L_{H7}	M	N	O	P	Q	Q'
SWG5-R1 **SWG5-R2**	***m5***	1 2	4°05' 8°08'	R	W3	25	56	70	80	85	30	5
SWG6-R1	***m6***	1	4°17'	R	W3	30	63	80	92	100	35	5
SWG6-R2 (Made to Order)	***m6***	2	8°32'	R	W3	30	63	80	92	100	35	5

[Precautions for Made to Order Products] Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

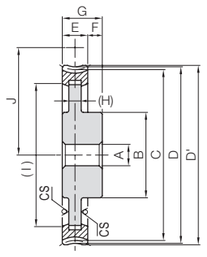
Total length	Socket head screw		Weight	Catalog Number
R	Size	S	(kg)	
120	—	—	2.78	**SWG5-R1** **SWG5-R2**
140	—	—	4.15	**SWG6-R1**
140	—	—	4.15	**SWG6-R2** (Made to Order)

Specifications	
Precision grade	KHK W 002 grade 2
Reference section of gear	Rotating plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC702 (old JIS A ℓ BC2) *
Heat treatment	—
Tooth hardness	—

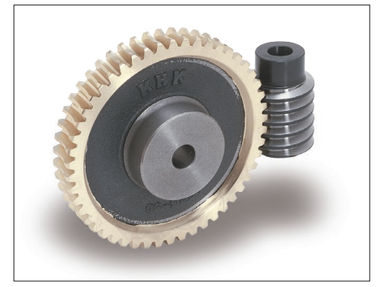
* The hub material of H4 and H5 is FC200.



H4



H5



Catalog Number	Reduction ratio	Transverse module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A_{H7}	B	C	D	D'	E
AG5-20R1	20	***m5***	20	1	4°05'	R	H4	22	75	100	110	115	35
AG5-20R2	10		20	2	8°08'		H4		75	100	110	115	
AG5-30R1	30		30	1	4°05'		H5		75	150	160	165	
AG5-30R2	15		30	2	8°08'		H5		75	150	160	165	
AG5-40R1	40		40	1	4°05'		H5		110	200	210	215	
AG5-50R1	50		50	1	4°05'		H5		120	250	260	265	
AG5-60R1	60		60	1	4°05'		H5		130	300	310	315	
AG6-20R1	20	***m6***	20	1	4°17'	R	H4	25	85	120	132	138	40
AG6-20R2 (Made to Order)	10	***m6***	20	2	8°32'	R	H4	25	85	120	132	138	40
AG6-30R1	30	***m6***	30	1	4°17'	R	H5	25	100	180	192	198	40
AG6-30R2 (Made to Order)	15	***m6***	30	2	8°32'	R	H5	25	100	180	192	198	40
AG6-40R1	40	***m6***	40	1	4°17'	R	H5	25	120	240	252	258	40
AG6-50R1	50	***m6***	50	1	4°17'	R	H5	25	130	300	312	318	40
AG6-60R1	60		60	1	4°17'		H5		150	360	372	378	

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

Hub width	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 1							Backlash	Weight	Catalog Number
F	G	(H)	(I)	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	1800 rpm	(mm)	(kg)	
25	60	—	—	85	202	163	127	101	88.4	79.0	65.5	0.07~0.19	2.79	**AG5-20R1**
		—	—	85	200	157	117	93.2	80.2	71.1	58.1		2.79	**AG5-20R2**
		(21)	(120)	110	427	348	275	224	196	175	147		4.75	**AG5-30R1**
		(21)	(120)	110	425	340	259	206	180	159	132		4.75	**AG5-30R2**
		(23)	(168)	135	731	597	478	394	346	309	259		8.84	**AG5-40R1**
		(23)	(215)	160	1110	903	729	605	534	479	402		12.7	**AG5-50R1**
		(24)	(260)	185	1550	1270	1030	855	763	682	575		17.6	**AG5-60R1**
30	70	—	—	100	315	252	196	157	135	121	99.6	0.07~0.19	4.53	**AG6-20R1**
30	70	—	—	100	314	244	182	145	124	110	89.3	0.07~0.19	4.53	**AG6-20R2** (Made to Order)
30	70	(26)	(142)	130	666	538	424	346	300	267	224	0.07~0.19	8.52	**AG6-30R1**
30	70	(26)	(142)	130	668	532	403	321	278	246	203	0.07~0.19	8.52	**AG6-30R2** (Made to Order)
30	70	(30)	(200)	160	1140	923	738	609	528	472	394	0.07~0.19	14.2	**AG6-40R1**
30	70	(30)	(258)	190	1720	1400	1130	935	816	733	611	0.07~0.19	21.0	**AG6-50R1**
		(30)	(312)	220	2410	1960	1580	1320	1170	1040	875		29.7	**AG6-60R1**

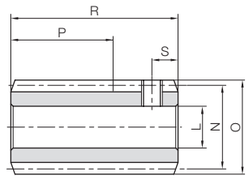
[NOTE 1] Allowable torque based on worm speed (rpm).

Product Precautions → Page 402

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

SW Module 0.5, 0.8 Worms

Specifications	
Precision grade	KHK W 001 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating



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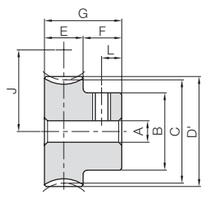
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (right)	Hub width (left)
						L_{H8}	M	N	O	P	Q	Q'
SW0.5-R1	***m*0.5**	1	2°36′	R	W2	5	—	11	12	(10)	—	—
SW0.5-R2		2	5°13′									
SW0.8-R1	***m*0.8**	1	3°17′	R	W2	6	—	14	15.6	(18)	—	—
SW0.8-R2		2	6°34′									

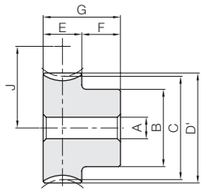
Total length	Socket head screw		Weight	Catalog Number
R	Size	S	(kg)	
18	M3	3	0.010	**SW0.5-R1** **SW0.5-R2**
30	M4	5	0.029	**SW0.8-R1** **SW0.8-R2**

BG Module 0.5, 0.8 Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	CAC502 (old JIS PBC2)
Heat Treatment	—
Tooth hardness	—



HAT



HA

Catalog Number	Reduction ratio	Normal module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A_{H7}	B	C	D	D'	E
BG0.5-20R1	20	***m*0.5**	20	1	2°36′	R	HAT	4	9	10.01	—	11	5
BG0.5-20R2	10		20	2	5°13′			4	9	10.04		11	
BG0.5-30R1	30		30	1	2°36′			4	12	15.02		16	
BG0.5-30R2	15		30	2	5°13′			4	12	15.06		16	
BG0.5-40R1	40		40	1	2°36′			5	15	20.02		21	
BG0.5-50R1	50		50	1	2°36′			5	20	25.03		26	
BG0.5-60R1	60		60	1	2°36′			5	25	30.03		31	

Hub width	Total length	Mounting distance	Socket head screw		Allowable torque (N·m) NOTE 1						Backlash (mm)	Weight (kg)	Catalog Number
F	G	J	Size	L	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm			
7	12	10.5	M3	3.5	0.27	0.23	0.19	0.15	0.14	0.13	0~0.16	0.0061	**BG0.5-20R1**
		10.5	M3		0.28	0.23	0.18	0.15	0.13	0.12		0.0061	**BG0.5-20R2**
		13	M3		0.58	0.50	0.41	0.34	0.30	0.28		0.014	**BG0.5-30R1**
		13	M3		0.59	0.49	0.39	0.32	0.29	0.26		0.014	**BG0.5-30R2**
		15.5	M4		0.99	0.85	0.71	0.60	0.54	0.50		0.023	**BG0.5-40R1**
		18	M4		1.50	1.28	1.08	0.92	0.83	0.77		0.039	**BG0.5-50R1**
		20.5	M4		2.10	1.80	1.52	1.31	1.19	1.09		0.059	**BG0.5-60R1**

Catalog Number	Reduction ratio	Normal module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A_{H7}	B	C	D	D'	E
BG0.8-20R1	20	***m*0.8**	20	1	3°17′	R	HA	5	12	16.03	—	17.6	9
BG0.8-20R2	10		20	2	6°34′			5	12	16.11		17.6	
BG0.8-30R1	30		30	1	3°17′			5	18	24.04		25.6	
BG0.8-30R2	15		30	2	6°34′			5	18	24.16		25.6	
BG0.8-40R1	40		40	1	3°17′			6	20	32.05		33.6	
BG0.8-50R1	50		50	1	3°17′			8	25	40.06		41.6	
BG0.8-60R1	60		60	1	3°17′			8	25	48.08		49.6	

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.

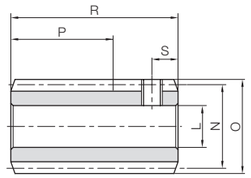
Hub width	Total length	Mounting distance	Allowable torque (N·m) NOTE 1						Backlash (mm)	Weight (kg)	Catalog Number
F	G	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm			
9	18	15	1.05	0.88	0.71	0.58	0.52	0.48	0.04~0.22	0.023	**BG0.8-20R1**
		15	1.06	0.86	0.66	0.54	0.48	0.44		0.023	**BG0.8-20R2**
		19	2.23	1.89	1.53	1.29	1.15	1.06		0.055	**BG0.8-30R1**
		19	2.24	1.87	1.46	1.20	1.07	0.98		0.055	**BG0.8-30R2**
		23	3.81	3.24	2.67	2.26	2.02	1.87		0.087	**BG0.8-40R1**
		27	5.76	4.90	4.07	3.47	3.13	2.90		0.13	**BG0.8-50R1**
		31	8.06	6.88	5.73	4.90	4.46	4.12		0.18	**BG0.8-60R1**

[NOTE 1] Allowable torque based on worm speed (rpm).

Product Precautions → Page 402

SW Module 1, 1.25 Worms

Specifications	
Precision grade	KHK W 001 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating



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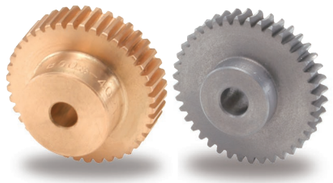
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (right)	Hub width (left)
						$L_{H7(H8)}$	M	N	O	P	Q	Q'
SW1-R1 **SW1-R2**	***m*1**	1 2	3°35′ 7°11′	R	W2	6 H8	—	16	18	(20)	—	—
SW1.25-R1 **SW1.25-R2**	***m*1.25**	1 2	3°25′ 6°50′	R	W2	8	—	21	23.5	(25)	—	—

Total length	Socket head screw		Weight (kg)	Catalog Number
R	Size	S		
32	M4	5	0.043	**SW1-R1** **SW1-R2**
37	M5	5	0.085	**SW1.25-R1** **SW1.25-R2**

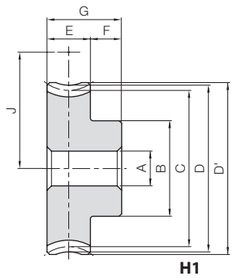
BG/CG Module 1, 1.25 Worm Wheels



Specifications		
Catalog Number	BG	CG
Precision grade	KHK W 002 grade 4*	
Reference section of gear	Normal plane	
Gear teeth	Standard full depth	
Normal pressure angle	20°	
Material	CAC502 (old JIS PBC2)	FC200
Heat treatment	—	
Tooth hardness	—	

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

A_{H7}	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
J	Mounting distance



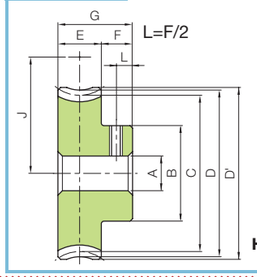
H1

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction		Shape	A_{H7}	B	C	D	D'	E	F	G	J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	Backlash (mm)	Weight (kg)
BG1-20R1	20	20	1	3°35′	R	H1	6	16	20.05	22	23	10	10	20	18	1.89	1.58	1.26	1.04	0.92	0.85	0.06~0.24	0.043
BG1-20R2	10	20	2	7°11′			6	16	20.16	22	23				18	1.90	1.54	1.18	0.97	0.85	0.78		0.043
BG1-30R1	30	30	1	3°35′			6	20	30.07	32	33				23	4.00	3.38	2.74	2.29	2.05	1.87		0.089
BG1-30R2	15	30	2	7°11′			6	20	30.24	32	33				23	4.03	3.35	2.62	2.14	1.91	1.74		0.089
BG1-40R1	40	40	1	3°35′			8	26	40.08	42	43				28	6.85	5.79	4.76	4.03	3.61	3.31		0.15
BG1-50R1	50	50	1	3°35′			8	30	50.10	52	53				33	10.3	8.76	7.27	6.18	5.58	5.14		0.23
BG1.25-20R1	20	20	1	3°25′	R	H1	6	20	25.04	27.5	28.75	11	9	20	23	3.19	2.65	2.10	1.72	1.53	1.40	0.08~0.26	0.070
BG1.25-20R2	10	20	2	6°50′			6	20	25.18	27.5	28.75				23	3.19	2.58	1.96	1.60	1.40	1.27		0.070
BG1.25-50R1	50	50	1	3°25′			8	40	62.61	65	66.25				41.75	17.4	14.7	12.1	10.3	9.25	8.49		0.40
CG1-60R1	60	60	1	3°35′	R	H1	10	30	60.12	62	63	10	10	20	38	8.69	7.39	6.14	5.24	4.78	4.39	0.06~0.24	0.25
CG1-80R1	80	80						35	80.16	82	83				48	14.7	12.6	10.5	9.11	8.30	7.72		0.43
CG1-100R1	100	100						40	100.20	102	103				58	21.9	19.0	16.0	13.9	12.7	11.9		0.66
CG1-120R1	120	120						40	120.24	122	123				68	30.5	26.7	22.5	19.6	18.0	16.7		0.91

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.

[NOTE 1] Allowable torque based on worm speed (rpm).

J Series



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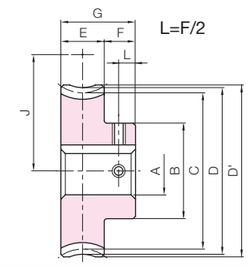


H1K

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

Bore H7	* The product shapes of J Series items are identified by background color.											
Keyway Js9	6	8	10	12	14	15	16	17	18	19	20	22
Screw size	—		4×1.8		5×2.3				6×2.8			
Catalog Number	M4	M5	M4						M5			
BG1-20R1 J BORE												
BG1-20R2 J BORE												
BG1-30R1 J BORE												
BG1-30R2 J BORE												
BG1-40R1 J BORE												
BG1-50R1 J BORE												
BG1.25-20R1 J BORE												
BG1.25-20R2 J BORE												
BG1.25-50R1 J BORE												
CG1-60R1 J BORE												
CG1-80R1 J BORE												
CG1-100R1 J BORE												
CG1-120R1 J 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.

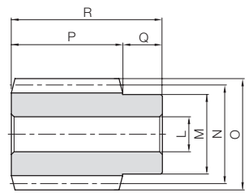
Product Precautions → Page 402 Precautions for Standard Machined Products → Pages 42~44

SW Module 1.5 Worms

Specifications	
Precision grade	KHK W 001 grade 4*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating

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

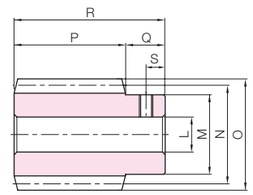
J



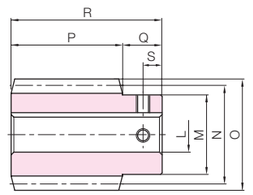
W1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



W1T



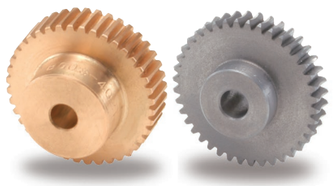
W1K

Catalog Number ● : J Series (Available-on-request)	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore L_{H7}	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width (right) Q	Hub width (left) Q'
SW1.5-R1	***m*1.5**	1	3°26′	R	W1	8	20	25	28	30	10	—
					W1T	8						
●SW1.5-R1J8					W1K	8						
●SW1.5-R1J10						10						
SW1.5-R2		2	6°54′		W1	8						
					W1T	8						
●SW1.5-R2J8					W1K	8						
●SW1.5-R2J10						10						

Total length R	Keyway Width × Depth	Socket head screw Size	S	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
40	—	—	—	0.12	**SW1.5-R1**
	—	M5	5	0.12	**●SW1.5-R1J8**
	4 x 1.8	M4	5	0.11	**●SW1.5-R1J10**
	—	—	—	0.12	**SW1.5-R2**
	—	M5	5	0.12	**●SW1.5-R2J8**
	4 x 1.8	M4	5	0.11	**●SW1.5-R2J10**

[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.

BG/CG Module 1.5 Worm Wheels

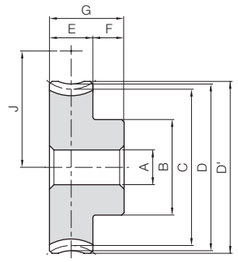


Specifications		
Catalog Number	BG	CG
Precision grade	KHK W 002 grade 4*	
Reference section of gear	Normal plane	
Gear teeth	Standard full depth	
Normal pressure angle	20°	
Material	CAC502 (old JIS PBC2)	FC200
Heat treatment	—	
Tooth hardness	—	

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

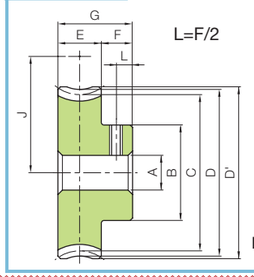
A_{H7}	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
J	Mounting distance

J

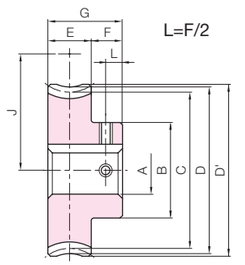


H1

J Series



H1T



H1K

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction		Shape	A_{H7}	B	C	D	D'	E	F	G	J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	Backlash (mm)	Weight (kg)
BG1.5-20R1	20	20	1	3°26′	R	H1	8	22	30.05	33	34.5	12	10	22	27.5	4.76	3.96	3.10	2.56	2.27	2.06	0.08~0.26	0.10
BG1.5-20R2	10	20	2	6°54′			8	22	30.22	33	34.5	12		22	27.5	4.75	3.85	2.89	2.38	2.08	1.87		0.10
BG1.5-30R1	30	30	1	3°26′			10	30	45.08	48	49.5	12		22	35	10.1	8.47	6.72	5.67	5.03	4.55		0.22
BG1.5-30R2	15	30	2	6°54′			10	30	45.33	48	49.5	12		22	35	10.1	8.37	6.40	5.26	4.67	4.20		0.22
BG1.5-40R1	40	40	1	3°26′			12	30	60.11	63	64.5	12		22	42.5	17.2	14.5	11.7	9.96	8.86	8.04		0.35
BG1.5-50R1	50	50	1	3°26′			12	40	75.13	78	79.5	14		24	50	30.4	25.6	20.8	17.8	16.0	14.6		0.65
CG1.5-30R1	30	30	1	3°26′	R	H1	10	30	45.08	48	49.5	12	10	22	35	6.04	5.08	4.03	3.40	3.02	2.73	0.08~0.26	0.18
CG1.5-40R1	40	40					12	30	60.11	63	64.5	12		22	42.5	10.3	8.71	7.01	5.98	5.31	4.83		0.28
CG1.5-50R1	50	50					12	40	75.13	78	79.5	14		24	50	18.2	15.4	12.5	10.7	9.59	8.74		0.53
CG1.5-60R1	60	60					12	40	90.16	93	94.5	14		24	57.5	25.5	21.6	17.6	15.1	13.7	12.4		0.73

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.
[NOTE 1] Allowable torque based on worm speed (rpm).

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	8	10	12	14	15	16	17	18	19	20	22	25	28	30
Screw size	—	4×1.8		5×2.3				6×2.8				8×3.3		
Catalog Number	M5	M4						M5				M6		
BG1.5-20R1 J BORE														
BG1.5-20R2 J BORE														
BG1.5-30R1 J BORE														
BG1.5-30R2 J BORE														
BG1.5-40R1 J BORE														
BG1.5-50R1 J BORE														
CG1.5-30R1 J BORE														
CG1.5-40R1 J BORE														
CG1.5-50R1 J BORE														
CG1.5-60R1 J 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.

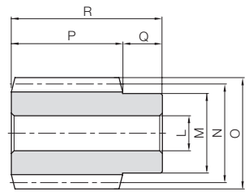
Product Precautions → Page 402 | Precautions for Standard Machined Products → Pages 42~44

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

SW Module 2 Worms

Specifications	
Precision grade	KHK W 001 grade 4*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	14°30'
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating

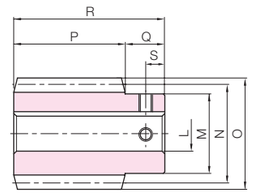
* The precision grade of J Series products is equivalent to the value shown in the table.



W1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series

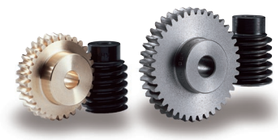


W1K

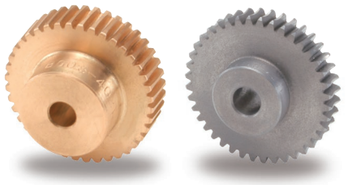
Catalog Number ● : J Series (Available-on-request)	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore L_{H7}	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width (right) Q	Hub width (left) Q'
SW2-R1		1	3°42′	R	W1	12						
●**SW2-R1J12**					W1K	12						
●**SW2-R1J14**					W1K	14						
SW2-R2		2	7°25′		W1	12						
●**SW2-R2J12**					W1K	12						
●**SW2-R2J14**					W1K	14						
SW2-L1	***m2***	1	3°42′	L	W1	12	25	31	35	32	14	—
●**SW2-L1J12**					W1K	12						
●**SW2-L1J14**					W1K	14						
SW2-L2		2	7°25′		W1	12						
●**SW2-L2J12**					W1K	12						
●**SW2-L2J14**					W1K	14						

Total length R	Keyway Width × Depth	Socket head screw Size	S	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
46	—	—	—	0.20	**SW2-R1**
	4 × 1.8	M4	7	0.20	●**SW2-R1J12**
	5 × 2.3	M4	7	0.18	●**SW2-R1J14**
	—	—	—	0.20	**SW2-R2**
	4 × 1.8	M4	7	0.20	●**SW2-R2J12**
	5 × 2.3	M4	7	0.18	●**SW2-R2J14**
	—	—	—	0.20	**SW2-L1**
	4 × 1.8	M4	7	0.20	●**SW2-L1J12**
	5 × 2.3	M4	7	0.18	●**SW2-L1J14**
	—	—	—	0.20	**SW2-L2**
	4 × 1.8	M4	7	0.20	●**SW2-L2J12**
	5 × 2.3	M4	7	0.18	●**SW2-L2J14**

[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.



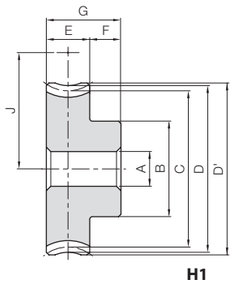
BG/CG Module 2 Worm Wheels



Specifications		
Catalog Number	BG	CG
Precision grade	KHK W 002 grade 4*	
Reference section of gear	Normal plane	
Gear teeth	Standard full depth	
Normal pressure angle	14°30'	
Material	CAC502 (old JIS PBC2)	FC200
Heat treatment	—	
Tooth hardness	—	

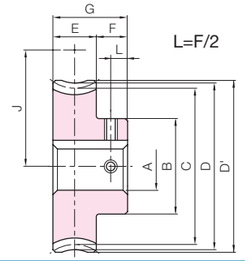
* The precision grade of J Series products is equivalent to the value shown in the table.

A_{H7}	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
J	Mounting distance



H1

J Series



H1K

Bronze Worm Wheels & Gray Iron Worm Wheels

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction		Shape	A_{H7}	B	C	D	D'	E	F	G	J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	Backlash (mm)	Weight (kg)
BG2-20R1	20	20	1	3°42′	R	H1	12	33	40.08	44	46	22	13	35	35.5	12.3	10.2	8.00	6.59	5.78	5.25	0.10~0.28	0.33
BG2-20R2	10		2	7°25′					40.34							12.3	10.0	7.51	6.15	5.32	4.80		
BG2-20L1	20		1	3°42′	L				40.08							12.3	10.2	8.00	6.59	5.78	5.25		
BG2-20L2	10		2	7°25′					40.34							12.3	10.0	7.51	6.15	5.32	4.80		
CG2-20R1	20	20	1	3°42′	R	H1	12	33	40.08	44	46	22	13	35	35.5	7.38	6.15	4.80	3.95	3.47	3.15	0.10~0.28	0.27
CG2-20R2	10	20	2	7°25′				33	40.34	44	46				35.5	7.40	6.00	4.51	3.69	3.19	2.88		0.27
CG2-30R1	30	30	1	3°42′				40	60.13	64	66				45.5	15.6	13.1	10.4	8.74	7.70	6.96		0.57
CG2-30R2	15	30	2	7°25′				40	60.51	64	66				45.5	15.7	13.1	9.96	8.15	7.18	6.45		0.57
CG2-40R1	40	40	1	3°42′				45	80.17	84	86				55.5	26.7	22.5	18.1	15.4	13.55	12.3		0.96
CG2-50R1	50	50	1	3°42′		H1	12	48	100.21	104	106	22	13	35	65.5	40.3	34.1	27.6	23.6	21.0	19.1		1.44
CG2-50R2	25	50	2	7°25′				48	100.84	104	106				65.5	40.7	34.0	26.9	22.4	19.6	17.8		1.44
CG2-60R1	60	60	1	3°42′				60	120.25	124	126				75.5	56.4	47.9	38.9	33.3	29.9	27.2		2.09
CG2-20L1	20	20	1	3°42′	L	H1		33	40.08	44	46				35.5	7.38	6.15	4.80	3.95	3.47	3.15		0.27
CG2-20L2	10	20	2	7°25′				33	40.34	44	46				35.5	7.40	6.00	4.51	3.69	3.19	2.88		0.27
CG2-30L1	30	30	1	3°42′				40	60.13	64	66				45.5	15.6	13.1	10.4	8.74	7.70	6.96		0.57
CG2-40L1	40	40	1	3°42′				45	80.17	84	86				55.5	26.7	22.5	18.1	15.4	13.55	12.3		0.96
CG2-50L1	50	50	1	3°42′		H1		48	100.21	104	106				65.5	40.3	34.1	27.6	23.6	21.0	19.1		1.44
CG2-60L1	60	60	1	3°42′		H1		60	120.25	124	126				75.5	56.4	47.9	38.9	33.3	29.9	27.2		2.09

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.
[NOTE 1] Allowable torque based on worm speed (rpm).

