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Catalog Number of KHK Stock Gears

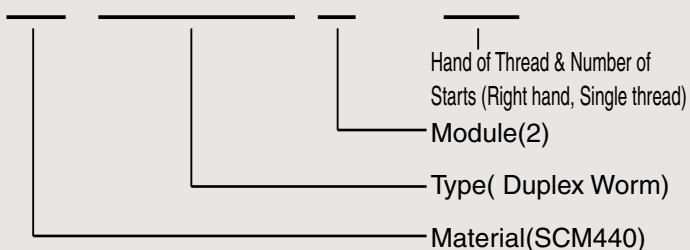
The Catalog Number for KHK stock gears is based on the simple formula listed below.
Please order KHK gears by specifying the Catalog Numbers.

(Example)

Worm Gear Pair

Worms

K WGDL 2 - R1

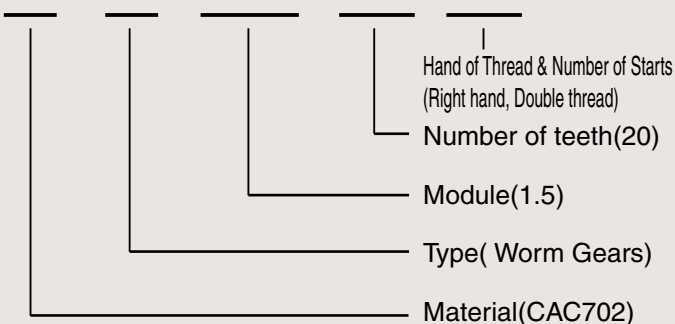


Worms

Material	Type	
K SCM440	W	Worms
S S45C	WG	Ground Worms
SU SUS303	WGDL	Duplex Ground Worms

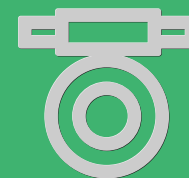
Worm Wheels

A G 1.5 - 20 R2



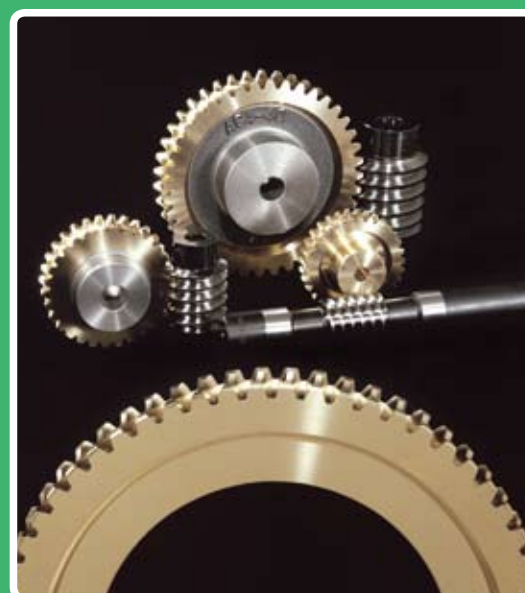
Worms Wheels

Material	Type	
A CAC702(A ℓ BC2)	G	Worm Gears
B CAC406C(BC6) CAC502A(PBC2)	GDL	Duplex Worm Gears
C FC200		* () indicates old JIS designation
P MC901		



9

Worm Gear Pair





Worm Gear Pair

Available in Speed Reduction Ratios of 1/10 to 1/120 in Many Materials and Styles.



Characteristics

The simplest way to obtain a large speed reduction with high torque in a compact space is with worm gear drives. KHK stock worms and worm wheels are available in modules 0.5~6 and in speed ratios of 1/10~1/120, made in a variety of materials and styles. We also offer stock duplex worms and worm wheels with which you can obtain a very low backlash, high rotational precision system.

Main Features of Types of Worm Gear Pair Offered

The following table lists the main features for easy selection.