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

Bore H7 / Keyway Js9 / Screw size / Catalog Number	* The product shapes of J Series items are identified by background color.														
	12	14	15	16	17	18	19	20	22	25	28	30	32	35
Screw size	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3	
Catalog Number	M4					M5				M6			M8	
BG2-20R1 J BORE														
BG2-20R2 J BORE														
BG2-20L1 J BORE														
BG2-20L2 J BORE														
CG2-20R1 J BORE														
CG2-20R2 J BORE														
CG2-30R1 J BORE														
CG2-30R2 J BORE														
CG2-40R1 J BORE														
CG2-50R1 J BORE														
CG2-50R2 J BORE														
CG2-60R1 J BORE														
CG2-20L1 J BORE														
CG2-20L2 J BORE														
CG2-30L1 J BORE														
CG2-40L1 J BORE														
CG2-50L1 J BORE														
CG2-60L1 J BORE														

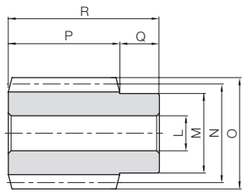
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

SW Module 2.5 Worms

Specifications	
Precision grade	KHK W 001 grade 4*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating

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



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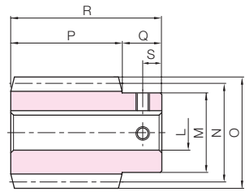
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series

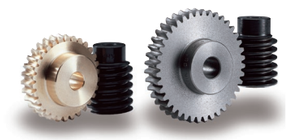


W1K

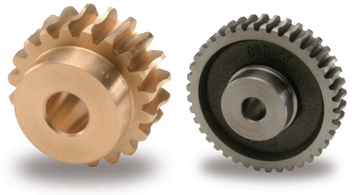
Catalog Number ● : J Series (Available-on-request)	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore L_{H7}	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width (right) Q	Hub width (left) Q'
SW2.5-R1		1	3°52′	R	W1	15						
●**SW2.5-R1J15**					W1K	15						
●**SW2.5-R1J16**					W1K	16						
●**SW2.5-R1J17**					W1K	17						
SW2.5-R2		2	7°46′		W1	15						
●**SW2.5-R2J15**					W1K	15						
●**SW2.5-R2J16**					W1K	16						
●**SW2.5-R2J17**					W1K	17						
SW2.5-L1	***m*2.5**	1	3°52′	L	W1	15	30	37	42	45	18	—
●**SW2.5-L1J15**					W1K	15						
●**SW2.5-L1J16**					W1K	16						
●**SW2.5-L1J17**					W1K	17						
SW2.5-L2		2	7°46′		W1	15						
●**SW2.5-L2J15**					W1K	15						
●**SW2.5-L2J16**					W1K	16						
●**SW2.5-L2J17**					W1K	17						

Total length R	Keyway Width × Depth	Socket head screw Size	S	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
63	—	—	—	0.39	**SW2.5-R1**
	5 × 2.3	M4	9	0.39	●**SW2.5-R1J15**
	5 × 2.3	M4	9	0.37	●**SW2.5-R1J16**
	5 × 2.3	M4	9	0.36	●**SW2.5-R1J17**
	—	—	—	0.39	**SW2.5-R2**
	5 × 2.3	M4	9	0.39	●**SW2.5-R2J15**
	5 × 2.3	M4	9	0.37	●**SW2.5-R2J16**
	5 × 2.3	M4	9	0.36	●**SW2.5-R2J17**
	—	—	—	0.39	**SW2.5-L1**
	5 × 2.3	M4	9	0.39	●**SW2.5-L1J15**
	5 × 2.3	M4	9	0.37	●**SW2.5-L1J16**
	5 × 2.3	M4	9	0.36	●**SW2.5-L1J17**
	—	—	—	0.39	**SW2.5-L2**
	5 × 2.3	M4	9	0.39	●**SW2.5-L2J15**
	5 × 2.3	M4	9	0.37	●**SW2.5-L2J16**
	5 × 2.3	M4	9	0.36	●**SW2.5-L2J17**

[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.



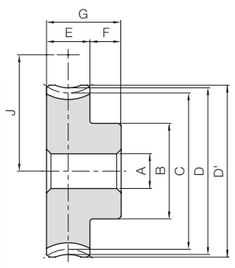
BG/CG Module 2.5 Worm Wheels



Specifications		
Catalog Number	BG	CG
Precision grade	KHK W 002 grade 4*	
Reference section of gear	Normal plane	
Gear teeth	Standard full depth	
Normal pressure angle	20°	
Material	CAC502 (old JIS PBC2)	FC200
Heat treatment	—	
Tooth hardness	—	

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

A_{H7}	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
(H)	Web thickness
(I)	Web O.D.
J	Mounting distance



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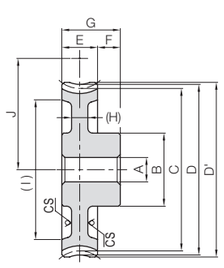


HB

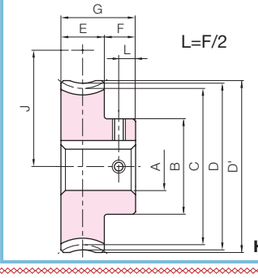
** CS has a forged finish surface.

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction		Shape	A_{H7}	B	C	D	D'	E	F	G	(H)	(I)	J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	Backlash (mm)	Weight (kg)
BG2.5-20R1	20	20	1	3°52′	R	H1	12	35	50.11	55	57.5	22	14	36	—	—	43.5	21.5	17.7	13.8	11.4	9.94	9.07	0.13~0.31	0.49
BG2.5-20R2	10		2	7°46′					50.46									21.5	17.3	13.0	10.6	9.14	8.27		
BG2.5-20L1	20		1	3°52′	L				50.11									21.5	17.7	13.8	11.4	9.94	9.07		
BG2.5-20L2	10		2	7°46′					50.46									21.5	17.3	13.0	10.6	9.14	8.27		
CG2.5-20R1	20	20	1	3°52′	R	H1	12	35	50.11	55	57.5				–	–	43.5	12.9	10.6	8.30	6.83	5.97	5.44	0.13~0.31	0.40
CG2.5-20R2	10	20	2	7°46′			12	35	50.46	55	57.5						43.5	12.9	10.4	7.78	6.36	5.49	4.96		0.40
CG2.5-30R1	30	30	1	3°52′			12	40	75.17	80	82.5						56	27.3	22.8	18.0	15.1	13.2	12.0		0.82
CG2.5-40R1	40	40	1	3°52′			15	45	100.23	105	107.5						68.5	46.7	39.0	31.3	26.5	23.3	21.2		1.39
CG2.5-50R1	50	50	1	3°52′		HB	15	50	125.29	130	132.5	22	14	36	(9)	(110)	81	70.6	59.0	47.8	40.7	36.1	33.0		1.54
CG2.5-60R1	60	60	1	3°52′				55	150.34	155	157.5					(136)	93.5	98.8	82.9	67.3	57.6	51.5	47.0		2.02
CG2.5-20L1	20	20	1	3°52′	L	H1	12	35	50.11	55	57.5				–	–	43.5	12.9	10.6	8.30	6.83	5.97	5.44		0.40
CG2.5-20L2	10	20	2	7°46′			12	35	50.46	55	57.5						43.5	12.9	10.4	7.78	6.36	5.49	4.96		0.40
CG2.5-40L1	40	40	1	3°52′			15	45	100.23	105	107.5						68.5	46.7	39.0	31.3	26.5	23.3	21.2		1.39

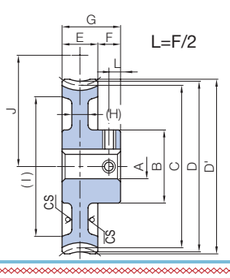
[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.
[NOTE 1] Allowable torque based on worm speed (rpm).

J Series

Bronze Worm Wheels & Gray Iron Worm Wheels



H1K



HBK

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
Screw size	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3	
Catalog Number	M4					M5				M6			M8	
BG2.5-20R1 J BORE														
BG2.5-20R2 J BORE														
BG2.5-20L1 J BORE														
BG2.5-20L2 J BORE														
CG2.5-20R1 J BORE														
CG2.5-20R2 J BORE														
CG2.5-30R1 J BORE														
CG2.5-40R1 J BORE														
CG2.5-50R1 J BORE														
CG2.5-60R1 J BORE														
CG2.5-20L1 J BORE														
CG2.5-20L2 J BORE														
CG2.5-40L1 J BORE														

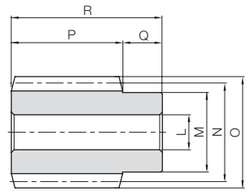
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

SW Module 3 Worms

Specifications	
Precision grade	KHK W 001 grade 4*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	14°30'
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating

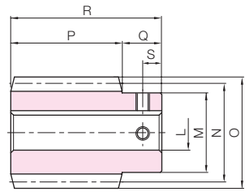
* The precision grade of J Series products is equivalent to the value shown in the table.



W1

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series

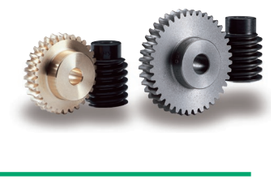


W1K

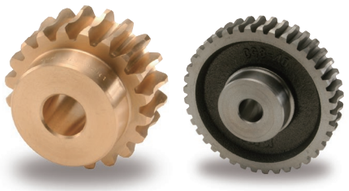
Catalog Number ● : J Series (Available-on-request)	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore L_{H7}	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width (right) Q	Hub width (left) Q'
SW3-R1	m3	1	3°55′	R	W1	16	35	44	50	50	20	—
●SW3-R1J17					W1K	17						
●SW3-R1J18					W1K	18						
●SW3-R1J19					W1K	19						
●SW3-R1J20					W1K	20						
SW3-R2		2	7°50′		W1	16						
●SW3-R2J17					W1K	17						
●SW3-R2J18					W1K	18						
●SW3-R2J19					W1K	19						
●SW3-R2J20					W1K	20						
SW3-L1		1	3°55′	L	W1	16						
●SW3-L1J17					W1K	17						
●SW3-L1J18					W1K	18						
●SW3-L1J19					W1K	19						
●SW3-L1J20					W1K	20						
SW3-L2		2	7°50′		W1	16						
●SW3-L2J17					W1K	17						
●SW3-L2J18					W1K	18						
●SW3-L2J19					W1K	19						
●SW3-L2J20					W1K	20						

Total length R	Keyway Width × Depth	Socket head screw Size	Socket head screw S	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
70	—	—	—	0.64	SW3-R1
	5 x 2.3	M4	10	0.62	●SW3-R1J17
	6 x 2.8	M5	10	0.60	●SW3-R1J18
	6 x 2.8	M5	10	0.58	●SW3-R1J19
	6 x 2.8	M5	10	0.56	●SW3-R1J20
	—	—	—	0.64	SW3-R2
	5 x 2.3	M4	10	0.62	●SW3-R2J17
	6 x 2.8	M5	10	0.60	●SW3-R2J18
	6 x 2.8	M5	10	0.58	●SW3-R2J19
	6 x 2.8	M5	10	0.56	●SW3-R2J20
	—	—	—	0.64	SW3-L1
	5 x 2.3	M4	10	0.62	●SW3-L1J17
	6 x 2.8	M5	10	0.60	●SW3-L1J18
	6 x 2.8	M5	10	0.58	●SW3-L1J19
	6 x 2.8	M5	10	0.56	●SW3-L1J20
	—	—	—	0.64	SW3-L2
	5 x 2.3	M4	10	0.62	●SW3-L2J17
	6 x 2.8	M5	10	0.60	●SW3-L2J18
	6 x 2.8	M5	10	0.58	●SW3-L2J19
	6 x 2.8	M5	10	0.56	●SW3-L2J20

[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.



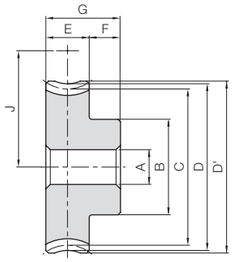
BG/CG Module 3 Worm Wheels



Specifications		
Catalog Number	BG	CG
Precision grade	KHK W 002 grade 4*	
Reference section of gear	Normal plane	
Gear teeth	Standard full depth	
Normal pressure angle	14°30'	
Material	CAC502 (old JIS PBC2)	FC200
Heat treatment	—	
Tooth hardness	—	

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

A_{H7}	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
(H)	Web thickness
(I)	Web O.D.
J	Mounting distance



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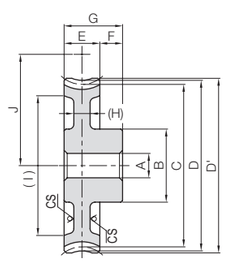


HB

** CS has a forged finish surface.

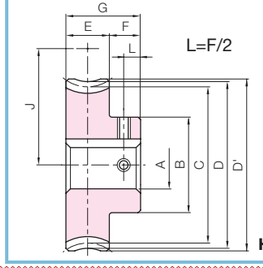
Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction		Shape	A_{H7}	B	C	D	D'	E	F	G	(H)	(I)	J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	Backlash (mm)	Weight (kg)
BG3-20R1	20	20	1	3°55′	R	H1	20	50	60.14	66	69	28	15	43	–	–	52	36.8	30.1	23.5	19.1	16.7	15.2	0.15~0.33	0.89
BG3-20R2	10		2	7°50′					60.57									37.0	29.5	22.1	17.9	15.4	14.0		
BG3-20L1	20		1	3°55′	L				60.14									36.8	30.1	23.5	19.1	16.7	15.2		
BG3-20L2	10		2	7°50′					60.57									37.0	29.5	22.1	17.9	15.4	14.0		
CG3-20R1	20	20	1	3°55′	R	H1	20	50	60.14	66	69	28	15	43	–	–	52	22.1	18.1	14.1	11.5	10.0	–	0.15~0.33	0.73
CG3-20R2	10	20	2	7°50′				50	60.57	66	69						52	22.2	17.7	13.3	10.7	9.24			0.73
CG3-30R1	30	30	1	3°55′				55	90.21	96	99						67	46.6	38.7	30.6	25.4	22.2			1.50
CG3-30R2	15	30	2	7°50′				55	90.85	96	99						67	47.2	38.5	29.3	23.7	20.8			1.50
CG3-40R1	40	40	1	3°55′		HB		55	120.28	126	129					(107)	82	79.8	66.3	53.2	44.6	39.1			1.93
CG3-50R1	50	50	1	3°55′				63	150.35	156	159	30		45	(9)	(138)	97	121	100	81.1	68.4	60.5			2.67
CG3-60R1	60	60	1	3°55′				70	180.42	186	189					(166)	112	169	141	114	96.7	86.3			3.58
CG3-20L1	20	20	1	3°55′	L	H1		50	60.14	66	69	28		43	–	–	52	22.1	18.1	14.1	11.5	10.0			0.73
CG3-20L2	10	20	2	7°50′				50	60.57	66	69						52	22.2	17.7	13.3	10.7	9.24			0.73
CG3-30L1	30	30	1	3°55′				55	90.21	96	99						67	46.6	38.7	30.6	25.4	22.2			1.50
CG3-60L1	60	60	1	3°55′		HB		70	180.42	186	189	30		45	(9)	(166)	112	169	141	114	96.7	86.3			3.58

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.

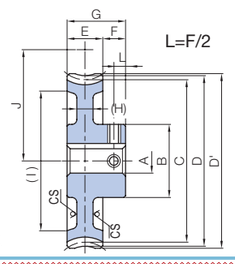
[NOTE 1] Allowable torque based on worm speed (rpm).

J Series

Bronze Worm Wheels & Gray Iron Worm Wheels



H1K



HBK

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

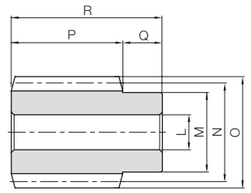
Bore H7	* The product shapes of J Series items are identified by background color.							
Keyway Js9	20	22	25	28	30	32	35	40
Screw size	6×2.8		8×3.3			10×3.3		12×3.3
Catalog Number	M5		M6			M8		
BG3-20R1 J BORE								
BG3-20R2 J BORE								
BG3-20L1 J BORE								
BG3-20L2 J BORE								
CG3-20R1 J BORE								
CG3-20R2 J BORE								
CG3-30R1 J BORE								
CG3-30R2 J BORE								
CG3-40R1 J BORE								
CG3-50R1 J BORE								
CG3-60R1 J BORE								
CG3-20L1 J BORE								
CG3-20L2 J BORE								
CG3-30L1 J BORE								
CG3-60L1 J 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.

Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

SW Module 4
Worms NEW

Specifications	
Precision grade	KHK W 001 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	14°30'
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating (excludes semi-custom products)



W1

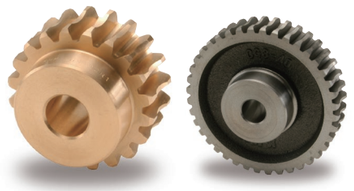
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore L_{H7}	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width (right) Q	Hub width (left) Q'
SW4-R1 **SW4-R2**	***m4***	1 2	3°42' 7°25'	R	W1	22	50	62	70	70	25	—
SW4-L1S (S) **SW4-L2S** (S)	***m4***	1 2	3°42' 7°25'	L	W1	22	50	62	70	70	25	—

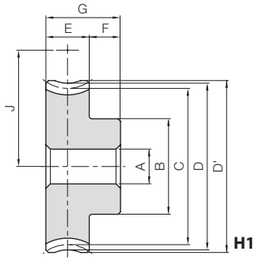
Total length R	Weight (kg)	Catalog Number
95	1.76	**SW4-R1** **SW4-R2**
95	1.76	**SW4-L1S** (S) **SW4-L2S** (S)

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

BG/CG Module 4
Worm Wheels NEW



Specifications		
Catalog Number	BG	CG
Precision grade	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane
Gear teeth	Standard full depth	Standard full depth
Normal pressure angle	14°30'	14°30'
Material	CAC502 (old JIS PBC2)	FC200
Heat Treatment	—	—
Tooth hardness	—	—



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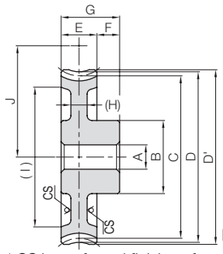

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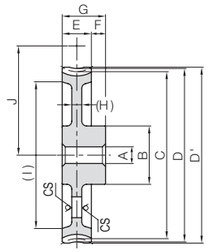


H2

* CS has a forged finish surface.

Catalog Number	Reduction ratio	Normal module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Throat dia. D	Outside dia. D'	Face width E
BG4-20R1 **BG4-20R2**	20 10	***m4***	20	1 2	3°42' 7°25'	R	H1	20	60	80.17 80.67	88	90	35

Hub width F	Total length G	Mounting distance J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	Backlash (mm)	Weight (kg)	Catalog Number
17	52	71	75.9 75.9	61.7 60.0	47.9 44.8	38.4 35.7	33.7 30.9	30.1 27.5	0.17~0.37	1.91	**BG4-20R1** **BG4-20R2**

Catalog Number	Reduction ratio	Normal module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore A_{H7}	Hub dia. B	Pitch dia. C	Throat dia. D	Outside dia. D'	Face width E
CG4-20R1	20		20	1	3°42'				60	80.17	88	90	
CG4-20R2	10	***m4***	20	2	7°25'	R	H1	20	60	80.67	88	90	35
CG4-30R1	30		30	1	3°42'				60	120.25	128	130	
CG4-30R2 (Made to Order)	15	***m4***	30	2	7°25'	R	H1	20	60	121.01	128	130	35
CG4-40R1	40	***m4***	40	1	3°42'	R	HB	20	70	160.33	168	171	35
CG4-50R1	50		50						70	200.42	208	211	
CG4-60R1	60	***m4***	60	1	3°42'	R	H2	20	80	240.5	248	251	35
CG4-20L1S (S)	20		20	1	3°42'				60	80.17	88	90	
CG4-20L2S (S)	10		20	2	7°25'				60	80.67	88	90	
CG4-30L1S (S)	30		30	1	3°42'				60	120.25	128	130	
CG4-40L1S (S)	40	***m4***	40	1	3°42'	L	H1	20	70	160.33	168	171	35
CG4-50L1S (S)	50		50	1	3°42'				70	200.42	208	211	
CG4-60L1S (S)	60		60	1	3°42'				80	240.5	248	251	

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) NOTE 1 30 rpm	100 rpm	300 rpm	600 rpm	Backlash (mm)	Weight (kg)	Catalog Number
17	52	—	—	71	45.6	37.0	28.7	23.0	0.17~0.37	1.56	**CG4-20R1**
		—	—	71	45.5	36.0	26.9	21.4		1.56	**CG4-20R2**
		—	—	91	96.3	79.1	62.3	50.9		3.17	**CG4-30R1**
17	52	—	—	91	96.8	78.3	59.4	47.3	0.17~0.37	3.17	**CG4-30R2** (Made to Order)
17	52	(11)	(136)	111	165	136	108	89.4	0.17~0.37	4.02	**CG4-40R1**
17	52	(12) (12)	(176) (218)	131 151	249 348	205 288	165 233	137 194	0.17~0.37	4.97 6.58	**CG4-50R1** **CG4-60R1**
17	52	—	—	71	45.6	37.0	28.7	23.0	0.17~0.37	1.56	**CG4-20L1S** (S)
				71	45.5	36.0	26.9	21.4		1.56	**CG4-20L2S** (S)
				91	96.3	79.1	62.3	50.9		3.17	**CG4-30L1S** (S)
				111	165	136	108	89.4		5.55	**CG4-40L1S** (S)
				131	249	205	165	137		8.43	**CG4-50L1S** (S)
				151	348	288	233	194		12.1	**CG4-60L1S** (S)

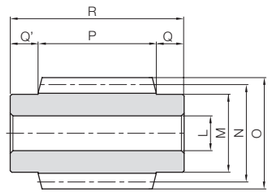
[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.
② H2 has a long cast hole in the web (H) section.
③ Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

[NOTE 1] Allowable torque based on worm speed (rpm).

Product Precautions → Page 402

Specifications	
Precision grade	KHK W 001 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	14°30'
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating (excludes semi-custom products)



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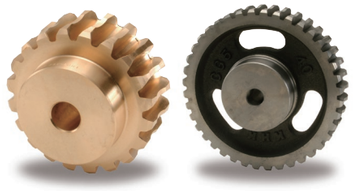
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (right)	Hub width (left)
						L_{H7}	M	N	O	P	Q	Q'
SW5-R1	***m*5**	1	4°06'	R	W3	25	56	70	80	85	20	20
SW5-R2 (Made to Order)	***m*5**	2	8°13'	R	W3	25	56	70	80	85	20	20
SW5-L1S (S)	***m*5**	1	4°06'	L	W3	25	56	70	80	85	20	20

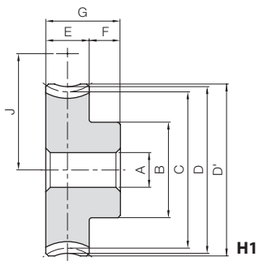
Total length	Weight	Catalog Number
R	(kg)	
125	2.86	**SW5-R1**
125	2.86	**SW5-R2** (Made to Order)
125	2.86	**SW5-L1S** (S)

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock 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.



Specifications		
Catalog Number	BG	CG
Precision grade	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane
Gear teeth	Standard full depth	Standard full depth
Normal pressure angle	14°30'	14°30'
Material	CAC502 (old JIS PBC2)	FC200
Heat Treatment	—	—
Tooth hardness	—	—



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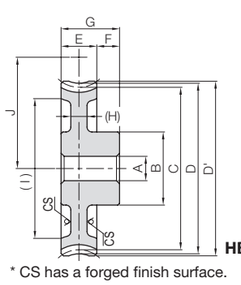

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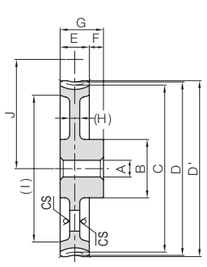
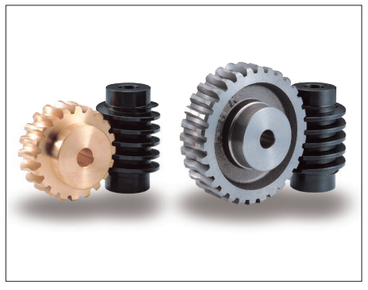


H2

* CS has a forged finish surface.



Catalog Number	Reduction ratio	Normal module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A_{H7}	B	C	D	D'	E
BG5-20R1	20	***m*5**	20	1	4°06'	R	H1	22	75	100.26	110	113	45
BG5-20R2 (Made to Order)	10	***m*5**	20	2	8°13'	R	H1	22	75	101.04	110	113	45

Catalog Number	Reduction ratio	Normal module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A_{H7}	B	C	D	D'	E
CG5-20R1	20	***m*5**	20	1	4°06'	R	H1	22	75	100.26	110	113	45
CG5-30R1	30		30	1	4°06'		HB		75	150.38	160	163	
CG5-30R2 (Made to Order)	15	***m*5**	30	2	8°13'	R	HB	22	75	151.56	160	163	45
CG5-40R1	40	***m*5**	40	1	4°06'	R	H2	22	90	200.51	210	213	45
CG5-50R1	50	***m*5**	50	1	4°06'	R	H2	22	90	250.61	260	263	45
CG5-60R1	60		60						100	300.77	310	313	
CG5-20L1S (S)	20		20						75	100.26	110	113	
CG5-30L1S (S)	30		30						75	150.38	160	163	
CG5-40L1S (S)	40	***m*5**	40	1	4°06'	L	H1	22	90	200.51	210	213	45
CG5-50L1S (S)	50		50						90	250.64	260	263	
CG5-60L1S (S)	60		60						100	300.77	310	313	

Hub width	Total length	Mounting distance	Allowable torque (N·m) NOTE 1						Backlash	Weight	Catalog Number
F	G	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	(mm)	(kg)	
20	65	85	146	117	91.2	73.0	63.7	56.9	0.20~0.40	3.89	**BG5-20R1**
20	65	85	146	115	85.8	68.4	58.8	52.2	0.20~0.40	3.89	**BG5-20R2** (Made to Order)

Hub width	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 1				Backlash	Weight	Catalog Number
F	G	(H)	(I)	J	30 rpm	100 rpm	300 rpm	600 rpm	(mm)	(kg)	
20	65	— (13)	— (127)	85 110	87.4 185	70.3 150	54.7 119	43.8 96.8	0.20~0.40	3.18 5.07	**CG5-20R1** **CG5-30R1**
20	65	(13)	(127)	110	187	150	114	90.6	0.20~0.40	5.07	**CG5-30R2** (Made to Order)
20	65	(16)	(172)	135	316	258	206	170	0.20~0.40	7.75	**CG5-40R1**
20	65	(16) (14)	(223) (276)	160 185	477 668	390 548	315 443	261 369	0.20~0.40	10.1 12.3	**CG5-50R1** **CG5-60R1**
20	65	—	—	85 110 135 160 185	87.4 185 316 477 668	70.3 150 258 390 548	54.7 119 206 315 443	43.8 96.8 170 261 369	0.20~0.40	3.18 6.44 11.3 17.1 24.4	**CG5-20L1S** (S) **CG5-30L1S** (S) **CG5-40L1S** (S) **CG5-50L1S** (S) **CG5-60L1S** (S)

[NOTE 1] Allowable torque based on worm speed (rpm).

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.
② H2 has a long cast hole in the web (H) section.
③ Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
④ For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

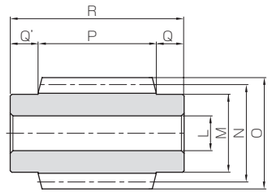
Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

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

SW Module 6
Worms NEW

M S

Specifications	
Precision grade	KHK W 001 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	14°30'
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	Black oxide coating (excludes semi-custom products)



W3

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Catalog Number	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (right)	Hub width (left)
						L_{H7}	M	N	O	P	Q	Q'
SW6-R1	***m6***	1	4°18'	R	W3	30	64	80	92	100	25	25
SW6-R2 (Made to Order)	***m6***	2	8°38'	R	W3	30	64	80	92	100	25	25
SW6-L1S S	***m6***	1	4°18'	L	W3	30	64	80	92	100	25	25

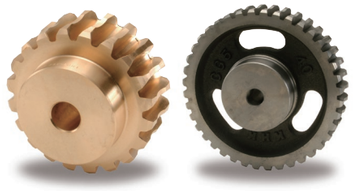
Total length	Weight	Catalog Number
R	(kg)	
150	4.38	**SW6-R1**
150	4.38	**SW6-R2** (Made to Order)
150	4.38	**SW6-L1S** S

[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

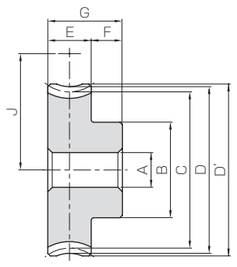
[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

BG・CG Module 6
Worm Wheels NEW

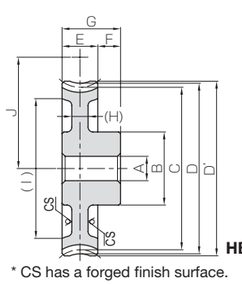
M S



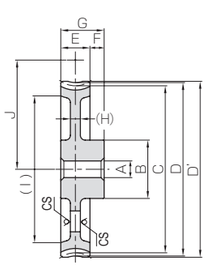
Specifications		
Catalog Number	BG	CG
Precision grade	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane
Gear teeth	Standard full depth	Standard full depth
Normal pressure angle	14°30'	14°30'
Material	CAC502 (old JIS PBC2)	FC200
Heat Treatment	—	—
Tooth hardness	—	—



H1

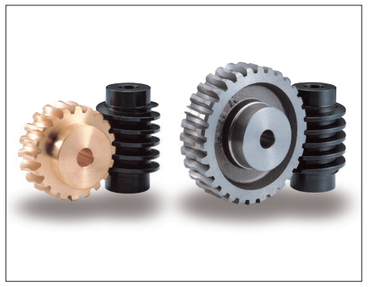


HB



H2

* CS has a forged finish surface.



Catalog Number	Reduction ratio	Normal module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A_{H7}	B	C	D	D'	E
BG6-20R1	20	***m6***	20	1	4°18'	R	H1	25	100	120.34	132	136	52
BG6-20R2 (Made to Order)	10	***m6***	20	2	8°38'	R	H1	25	100	121.38	132	136	52

Catalog Number	Reduction ratio	Normal module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A_{H7}	B	C	D	D'	E
CG6-20R1	20	***m6***	20	1	4°18'	R	H1	25	100	120.34	132	136	52
CG6-30R1	30		30				HB			180.51	192	196	
CG6-40R1	40		40				H2			240.68	252	256	
CG6-50R1	50		50	1	4°18'		H2		100	300.85	312	316	
CG6-60R1	60		60						120	361.02	372	376	
CG6-20L1S S	20	***m6***	20	1	4°18'	L	H1	25	100	120.34	132	136	52
CG6-30L1S S	30		30						100	180.51	192	196	
CG6-40L1S S	40		40						100	240.68	252	256	
CG6-50L1S S	50		50						100	300.85	312	316	
CG6-60L1S S	60		60						120	361.02	372	376	

Hub width	Total length	Mounting distance	Allowable torque (N·m) NOTE 1						Backlash	Weight	Catalog Number
F	G	J	30 rpm	100 rpm	300 rpm	600 rpm	900 rpm	1200 rpm	(mm)	(kg)	
20	72	100	232	185	144	115	99.2	88.8	0.22~0.42	6.60	**BG6-20R1**
20	72	100	235	183	136	109	92.3	82.0	0.22~0.42	6.60	**BG6-20R2** (Made to Order)

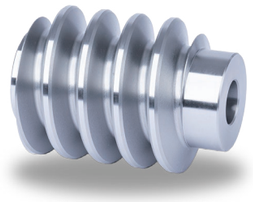
Hub width	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 1			Backlash	Weight	Catalog Number
F	G	(H)	(I)	J	30 rpm	100 rpm	300 rpm	(mm)	(kg)	
20	72	—	—	100	139	111	86.2	0.22~0.42	5.39	**CG6-20R1**
		(15)	(155)	130	294	237	187		8.72	**CG6-30R1**
		(15)	(213)	160	502	407	325		11.4	**CG6-40R1**
		(16)	(275)	190	760	615	496		14.5	**CG6-50R1**
		(17)	(336)	220	1060	865	698		20.3	**CG6-60R1**
20	72	—	—	100	139	111	86.2	0.22~0.42	5.39	**CG6-20L1S** S
				130	294	237	187		10.8	**CG6-30L1S** S
				160	502	407	325		18.4	**CG6-40L1S** S
				190	760	615	496		28.0	**CG6-50L1S** S
				220	1060	865	698		40.3	**CG6-60L1S** S

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.
② H2 has a long cast hole in the web (H) section.
③ Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
④ For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

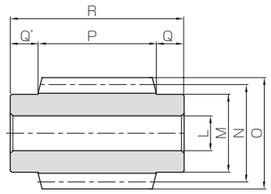
[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

[NOTE 1] Allowable torque based on worm speed (rpm).

SW Module 8, 10
Worms NEW



Specifications	
Precision grade	KHK W 001 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	S45C
Heat treatment	—
Tooth hardness	(less than 194HB)
Surface treatment	—



W3

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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FEINWERKTECHNIK GmbH
Oberes Dorf 1
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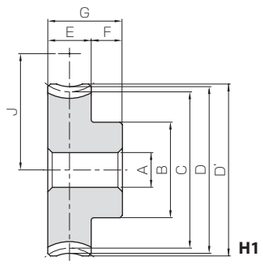
Catalog Number		Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (right)	Hub width (left)
							L_{H7}	M	N	O	P	Q	Q'
SW8-R1S	S	m8	1	5°6′	R	W3	30	68	90	106	120	25	5
SW10-R1S	S	m10	1	5°44′	R	W3	30	73	100	120	120	25	5

Total length	Weight	Catalog Number	
R	(kg)		
150	6.02	SW8-R1S	S
150	7.55	SW10-R1S	S

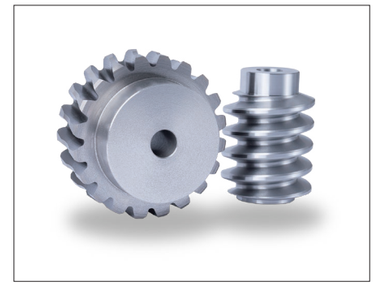
[Caution on Product Characteristics] ① Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

CG Module 8, 10
Worm Wheels NEW

Specifications	
Precision grade	KHK W 002 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	FC200
Heat treatment	—
Tooth hardness	—
Surface treatment	—



H1



Catalog Number		Reduction ratio	Normal module	No. of teeth	No. of starts of mating worm	Lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
									A_{H7}	B	C	D	D'	E
CG8-20R1S	S	20	m8	20	1	5°06′	R	H1	30	130	160.64	176	180	60
CG8-30R1S	S	30		30					30	180	240.95	256	260	
CG8-40R1S	S	40		40					40	220	321.27	336	340	
CG8-50R1S	S	50		50					40	240	401.59	416	420	
CG10-20R1S	S	20	m10	20	1	5°44′	R	H1	30	165	201.01	220	225	72
CG10-30R1S	S	30		30					50	240	301.51	320	325	
CG10-40R1S	S	40		40					50	280	402.02	420	425	

Hub width	Total length	Mounting distance	Allowable torque (N·m) NOTE 1			Backlash	Weight	Catalog Number	
F	G	J	30 rpm	100 rpm	300 rpm	(mm)	(kg)		
35	95	125	288	230	177	0.27~0.51	12.0	CG8-20R1S	S
		165	610	492	385		26.2	CG8-30R1S	S
		205	1040	843	669		44.4	CG8-40R1S	S
		245	1580	1280	1020		66.0	CG8-50R1S	S
40	112	150	524	417	320	0.32~0.59	22.8	CG10-20R1S	S
		200	1110	893	694		49.5	CG10-30R1S	S
		250	1900	1530	1210		83.2	CG10-40R1S	S

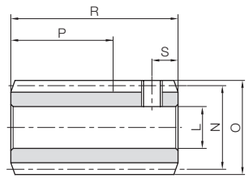
[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.
② Products with S at the end of the catalog number are semi-custom stock products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.
③ For S semi-custom standard products weighing 15 kg or more, eyebolt screw threads (2-M12 depth 25 mm) are machined around the outside of the hub side surface. Details of the PCD of the screw threads are located on page 51.

[NOTE 1] Allowable torque based on worm speed (rpm).

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

SUW Module 0.5, 0.8
Stainless Steel Worms

Specifications	
Precision grade	KHK W 001 grade 4
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)



W2

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

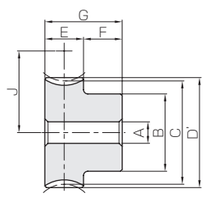
Catalog Number	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						L_{H8}	M	N	O	P	Q	R
SUW0.5-R1	***m*0.5**	1	2°36′	R	W2	5	—	11	12	(10)	—	18
SUW0.5-R2		2	5°13′									
SUW0.8-R1	***m*0.8**	1	3°17′	R	W2	6	—	14	15.6	(18)	—	30
SUW0.8-R2		2	6°34′									

Socket head screw		Weight (kg)	Catalog Number
Size	S		
M3	3	0.011	**SUW0.5-R1**
		0.010	**SUW0.5-R2**
M4	5	0.029	**SUW0.8-R1**
			SUW0.8-R2

PG Module 0.5, 0.8
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 5 *
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	MC901
Heat treatment	—
Tooth hardness	—

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



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Catalog Number	Normal module	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction		Shape	A $^{-0.05}_{-0.10}$	B	C	D	D'	E
PG0.5-20R1	***m*0.5**	20	20	1	2°36'	R	HA	4	9	10.01	—	11	5
PG0.5-20R2		10	20	2	5°13'			4	9	10.04		11	
PG0.5-30R1		30	30	1	2°36'			4	12	15.02		16	
PG0.5-30R2		15	30	2	5°13'			4	12	15.06		16	
PG0.5-40R1		40	40	1	2°36'			5	15	20.02		21	
PG0.5-50R1		50	50	1	2°36'			5	20	25.03		26	
PG0.5-60R1		60	60	1				5	25	30.03		31	
PG0.8-20R1	***m*0.8**	20	20	1	3°17'	R	HA	5	12	16.03	—	17.6	9
PG0.8-20R2		10	20	2	6°34'			5	12	16.11		17.6	
PG0.8-30R1		30	30	1	3°17'			5	18	24.04		25.6	
PG0.8-30R2		15	30	2	6°34'			5	18	24.16		25.6	
PG0.8-40R1		40	40	1	3°17'			6	20	32.05		33.6	
PG0.8-50R1		50	50	1	3°17'			8	25	40.07		41.6	
PG0.8-60R1		60	60	1				8	25	48.08		49.6	

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.

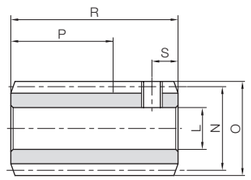
F	G	J	Allowable torque (N-m) Bending strength	Allowable torque (kgf-m) Bending strength	Backlash (mm)	Weight (kg)	Catalog Number
7	12	10.5	0.077	0.0078	0.09~0.17	0.83	**PG0.5-20R1**
		10.5	0.077	0.0078		0.83	**PG0.5-20R2**
		13	0.13	0.013		1.82	**PG0.5-30R1**
		13	0.13	0.013		1.82	**PG0.5-30R2**
		15.5	0.19	0.019		3.06	**PG0.5-40R1**
		18	0.24	0.025		5.24	**PG0.5-50R1**
		20.5	0.31	0.031		7.96	**PG0.5-60R1**
9	18	15	0.35	0.036	0.13~0.23	3.06	**PG0.8-20R1**
		15	0.36	0.036		3.06	**PG0.8-20R2**
		19	0.59	0.060		7.27	**PG0.8-30R1**
		19	0.60	0.061		7.27	**PG0.8-30R2**
		23	0.86	0.087		11.51	**PG0.8-40R1**
		27	1.13	0.12		17.76	**PG0.8-50R1**
		31	1.41	0.14		23.67	**PG0.8-60R1**

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

SUW Module 1, 1.5
Stainless Steel Worms

Specifications	
Precision grade	KHK W 001 grade 4*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)

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



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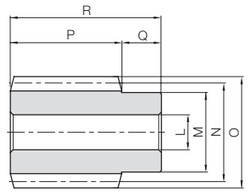
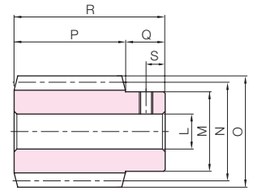


W1

J Series



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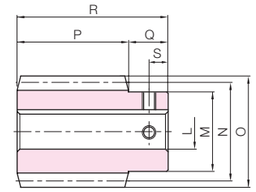


W1K

Catalog Number ● : J Series (Available-on-request)	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore $L_{H7(H8)}$	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width Q	Total length R
SUW1-R1	***m*1**	1	3°35′	R	W2	6 ^{H8}	—	16	18	(20)	—	32
SUW1-R2		2	7°11′		W2							
SUW1.5-R1	***m*1.5**	1	3°26′	R	W1	8	20	25	28	30	10	40
●SUW1.5-R1J8					W1T	8						
●SUW1.5-R1J10					W1K	10						
SUW1.5-R2		2	6°54′		W1	8						
●SUW1.5-R2J8					W1T	8						
●SUW1.5-R2J10					W1K	10						

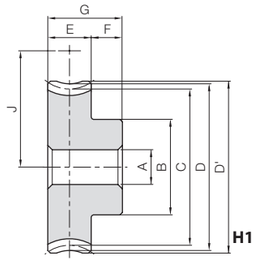
Keyway	Socket head screw		Weight	Catalog Number ● : J Series (Available-on-request)
Width × Depth	Size	S	(kg)	
—	M4	5	0.043	**SUW1-R1** **SUW1-R2**
—	—	—	0.13	**SUW1.5-R1**
—	M5	5	0.13	**●SUW1.5-R1J8**
4 x 1.8	M4	5	0.11	**●SUW1.5-R1J10**
—	—	—	0.13	**SUW1.5-R2**
—	M5	5	0.13	**●SUW1.5-R2J8**
4 x 1.8	M4	5	0.11	**●SUW1.5-R2J10**

[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.

PG Module 1, 1.5
Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 5*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	20°
Material	MC901
Heat treatment	—
Tooth hardness	—

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



H1

A	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
J	Mounting distance

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction		Shape	A_{H8}	B	C	D	D'	E	F	G	J	Allowable torque (N-m) Bending strength	Allowable torque (kgf-m) Bending strength	Backlash (mm)	Weight (kg)
PG1-20R1	20	20	1	3°35′	R	H1	6	16	20.04	22	23				18	0.62	0.060		0.0058
PG1-20R2	10	20	2	7°11′			6	16	20.16	22	23				18	0.62	0.060		0.0058
PG1-30R1	30	30	1	3°35′	R	H1	6	20	30.06	32	33	10	10	20	23	1.03	0.10	0~0.28	0.012
PG1-40R1	40	40	1	3°35′			8	26	40.08	42	43				28	1.49	0.15		0.021
PG1-50R1	50	50	1	3°35′			8	30	50.1	52	53				33	1.96	0.20		0.031
PG1.5-20R1	20	20	1	3°26′	R	H1	8	22	30.05	33	34.5	12	10	22	27.5	1.66	0.17	0~0.30	0.014
PG1.5-20R2	10		2	6°54′					30.22							1.68			

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
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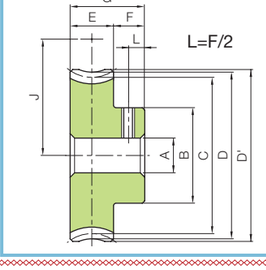
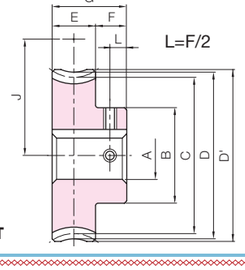
Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

J Series



H1T



H1K

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

Bore	* The product shapes of J Series items are identified by background color.							
Keyway Js9	6	8	10	12	14	15	16	17
Screw size	—		4×1.8		5×2.3			
Catalog Number	M4	M5	M4					
PG1-20R1 J BORE								
PG1-20R2 J BORE								
PG1-30R1 J BORE								
PG1-40R1 J BORE								
PG1-50R1 J BORE								
PG1.5-20R1J BORE								
PG1.5-20R2J 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.

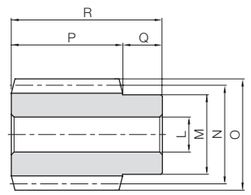
* In regard to MC Nylon gears, other materials are available for plastic gears, including Ultra High Molecular Weight Polyethylene (U-PE), which has excellent abrasion resistance Poly Ether Ether Ketone (PEEK) also has quality properties. A single piece order is acceptable and will be produced as a custom-made gear. Please see Page 26 for more details on quotations and orders.

SUW Module 2, 3 Stainless Steel Worms

Specifications	
Precision grade	KHK W 001 grade 4*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	14°30'
Material	SUS303
Heat treatment	—
Tooth hardness	(less than 187HB)

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

J



W1

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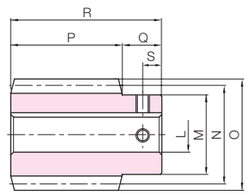
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

J Series



W1K

Catalog Number ● : J Series (Available-on-request)	Normal module	Number of Starts	Nominal lead angle	Direction of helix	Shape	Bore L_{H7}	Hub dia. M	Pitch dia. N	Outside dia. O	Face width P	Hub width Q	Total length R
SUW2-R1	*m*2	1	3°42′	R	W1	12	25	31	35	32	14	46
●**SUW2-R1J12**					W1K	12						
●**SUW2-R1J14**					W1K	14						
SUW2-R2		2	7°25′		W1	12						
●**SUW2-R2J12**					W1K	12						
●**SUW2-R2J14**					W1K	14						
SUW3-R1	*m*3	1	3°55′	R	W1	16	35	44	50	50	20	70
●**SUW3-R1J17**					W1K	17						
●**SUW3-R1J18**					W1K	18						
●**SUW3-R1J19**					W1K	19						
●**SUW3-R1J20**					W1K	20						
SUW3-R2		2	7°50′		W1	16						
●**SUW3-R2J17**					W1K	17						
●**SUW3-R2J18**					W1K	18						
●**SUW3-R2J19**					W1K	19						
●**SUW3-R2J20**					W1K	20						

Keyway Width × Depth	Socket head screw Size	Socket head screw S	Weight (kg)	Catalog Number ● : J Series (Available-on-request)
—	—	—	0.20	**SUW2-R1**
4 x 1.8	M4	7	0.20	●**SUW2-R1J12**
5 x 2.3	M4	7	0.18	●**SUW2-R1J14**
—	—	—	0.20	**SUW2-R2**
4 x 1.8	M4	7	0.20	●**SUW2-R2J12**
5 x 2.3	M4	7	0.18	●**SUW2-R2J14**
—	—	—	0.64	**SUW3-R1**
5 x 2.3	M4	10	0.62	●**SUW3-R1J17**
6 x 2.8	M5	10	0.60	●**SUW3-R1J18**
6 x 2.8	M5	10	0.59	●**SUW3-R1J19**
6 x 2.8	M5	10	0.57	●**SUW3-R1J20**
—	—	—	0.64	**SUW3-R2**
5 x 2.3	M4	10	0.62	●**SUW3-R2J17**
6 x 2.8	M5	10	0.60	●**SUW3-R2J18**
6 x 2.8	M5	10	0.59	●**SUW3-R2J19**
6 x 2.8	M5	10	0.57	●**SUW3-R2J20**

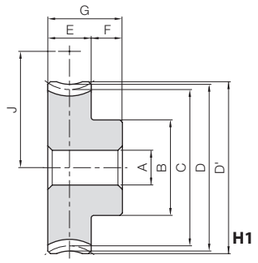
[Caution on J series] ① Cancellation is not possible for made-to-order products. See page 42 for lead times and allowable order quantities. See page 44 for other precautions.

PG Module 2, 3 Worm Wheels

Specifications	
Precision grade	KHK W 002 grade 5*
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Normal pressure angle	14°30'
Material	MC901
Heat treatment	—
Tooth hardness	—

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

J



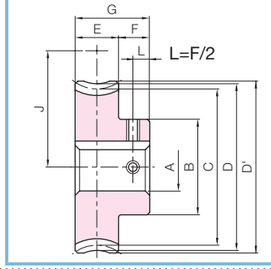
H1

A	Bore
B	Hub dia.
C	Pitch dia.
D	Throat dia.
D'	Outside dia.
E	Face width
F	Hub width
G	Total length
J	Mounting distance

Catalog Number	Reduction ratio	No. of teeth	No. of starts of mating worm	Lead angle helix direction		Shape	A_{H8}	B	C	D	D'	E	F	G	J	Allowable torque (N-m) Bending strength	Allowable torque (kgf-m) Bending strength	Backlash (mm)	Weight (kg)
PG2-20R1	20	20	1	3°42′	R	H1	10	33	40.08	44	46	22	13	35	35.5	4.78	0.49	0~0.33	0.046
PG2-20R2	10		2	7°25′					40.34							4.82	0.49		
PG3-20R1	20	20	1	3°55′	R	H1	15	50	60.14	66	69	28	15	43	52	(13.7)	1.40	0~0.38	0.13
PG3-20R2	10		2	7°50′					60.57							(13.8)	1.41		

[Caution on Product Characteristics] ① The worm wheel is shifted to fit the mounting distance.

J Series



H1K

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

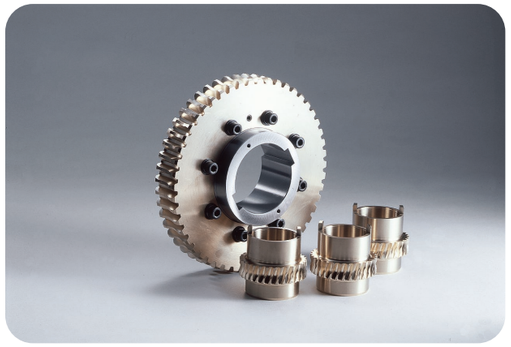
Bore	* The product shapes of J Series items are identified by background color.												
Keyway Js9	10	12	14	15	16	17	18	19	20	22	25	28	30
Screw size	4×1.8		5×2.3				6×2.8				8×3.3		
Catalog Number	M4						M5				M6		
PG2-20R1 J BORE													
PG2-20R2 J BORE													
PG3-20R1 J BORE													
PG3-20R2 J 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.

Product Precautions → Page 402
Precautions for Standard Machined Products → Pages 42~44

Custom-made worm gears are available.

KHK offers high-precision products.

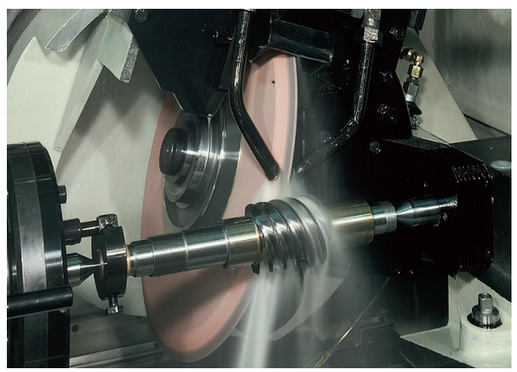


◆ Production Range

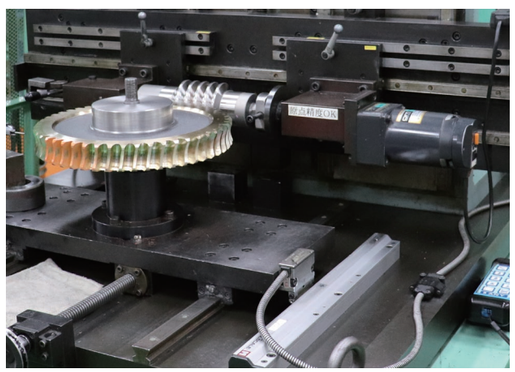
Module	: 0.5~10
Assembly distance	: 350 mm or less
Worm outer diameter	: ϕ100 mm or less
Total length	: 600 mm or less
Weight	: 25kg or less
Wheel outer diameter	: ϕ600 mm or less
Weight	: 200kg or less

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

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



Custom-made Worm Grinding Machine



Worm Gear Tooth Contact Machine

KBX Bevel Gearboxes	CBX Bevel Gearboxes
Material: -	Material: -
Model L/T Page 462	Model L/T Page 466

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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Oberes Dorf 1
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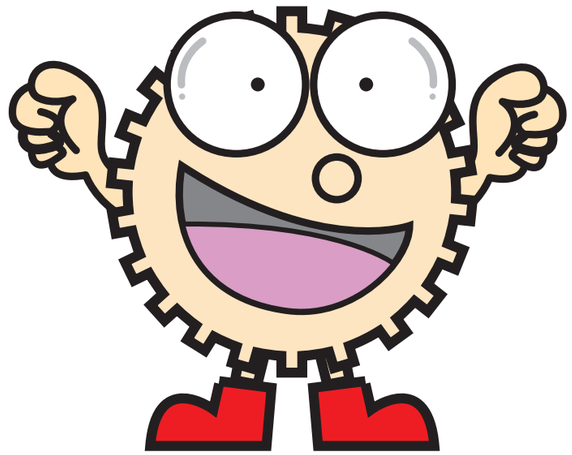


Catalog Number of KHK Stock Gears

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) Gearboxes

K BX - 10 1 L

- L: Type (L)
- 1: Gear Ratio (1)
- 10: Shaft Diameter (4 mm)
- BX: Type (Bevel Gearboxes)
- K: Case Material (Light Alloy)

Case Material		Type	
K	Light Alloy	BX	Bevel Gearboxes
C	FC250		

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Features

① Compact

The structure is simple and the case is made of aluminum die-cast

② Low-noise and high-efficiency

Uses spiral bevel gears that are made of carburized special steel

③ Flexible mounting direction

Can be installed in all directions and is easy to install

④ Maintenance-free

Shipped with high-grade grease enclosed

⑤ Gear ratio

Gear ratio of 1 and 2 can be selected according to the application

■ Lubrication

Lubricating oil of specified amount is enclosed at the time of shipment.