Type	Catalog No.	Module	No. of threads or speed ratio	Material () indicates old JIS designation	Heat treatment	Tooth surface finish	Precision KHK W 001 KHK W 002 NOTE 2	Main Characteristics
Duplex Worms & Worm Wheels	Worm	KWGD	2~4	Single thread	SCM440	Teeth induction hardened	Ground	Duplex lead worms have slightly different leads and lead angles on the opposite face of the gear tooth. A range of backlash can be obtained by moving the worm axially. Worms have a high precision ground finish while worm wheels are made of abrasion-resistant Aluminum Bronze, making these the top-grade products. Worms come in bore type and shaft type styles.
	Worm	KWGDLS	2~4	Single thread	SCM440	Thermal refining and teeth induction hardened	Ground	
	Worm Wheel	AGDL	2~4	1/20~1/60	CAC702 (AIBC2)	—	Cut	
Worms & Worm Gears	Worm	KWG	0.5~6	Single thread~Double thread	SCM440	Thermal refining and teeth induction hardened	Ground	Use of worm shafts eliminate the need to attach worms to shafts. Machining of bearing journal can be performed on the shafts. KWG2 or larger worm shafts have smaller pitch diameters than the comparable SWG worms, which allow more compact design with higher efficiency.
	Worm Wheel	AG <small>NOTE 1</small>	0.5~1.5	1/10~1/60	CAC702 (AIBC2)	—	Cut	
	Worm Wheel	AGF <small>NOTE 1</small>	2~6	1/10~1/60	CAC702 (AIBC2)	—	Cut	
	Worm	SWG	1~6	Single thread~Triple thread	S45C	Teeth induction hardened	Ground	Superior strength and wear-resistance lead to compact designs with these gears. They have the same center distances as the more popular SW/CG series which permit substitution of these in place of SW/CG series for more demanding applications.
	Worm Wheel	AG <small>NOTE 1</small>	1~6	1/10~1/60	CAC702 (AIBC2)	—	Cut	
	Worm	SW	0.8~6	Single thread~Double thread	S45C	—	Cut (Thread rolled)	A large selection is available in these economical and most popular series. Modules range from 0.8 to 6 and speed ratios from 1/10 to 1/120. Worm wheels are also available in lightweight MC nylon which can be used without lubrication.
	Worm	SUW	1~3	Single thread~Double thread	SUS303	—	Cut	
	Worm Wheel	CG	1~6	1/10~1/120	FC200	—	Cut	
	Worm Wheel	BG	0.8~6	1/10~1/50	CAC406C(BC6) CAC502A(PBC2)	—	Cut	
	Worm Wheel	PG	1~3	1/10~1/50	MC901	—	Cut	

NOTE 1: The material of cast hubs of AGF and AG worm wheels is FC200. AG worm wheels mate primarily with SWG worms. But, for Modules 0.8 or smaller, AG worm wheels mate with KWG worms.

NOTE 2: KHK stock worms and worm wheels are produced to KHK's own precision grades. See the "Precision of Worms and Worm Gears" in the "Selection Hints" section.





Efficiency of Worm Gear Drives and Their Self-Locking Feature

1. Efficiency of Worm Gear Pair

The efficiency of power transmission varies somewhat with the conditions of assembly and lubricant, but is generally 30~90% (excludes losses from bearings and churning of lubricants). The efficiency of KHK stock worm gear pair is given below as a reference.

Efficiency of KWGDL(S)/AGDL Worm Gear Pair (%) (min⁻¹=Rotation of worm)

Catalog No.	Worm min ⁻¹	100	300	600	900	1200	1800
KWGDL2 -R1		40	46	52	55	59	62
KWGDL2.5 -R1		42	49	55	59	62	66
KWGDL3 -R1		43	51	56	61	64	67
KWGDL3.5 -R1		43	52	58	62	65	68
KWGDL4 -R1		43	52	59	63	66	69

Efficiency of KWG/AGF Worm Gear Pair (%) (min⁻¹=Rotation of worm)