Machine Type	Approximate amount of oil	Lubricant type	
KBX-10 KBX-15 KBX-20	10g 30g 50g	Grease	NLGI-00 with Li extreme pressure additive

■ Application Hints

1. Installation Location

① Ambient temperature : −10°C to 40°C
② Ambient humidity : 80% or less
③ Atmosphere : A space free of corrosive gas and steam
A well-ventilated space free of dust and dirt
④ Installation location : Indoors

2. Installation Method

① Securely fix the mounting surface to a machined flat surface without vibration using bolts.
② No secondary operations such as boring can be made on the case. Also, do not disassemble or modify the product. If the device is damaged, the product will not be covered by the warranty.
③ For devices for which oil must be avoided such as food machinery, be sure to take measures to prevent damage such as oil reservoir in case of oil leakage due to failure, aging, etc.

3. Connection with the mating machine

① Check the rotation direction before connecting to the mating machine. There is a risk of the device being damaged due to difference in rotation direction.
② When attaching the coupling, sprocket, pulley, gear or the like to the shaft of the gear box, make sure that it does not interfere with the oil seal or case surface in models that have no steps on the shaft. We also recommend H7 for hole fitting.
③ For direct connection, locate the center accurately so that the axial center of the gear box and mating axis match. We also recommend using flexible fastening supplies.
④ When using a chain, belt or gear, make sure that the gear box shaft and mating shaft are parallel, and install it so that the line connecting the centers of two shafts is perpendicular to the shafts.

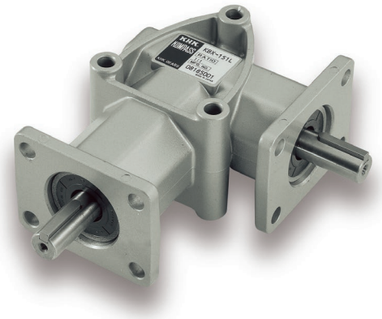
4. Precautions during driving

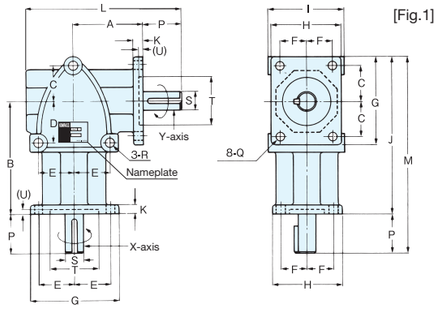
① Do not approach or touch rotating objects such as the shafts during operation. There is a risk of entanglement and injury.
② If there is abnormal noise or temperature rise, stop the operation immediately and do not operate until the cause of the abnormality is investigated and measures are taken.
③ Forward and reverse rotations due to plucking adversely affect the gear box and mating machine, so be sure to stop the unit and then start in the opposite direction.
④ Be sure to set the load torque and O.H.L. (overhang load) within the permissible values before operation.

■ KBX Performance Table

Speed ratio	Model Code	Specification Symbol	X-axis Rotation Speed (rpm) 50	100	200	300	400	600	900	1200	1500	1800	2500	3600	Allowable Thrust Load (N) {kgf} X-axis	Y-axis
1:1	KBX-101	Allowable Capacity (kW)	0.01	0.02	0.05	0.07	0.09	0.14	0.20	0.26	0.31	0.35	0.38	0.44	59 {6}	69 {7}
		Allowable X, Y-axis Torque (N·m) {kgf·m}	2.35 {0.24}	2.35 {0.24}	2.25 {0.23}	2.25 {0.23}	2.16 {0.22}	2.16 {0.22}	2.06 {0.21}	2.06 {0.21}	1.96 {0.20}	1.86 {0.19}	1.47 {0.15}	1.18 {0.12}		
		Allowable X-axis O.H.L. (N) {kgf}	78 {8}	78 {8}	78 {8}	78 {8}	69 {7}	69 {7}	69 {7}	69 {7}	69 {7}	59 {6}	49 {5}	39 {4}		
		Allowable Y-axis O.H.L. (N) {kgf}	127 {13}	127 {13}	118 {12}	118 {12}	118 {12}	118 {12}	108 {11}	108 {11}	108 {11}	98 {10}	78 {8}	59 {6}		
		Transmission Efficiency (Reference)	90%													
	KBX-151	Allowable Capacity (kW)	0.05	0.09	0.18	0.27	0.35	0.51	0.75	0.96	1.16	1.30	1.44	1.66	98 {10}	118 {12}
		Allowable X, Y-axis Torque (N·m) {kgf·m}	8.82 {0.90}	8.82 {0.90}	8.62 {0.88}	8.53 {0.87}	8.33 {0.85}	8.13 {0.83}	7.94 {0.81}	7.64 {0.78}	7.35 {0.75}	6.86 {0.70}	5.49 {0.56}	4.41 {0.45}		
		Allowable X-axis O.H.L. (N) {kgf}	255 {26}	255 {26}	255 {26}	245 {25}	245 {25}	235 {24}	225 {23}	216 {22}	216 {22}	186 {19}	157 {16}	127 {13}		
		Allowable Y-axis O.H.L. (N) {kgf}	294 {30}	294 {30}	284 {29}	284 {29}	274 {28}	265 {27}	265 {27}	255 {26}	245 {25}	216 {22}	176 {18}	147 {15}		
		Transmission Efficiency (Reference)	90%													
	KBX-201	Allowable Capacity (kW)	0.09	0.18	0.36	0.52	0.68	0.95	1.38	1.78	2.15	2.50	2.55	2.95	196 {20}	274 {28}
		Allowable X, Y-axis Torque (N·m) {kgf·m}	17.6 {1.80}	17.6 {1.80}	17.2 {1.75}	16.7 {1.70}	16.2 {1.65}	15.2 {1.55}	14.7 {1.50}	14.2 {1.45}	13.7 {1.40}	13.2 {1.35}	9.80 {1.00}	7.84 {0.80}		
		Allowable X-axis O.H.L. (N) {kgf}	353 {36}	353 {36}	343 {35}	333 {34}	333 {34}	323 {33}	314 {32}	304 {31}	294 {30}	265 {27}	216 {22}	176 {18}		
		Allowable Y-axis O.H.L. (N) {kgf}	529 {54}	529 {54}	519 {53}	510 {52}	500 {51}	490 {50}	470 {48}	451 {46}	441 {45}	392 {40}	314 {32}	255 {26}		
		Transmission Efficiency (Reference)	90%													
1:2	KBX-102	Allowable Capacity (kW)	0.005	0.01	0.02	0.03	0.04	0.06	0.09	0.12	0.14	0.16	0.17	0.20	59 {6}	69 {7}
		Allowable Y-axis Torque (N·m) {kgf·m}	2.06 {0.21}	2.06 {0.21}	2.06 {0.21}	1.96 {0.20}	1.96 {0.20}	1.96 {0.20}	1.86 {0.19}	1.86 {0.19}	1.76 {0.18}	1.67 {0.17}	1.27 {0.13}	1.08 {0.11}		
		Allowable X-axis O.H.L. (N) {kgf}	88 {9}	88 {9}	88 {9}	88 {9}	88 {9}	78 {8}	78 {8}	78 {8}	78 {8}	69 {7}	59 {6}	49 {5}		
		Allowable Y-axis O.H.L. (N) {kgf}	137 {14}	137 {14}	137 {14}	127 {13}	127 {13}	127 {13}	127 {13}	118 {12}	118 {12}	108 {11}	88 {9}	69 {7}		
		Transmission Efficiency (Reference)	90%										85%			
	KBX-152	Allowable Capacity (kW)	0.02	0.04	0.08	0.13	0.17	0.25	0.36	0.46	0.55	0.62	0.69	0.80	98 {10}	118 {12}
		Allowable Y-axis Torque (N·m) {kgf·m}	8.43 {0.86}	8.43 {0.86}	8.23 {0.84}	8.13 {0.83}	8.04 {0.82}	7.84 {0.80}	7.55 {0.77}	7.25 {0.74}	7.06 {0.72}	6.57 {0.67}	5.29 {0.54}	4.21 {0.43}		
		Allowable X-axis O.H.L. (N) {kgf}	255 {26}	255 {26}	255 {26}	245 {25}	245 {25}	235 {24}	225 {23}	216 {22}	216 {22}	186 {19}	157 {16}	127 {13}		
		Allowable Y-axis O.H.L. (N) {kgf}	294 {30}	294 {30}	284 {29}	284 {29}	274 {28}	265 {27}	265 {27}	255 {26}	245 {25}	216 {22}	176 {18}	147 {15}		
		Transmission Efficiency (Reference)	90%										85%			
	KBX-202	Allowable Capacity (kW)	0.05	0.10	0.19	0.28	0.37	0.53	0.77	0.99	1.15	1.31	1.40	1.57	196 {20}	274 {28}
		Allowable Y-axis Torque (N·m) {kgf·m}	19.6 {2.00}	19.6 {2.00}	18.6 {1.90}	18.1 {1.85}	17.6 {1.80}	17.0 {1.73}	16.4 {1.67}	15.7 {16.0}	14.7 {1.50}	13.9 {1.42}	10.8 {1.10}	8.33 {0.85}		
		Allowable X-axis O.H.L. (N) {kgf}	372 {38}	372 {38}	363 {37}	363 {37}	353 {36}	343 {35}	333 {34}	323 {33}	314 {32}	274 {28}	235 {24}	186 {19}		
		Allowable Y-axis O.H.L. (N) {kgf}	588 {60}	588 {60}	578 {59}	568 {58}	559 {57}	539 {55}	529 {54}	510 {52}	490 {50}	441 {45}	363 {37}	294 {30}		
		Transmission Efficiency (Reference)	90%										85%			

[Note]
① Be sure to use the product below the permissible values. The speed ratio (1:2) decelerates to the Y axis.
② The values in this performance table are where the service factor is 1. When using the product under other conditions, refer to the Selection Guide.
③ O.H.L. (overhang load) is the allowable load that can be applied to the center of the shaft. When using the product under other conditions, refer to the coefficients K_1 and K_2 in the Selection Guide (Page 470).
④ When the speed ratio (1:2) type is used at increased speed (from Y-axis to X-axis), the allowable X-axis torque is 1/2 of the value in the performance table (allowable Y-axis torque).
⑤ Y-axis torque of the model T is the total value of the left and right axes.
⑥ Y-axis O.H.L. of the model T is the total value of the left and right axes.



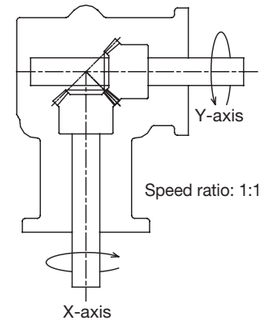


[Fig.1]

[Caution on Product Characteristics]
① The rotation direction of the arrow does not limit the direction. Both the forward and reverse rotations are allowed.
② There is NO alignment of the X-axis and Y-axis keyways.
③ The indicated angular backlash is reference values measured on the X-axis (input axis).
④ JIS B 1301-1976 (normal) is used for the key dimensions.
⑤ The shaft diameter tolerance is JIS h7.
⑥ Refer to the figure at right for the direction of rotation of the X- and Y-axes.
⑦ The 1:2 speed ratio type decelerates from the X-axis (input axis) to the Y-axis (output axis).

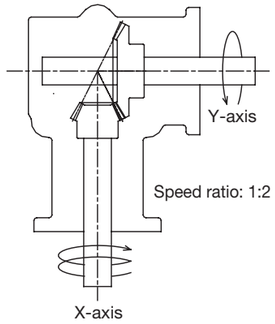
[Caution on Secondary Operations]
① Secondary operations cannot be performed. Do not disassemble or modify the product.

Key Detail Diagram



Catalog Number	Speed ratio	A	B	C	D	E	F	G	H	I	J	K	L	M	P	Q	R	S
KBX-101L	1:1	37	58	18	18	18	14	46	38	40	82	5	82	102	20	ϕ5.5	ϕ6.5	ϕ10
KBX-102L	1:2																	
KBX-151L	1:1	66	100	31	36	31	22	80	62	66	140	8	137	170	30	ϕ8.5	ϕ8.5	ϕ15
KBX-152L	1:2																	
KBX-201L	1:1	80	120	36	36	36	26	92	72	76	166	10	168	206	40	ϕ8.5	ϕ8.5	ϕ20
KBX-202L	1:2																	

T	(U)	Key	Angular Backlash	Weight (kg)	Catalog Number
ϕ26$_{H7}$	(2)	Depth 1 x 15 ℓ Horizontal	16′~44′	0.40	**KBX-101L**
			30′ ~1° 23′		**KBX-102L**
ϕ42$_{H7}$	(3)	5 x 5 x 27 ℓ	10′~37′	1.80	**KBX-151L**
			19′ ~1° 09′		**KBX-152L**
ϕ52$_{H7}$	(4)	6 x 6 x 35 ℓ	8′~33′	3.10	**KBX-201L**
			15′~60′		**KBX-202L**



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
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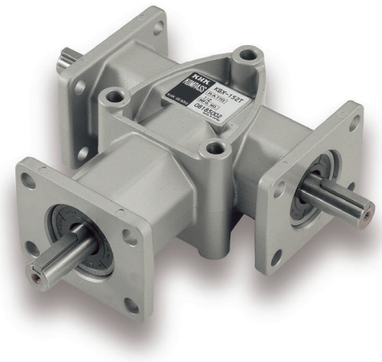
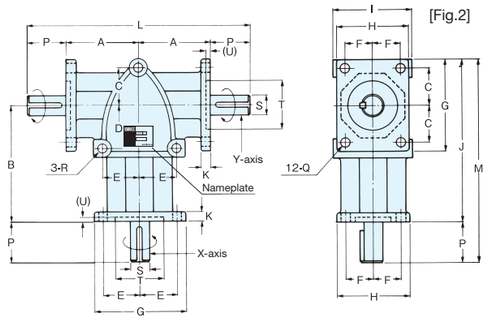
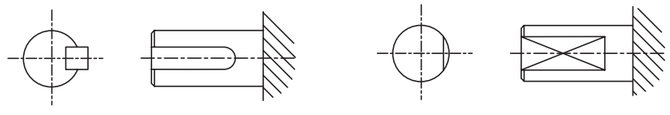




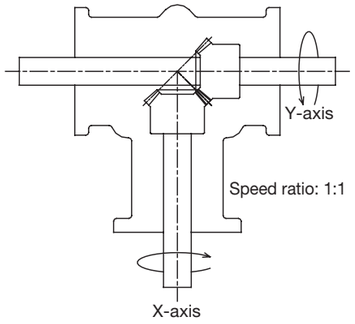
[Fig.2]

[Caution on Product Characteristics]
① The rotation direction of the arrow does not limit the direction. Both the forward and reverse rotations are allowed.
② There is NO alignment of the X-axis and Y-axis keyways.
③ The indicated angular backlash is reference values measured on the X-axis (input axis).
④ JIS B 1301-1976 (normal) is used for the key dimensions.
⑤ The shaft diameter tolerance is JIS h7.
⑥ Refer to the figure at right for the direction of rotation of the X- and Y-axes.
⑦ The 1:2 speed ratio type decelerates from the X-axis (input axis) to the Y-axis (output axis).

[Caution on Secondary Operations]
① Secondary operations cannot be performed. Do not disassemble or modify the product.

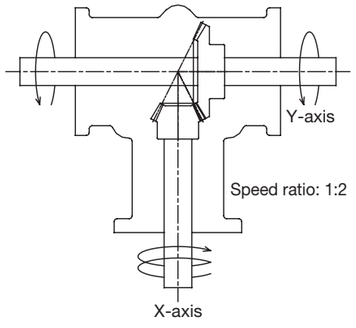


Key Detail Diagram



Catalog Number	Speed ratio	A	B	C	D	E	F	G	H	I	J	K	L	M	P	Q	R	S
KBX-101T	1:1	37	58	18	18	18	14	46	38	40	82	5	114	102	20	ϕ5.5	ϕ6.5	ϕ10
KBX-102T	1:2																	
KBX-151T	1:1	66	100	31	36	31	22	80	62	66	140	8	192	170	30	ϕ8.5	ϕ8.5	ϕ15
KBX-152T	1:2																	
KBX-201T	1:1	80	120	36	36	36	26	92	72	76	166	10	240	206	40	ϕ8.5	ϕ8.5	ϕ20
KBX-202T	1:2																	

T	(U)	Key	Angular Backlash	Weight (kg)	Catalog Number
ϕ26$_{H7}$	(2)	Depth 1 x 15 ℓ Horizontal	16′~ 44′	0.50	**KBX-101T**
			30′~1° 23′		**KBX-102T**
ϕ42$_{H7}$	(3)	5 x 5 x 27 ℓ	10′~ 37′	2.20	**KBX-151T**
			19′~1° 09′		**KBX-152T**
ϕ52$_{H7}$	(4)	6 x 6 x 35 ℓ	8′~ 33′	3.40	**KBX-201T**
			15′~ 60′		**KBX-202T**



ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Shaft arrangement and shaft arrangement numbers

The CBX bevel box standardizes 24 different shaft arrangements depending on the rotation direction of the shaft. When using the product, consider not only the catalog number but also the shaft arrangement.

[NOTES]
① This figure shows the mounting base and flat surface mounting (floor mounting).
② The rotation direction of the arrow does not limit the direction. Both the forward and reverse rotations are allowed.
③ ▼ indicates the wall surface with fuel filler port and drain plug when mounted on a flat surface (floor mounting). Unmarked items are the back of this figure. (standard specifications)
④ Shaft arrangement: For products other than LI to LL and TE to TF, the input shaft (X-axis) cannot be installed facing upward.

Features

① **Tough**
High-grade cast iron is used for the case and tapered roller bearing is used for the bearing

② **Low-noise and high-efficiency**
Uses spiral bevel gears that are made of carburized special steel

③ **Flexible mounting direction**
Various installations are possible depending on the shaft arrangement

④ **Lubricant enclosed**
High-grade oil enclosed upon shipment

⑤ **Speed ratio**
Gear ratio of 1/1 and 1/2 can be selected according to the applications

Lubrication

Lubricating oil of specified amount is enclosed at the time of shipment.

Machine Type	Approximate amount of oil	Lubricant type	
CBX-19 CBX-25 CBX-32 CBX-40	0.3L 0.7L 1.0L 1.5L	Oil	JIS gear oil Class 2 for industrial use

Application Hints

Refer to KBX (Page 462).

CBX Shaft Arrangement Table

	CBX-L Diagram				CBX-T Diagram	
Horizontal (Plan View)	A	B	C	D	A	B
Vertical (Front View)	E	F	G	H	C	D
	I	J	K	L	E	F
	M	N	O	P	G	H

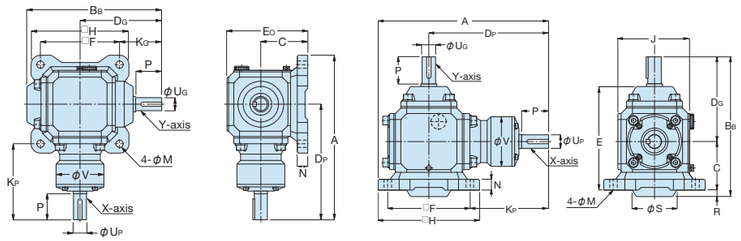
CBX Performance Table

Speed ratio	Model Code	Specification Symbol	X-axis Rotation Speed (rpm) 20	50	100	200	300	400	600	900	1200	1500	1800	2500	3600
1:1	CBX-191	Allowable Capacity (kW)	0.08	0.20	0.39	0.77	1.15	1.50	2.05	2.67	3.30	3.95	4.40	4.40	4.40
		Allowable X, Y-axis Torque (N·m) {kgf·m}	37.2 {3.8}	37.2 {3.8}	37.2 {3.8}	36.3 {3.7}	36.3 {3.7}	36.3 {3.6}	32.3 {3.3}	28.4 {2.9}	26.5 {2.7}	24.5 {2.5}	23.5 {2.4}	16.7 {1.7}	10.8 {1.1}
		Allowable X-axis O.H.L. (N) {kgf}	1760 {180}	1760 {180}	1760 {180}	1760 {180}	1670 {170}	1620 {165}	1270 {130}	1080 {110}	882 {90}	833 {85}	784 {80}	686 {70}	637 {65}
		Allowable Y-axis O.H.L. (N) {kgf}	1960 {200}	1960 {200}	1960 {200}	1960 {200}	1960 {200}	1810 {185}	1470 {150}	1180 {120}	1030 {105}	980 {100}	931 {95}	784 {80}	735 {75}
		Transmission Efficiency (Reference)	95%							90%					
	CBX-251	Allowable Capacity (kW)	0.25	0.62	1.24	2.47	3.68	4.70	6.40	8.60	10.5	12.3	13.8	—	—
		Allowable X, Y-axis Torque (N·m) {kgf·m}	118 {12.0}	118 {12.0}	118 {12.0}	118 {12.0}	116 {11.8}	112 {11.4}	101 {10.3}	91.1 {9.3}	83.3 {8.5}	78.4 {8.0}	73.5 {7.5}	— —	— —
		Allowable X-axis O.H.L. (N) {kgf}	3920 {400}	3920 {400}	3920 {400}	3920 {400}	3630 {370}	3330 {340}	2940 {300}	2450 {250}	2160 {220}	1960 {200}	1760 {180}	— —	— —
		Allowable Y-axis O.H.L. (N) {kgf}	4120 {420}	4120 {420}	4120 {420}	4120 {420}	4020 {410}	3920 {400}	3430 {350}	2940 {300}	2550 {260}	2450 {250}	2250 {230}	— —	— —
		Transmission Efficiency (Reference)	95%							90%				—	—
	CBX-321	Allowable Capacity (kW)	0.36	0.88	1.77	3.53	5.26	6.72	9.15	12.3	15.0	17.5	19.7	—	—
		Allowable X, Y-axis Torque (N·m) {kgf·m}	167 {17.0}	167 {17.0}	167 {17.0}	167 {17.0}	165 {16.8}	160 {16.3}	144 {14.7}	130 {13.3}	119 {12.1}	112 {11.4}	104 {10.6}	— —	— —
		Allowable X-axis O.H.L. (N) {kgf}	4900 {500}	4900 {500}	4900 {500}	4900 {500}	4610 {470}	4210 {430}	3720 {380}	3140 {320}	2740 {280}	2450 {250}	2160 {220}	— —	— —
		Allowable Y-axis O.H.L. (N) {kgf}	5190 {530}	5190 {530}	5190 {530}	5190 {530}	5100 {520}	4900 {500}	4310 {440}	3720 {380}	3230 {330}	3140 {320}	2840 {290}	— —	— —
		Transmission Efficiency (Reference)	95%							90%				—	—
	CBX-401	Allowable Capacity (kW)	0.62	1.59	3.18	6.32	9.50	12.0	16.1	22.0	26.5	—	—	—	—
		Allowable X, Y-axis Torque (N·m) {kgf·m}	294 {30.0}	294 {30.0}	294 {30.0}	294 {30.0}	294 {30.0}	284 {29.0}	225 {26.0}	231 {23.6}	211 {21.5}	— —	— —	— —	— —
		Allowable X-axis O.H.L. (N) {kgf}	9800 {1000}	9800 {1000}	9800 {1000}	7840 {800}	5880 {600}	4900 {500}	4410 {450}	3720 {380}	3430 {350}	— —	— —	— —	— —
		Allowable Y-axis O.H.L. (N) {kgf}	11760 {1200}	11760 {1200}	11760 {1200}	9800 {1000}	7350 {750}	6370 {650}	5880 {600}	5100 {520}	4020 {410}	— —	— —	— —	— —
		Transmission Efficiency (Reference)	95%							90%		—	—	—	—