Catalog No.	Worm min ⁻¹	100	300	600	900	1200	1800
KWG0.5 -R1		31	36	39	42	44	47
KWG0.8 -R1		36	42	46	49	51	54
KWG1 -R1		36	42	46	49	51	56
KWG1.5 -R1		37	43	48	52	55	59
KWG2 -R1		46	53	58	61	64	67
KWG2.5 -R1		46	53	58	62	65	68
KWG3 -R1		46	53	59	63	66	69
KWG4 -R1		52	59	65	69	71	74
KWG5 -R1		53	61	67	71	73	76
KWG6 -R1		54	62	69	72	74	77
KWG0.5 -R2		47	52	56	59	61	64
KWG0.8 -R2		52	58	62	65	67	70
KWG1 -R2		53	58	63	66	68	71
KWG1.5 -R2		54	59	65	68	70	74
KWG2 -R2		62	68	73	75	77	80
KWG2.5 -R2		62	68	73	76	78	81
KWG3 -R2		62	69	74	76	79	81
KWG4 -R2		67	73	78	81	82	85

Efficiency of SWG/AG Worm Gear Pair (%) (min⁻¹=Rotation of worm)

Catalog No.	Worm min ⁻¹	100	300	600	900	1200	1800
SWG1 -R1		36	42	46	49	51	56
SWG1.5 -R1		37	42	48	52	55	59
SWG2 -R1		40	46	52	55	59	62
SWG2.5 -R1		42	49	55	59	62	66
SWG3 -R1		43	51	56	61	64	67
SWG4 -R1		43	52	59	63	66	69
SWG5 -R1		47	56	63	66	69	72
SWG6 -R1		49	58	65	68	71	74
SWG1 -R2		53	58	63	66	68	71
SWG1.5 -R2		54	59	65	68	70	74
SWG2 -R2		56	63	68	71	71	77
SWG2.5 -R2		59	65	71	74	76	79
SWG3 -R2		60	67	72	75	78	80
SWG4 -R2		60	68	74	77	79	81
SWG5 -R2		63	71	77	79	81	84
SWG6 -R2		66	73	78	81	83	85
SWG3 -R3		69	74	79	82	84	85
SWG4 -R3		69	75	80	83	84	86

Efficiency of SW, SUW/CG, BG, PG Worm Gear Pair (%)

The efficiency is approximately as follows, depending on the assembly, loading, lubrication and rotational speed:

Single thread	40~50%
Double thread	50~60%

2. Self-Locking Feature of Worm Gear Pair

Self-locking is defined as the inability of worm wheels to drive the worms. Factors affecting the self-locking feature include the materials of the worm and worm wheel, lead angle, precision of manufacture, types of bearings, lubricant, etc. Thus, it is not dependent simply on the lead angle. But, in general, self-locking will occur when the lead angle in a single thread worm is less than 4°. For systems requiring fail-safe prevention of back drive, we recommend other braking mechanisms or one-way clutches.



Worm Gear Pair



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. Use of catalog numbers when ordering will simplify and expedite the processing of your order.

1. Caution in Selecting the Mating Gears

Worms and worm wheels have either right-hand or left-hand helix. The same hand worms and worm wheels comprise sets. However, the number of threads and whether they use normal module or axial module system must also be matched. The table below shows available combinations of KHK stock worms and worm wheels.

Mating Worm Gear Selection Chart

Worm		Mating worm wheel <small>NOTE 1</small>
KWGD(L)(S)	RH, single	AGDL RH, single
KWG	RH, single	AGF, AG0.5~AG1.5 RH, single
	RH, double	AGF, AG0.5~AG1.5 RH, double
SWG	RH, single	AG RH, single
	RH, double	AG RH, double
	RH, triple	AG RH, triple
SW	RH, single	CG, BG, PG RH, single
	RH, double	CG, BG, PG RH, double
	LH, single	CG, BG LH, single
	LH, double	CG, BG LH, double
SUW	RH, single	CG, BG, PG RH, single
	RH, double	CG, BG, PG RH, double

NOTE 1: Select the same module for both members.