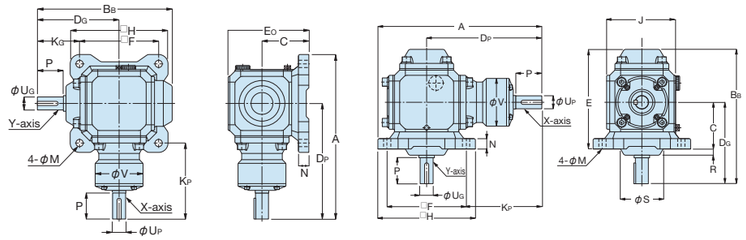
Speed ratio	Model Code	Specification Symbol	X-axis Rotation Speed (rpm) 20	50	100	200	300	400	600	900	1200	1500	1800	2500	3600
1:2	CBX-192	Allowable Capacity (kW)	0.03	0.07	0.14	0.27	0.40	0.53	0.78	1.15	1.50	1.85	2.17	2.20	2.20
		Allowable Y-axis Torque (N·m) {kgf·m}	25.5 {2.6}	25.5 {2.6}	25.5 {2.6}	25.5 {2.6}	25.5 {2.6}	24.5 {2.5}	24.5 {2.5}	24.5 {2.5}	23.5 {2.4}	23.5 {2.4}	22.5 {2.3}	16.7 {1.7}	10.8 {1.1}
		Allowable X-axis O.H.L. (N) {kgf}	1180 {120}	1180 {120}	1180 {120}	1180 {120}	1180 {120}	1130 {115}	1130 {115}	1080 {110}	1080 {110}	882 {90}	833 {85}	784 {80}	735 {75}
		Allowable Y-axis O.H.L. (N) {kgf}	1760 {180}	1760 {180}	1760 {180}	1760 {180}	1760 {180}	1720 {175}	1670 {170}	1470 {150}	1270 {130}	1080 {110}	980 {100}	833 {85}	784 {80}
		Transmission Efficiency (Reference)	90%							85%					
	CBX-252	Allowable Capacity (kW)	0.09	0.23	0.45	0.90	1.34	1.78	2.67	4.00	5.30	6.33	7.50	7.50	—
		Allowable Y-axis Torque (N·m) {kgf·m}	85.3 {8.7}	85.3 {8.7}	85.3 {8.7}	85.3 {8.7}	85.3 {8.7}	84.3 {8.6}	84.3 {8.6}	84.3 {8.6}	84.3 {8.6}	80.4 {8.2}	79.4 {8.1}	56.8 {5.8}	— —
		Allowable X-axis O.H.L. (N) {kgf}	3920 {400}	3920 {400}	3920 {400}	3920 {400}	3920 {400}	3720 {380}	3630 {370}	3530 {360}	3230 {330}	2740 {280}	2250 {230}	1670 {170}	— —
		Allowable Y-axis O.H.L. (N) {kgf}	4120 {420}	4120 {420}	4120 {420}	4120 {420}	4020 {410}	3920 {400}	3820 {390}	3720 {380}	3430 {350}	3040 {310}	2650 {270}	2350 {240}	— —
		Transmission Efficiency (Reference)	90%							85%					—
	CBX-322	Allowable Capacity (kW)	0.13	0.32	0.64	1.28	1.91	2.54	3.80	5.72	7.57	9.05	10.7	—	—
		Allowable Y-axis Torque (N·m) {kgf·m}	123 {12.5}	123 {12.5}	123 {12.5}	123 {12.5}	122 {12.4}	122 {12.4}	121 {12.3}	121 {12.3}	120 {12.2}	115 {11.7}	114 {11.6}	— —	— —
		Allowable X-axis O.H.L. (N) {kgf}	4900 {500}	4900 {500}	4900 {500}	4900 {500}	4900 {500}	4700 {480}	4610 {470}	4410 {450}	4120 {420}	3430 {350}	2840 {290}	— —	— —
		Allowable Y-axis O.H.L. (N) {kgf}	5190 {530}	5190 {530}	5190 {530}	5190 {530}	5100 {520}	4900 {500}	4800 {490}	4700 {480}	4310 {440}	3820 {390}	3330 {340}	— —	— —
		Transmission Efficiency (Reference)	90%							85%				—	—
	CBX-402	Allowable Capacity (kW)	0.20	0.48	0.96	1.93	2.90	3.84	5.72	8.55	11.0	13.8	16.4	—	—
		Allowable Y-axis Torque (N·m) {kgf·m}	183 {18.7}	183 {18.7}	183 {18.7}	183 {18.7}	183 {18.7}	182 {18.6}	181 {18.5}	180 {18.4}	174 {17.8}	173 {17.6}	172 {17.5}	— —	— —
		Allowable X-axis O.H.L. (N) {kgf}	9800 {1000}	9800 {1000}	9800 {1000}	9800 {1000}	9800 {1000}	8820 {900}	7840 {800}	6860 {700}	5880 {600}	4900 {500}	3920 {400}	— —	— —
		Allowable Y-axis O.H.L. (N) {kgf}	11760 {1200}	11760 {1200}	11760 {1200}	11760 {1200}	11760 {1200}	9800 {1000}	8820 {900}	8820 {900}	8820 {900}	7840 {800}	6860 {700}	— —	— —
		Transmission Efficiency (Reference)	90%							85%				—	—

[Note] ① Be sure to use the product below the permissible values. The speed ratio (1:2) decelerates to the Y axis.
② The values in this performance table are where the service factor is 1. When using the product under other conditions, refer to Table 1 (Page 470) Service Factors.
③ O.H.L. (overhang load) is the allowable load that can be applied to the center of the shaft length. When using the product under other conditions, refer to the coefficients K_1 and K_2 in Table 2 and 3 (Page 470).
④ When the speed ratio (1:2) type is used at increased speed (from Y-axis to X-axis), the allowable X-axis torque is 1/2 of the value in the performance table (allowable Y-axis torque).
⑤ Y-axis torque of the model CBX-T is the total value of the left and right axes.
⑥ Y-axis O.H.L. of the model CBX-T is the total value of the left and right axes.
⑦ The allowable thrust load is half of respective O.H.L. value.

CBX L
Bevel Gearboxes



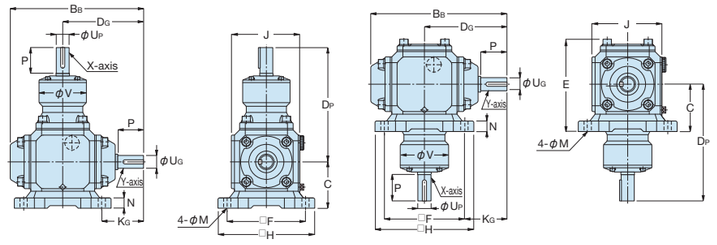
LA,LB LE,LF



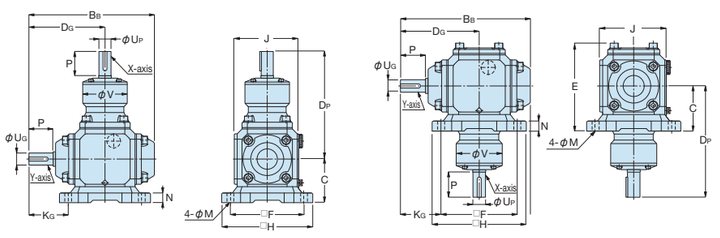
LC,LD LG,LH

Catalog Number	Speed ratio	A	BB	C	DP	DG	E	EO	F	H	J	KP	KG	φM	N	P	R	φS
CBX-191L□	1:1	257	193	76	180	116	146	129	125	154	109	117.5	53.5	10.5	17	38	—	—
CBX-192L□	1:2																	
CBX-251L□	1:1	316	259	90	222	157	177.5	155	152	188	133	146	81	14	20	50	12	82.5
CBX-252L□	1:2																	
CBX-321L□	1:1	340	277	100	242	168	192.5	174	160	196	151	162	88	14	20	55	9	88.5
CBX-322L□	1:2																	
CBX-401L□	1:1	425	337	115	308	208	225	200	195	234	173	210.5	110.5	14	22	75	14	114.5
CBX-402L□	1:2																	

When placing an order, select the model code (A to P) from the Shaft Arrangement Table on Page 466 in the □ at the end of the catalog number.



LI,LJ LM,LN



LK,LL LO,LP

φV	X-axis diameter φUP	Y-axis diameter φUG	Key	Angular Backlash	Weight (kg)	Catalog Number
66	19	19	6 x 6 x 27ℓ	11′~30′	10.0	**CBX-191L□**
	18			17′~47′		**CBX-192L□**
92	25	25	8 x 7 x 40ℓ	9′~22′	17.0	**CBX-251L□**
				15′~36′		**CBX-252L□**
100	32	32	10 x 8 x 50ℓ	9′~21′	22.0	**CBX-321L□**
				15′~36′		**CBX-322L□**
124	40	40	12 x 8 x 60ℓ	8′~20′	33.0	**CBX-401L□**
				15′~37′		**CBX-402L□**

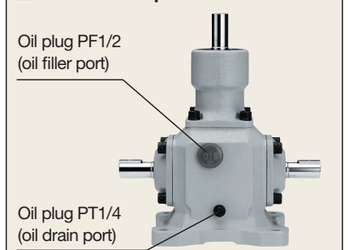
[Caution on Product Characteristics]

① There is NO alignment of the X-axis and Y-axis keyways.
② The indicated angular backlash is reference values measured on the X-axis (input axis).
③ JIS B 1301-1976 (normal) is used for the key dimensions.
④ The shaft diameter tolerance is JIS h6.

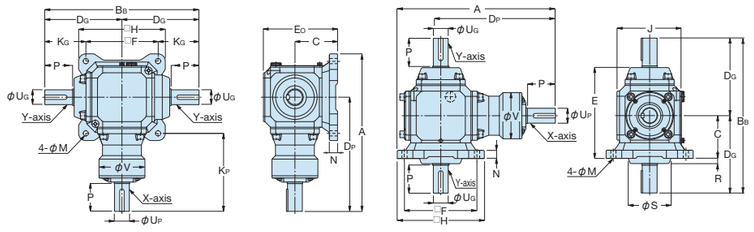
[Caution on Secondary Operations]

① Secondary operations cannot be performed. Do not disassemble or modify the product.

■ Standard specifications



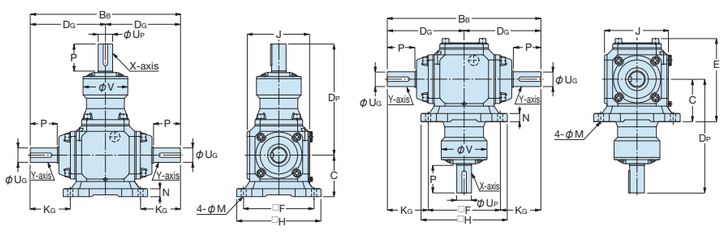
CBX T
Bevel Gearboxes



TA,TB TC,TD

Catalog Number	Speed ratio	A	BB	C	DP	DG	E	EO	F	H	J	KP	KG	φM	N	P	R	φS
CBX-191T□	1:1	257	232	76	180	116	146	129	125	154	109	117.5	53.5	10.5	17	38	—	—
CBX-192T□	1:2																	
CBX-251T□	1:1	316	314	90	222	157	177.5	155	152	188	133	146	81	14	20	50	12	82.5
CBX-252T□	1:2																	
CBX-321T□	1:1	340	336	100	242	168	192.5	174	160	196	151	162	88	14	20	55	9	88.5
CBX-322T□	1:2																	
CBX-401T□	1:1	425	416	115	308	208	225	200	195	234	173	210.5	110.5	14	22	75	14	114.5
CBX-402T□	1:2																	

When placing an order, select the model code (A to H) from the Shaft Arrangement Table on Page 466 in the □ at the end of the catalog number.



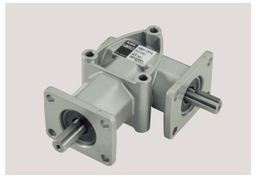
TE,TF TG,TH

φV	X-axis diameter φUP	Y-axis diameter φUG	Key	Angular Backlash	Weight (kg)	Catalog Number
66	19	19	6 x 6 x 27ℓ	11′~30′	10.0	**CBX-191T□**
	18			17′~47′		**CBX-192T□**
92	25	25	8 x 7 x 40ℓ	9′~22′	18.0	**CBX-251T□**
				15′~36′		**CBX-252T□**
100	32	32	10 x 8 x 50ℓ	9′~21′	23.0	**CBX-321T□**
				15′~36′		**CBX-322T□**
124	40	40	12 x 8 x 60ℓ	8′~20′	34.0	**CBX-401T□**
				15′~37′		**CBX-402T□**

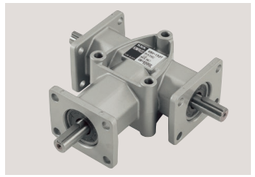
* As this product is assembled according to customer specifications, delivery will be made about 15 days after an order is received. Please be aware of this when ordering.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Selection Guide



KBX-L



KBX-T

Items required for selection

Load torque, prime mover type, input rotation speed, speed ratio, operating time, connection method, frequency of start/stop

Selection Procedure

The performance table in the catalog is where the load is uniform, the prime mover is a motor and the operating time is 10 hours/day.

A) When using under other conditions, correct the load torque according to the Service Factors in <Table 1>.

Corrected load torque = Load torque applied to the gear box × Service factor <See Table 1>

Service Factor (Sf) <Table 1>

Load State	Service Factor (Sf)		
	Operation of 3H or less / day	Operation of 3~10H / day	Operation of 10H or more / day
Uniform load	1 (1)	1 (1.25)	1.25 (1.50)
Light impact load	1 (1.25)	1.25 (1.50)	1.50 (1.75)
Severe impact load	1.25 (1.50)	1.50 (1.75)	1.75 (2.00)

(Note) 1. If the frequency of start/stop is 10 times or more per hour, the coefficient in parentheses will be used.
2. For a prime mover other than electric motor is used (engine, etc.), the coefficient in parentheses will also be used.

Make sure that the corrected load torque is smaller than the X/Y-axis allowable torque or the Y-axis allowable torque in the performance table at the operating rotation speed.

B) For the shaft arrangement, select from the Shaft Arrangement Diagram of respective model.

C) Confirming the overhang load (O.H.L.)
Overhang load (O.H.L.) is a suspended load acting on the shaft. The O.H.L. must be considered if a chain, belt, gear or the like is used to connect the gear box shaft and mating machine.

$$\text{O.H.L.} = \frac{T_{LE} \times K_1 \times K_2}{R} \text{ (N) \{kgf\}}$$

T_{LE} : Corrected load torque (N·m) {kgf·m} applied to the gear box shaft
R : Pitch circle radius (m) of a sprocket, pulley, gear or the like attached to the gear box shaft
K_1 : Coefficient by connection method <See Table 2>
K_2 : Coefficient by load position <See Table 3>
* Make sure that the O.H.L. calculated using the above formula is smaller than the allowable O.H.L. for the X-axis and Y-axis shown in the performance table.

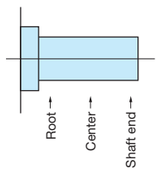
Coefficient K_1 <Table 2>

Connection method	K_1
Chain, timing belt	1.00
Gear	1.25
V-belt	1.50

Coefficient K_2 <Table 3>

Load position	K_2
Shaft root	0.75
Shaft center	1.00
Shaft end	1.50

● Load position



D) Select a model that satisfies all of A), B) and C) obtained using the above formula.

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Tel +49 (0)9280-7390088
info@zahnrad24.com
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Oberes Dorf 1
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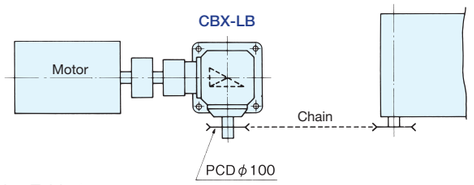
■ Selection Example

CBX-L

CBX-T

Selection example 1

Application / Conveyor (uniform load)
Load torque / 78.4N·m {8kgf·m}
X-axis rotation speed / 300rpm
Speed ratio / 1:2
Shaft arrangement / As shown in the diagram on the right
Operating time / 12 hours/day
Connection method / X-axis - Coupling
Y-axis - Chain (located in the center of the shaft)
Installation method / Horizontal mounting
Installation location / Indoors



① Considering the torque

The service factor based on the load status is Sf = 1.25 as shown in <Table 1>.
Therefore, the corrected load torque applied to the Y-axis is:
T_{LE} = 78.4×1.25 = 98N·m {T_{LE} = 8×1.25 = 10kgf·m}.

② Considering the O.H.L.

The load O.H.L. of Y-axis is:

$$\text{O.H.L.} = \frac{T_{LE} \times K_1 \times K_2}{R} = \frac{98 \times 1 \times 1}{\frac{100}{2 \times 1000}} = 1960\text{N} \quad \{\text{O.H.L.} = \frac{T_{LE} \times K_1 \times K_2}{R} = \frac{10 \times 1 \times 1}{\frac{100}{2 \times 1000}} = 200\text{kgf}\}$$

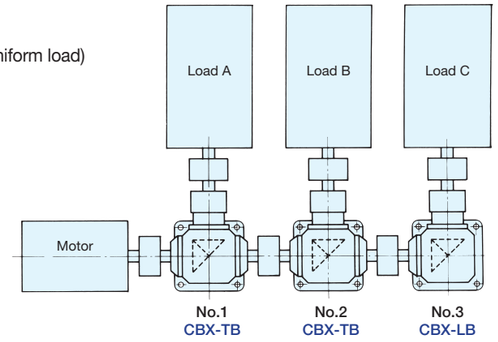
③ Determining the model

A model that satisfies all the conditions, torque and O.H.L. is **CBX-322LB**.

Selection example 2

Application / Line shaft drive
Load torque / Load A, B, and C are 58.8N·m {6kgf·m} respectively (uniform load)
Rotation speed / 600rpm
Speed ratio / 1:1
Shaft arrangement / As shown in the diagram on the right
Operating time / 8 hours/day
Connection method / All coupling
Installation method / Horizontal mounting
Installation location / Indoors

For line shaft drive, the load applied to the Y-axis differs depending on the position of the gear box, so it is necessary to select each separately. The Service Factors <Table 1> based on the conditions are all Sf = 1.0.



① Gearboxes No.1

The corrected load torque applied to the X-axis drives only load A.
Therefore, 58.8 × 1.0 = 58.8 N·m {6 × 1.0 = 6 kgf·m}
The corrected load torque applied to the Y-axis drives loads A, B and C.
Therefore, (58.8 + 58.8 + 58.8) × 1.0 = 176.4 N·m
{(6 + 6 + 6) × 1.0 = 18kgf·m}
Based on the performance table, **CBX-401TB** is selected.

② Gearboxes No.2

The corrected load torque applied to the X-axis drives only load B.
Therefore, 58.8 × 1.0 = 58.8 N·m {6 × 1.0 = 6 kgf·m}
The corrected load torque applied to the Y-axis drives loads B and C.
Therefore, (58.8 + 58.8) × 1.0 = 117.6N·m
{(6 + 6) × 1.0 = 12kgf·m}
Based on the performance table, **CBX-321TB** is selected.

③ Gearboxes No.3

The corrected load torque applied to the X-axis drives only load C.
Therefore, 58.8 × 1.0 = 58.8 N·m {6 × 1.0 = 6 kgf·m}
The corrected load torque applied to the Y-axis drives only load C.
Therefore, 58.8 × 1.0 = 58.8 N·m {6 × 1.0 = 6 kgf·m}
Based on the performance table, **CBX-251LB** is selected.

④ Determining the model

No.1 Gear Box **CBX-401TB**
No.2 Gear Box **CBX-321TB**
No.3 Gear Box **CBX-251LB**

Moment of Inertia of KBX Bevel Box

Unit: kg·m²

Model	Item	Pinion Axis (X)	Gear Axis (Y)
L	KBX-101L	4.45×10^{-6}	4.45×10^{-6}
	KBX-102L	2.16×10^{-6}	8.65×10^{-6}
	KBX-151L	5.30×10^{-5}	5.30×10^{-5}
	KBX-152L	3.65×10^{-5}	1.47×10^{-4}
	KBX-201L	1.79×10^{-4}	1.79×10^{-4}
	KBX-202L	7.85×10^{-5}	3.15×10^{-4}
T	KBX-101T	4.75×10^{-6}	4.75×10^{-6}
	KBX-102T	2.23×10^{-6}	8.93×10^{-6}
	KBX-151T	5.60×10^{-5}	5.60×10^{-5}
	KBX-152T	3.37×10^{-5}	1.50×10^{-4}
	KBX-201T	1.94×10^{-4}	1.94×10^{-4}
	KBX-202T	8.20×10^{-5}	3.28×10^{-4}

[NOTES] Consider the indicated moment of inertia as reference values.

Moment of Inertia of CBX Bevel Box

Unit: kg·m²

Model	Item	Pinion Axis (X)	Gear Axis (Y)
L	CBX-191L	4.00×10^{-4}	4.00×10^{-4}
	CBX-192L	1.86×10^{-4}	7.43×10^{-4}
	CBX-251L	2.48×10^{-3}	2.48×10^{-3}
	CBX-252L	1.03×10^{-3}	4.13×10^{-3}
	CBX-321L	4.00×10^{-3}	4.00×10^{-3}
	CBX-322L	1.29×10^{-3}	5.18×10^{-3}
	CBX-401L	8.95×10^{-3}	8.95×10^{-3}
	CBX-402L	3.83×10^{-3}	1.53×10^{-2}
T	CBX-191T	4.05×10^{-4}	4.05×10^{-4}
	CBX-192T	1.87×10^{-4}	7.48×10^{-4}
	CBX-251T	2.50×10^{-3}	2.50×10^{-3}
	CBX-252T	1.04×10^{-3}	4.15×10^{-3}
	CBX-321T	4.08×10^{-3}	4.08×10^{-3}
	CBX-322T	1.31×10^{-3}	5.25×10^{-3}
	CBX-401T	9.20×10^{-3}	9.20×10^{-3}
	CBX-402T	3.88×10^{-3}	1.55×10^{-2}

[NOTES] Consider the indicated moment of inertia as reference values.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
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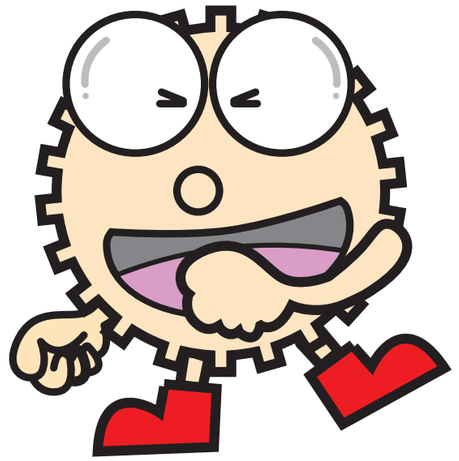
Other Products

SRT/SRT-C Ratchets & Pawls — Material: S45C — P2.09~12.57 Page 474
SRTB/SRT-C Ratchets & Pawls — Material: S45C — P2.09~12.57 Page 476
GC/GC-I Gear Couplings — Material: S45C — m2, 2.5 Page 478
SV/SVI Involute Spline Shafts, Spline Bushings — Material: S45C — m1.667 Page 480
HEPCO Ring Rail Gears, Accessories — Material: - Page 482
GCU Gear Assembly Kit — Material: - Page 490
Rack & Pinion Lubrication System — Additional — Material: - Page 492
Racks & Pinions Aluminum Frame Transport Device — Material: - Page 30

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) Other Products

S V 20 - 200

- 200: Total Length (200mm)
- 20: Outer diameter (20mm)
- V: Type (Involute Spline Shafts)
- S: Material (S45C)

Material	
S	S45C

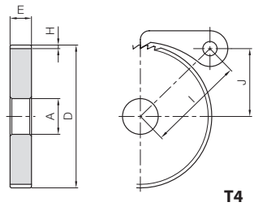
Type	
RT	Ratchets
GC	Gear Couplings
V	Involute Spline

SRT Pitch 2.09~12.57 Ratchets

J

Specifications	
Tooth groove angle	60°
Material	S45C
Heat treatment	Gear teeth induction hardened *
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* 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).



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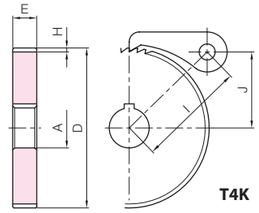
J Series



T4K

Characteristics of Pawls and Ratchets

- A simple structure used to restrict the rotational direction in one-way.
- The tips of pawls and the teeth of ratchets are induction hardened and therefore have superior durability.

Catalog Number	Pitch	No. of teeth	Shape	Bore A	Hub dia. B	Outside dia. D	Face width E	Hub width F	Total length G	Tooth height H	Center distance I	Mounting height J	Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Weight (kg)
SRT2/3-50	**2.09**	50	T4	10	—	33.3	6	—	6	1	33.84	15.67	3.07	0.31	0.035
SRT2/3-60		60		10		40					35.51	19	4.10	0.42	0.053
SRT2/3-80		80		12		53.3					39.48	25.67	6.00	0.61	0.096
SRT2/3-100		100		12		66.6					44.11	32.33	8.24	0.84	0.15
SRT1-50	**3.14**	50		12	—	50	12	—	12	1.6	45.48	23.4	14.7	1.50	0.16
SRT1-60		60		15		60					48.24	28.4	19.5	1.99	0.24
SRT1-80		80		15		80					54.73	38.4	29.4	3.00	0.44
SRT1-90		90		15		90					58.35	43.4	34.5	3.52	0.56
SRT1-100		100		15		100					62.16	48.4	39.4	4.02	0.70
SRT2-30	**6.28**	30		15	—	60	15	—	15	3.1	61.23	26.9	29.0	2.96	0.28
SRT2-40		40				80					66.23	36.9	49.2	5.02	0.53
SRT2-50		50				100					72.28	46.9	70.8	7.22	0.85
SRT2-60		60				120					79.14	56.9	94.3	9.61	1.24
SRT3-30	**9.42**	30		15	—	90	20	—	20	5	76.32	40	92.6	9.44	0.86
SRT3-40		40		20		120					85.15	55	158	16.1	1.58
SRT3-50		50		20		150					95.52	70	229	23.3	2.54
SRT4-30	**12.57**	30		20	—	120	25	—	25	7.4	95.74	52.6	226	23.0	1.89
SRT4-40		40				160					108.03	72.6	385	39.3	3.53
SRT4-50		50				200					122.37	92.6	559	57.0	5.66

[Caution on Product Characteristics] ① The bore may slightly vary due to the effect of heat treatment. When using with the indicated hole diameter, provide machining with a reamer or the like before use.

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	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Screw size	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Catalog Number	—																	
SRT2/3-50J BORE																		
SRT2/3-60 J BORE																		
SRT2/3-80 J BORE																		
SRT2/3-100 J BORE																		
SRT1-50 J BORE																		
SRT1-60 J BORE																		
SRT1-80 J BORE																		
SRT1-90 J BORE																		
SRT1-100 J BORE																		
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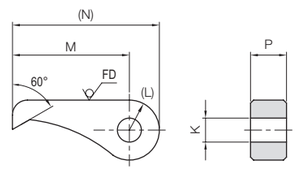
SRT4-30 J BORE																		
SRT4-40 J BORE																		
SRT4-50 J BORE																		

[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.
② Number of pieces we can process for one order is 1 to 20 units. For larger orders, please request a price and delivery quote.
③ Black oxide is not re-applied after hole and key secondary operations.
④ Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that tooth phase matching is not performed.

SRT-C Pitch 2.09~12.57 Ratchet Pawls

Specifications	
Tooth angle	60°
Material	S45C
Heat treatment	Pawl induction hardened
Pawl hardness	50 to 60HRC
Surface treatment	Black oxide coating



* FD has a forged finish surface.

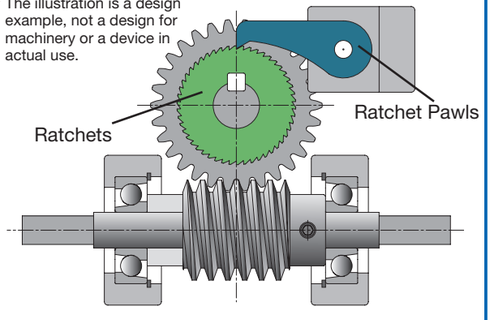
T5

Catalog Number	Shape	K	(L)	M	(N)	P	Weight (kg)
SRT2/3-C	T5	5	(8)	30	(38)	6	0.020
SRT1-C		8	(10)	39	(49)	12	0.057
SRT2-C		10	(12.5)	55	(67.5)	15	0.13
SRT3-C		12	(15)	65	(80)	20	0.23
SRT4-C		13	(18)	80	(98)	25	0.38

[Caution on Product Characteristics] ① SRT2/3-C is a lost wax product that uses S45C-equivalent material.
② The ratchet pawl is for preventing reverse rotation. It cannot be used for feeding or indexing.

Application Examples

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



Example: ratchets used for complete reverse prevention of worm gears

Bending Strength of Ratchets

The allowable transmission force F_b (N) of ratchets is the value calculated by the following formula.

$$F_b=\sigma_b \cdot \frac{b \cdot e^2}{6} \cdot \frac{1}{h} \cdot \frac{1}{S_F}$$

Also, the SRT Ratchet's allowable torque T (N·m) for bending strength is calculated by the following formula.

$$T=F_b \cdot r_f$$

Where

σ_b : Bending stress → Assumed 225.55MPa (23kgf/mm²)
b : Face width mm → Dimension Table ratchet face width E
e : Root length mm

$$\rightarrow e=h \times \tan\left(60\text{-}\frac{360}{\text{No. of teeth}}\right)$$ is the calculation

h : Depth of teeth mm → Dimension Table ratchet tooth depth H
S_F : Safety factor → Assumed 2
r_f : Tooth root radius m

$$\rightarrow r_f=\frac{\text{Outside dia. D}-2h}{2000}$$ is the calculation

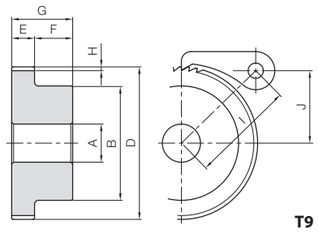
For information on misprints in the catalog, please visit our website.

SRTB Pitch 2.09~12.57 Ratchets

Made to Order

Specifications	
Tooth groove angle	60°
Material	S45C
Heat treatment	Gear teeth induction hardened *
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* 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).



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ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

■ Characteristics of Pawls and Ratchets

- A simple structure used to restrict the rotational direction in one-way.
- The tips of pawls and the teeth of ratchets are induction hardened and therefore have superior durability.

Catalog Number	Pitch	No. of teeth	Shape	Bore	Hub dia.	Outside dia.	Face width	Hub width	Total length	Tooth height
				A	B	D	E	F	G	H
SRTB2/3-50 (Made to Order)		50		10	25	33.3				
SRTB2/3-60 (Made to Order)		60		10	30	40				
SRTB2/3-80 (Made to Order)	**2.09**	80		12	35	53.3	6	10	16	1
SRTB2/3-90 (Made to Order)		90		12	40	60				
SRTB2/3-100 (Made to Order)		100		12	40	66.6				
SRTB1-50 (Made to Order)		50		12	35	50				
SRTB1-60 (Made to Order)		60		15	40	60				
SRTB1-80 (Made to Order)	**3.14**	80		15	50	80	12	12	24	1.6
SRTB1-90 (Made to Order)		90		15	50	90				
SRTB1-100 (Made to Order)		100		15	50	100				
SRTB2-30 (Made to Order)		30	T9		50	60				
SRTB2-40 (Made to Order)	**6.28**	40		15	60	80	15	14	29	3.1
SRTB2-50 (Made to Order)		50			60	100				
SRTB2-60 (Made to Order)		60			65	120				
SRTB3-30 (Made to Order)		30		15	75	90				
SRTB3-40 (Made to Order)	**9.42**	40		20	80	120	20	16	36	5
SRTB3-50 (Made to Order)		50		20	85	150				
SRTB4-30 (Made to Order)		30			90	120				
SRTB4-40 (Made to Order)	**12.57**	40		20	90	160	25	18	43	7.4
SRTB4-50 (Made to Order)		50			100	200				

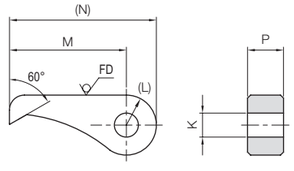
Center distance	Mounting height	Allowable torque (N-m)	Allowable torque (kgf-m)	Weight	Catalog Number
I	J	Bending strength	Bending strength	(kg)	
33.84	15.67	3.07	0.31	0.067	**SRTB2/3-50** (Made to Order)
35.51	19	4.10	0.42	0.10	**SRTB2/3-60** (Made to Order)
39.48	25.67	6.00	0.61	0.16	**SRTB2/3-80** (Made to Order)
41.73	29	7.11	0.73	0.21	**SRTB2/3-90** (Made to Order)
44.11	32.33	8.24	0.84	0.24	**SRTB2/3-100** (Made to Order)
45.48	23.4	14.7	1.50	0.24	**SRTB1-50** (Made to Order)
48.24	28.4	19.5	1.99	0.34	**SRTB1-60** (Made to Order)
54.73	38.4	29.4	3.00	0.61	**SRTB1-80** (Made to Order)
58.35	43.4	34.5	3.52	0.73	**SRTB1-90** (Made to Order)
62.16	48.4	39.4	4.02	0.87	**SRTB1-100** (Made to Order)
61.23	26.9	29.0	2.96	0.47	**SRTB2-30** (Made to Order)
66.23	36.9	49.2	5.02	0.82	**SRTB2-40** (Made to Order)
72.28	46.9	70.8	7.22	1.14	**SRTB2-50** (Made to Order)
79.14	56.9	94.3	9.61	1.59	**SRTB2-60** (Made to Order)
76.32	40	92.6	9.44	1.40	**SRTB3-30** (Made to Order)
85.15	55	158	16.1	2.17	**SRTB3-40** (Made to Order)
95.52	70	229	23.3	3.22	**SRTB3-50** (Made to Order)
95.74	52.6	226	23.0	2.75	**SRTB4-30** (Made to Order)
108.03	72.6	385	39.3	4.38	**SRTB4-40** (Made to Order)
122.37	92.6	559	57.0	6.72	**SRTB4-50** (Made to Order)

[Caution on Product Characteristics] ① For the ratchet with SRTB hub, pay attention to the orientation of the teeth with respect to the hub. Items with opposite orientation can be made to order.
② The bore may slightly vary due to the effect of heat treatment. When using with the indicated hole diameter, provide machining with a reamer or the like before use.

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

SRT-C Pitch 2.09~12.57 Ratchet Pawls

Specifications	
Tooth angle	60°
Material	S45C
Heat treatment	Pawl induction hardened
Pawl hardness	50 to 60HRC
Surface treatment	Black oxide coating



* FD has a forged finish surface.

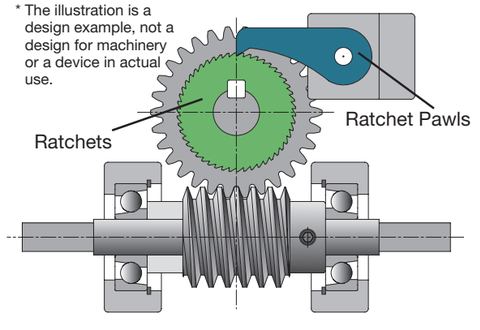
T5

Catalog Number	Shape	K	(L)	M	(N)	P	Weight (kg)
SRT2/3-C		5	(8)	30	(38)	6	0.020
SRT1-C		8	(10)	39	(49)	12	0.057
SRT2-C	T5	10	(12.5)	55	(67.5)	15	0.13
SRT3-C		12	(15)	65	(80)	20	0.23
SRT4-C		13	(18)	80	(98)	25	0.38

[Caution on Product Characteristics] ① SRT2/3-C is a lost wax product that uses S45C-equivalent material.
② The ratchet pawl is for preventing reverse rotation. It cannot be used for feeding or indexing.

■ Application Examples

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



Example: ratchets used for complete reverse prevention of worm gears

■ Bending Strength of Ratchets

The allowable transmission force F_b (N) of ratchets is the value calculated by the following formula.

$$F_b=\sigma_b \cdot \frac{b \cdot e^2}{6} \cdot \frac{1}{h} \cdot \frac{1}{S_F}$$

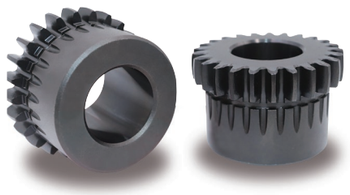
Also, the SRT Ratchet's allowable torque T (N·m) for bending strength is calculated by the following formula.

$$T=F_b \cdot r_f$$

Where
σ_b : Bending stress → Assumed 225.55MPa (23kgf/mm^2)
b : Face width mm → Dimension Table ratchet face width E
e : Root length mm
→ $e=h \times \tan\left(60 - \frac{360}{\text{No. of teeth}}\right)$ is the calculation
h : Depth of teeth mm → Dimension Table ratchet tooth depth H
S_F : Safety factor → Assumed 2
r_f : Tooth root radius m
→ $r_f=\frac{\text{Outside dia. D}-2h}{2000}$ is the calculation

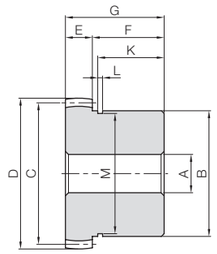
For information on misprints in the catalog, please visit our website.

Gear Couplings (Inner Hubs)

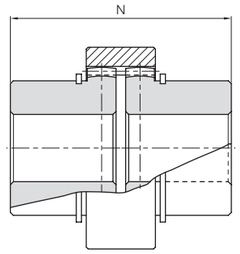


Specifications	
Gear teeth	Normal teeth (crowning)
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened *
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

* 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).



T2



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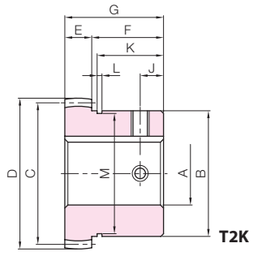
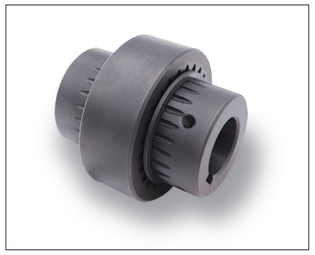
J Series



T2K

Catalog Number	J
GC1-12SJ BORE	10
GC2-20SJ BORE	13
GC3-20SJ BORE	20



Catalog Number	Module	No. of teeth	Shape	Bore A_{H8}	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	C-shaped retaining ring groove K	C-shaped retaining ring groove L	C-shaped retaining ring groove M	Mounting trial length N	Backlash (mm)	Weight (kg)
GC1-12S	***m*2**	25	T2	12	45	50	54	10	25	35	23	1.95	42.5	73	0.40~0.60	0.43
GC2-20S	***m*2**	40		20	70	80	84	15	40	55	37	2.7	67	115		1.66
GC3-20S	***m*2.5**	42		20	90	105	110	20	45	65	42	3.2	86.5	135		3.43

[Caution on Product Characteristics] ① A snap ring is included as an accessory.

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

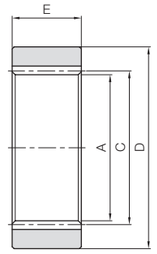
Bore H7	* The product shapes of J Series items are identified by background color.																	
Keyway Js9	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	
Screw size	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8		
Catalog Number	M4					M5				M6			M8			M10		
GC1-12SJ BORE	*																	
GC2-20SJ BORE								*										
GC3-20SJ 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.
② Number of pieces we can process for one order is 1 to 20 units. For larger orders, please request a price and delivery quote.
③ Black oxide is not re-applied to parts undergoing secondary operations.
④ Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.
⑤ Certain products which would otherwise have a very long tapped hole are counterbored. Please see the Website for more details.
⑥ For products having a tapped hole, a set screw is included.
⑦ Products marked with an * have a bore tolerance of H8.

Gear Couplings (Outer Rings)

Specifications	
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

* 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).



T1

Catalog Number	Module	No. of teeth	Shape	Inside dia. A	Pitch dia. C	Outside dia. D	Face width E	Backlash (mm)	Weight (kg)
GC1-I	***m*2**	25	T1	46	50	68	25	0.40~0.60	0.33
GC2-I	***m*2**	40		76	80	105	36		1.03
GC3-I	***m*2.5**	42		100	105	145	48		2.96

■ Characteristics of Gear Couplings

- There are many ways to couple shafts to transmit power. We have developed these standardized gear couplings of our own design. They are easier to connect or disconnect than chain couplings.
- As the external gear (inner cylinder) is crowned, the shaft angle can be up to 5°.
- Due to the induction hardened gear teeth, these couplings have excellent durability.
- The GCJ units are machined complete with keyways, set screw holes and finished bores and are ready for immediate installation. We also offer minimum bore models for users who want to perform their own secondary operations.

■ Gear Coupling Ordering Method

Gear coupling outer rings and inner hubs can each be purchased individually: however, normal usage requires a set of 1 outer ring and 2 inner hubs.

<E.g.> For 1 set of GC2-20S
GC2-I (outer ring) x 1 piece and GC2-20S (inner hub) x 2 piece set.

■ Strength of Gear Couplings

The allowable torques of the gear couplings are determined in accordance with the shear strength of the keys.
Allowable shear force of keys F (N) is calculated from the following formula.

$$F=b\cdot L\cdot\sigma\cdot\frac{1}{S}$$

Additionally, allowable torques T(N·m) of the inner hubs of the GC gear coupling is calculated using the following formula.

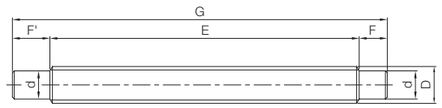
$$T=\frac{F\cdot d}{2000}$$

b : Key Width mm → Keyway width of inner hubs of the GC Gear Coupling
L : Key Length mm → Set at G-2 mm from the total length of the inner hub of the GC Gear Coupling
σ : Allowable Shear Force of keys → Set at 49MPa (5kgf/mm^2)
S : Safety Factor → Optionally set
d : Bore size (mm) → Bore size A of the inner hub of the GC Gear Coupling

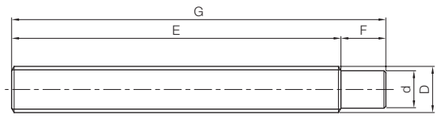
Caution: Safety Factor (S) must be set at a value between 1 to 3, depending on the load types or the coupling displacement.

Involute Spline Shafts

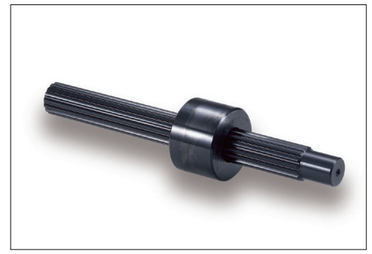
Specifications	
Gear teeth	Stub teeth
Pressure angle	20°
Material	S45C
Heat treatment	Thermal refined
Tooth hardness	200 to 270HB
Surface treatment	Black oxide coating



TA



TB



Catalog Number	Module	No. of teeth	Shape	Outside dia. D	Hub dia. $d^{+0.25}_{+0.15}$	Face width E	Hub width (left) F'	Hub width (right) F	Total length G	Backlash (mm)	Weight (kg)
SV17-170	***m*1.667**	8	TA	16.67	13	135	20	15	170	0.06~0.15	0.26
SV20-200		10	TA	19.67	15	165	20	15	200		0.43
SV25-250		13	TB	24.67	20	220	—	30	250		0.88
SV30-300		16	TB	29.67	25	270	—	30	300		1.55

[Caution on Secondary Operations] ① When modifying the SV involute spline shaft with secondary operations, be careful not to crush the teeth or bend the shaft.

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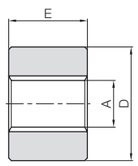
■ Characteristics of Involute Spline Shafts

- SV and SVI series are made according to the automotive involute spline standard, JIS B 1603: 1995 (Straight cylindrical involute splines, backlash 0.06 to 0.15).
- Involute spline shafts and bushings are thermal refined to have good abrasion-resistance.
- Spline bushings may be made in CAC (copper) type material as a special custom order item.

Involute Spline Bushings

Specifications	
Gear teeth	Stub teeth
Pressure angle	20°
Material	S45C
Heat treatment	Thermal refined
Tooth hardness	200 to 270HB
Surface treatment	Black oxide coating



T1

Catalog Number	Module	No. of teeth	Shape	Outside dia. A	Outside dia. D	Face width E	Allowable torque (N·m) Surface durability	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)
SVI17-40	***m*1.667**	8	T1	13.7	40	25	33.2	3.38	0.06~0.15	0.21
SVI20-45		10		16.7	45	30	59.6	6.08		0.31
SVI25-55		13		21.7	55	38	125	12.8		0.57
SVI30-65		16		26.7	65	45	222	22.6		0.93

[Caution on Product Characteristics] ① The allowable torque shown are reference values calculated from “Surface strength of splines” on Page 481.
② Lubrication is always required on the mating surface of the spline shaft and hub to prevent wear damage.

■ Surface Strength of Splines

The design concept of the spline surface strength is the same as that of a key. Here is the formula for the allowable transmission force F(N) of spline.

$$F=\eta \cdot z \cdot h_w \cdot l \cdot \sigma$$

And the formula of allowable torque T (N·m) of spline with respect to the surface strength.

$$T=\frac{F \cdot d_w}{2000}$$

In designing a spline shaft, besides considering the surface strength, we should take into account the torsional and bending stresses of the spline.
Where

η : Contact ratio of surface → 0.75 (assumed)
z : Number of teeth → number of teeth of spline from the table
h_w : Contact depth of tooth (mm) → 1.485
l : Contact length of spline → spline hub face width E from the table
σ : Allowable surface stress of spline → 19.61MPa (2kgf/mm^2) (assumed)
d_w : Contact diameter (mm) → Tip diameter of spline shaft D - h_w

Features

- Low-friction structure
- Simple and efficient lubrication method
- Little play between ring rail and bearing
- Usable on planes at any angle
- Easy mounting and mounting error adjustment
- Ring rail drive equipment location can be set freely
- Large central opening where other components can be stored

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Ring Rail Gear System

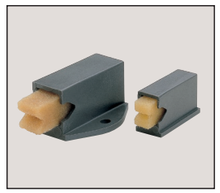
With its five different ring diameters, the product can be mounted freely and with high accuracy through the use of 12 types of bearings.

Bearing (fixed)

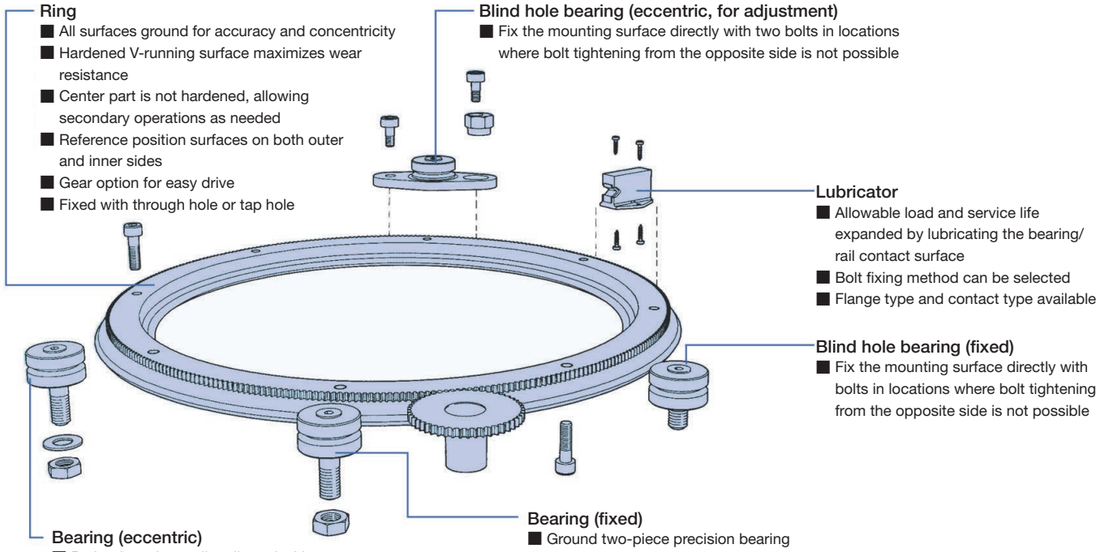
Bearing (eccentric)

Blind hole bearing (fixed)

Blind hole bearing (eccentric, for adjustment)


Lubricator

System Configuration

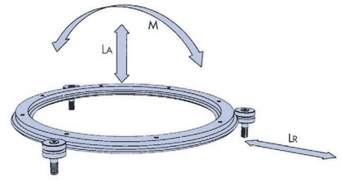


Technical Information

System in which the ring mounted with bearings revolves

Ring rail gears' allowable load and service life are determined by various factors. These factors include ring size, size and number of bearings used, lubrication, size and direction of load, operation speed (see Note 1), and travel path length (see Note 2). In order to extend the normal life, use at a load below the maximum. The data and formulae in this section can be used to calculate the life. When possible, be sure to use a lubricator (see Page 482) to lubricate the ring rail gears.
This lubrication vastly extends the allowable load and system life.

[Note 1] The rated operation speed is 1m/s without lubrication and 5m/s with lubrication; be sure to take inertia load into account as well. Smaller loads may enable faster operation.
[Note 2] For short-stroke operation (stroke length less than 5 times the bearing outer diameter), calculate the life with the stroke set at 5 times the bearing outer diameter.

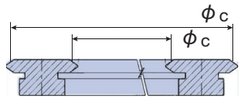


System allowable load

In this system, where a complete ring revolves on a number of bearings surrounding it, bearings are set at specific intervals around the ring periphery. When calculating life, the load operating on the system must be divided into direct load elements L_A and L_R and moment load elements M. (See figure at right and Note 1)

Bearing size	Ring part numbers used	No. of bearings at equal intervals	Max. allowable load without lubrication			Max. allowable load with lubrication		
			L_A(N)	L_R(N)	M (Nm)	L_A(N)	L_R(N)	M (Nm)
RSJ/BHJ-18 (Made to Order)	R20-210	3	135	76	32 × ϕ c	375	170	90 × ϕ c
		4	165	90	39 × ϕ c	465	200	108 × ϕ c
		For each 1 pc added	21	13	4 × ϕ c	90	50	18 × ϕ c
RSJ/BHJ-25	R25-159 R25-255 R25-351	3	300	170	72 × ϕ c	960	510	230 × ϕ c
		4	370	200	87 × ϕ c	1190	600	278 × ϕ c
		For each 1 pc added	48	30	9 × ϕ c	230	150	48 × ϕ c
RSJ/BHJ-34	R44-468 R44-612	3	600	340	140 × ϕ c	2400	1200	570 × ϕ c
		4	740	400	170 × ϕ c	2950	1400	690 × ϕ c
		For each 1 pc added	96	60	19 × ϕ c	570	350	120 × ϕ c
RSJ/BHJ-54 (Made to Order)	R76-799 R76-1033	3	1350	765	320 × ϕ c	5400	2740	1290 × ϕ c
		4	1670	900	390 × ϕ c	6650	3200	1560 × ϕ c
		For each 1 pc added	210	130	44 × ϕ c	1290	800	270 × ϕ c

ϕ c is the contact diameter of the ring slide (unit: m), that is the diameter of the circle passing through the central position of the bearing and curved rail contact point.



To calculate the life of this system, input the L_A, L_R and M values first indicated for the direct load and the maximum allowable load in the table above into the following formula [1] in order to derive the load element L_F.

$$L_F = \frac{L_A}{L_{A\,(max)}} + \frac{L_R}{L_{R\,(max)}} + \frac{M}{M_{(max)}} \qquad [1]$$

Catalog Number	ϕ c value (m)	
	With bearing on outside	With bearing on inside
(M) R20-210 (P,Q)	0.2275	0.1925
R25-159 (P,Q)	0.1815	0.1365
R25-255 (P,Q)	0.2775	0.2325
R25-351 (P,Q)	0.3735	0.3285
R44-468 (P,Q)	0.5085	0.4275
R44-612 (P,Q)	0.6525	0.5715
(M) R76-799 (P,Q)	0.8695	0.7285
(M) R76-1033 (P,Q)	1.1035	0.9625

(M) : Made to Order

System life calculation

Having calculated L_F, one of the two formulae below can be used to calculate life (units: km). In these formulae, obtain the reference life for the relevant bearing and lubrication status from the table at right.

When using the system without lubrication, use formula [2].

$$\text{System life (km)} = \frac{B_L}{(0.03+0.97L_F)^2} \qquad [2]$$

When using the system with lubrication, use formula [3].

$$\text{System life (km)} = \frac{B_L}{(0.03+0.97L_F)^3} \qquad [3]$$

Bearing	Reference life without lubrication (B_L)	Reference life with lubrication (B_L)
(M) RSJ/BHJ-18	50	60
RSJ/BHJ-25	70	40
RSJ/BHJ-34	100	70
(M) RSJ/BHJ-54	150	150

(M) : Made to Order

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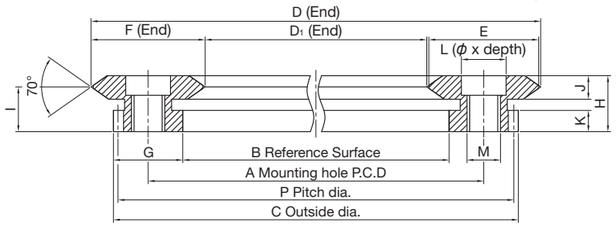
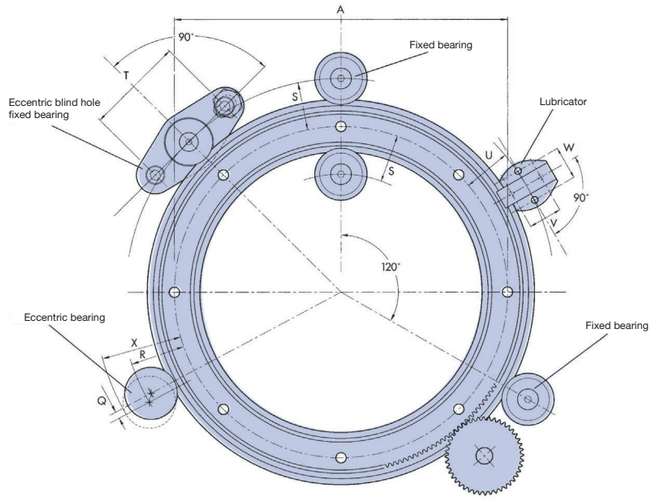
■ External Ring Gears

External ring gear (P type)



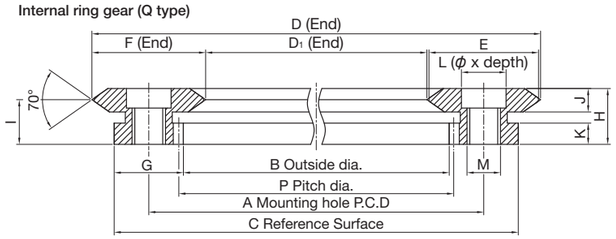


Type	Catalog Number	±0.2	Reference Surface	Outside dia.							±0.025		Face width	No. of holes	Counterbore	Socket head screw
		A	B	C	D	D1	E	F	G	H	I	J	K		L	M
External ring gear	**R20-210P** (made to order)	210	197.6	222.4	230.37	189.63	20	20.37	12.4	10	8	4.2	3.8	8	8 x 3.5	M6 x 1
	R25-159P	159	143.6	174.4	184.74	133.26	25	25.74	15.4	12.25	10	4.5	5.75	8	9 x 6	M8 x 1.25
	R25-255P	255	239.6	270.4	280.74	229.26	25	25.74	15.4	12.25	10	4.5	5.75	8	9 x 6	M8 x 1.25
	R25-351P	351	335.6	366.4	376.74	325.26	25	25.74	15.4	12.25	10	4.5	5.75	12	9 x 6	M8 x 1.25
	R44-468P	468	442	494	512.74	423.26	44	44.74	26	15.5	12.5	6	7	12	11 x 7	M8 x 1.25
	R44-612P	612	586	638	656.74	567.26	44	44.74	26	15.5	12.5	6	7	16	11 x 7	M8 x 1.25
	R76-799P (made to order)	799	748.5	849.5	875.74	722.26	76	76.74	50.5	24	19.5	9	12	16	20 x 13	M16 x 2
	R76-1033P (made to order)	1033	982.5	1083.5	1109.74	956.26	76	76.74	50.5	24	19.5	9	12	20	20 x 13	M16 x 2

Module	Pressure angle	No. of teeth	Profile shift coefficient	Pitch dia.	Weight	Drilling position								Catalog Number
	Pa	z	x	P	(kg)	Q	R	S	T ±0.2	U ±0.2	V ±0.2	W ±0.2	X	
0.8	20°	276	0	220.8	0.66	1.8	19	17.2	38	18	13	13	30.6	**R20-210P** (made to order)
0.8	20°	216	0	172.8	0.77	1.4	24.5	23.1	50	22.5	16	18	39	**R25-159P**
0.8	20°	336	0	268.8	1.20	1.4	24.5	23.1	50	22.5	16	18	39	**R25-255P**
0.8	20°	456	0	364.8	1.65	1.4	24.5	23.1	50	22.5	16	18	39	**R25-351P**
1	20°	492	0	492	5.10	1.8	37.8	36	60	34.5	22	25	57.3	**R44-468P**
1	20°	636	0	636	6.70	1.8	37.8	36	60	34.5	22	25	57.3	**R44-612P**
1.5	20°	564	+0.167	846	25	3.2	62.6	59.4	89.5	57	33	38	94	**R76-799P** (made to order)
1.5	20°	720	+0.167	1080	32	3.2	62.6	59.4	89.5	57	33	38	94	**R76-1033P** (made to order)

■ Internal Ring Gears

Internal ring gear (Q type)



Type	Catalog Number	±0.2	Outside dia.	Reference Surface							±0.025		Face width	No. of holes	Counterbore	Socket head screw
		A	B	C	D	D1	E	F	G	H	I	J	K		L	M
Internal Ring Gears	**R20-210Q** (made to order)	210	197.6	222.4	230.37	189.63	20	20.37	12.4	10	8	4.2	3.8	8	8 x 3.5	M6 x 1
	R25-159Q	159	143.6	174.4	184.74	133.26	25	25.74	15.4	12.25	10	4.5	5.75	8	9 x 6	M8 x 1.25
	R25-255Q	255	239.6	270.4	280.74	229.26	25	25.74	15.4	12.25	10	4.5	5.75	8	9 x 6	M8 x 1.25
	R25-351Q	351	335.6	366.4	376.74	325.26	25	25.74	15.4	12.25	10	4.5	5.75	12	9 x 6	M8 x 1.25
	R44-468Q	468	442	494	512.74	423.26	44	44.74	26	15.5	12.5	6	7	12	11 x 7	M8 x 1.25
	R44-612Q	612	586	638	656.74	567.26	44	44.74	26	15.5	12.5	6	7	16	11 x 7	M8 x 1.25
	R76-799Q (made to order)	799	748.5	849.5	875.74	722.26	76	76.74	50.5	24	19.5	9	12	16	20 x 13	M16 x 2
	R76-1033Q (made to order)	1033	982.5	1083.5	1109.74	956.26	76	76.74	50.5	24	19.5	9	12	20	20 x 13	M16 x 2

■ Ring Rail Gears

Ring rail gears are composed of high-quality steel and hardened V-edges, precision-ground overall, with reference surfaces on both inside and outside for easier positioning. There is a gear drive ring rail with machined gears on either the inner or outer reference surface. The number of gears on the external ring gear is a multiple of 12 for easier pinion selection.

■ Assembly

When using ring rail gears, as shown in the figure above, it is recommended to use two fixed bearings 120° apart as reference. Use the eccentric type for the other bearings. In locations where ring position adjustment is required, all eccentric bearings can be used. When using lubrication to improve allowable load/life, one or more lubricators can be mounted at easily used positions. (See Technical Data on Page 483.)

[Caution on Product Characteristics] ① For each bearing size, two fixing bolt lengths are available.
② Series including SSY Spur Gears are available as ring rail gear drive pinions.
③ Q, R, and S are accurate logical values. The ring axis is determined by the S dimension positional accuracy. Normally, the Q and R dimensions' positional accuracy is not important. Machine the bearing hole with a reamer so that it meets tolerance for the R dimension.

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

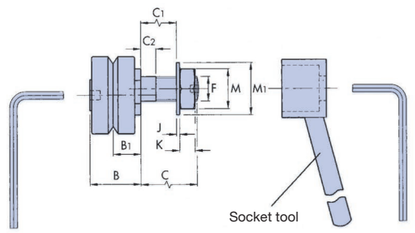
Module	Pressure angle	No. of teeth	Profile shift coefficient	Pitch dia.	Weight	Drilling position								Catalog Number
	Pa	z	x	P	(kg)	Q	R	S	T ±0.2	U ±0.2	V ±0.2	W ±0.2	X	
0.8	20°	249	0	199.2	0.66	1.8	19	17.2	38	18	13	13	30.6	**R20-210Q** (made to order)
0.8	20°	182	-0.25	145.6	0.77	1.4	24.5	23.1	50	22.5	16	18	39	**R25-159Q**
0.8	20°	302	-0.25	241.6	1.20	1.4	24.5	23.1	50	22.5	16	18	39	**R25-255Q**
0.8	20°	422	-0.25	337.6	1.65	1.4	24.5	23.1	50	22.5	16	18	39	**R25-351Q**
1	20°	444	0	444	5.10	1.8	37.8	36	60	34.5	22	25	57.3	**R44-468Q**
1	20°	588	0	588	6.70	1.8	37.8	36	60	34.5	22	25	57.3	**R44-612Q**
1.5	20°	501	0	751.5	25	3.2	62.6	59.4	89.5	57	33	38	94	**R76-799Q** (made to order)
1.5	20°	657	0	985.5	32	3.2	62.6	59.4	89.5	57	33	38	94	**R76-1033Q** (made to order)

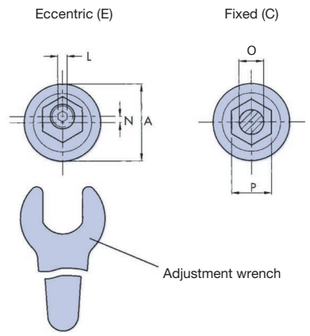
■ Bearings (Through Hole Type)

Through hole type bearings include long and short fixing bolts compatible with almost all applications.
They also come in two types: fixed, to be used at the reference position, and eccentric, enabling easy system adjustment.

Bearing (fixed)

Bearing (eccentric)





Body (Ring rail gear)	Catalog Number	Type	A	B	±0.025 B1	C	C1	C2	±0.025 D	E	F	G	H	J	K	L
For R20 (Made to Order)	**RSJ-18-C**	Through hole fixed (short)	18	12.4	6.75	7.4	3.4	2.4	14.00	7	M6 x 0.75	10	0.6	0.8	3.2	—
	RLJ-18-C	Through hole fixed (long)				14	10	2.5								
	RSJ-18-E	Through hole eccentric (short)	18	12.4	6.75	7.4	3.4	2.4	14.00	7	M6 x 0.75	10	0.6	0.8	3.2	2.5
	RLJ-18-E	Through hole eccentric (long)				14	10	2.5								
	BHJ-18-C	Blind hole fixed	18	12.4	6.75	7.4	—	—	14.00	7	M6 x 0.75	10	0.6	—	—	—
	BHJ-18-E	Blind hole eccentric														2.5
For R25	**RSJ-25-C**	Through hole fixed (short)	25	16.6	9	9.8	3.8	2.2	20.27	10	M8 x 1	14	0.5	1	5	—
	RLJ-25-C	Through hole fixed (long)				19	13	4.9								
	RSJ-25-E	Through hole eccentric (short)	25	16.6	9	9.8	3.8	2.2	20.27	10	M8 x 1	14	0.5	1	5	3
	RLJ-25-E	Through hole eccentric (long)				19	13	4.9								
	BHJ-25-C	Blind hole fixed	25	16.6	9	9.8	—	—	20.27	10	M8 x 1	14	0.5	—	—	—
	BHJ-25-E	Blind hole eccentric														3
For R44	**RSJ-34-C**	Through hole fixed (short)	34	21.3	11.5	13.8	6.6	5.2	27.13	12	M10 x 1.25	18	0.7	1.25	6	—
	RLJ-34-C	Through hole fixed (long)				22	14.8	5.9								
	RSJ-34-E	Through hole eccentric (short)	34	21.3	11.5	13.8	6.6	5.2	27.13	12	M10 x 1.25	18	0.7	1.25	6	4
	RLJ-34-E	Through hole eccentric (long)				22	14.8	5.9								
	BHJ-34-C	Blind hole fixed	34	21.3	11.5	13.8	—	—	27.13	12	M10 x 1.25	18	0.7	—	—	—
	BHJ-34-E	Blind hole eccentric														4
For R76 (Made to Order)	**RSJ-54-C**	Through hole fixed (short)	54	34.7	19	17.8	8.2	5.7	41.76	25	M14 x 1.5	28	1.6	1.6	8	—
	RLJ-54-C	Through hole fixed (long)				30	20.4	7.9								
	RSJ-54-E	Through hole eccentric (short)	54	34.7	19	17.8	8.2	5.7	41.76	25	M14 x 1.5	28	1.6	1.6	8	6
	RLJ-54-E	Through hole eccentric (long)				30	20.4	7.9								
	BHJ-54-C	Blind hole fixed	54	34.7	19	17.8	—	—	41.76	25	M14 x 1.5	28	1.6	—	—	—
	BHJ-54-E	Blind hole eccentric														6

[Caution on Product Characteristics]
① Screws are metric fine thread. See dimension F above.
② All the RSJ/RLJ type eccentric bearing fixing bolts have hex sockets for adjustment, as in the figure.
③ Nuts and washers are included with the fixed and eccentric types of RSJ/RLJ bearings.
④ The R dimension value is the eccentricity of the adjusting nut, which is the adjustment amount of the adjusting nut in 360° rotation on the bearing center line.
⑤ The bearing sizes are designed for use on specifically sized ring parts (see table above). When required by certain applications, however, it is possible to combine ring parts larger than those designed with arbitrary bearings for use. Also, size 34 bearings can be used along with size 25 ring parts.

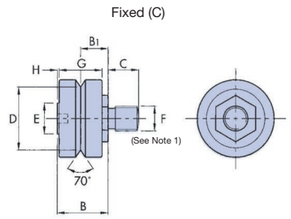
[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

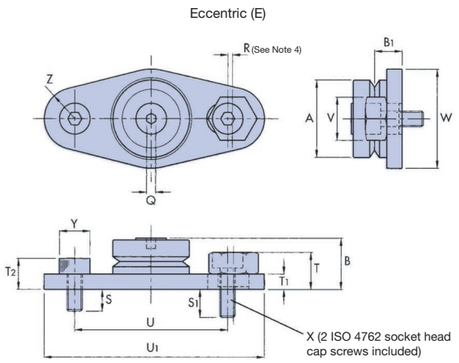
■ Bearings (Blind Hole Type)

Blind hole type bearings are used when fixing from the back of the bearing is not possible. They also come in two types: fixed, to be used at the reference position, and eccentric, enabling easy system adjustment.

Blind hole bearing (fixed)

Blind hole bearing
(eccentric, for adjustment)



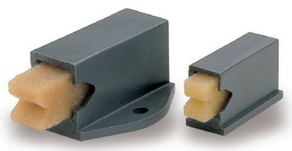


M	M1	N	O	P	Q	R	S	S1	T	T1	T2	±0.2 U	U1	V	W	X	Y	Z	Weight (g)	Catalog Number
10	13	—	6	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.0	**RSJ-18-C**
																			20.0	**RLJ-18-C**
10	13	2.6	6	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19.0	**RSJ-18-E**
																			20.0	**RLJ-18-E**
—	—	—	—	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18.0	**BHJ-18-C**
					2	1.2	8	10.5	10	4	8	38	54	11	24.5	M4 x 0.7	7	7	45	**BHJ-18-E**
13	17	—	8	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	48.0	**RSJ-25-C**
																			51.0	**RLJ-25-C**
13	17	2	8	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	48.0	**RSJ-25-E**
																			51.0	**RLJ-25-E**
—	—	—	—	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	43.0	**BHJ-25-C**
					3	1.5	7	9	12	5	10	50	72	14	32	M5 x 0.8	8.5	10	105	**BHJ-25-E**
17	21	—	10	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	115	**RSJ-34-C**
																			120	**RLJ-34-C**
17	21	2.5	10	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	115	**RSJ-34-E**
																			120	**RLJ-34-E**
—	—	—	—	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	105	**BHJ-34-C**
					4	2	9.5	8.5	17.5	6.5	12.5	60	90.5	17	42	M6 x 1	10	14	235	**BHJ-34-E**
22	28	—	14	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	415	**RSJ-54-C**
																			425	**RLJ-54-C**
22	28	4.5	14	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	415	**RSJ-54-E**
																			425	**RLJ-54-E**
—	—	—	—	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	390	**BHJ-54-C**
					8	3.0	14.5	16.4	23.5	10.5	18.5	89.5	133	25	62	M8 x 1.25	13	20	800	**BHJ-54-E**

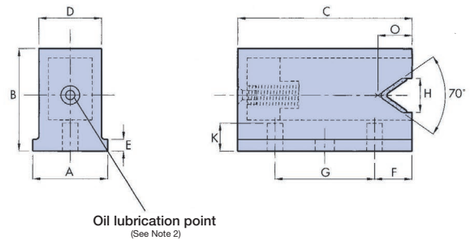
ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Lubricator

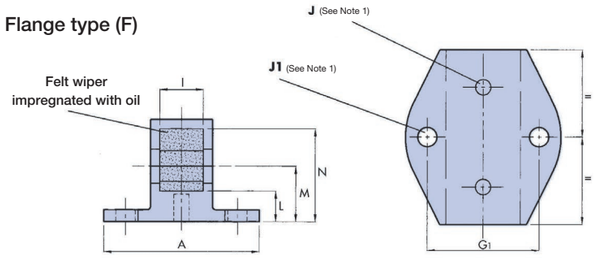
The lubricator is composed of impact-resistant molded polyacetal plastic and a felt wiper impregnated with lubricant and supported with a spring. It is designed to create a constant film of oil on the rail operating surface without excessive friction. The use of lubrication vastly extends the system allowable load and life.



Compact type (C)



Flange type (F)



Body (Ring rail gear)	Catalog Number	Type	A	B	C	D	E	F	G	G1	H	I	J	J1 (screw used)
For R20 (Made to Order)	**LB-20C**	Compact	8	12	22.5	6.5	2	4.75	13	13	7.2	4	ϕ2.5 x 10	ϕ2.7(M2.5 x 0.45 x 6)
	LB-20F	Flange	19											
For R25	**LB-25C**	Compact	12	16.5	28	9.9	2	6	16	18	5.5	7	ϕ3 x 10	ϕ3.2(M3 x 0.5 x 8)
	LB-25F	Flange	25											
For R44	**LB-44C**	Compact	17	20	38	15	2.4	8	22	25	7	11	ϕ3 x 16	ϕ4.2(M4 x 0.7 x 10)
	LB-44F	Flange	34											
For R76 (Made to Order)	**LB-76C**	Compact	25	33.5	57	22.7	4.5	12	33	38	10	18	ϕ3.5 x 22	ϕ5.2(M5 x 0.8 x 12)
	LB-76F	Flange	50											

K	L	M	N	O	Weight (g)	Catalog Number
2.5	3.5	6.75	10.75	4.5	3	**LB-20C**
					3	**LB-20F**
4.5	5	9	15.25	5.5	5	**LB-25C**
					6	**LB-25F**
5.5	6.25	11.5	18.25	8	14	**LB-44C**
					16	**LB-44F**
9	10	19	31.5	11.5	40	**LB-76C**
					44	**LB-76F**

[Caution on Product Characteristics] ① Each lubricator comes with two self-tapping Plastite 45 cross-recessed pan head screws, generally compliant with ISO 7049, for fixing in hole J. Further, flange type lubricators come with two DIN 84A cross-recessed cheese head screws for fixing in hole J1.
② For oil replenishment, use BP Energol GHL68 or 68-viscosity EP mineral oil from the lubrication point.

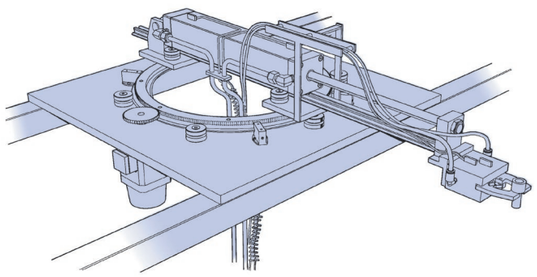
[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Usage Examples

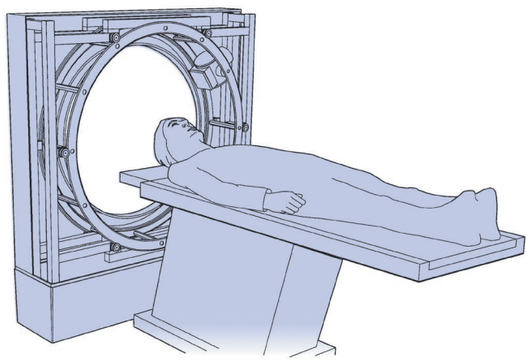
Simple pick & place attachment

Ring rail gears realize 360° rotation and support strength roughly equivalent to load. The empty central space can be used for wiring routes, etc.



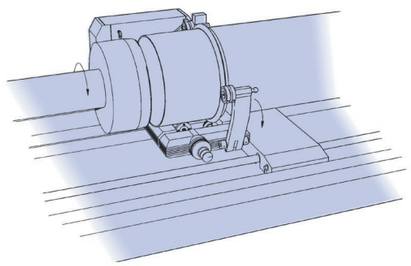
Body scanner

An image head is mounted on the ring rail gears surrounding the patient. The smooth, quiet movement with no play realizes high resolution.



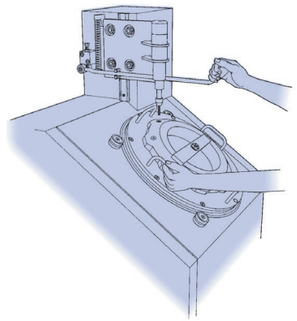
Laser platemaker for rotary printing screen

Dedicated ring rail gears move on the screen tube, keeping its shape consistent. Hinge-type bearing bracket enables rapid mounting and removal.



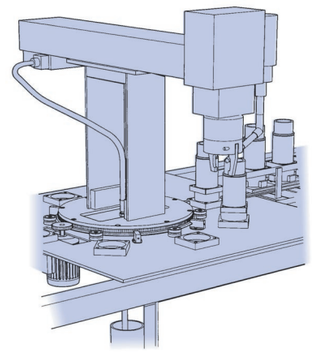
Rotary assembler

Ring rail gears enable friction-free manual rotation, making it possible to control and support the load location.

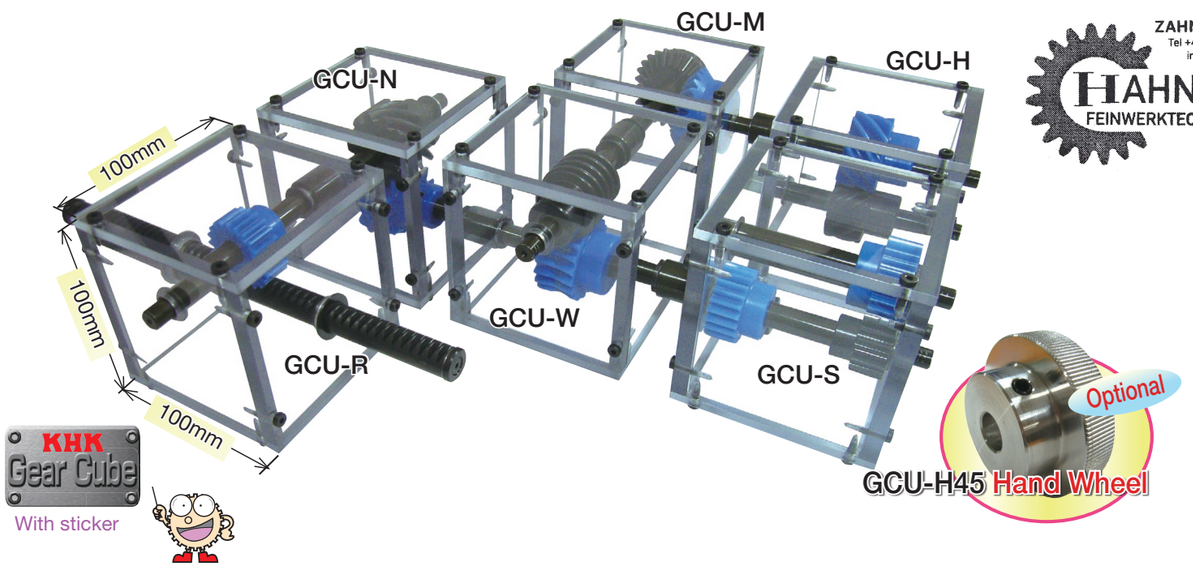


3-axis assembly robot

Highly safe ring rail gears, rotating without friction, enable smooth, high-rigidity movement.



See the gears with your own eyes and move them with your own hands to learn about their mechanisms and characteristics.



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* These kits are not for actual use to transmit power. Please use only as representations of gear systems.

KAWAGUCHI i-mono
This product is certified by KAWAGUCHI i-mono i-waza

■ Features of GearCube

- Assembly kits can be connected flexibly.
- The frame is made of polycarbonate with high transparency and impact resistance.
- Gears combine MC nylon and metal, making lubrication unnecessary.
- An instruction manual is included, enabling easily assembly by anyone.

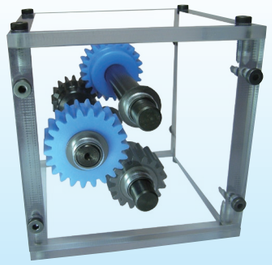
Assembly Procedure

Details are available on the Japanese website

Photo shows GCU-R

All six types of assembly kit and input/output shafts can be connected.

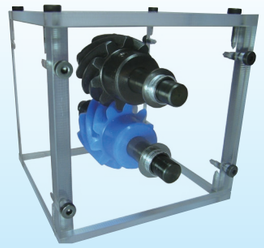
GCU-S Spur Gear Kit



Installation: Parallel Axes (Two-stage)
Gear Type: Spur Gear
Used Product: 2 units of SS1.5-16
2 units of PS1.5-22
Gear Ratio: 1.89
Weight: Approx. 1kg

The Gear Kit contains a two-stage spur gear train and allows speed increases / reductions, and includes the most commonly used combinations of gears.

GCU-H Helical Gear Kit



Installation: Parallel Axes
Gear Type: Helical Gears (also for Screw Gears)
Gears: SN2.5-10L
PN2.5-10R equivalent
Gear Ratio: 1
Weight: Approx. 1kg

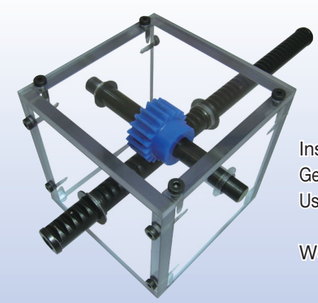
Helical gears have more strength than spur gears of the same dimensions and have the advantage of being less noisy.

GCU-M Miter Gear Kit

Installation: Intersecting Axes
Gear Type: Miter
Gears: SM2-25
PM2-25
Gear Ratio: 1
Weight: Approx. 1kg

The shaft angle of bevel gears can be changed by 90°.
It is used to change the direction of the power.

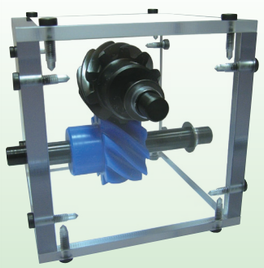
GCU-R Rack Kit



Installation: Parallel Axes
Gear Type: Racks & Pinions
Used Product: SRO1.5-500
PS1.5-20
Weight: Approx. 1kg

Racks can be used to convert rotation to linear. They are used for elevating devices, etc.

GCU-N Screw Gear Kit



Installation: Nonparallel and nonintersecting gears
Gear Type: Screw Gears
Gears: SN2.5-10R
PN2.5-10R equivalent
Gear Ratio: 1
Weight: Approx. 1kg

Screw Gears are helical gears used in nonparallel and nonintersecting situations. Applications include devices like conveyers with light loads.

GCU-W Worm Gear Pair Kit

Installation: Nonparallel and nonintersecting gears
Gear Type: Worm Gear Pair
Gears: SW2-R1
PG2-20R1
Gear Ratio: 20
Weight: Approx. 1kg

Large deceleration can be made in one step. The worm gear cannot be driven by the worm wheel due to inherent self-locking.

Rack & Pinion Lubrication System *Additional* M

System Configuration

NO.	Product Name
1	Flex pump
2	Grease cartridge
3	Tube connector
4	Tube
5	Mounting shaft
6	Lubricating gear

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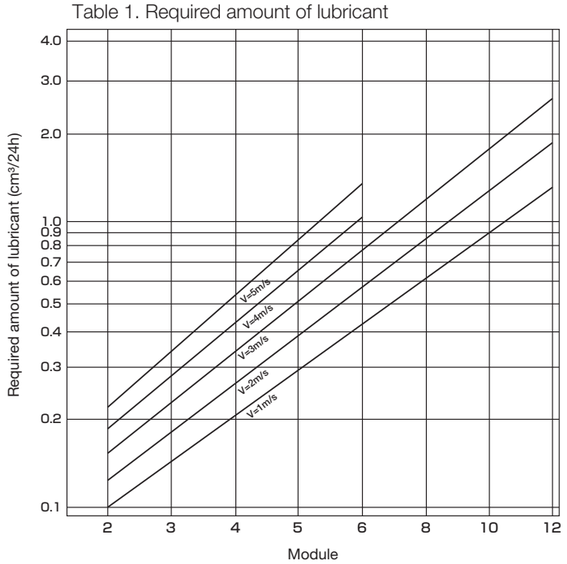
Features

- Ideal lubrication system for racks & pinions used in open environments.
- A small amount of grease extruded from the pump is automatically supplied through the lubricating gear.
- The amount of lubricant* can be adjusted according to the application.
- If pump errors are detected, an error signal is emitted.
- Grease is applied by a polyurethane lubricating gear to form a uniform lubricating film.
- Grease up to consistency No. 2 can be used regardless of the manufacturer.
- Special grease GC-F01 does not drip or pollute the machine.
- Optimized lubricant improves the durability of racks & pinions and reduces the maintenance costs.

* Please use the required amount of lubricant in Table 1 as a guide depending on the module of the product used and the peripheral speed (m/s).

Table 1. Required amount of lubricant



Application Examples

Flex pump FP401

CE Mark compatible product.

24 VDC automatic time controlled lubrication pump (1-port type)

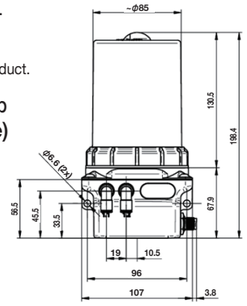
* A tube connector (right angle type) and power cable (5m) are included.
* Secondary operations cannot be performed. Do not disassemble or modify the product.

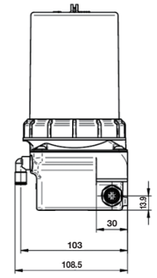
Flex pump FP402

CE Mark compatible product.

24 VDC automatic time controlled lubrication pump (2-port type)

* A tube connector (right angle type) and power cable (5m) are included.
* Secondary operations cannot be performed. Do not disassemble or modify the product.





Flex pump FP400B (Made to Order) M

CE Mark compatible product.

6 V battery automatic time controlled lubrication pump (1-port type)

* A tube connector (right angle type) and power cable (5m) are included.
* Secondary operations cannot be performed. Do not disassemble or modify the product.

Specifications	
Dimensions (W x H x D)	Max: 111 x 200 x 108mm
Weight (no lubricant)	1130g
Operation method	Piston pump type
Lubricating oil amount	400cm³
Minimum lubricant supply amount	0.15cm³
Operating pressure	Up to 70 bar
Lubricant	Grease of consistency up to NLGI No. 2
Operating temperature	-15 to 60°C
Operating voltage	24 VDC (±5%) (battery type is 6V)
Consumption voltage (24 VDC)	I_{max}≤300mA
Mounting direction	Omni-directional mounting available * Vertical direction is recommended
Control device	Built-in, electronic type
Pressure monitor	Built-in, electronic type
Lubricant level monitor	Built-in, lead contact type
Error detection	Grease shortage / back pressure increase / battery level decrease
Dustproof/waterproof class	IEC Standard IP54

Grease cartridge GC-F01

Special grease that contains additives considering the optimum adhesion to metal surfaces.
Ideal for racks & pinions used in high-temperature and high-load environments.

(Empty cartridge GC-0)

Specifications	
Consistency number	No. 1
Dropping point	220°C
Operating temperature range	-30 to 150°C
Withstand pressure load	4800N
Internal capacity	400cm³

Tube T-6×4-5 T-6×4-10

This tube has excellent pressure resistance, elasticity, restoring force and bending strength.
GC-F01 grease is provided before shipment.

Specifications		
Product Name	Material	Outer diameter x Inner diameter x Length
T-6×4-5	Polyamide 6	6mm×4mm×5m
T-6×4-10		6mm×4mm×10m

Tube connector TCS/TCR

A tube connector with hex socket has high fluidity.

■ **Straight Type**

- TCS−M6
- TCS−M10
- TCS−G1/8

■ **Right Angle Type**

- TCR−M6
- TCR−M10
- TCR−G1/8

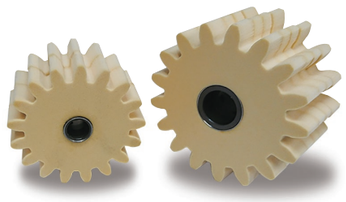
Specifications	
Material	CW614N (brass)
Surface treatment	Nickel plated
Operating pressure	Up to 80 bar
Operating temperature	-30 to 100°C

Note: Catalog codes M6, M10 and G1/8 are the screw sizes. Please select according to the mounting shaft.

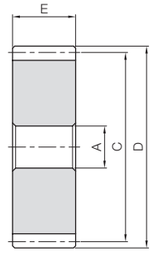
PUS/PUSCP lubricated spur gear

Module 1.5~10 Circular pitch 5, 10

M *Lubrication Spur Gears*



Specifications	
Gear teeth	Standard full depth
Pressure angle	20°
Material	Polyurethane foam



S5

Catalog Number	Module	No. of teeth	Shape	Bore A	Pitch dia. C	Outside dia. D	Face width E	Mounting shaft to be set
PUS1.5-24	***m*1.5**	24	S5	12	36	39	15	MAS1.5 or MAR1.5
PUS2-17	***m*2**	17			34	38	20	MAS2 or MAR2
PUS2.5-17	***m*2.5**				42.5	47.5	24	MAS2.5 or MAR2.5
PUS3-17	***m*3**				51	57	30	MAS3 or MAR3
PUS4-17	***m*4**				68	76	40	MAS4 or MAR4
PUS5-17	***m*5**			20	85	95	50	MAS5 or MAR5
PUS6-17	***m*6**				102	114	60	MAS6 or MAR6
PUS8-17 (made to order)	***m*8**	17	S5	20	136	152	80	MAS8 or MAR8
PUS10-17 (made to order)	***m*10**				170	190	100	MAS10 or MAR10

Catalog Number	Pitch mm (Module)	No. of teeth	Shape	Bore A	Pitch dia. C	Outside dia. D	Face width E	Mounting shaft to be set
PUSCP5-24	**CP5** (1.5915)	24	S5	12	38.2	41.4	15	MAS1.5 or MAR1.5
PUSCP10-15	**CP10** (3.1831)	15			47.7	54.1	30	MAS3 or MAR3

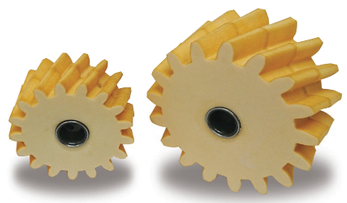
[Application Hints] ① Can be used in temperatures from -30 to 150 °C.
② Setting is possible to either a rack or a pinion, but we recommend a pinion.
③ Avoid operations with high load until grease is applied to the gear teeth of the rack gears and pinion gears.

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

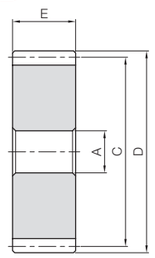
PUH Lubricated Helical Gears

Module 1.5~10

M *Lubrication Helical Gears*



Specifications	
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Pressure angle	20°
Helix angle	19°31'41"
Material	Polyurethane foam



S5

Catalog Number	Module	No. of teeth	Direction of spiral	Shape	Bore A	Pitch dia. C	Outside dia. D	Face width E	Mounting shaft to be set
PUH1.5-24R **PUH1.5-24L**	***m*1.5**	24	R L	S5	12	38.2	41.2	15	MAS1.5 or MAR1.5
PUH2-17R **PUH2-17L**	***m*2**	17	R L			36.1	40.1	20	MAS2 or MAR2
PUH3-17R **PUH3-17L**	***m*3**		R L			54.1	60.1	30	MAS3 or MAR3
PUH4-17R **PUH4-17L**	***m*4**		R L			72.2	80.2	40	MAS4 or MAR4
PUH5-17R **PUH5-17L**	***m*5**		R L		20	90.2	100.2	50	MAS5 or MAR5
PUH6-17R **PUH6-17L**	***m*6**		R L			108.2	120.2	60	MAS6 or MAR6
PUH8-17R **PUH8-17L** (made to order)	***m*8**	17	R L	S5	20	144.3	160.3	80	MAS8 or MAR8
PUH10-17R **PUH10-17L** (made to order)	***m*10**		R L			180.4	200.4	100	MAS10 or MAR10

[Application Hints] ① Can be used in temperatures from -30 to 150 °C.
② Setting is possible to either a rack or a pinion, but we recommend a pinion.
③ Avoid operations with high load until grease is applied to the gear teeth of the rack gears and pinion gears.

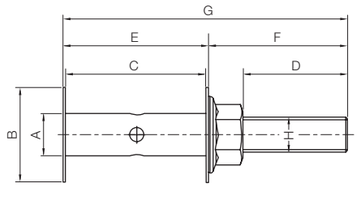
[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

DLS Schmiersysteme

Mounting Shaft for Lubricated Gears

M *Mounting Axes*

● Straight Type



Set Example

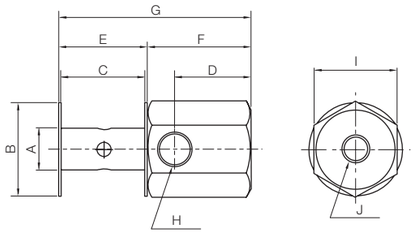
Surface treatment: Nickel plated

Catalog Number	A	B	C	D	E	F	G	H	I	J
								Connected screw		
MAS1.5	12	27	15.2	29.8	16.4	39.8	60.4	M10	15	M6
MAS2			20.2		21.4		61.2			
MAS2.5			24.2		25.4		65.2			
MAS3			30.2		31.4		71.2			
MAS4			40.2		41.4		81.2			
MAS5	20	60	50.2	49.1	51.4	64.9	116.3	M16	24	M10 (Fine)
MAS6			60.2		61.4		126.3			
MAS8 (made to order)	20	60	80.2	49.1	81.4	64.9	146.3	M16	24	M10 (Fine)
MAS10 (made to order)		100	100.2		101.4		166.3			

[Application Hints] ① Tube connector is not included.
② Due to specification changes, the connecting screw G1/8" has been changed to M10 (fine).

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

● Right Angle Type



Set Example

Surface treatment: Nickel plated

Catalog Number	A	B	C	D	E	F	G	H	I	J
								Connected screw		
MAR1.5	12	27	15.2	22	16.4	30	46.4	M10 (Fine)	24	M8×10
MAR2			20.2		21.4		51.4			
MAR2.5			24.2		25.4		55.4			
MAR3			30.2		31.4		61.4			
MAR4			40.2		41.4		71.4			
MAR5	20	60	50.2		51.4		81.4			
MAR6			60.2		61.4		91.4			
MAR8 (made to order)	20	60	80.2	22	81.4	30	111.4	M10 (Fine)	24	M8×10
MAR10 (made to order)		100	100.2		101.4		131.4			

[Application Hints] ① Tube connector is not included.
② Due to specification changes, the connecting screw G1/8" has been changed to M10 (fine).

[Precautions for Made to Order Products] ① Prices and lead times for Made to Order products require separate estimates. Contact your dealer.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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Oberes Dorf 1
95152 Selbitz

KHK Information

Kohara Gear Industry Co.,Ltd.

KHK was designated as a partner company for Sainokuni, an industrial development project organized by Saitama Prefecture in Japan.

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
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KHK Group

Kohara Gear Industry Co.,Ltd.
Design, manufacture and sales of KHK stock gears
Order and manufacture of various order-made gears

KHK Noda Co.,Ltd.
Manufacture/sales of gears and stock gears

KHK CO., LTD.
Purchase/sales of gears and variable speed reducers Trade in transmission items

Sales Overseas

KHK's global network is built throughout the world. See the website for details on each country and region.

Factory Introduction

JIT Line

Lathe

Tooth Cutting

Grinding Operations

Machining

Wire Cutting

Quality Assurance / Inspection

Warehouse of KHK Stock Gears

Production Equipment

Combined Machining Machine (INTEGREX J-200)

Vertical Machining Center (SVC2000)

Inner Surface Combined Grinding Machine (IGH-2NT)

CNC Hobbing Machine (KN-152)

Hobbing Board (KL-451)

Gear Grinding Machine (VIPER500W)

Wire Electric Discharge Machine (C-600iA)

Combined Machining Machine (DMU 85 FD monoBLOCK)

KHK Noda Co., Ltd.

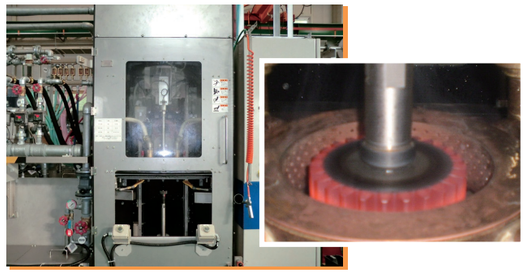
KHK Noda Co., Ltd.　143 Nakazato, Noda-shi, Chiba, 270-0237

Quality Assurance

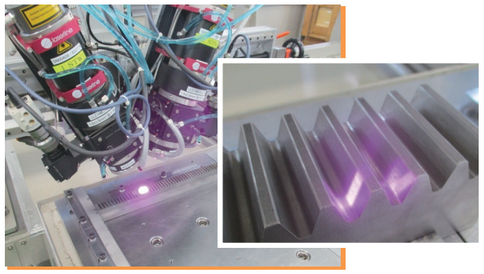
Carl Zeiss 3D Coordinate Measuring Machine (ACCURA)

Gear Measuring System (350GMS)

Hardening Equipment



Induction Hardener (MK16A STAT300-50)



Laser Hardener (LDF4000-40)

Production Equipment

Rack Grinding Machine (ZSM Compact 2200)

CNC Lathe (MW120EXG)

Vertical Machining Center (PCV-31)

CNC Gear Grinding Machine (300TWG)

CNC Bevel Gear Grinding Machine (PH-280HG)

Vertical Machining Center (VCN-530C)

CNC Screw Grinding Machine (TE-LM200)

Packaging Machine (EPK-S)

Discontinued Stock Product Model Number History Table

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Category	Discontinued Products		Specifications		Alternative	Sales Period
	Item	Range	Characteristics	Material	Item	
Spur Gears	MSGA/MSGB	Some products of module 1,1.5, 2, 2.5, 3, 4	Carburized	SCM415	Custom order	1978~2024
	KSG	Some products of module 1, 1.5, 2, 2.5, 3	Thermal refined, gear teeth induction hardened	SCM440	Custom order	2018~2024
	SSGS	Some products of module 1.5, 2, 2.5, 3	Thermal refined, gear teeth induction hardened	S45C	Custom order	1984~2024
	SSG	Some products of module 0.5, 0.8, 1, 1.5, 2.5, 3	Finished	S45C	Custom/Made to Order	2008~2024
	SSAG	Some products of module 1, 2.5, 3, 4	Finished	S45C	Custom order	2016~2024
	KS	All	Thermal refined	SCM440	Made to Order	2018~2024
	SSS	Some products of module 0.5, 0.8, 1, 1.5, 2, 2.5, 3	Shaft Type	S45C	Custom order	2008~2024
	SS	Some products of module 0.5~6	Finished	S45C	Made to Order / Secondary Operations	1974~2024
	SSA	Module 1.5, 2.5	Finished	S45C	Custom order	1974~2024
	SSY	Some products of module 0.8, 1, 1.25	With Hub	S45C	Custom order	1984~2024
	SSAY	Module 1.25	Hubless	S45C	Custom order	1988~2008
	SSAY/K	All	K clamp (patented)	S45C	No production	2002~2017
	SSH	All	Honing treatment on Tooth Surface	S45C	SSG	1973~1975
	LS	m0.5-25,40 m0.8-25,40,60,70,80	Sintered item	SMF5040	SS	2000~2014
	CS	All	Molded	FC200	SS	1973~1984
	SUSL	All	F-loc	SUS303	SUSF	1996~2016
	DSL	All	F-loc	Acetal (SUS303)	DSF	2000~2016
	SUS/SUSA	Some products of module 1, 1.5, 2.5, 3	Finished	SUS303	Custom order	1978~2024
	SUSF	Module 0.5, 1	F-loc	SUS303	Custom order	2016~2024
	DSF	Module 0.5, 1	F-loc	Polyacetal (SUS303)	Custom order	2016~2024
	NSU	Some products of module 1,1.5, 2, 2.5, 3	With core hub	MC602ST (S45C)	Custom order	1988~2024
	PSU	All	With core hub	MC901 (FC200)	PU	1988~1996
	PU	Some products of module 1.5	With core hub	MC901 (SUS303)	Custom order	1996~2024
	PS/PSA	Some products of module 1, 1.5, 2.5, 3	Finished	MC901	Custom order	1975~2024
	DS	Some products of module 0.5, 0.8, 1	Molded item	Duracon (R) (M90-44)	Custom order	1988~2024
	BSS	Some products of module 0.5, 0.8, 1	Finished	C3604	Made to Order / Secondary Operations	2008~2020
	MSCPG	All	Carburized	SCM415	Made to Order	2014~2020
	KSCPG	Some products of CP 5, 10	Thermal refined, gear teeth induction hardened	SCM440	Custom order	2018~2024
	SSCPGS	Some products of CP 5	Thermal refined, gear teeth induction hardened	S45C	Custom order	1992~2024
	SSCPG	Some products of CP 15.20	Gear teeth induction hardened	S45C	Custom order	1984~2024
	KSCP	All	Thermal refined, gear teeth induction hardened	SCM440	KSSCP Hardened Plus	2014~2019
	KTSCP	Some products of CP 5, 10	CP, Thermal Refined	SCM440	Custom order	2000~2024
	KSSCP	Some products of CP 5, 10	CP, Thermal Refined	SCM440	Custom order	2018~2024
	SSCP	Some products of CP 2.5	CP	S45C	Custom order	1978~2024
	SUSCP	Some products of CP 10	CP	SUS303	Custom order	1989~2024
Helical Gears	KHCPG	All	CP, Ground	SCM440	Custom order	1992~1992
	KHG	Some products of module 1,1.5, 2, 2.5, 3	Transverse modules, ground gears	SCM440	Custom order	1989~2024
	SH	Some products of module 2	Normal module	S45C	Custom order	1974~2024
Internal Ring Gears	CI	All	Molded	FCD55	SI	1973~1978
	SI	Some products of module 1.5, 2, 2.5, 3	Finished	S45C	Custom order	1978~2024
Racks	KRG	All 500mm	Thermal Refined, Ground	SCM440	KRGF	1984~2020
	KRGD	All	Thermal Refined, Ground	SCM440	KRGFD-HJ	1984~2019
	SR	Lengths over 1000 mm	Common Type	S45C	SRF	1973~2008
	SRG/SRGF	Module 0.5, 0.8	Gear teeth induction hardened	S45C	Made to Order	1996~2022
	SUR	Lengths over 1000 mm	Stainless Steel	SUS304	SURF	1978~2020
	DRF	Some products of module 1.5, 2, 2.5, 3	Polyacetal	Polyacetal	PRF	2014~2024
	PR	Lengths over 1000 mm	Plastic	MC901	PRF	1984~2020
	BSR	Module 1.25	Contains Brass	C3604	Custom order	1984~2008
	SRO	SRO6-1000	Round Racks	S45C	Custom order	1975~2019
	CR	All	Molded	FC200	SRF	1973~1978
	SRH	Some products of module 2.3	Common Type	S45C	Custom order	1974~2024
	KRGCP	All 500mm	Thermal Refined, Ground	SCM440	KRGCPF	1986~2020
	SRGCPF	Some products of CP 15.20	Gear teeth induction hardened	S45C	Made to Order / Secondary Operations	1996~2024
	KRGCPD	All	CP, Thermal Refined, Ground	SCM440	KRGCPFD-HJ	1984~2019
Racks	SRCP	Lengths over 1000 mm	CP	S45C	SRCPF	1978~2008
	SRCPF	Some products of CP 15.20	CP	S45C	Made to Order / Secondary Operations	1978~2024
Helical Racks	KRHG	Some products of module 2, 2.5, 3	Thermal Refined, Ground	SCM440	Custom order	1992~2022
	KRHGCPF	All	CP, Ground	SCM440	Custom order	1992~1992
Spiral Miter Gears	SMS	Some products of module 1, 1.25, 1.5	Common Type	S45C	Custom order	1975~2024
	SMSG	Some products of module 1, 1.5, 2, 2.5, 3, 3.5, 4, 5	Gear teeth induction hardened	S45C	Custom order	1996~2024
	KSP	F Type (Finished Products with Key Groove) All Products, Parts of m1.5 to 6	Finished	SCM415	Made to Order / Secondary Operations	2004~2022
	MMS	Some products of module 2, 2.5, 3	Finished	SCM415	Custom order	1984~2024
Straight Miter Gears	CM	All	Molded	FC20	SM	1973~1978
	FM	All	Precision Molded	S45C	SM	1973~1978
	SMA/B/C	Some products of module 3.5, 6, 8	Finished	S45C	Custom order	1973~2022
	SM	Some products of module 4.5	Common Type	S45C	Custom order	1973~2024
	SUM	Some products of module 1, 1.5	Finished	SUS303	Custom order	1978~2024
	PM	Some products of module 1, 1.25, 1.5, 2, 2.5, 3	Plastic	MC901	Custom order	1975~2024
Ground Zerol Miter Gears	SMZG	All	Thermal refined, gear teeth induction hardened	S45C	Custom order	2010~2020
High-Ratio Hypoid Gears	MHP	Reduction ratios 90, 120, 180, 200, 20 (m1), 30 (m1.5)	High reduction ratio with a pair of gears	SCM415	No production	2000~2016
Spiral Bevel Gears	MBSA	Some products of module 1.5 or less, 2, 2.5, 3, 4, 5, 6	Finished	SCM415	Custom order	1978~2020
	MBSB	Some products of module 1.5 or less, 2, 2.5, 3, 4, 5, 6	Finished	SCM415	Custom order	1978~2020
	KSP	F Type (Finished Products with Key Groove) All Products, Parts of m1.5 to 6	Finished	SCM415	Custom order	2004~2022
	SBS	Some products of module 2.5	Common Type	S45C	Custom order	1973~2024
Straight Bevel Gears	FB	All	Precision Molded	S45C	SB	1973~1978
	SB	CB gear mating pinions with module over m5/some of m1.25	Common Type	S45C	SBY	1973~2024
	CB	All items having SB	Molded	FC200	SB, SBY	1973~2000
	CB	SB mating gears with module over m5	Molded	FC200	SB, SBY	1973~2006
	PB	Some products of module 2.5, 3	Plastic	MC901	Custom order	1978~2024
Ground Zerol Bevel Gears	SBZG	All	High reduction ratio with a pair of gears	S45C	Custom order	2010~2020
Screw Gears	SN	Some products of module 1, 4	Common Type	S45C	Custom order	1973~2024
	SUN	Some products of module 1, 2.5, 3	Stainless Steel	SUS303	Custom order	1989~2024
	AN	Module 2.5, 3,4	Contains Aluminum Bronze	CAC702 (AlBC2)	Made to Order	1979~2022
	PN	Some products of module 2.5, 3	Plastic	MC901	Custom order	1984~2024
Worms	KWGDL	Module Over 5	Duplex, Ground	SCM440	Custom order	1988~2002
	KWGDLS	Module Over 5	Duplex, Ground Shaft	SCM440	Custom order	1992~2002
	KWG	Right-hand helix with double threads with module over m5 (R2)	Ground Shaft	SCM440	Custom order	1978~2002
	SWG	Some products of module 3, 4, 6	Gear teeth induction hardened	S45C	Custom/Made to Order	1973~2024
	SW	Some products of module 4 or more	Common Type	S45C	Custom/Made to Order	1975~2024
	SUW	Module 2.5	Stainless Steel	SUS303	Custom order	1996~2024
Worm Wheels	AG	Some products of module 0.5, 3, 4, 6	Contains Aluminum Bronze	CAC702 (AlBC2)	Custom/Made to Order	1973~2024
	AGDL	Some products of module 1.5, 2, 2.5, 3, 3.5, 4	Duplex	CAC702 (AlBC2)	Custom order	1988~2024
	AGF	Some products of module 2, 2.5, 3	Contains Aluminum Bronze	CAC702 (AlBC2)	Custom order	1978~2024
	BG	Some products of module 1.25, 4, 5, 6	Contains Phosphor Bronze	CAC502 (PBC2)	Custom/Made to Order	1975~2024
	CG	Some products of module 1.5, 2.5, 3, 4, 5	Molded	FC200	Custom/Made to Order	1975~2024
	PG	Module 2.5	Plastic	MC901	Custom order	1975~2024
	DG	Module 0.5, 0.8	Polyacetal	Polyacetal	Custom order	2008~2022
Gearboxes	PBX	All	Bevel Gearboxes	—	No production	2004~2022
Other Products	SRT	Some products of module 2/3	Gear teeth induction hardened	S45C	Custom order	1973~2024
	SRTB	Some products of modules 2/3~4	Gear teeth induction hardened	S45C	Made to Order	1992~2022
	GC	All TK	Gear Couplings	S45C	GC-J	1975~2020
	HEPCO	Some RSJ, RLJ, BHJ, LB, and R products	HEPCO	—	Made to Order	2004~2022
One-cycle-clutch type geared motor	F	All	Without motor		No production	1973~1980
	IM	All	With motor		No production	1973~1980
	M	All	With motor		No production	1973~1980
Gear calculation software	GCSW	All	General gear calculation		Online GCSW	1988~2009
Electronic catalog (Japanese version only)	30XX	All	Product information for KHK stock gears DXF, strength calculation, etc.		Website	1992~2011

ZAHNRAD24.COM
Tel +49 (0)9280-7390088
info@zahnrad24.com
HAHN
FEINWERKTECHNIK GmbH
Oberes Dorf 1
95152 Selbitz

Customer Trust and Satisfaction

KHK® STOCK GEARS

KHK CO., LTD.

Overseas Sales Department **13-15 Nakacho, Kawaguchi-shi, Saitama-ken, 332-0022 Japan**
Phone : +81- 48(254)1744 **Fax : +81- 48(254)1765**

URL https://khkgears.net/new/ E-mail info@khkgears.net

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