2. Caution in Selecting Gears Based on Gear Strength

The gear strength values shown in the product pages were computed by assuming a certain application environment as shown 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

Item	KWGD(L)(S)/AGDL, KWG/AGF, SWG/AG	SW/CG, SW/BG	SUW/PG
Formula <small>NOTE 2</small>	Formula of worm gear's strength (JGMA405-01)		The Lewis formula
Rotations of worm	600min ⁻¹		Allowable bending stress 1.15kgf/mm ² (40°C with no lubricant)
Lubricant	Lubricant for gears with proper viscosity and with anti-pressure additives		
Lubrication	Oil bath		
Starting condition	Starting torque less than 200% of rated torque. Less than 2 starts per hour		
Durability	26000Hrs		
Impact from motor	Uniform load		
Impact from load	Uniform load		
Allowable stress factor Sc _{lim}	0.67	0.42	

NOTE 2: The gear strength formula is based on JGMA (Japanese Gear Manufacturer's Association) specifications and "MC Nylon Technical Data" by Nippon Polypenco Limited. The units for the rotational speed (min⁻¹) and the stress (kgf/mm²) are adjusted to the units needed in the formula.

The Helixes of Worms and Worm Wheels



The Maximum Allowable Sliding Speed Due to Heat

The maximum allowable sliding speed for each series of worm wheels is given below. Select the appropriate part by calculating the sliding speed.

Sliding speed v_s (m/s)

$$v_s = \frac{dn}{19100 \cos \gamma}$$

d : Worm pitch dia.
n : Worm speed (min⁻¹)
γ : Worm nominal lead angle

Catalog No.	Max. Sliding Speed (m/s)
AGDL	* 15
AGF	* 15
AG	* 15
BG	* 5
CG	* 2.5
PG	1 (no lubrication)

*JGMA405-01



3. Selecting Worms and Worm Wheels by Precision

The precision standards of KHK stock worms and worm wheels are established by us. The table below indicates the tolerance ranges for our products.

① Precision of worms (KHK W 001)

KHK established the precision grades 1~4 of worms. For profile and lead errors, JIS B 4354:1988, “Gear Hobs”, was used as reference. Lead errors are measured over one full revolution.

■ Precision Grades of Worms (KHK W 001) (Unit: μm)

Grade	Error	Module				
		over M0.4 up to 1	over M1 up to 1.6	over M1.6 up to 2.5	over M2.5 up to 4	over M4 up to 6
1	Tooth profile error	8	12	16	20	25
	Lead error	7	9	11	13	16
2	Tooth profile error	12	16	20	24	29
	Lead error	15	18	21	25	28
3	Tooth profile error	16	23	30	37	50
	Lead error	20	23	27	33	37
4	Tooth profile error	20	30	40	50	70
	Lead error	30	32	38	46	52

② Precision of worm wheels (KHK W 002)

We have established standard grades 1~5 of worm wheels using JIS B 1702:1976, “Precision of Spur and Helical Gears” as the reference.

■ Precision Grades of Worm Wheels (KHK W 002) (Unit: μm)

Grade	Error	over $m0.4$ up to 1		over $m1$ up to 1.6				over $m1.6$ up to 2.5				over $m2.5$ up to 4				over $m4$ up to 6										
		Pitch diameter (mm)																								
		6 up to 12	12 up to 25	25 up to 50	50 up to 100	100 up to 200	12 up to 25	25 up to 50	50 up to 100	100 up to 200	200 up to 400	12 up to 25	25 up to 50	50 up to 100	100 up to 200	200 up to 400	25 up to 50	50 up to 100	100 up to 200	200 up to 400	400 up to 800	25 up to 50	50 up to 100	100 up to 200	200 up to 400	400 up 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
	Tooth-to-tooth error	6	6	7	8	9	7	7	8	9	11	7	8	9	10	12	9	10	11	13	15	10	11	13	14	16
	Total composite 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
	Runout 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
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
	Tooth-to-tooth error	8	9	10	12	13	9	10	12	14	16	10	12	13	15	17	13	14	16	18	21	15	16	18	20	24
	Total composite 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
	Runout 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
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
	Tooth-to-tooth error	12	13	15	17	19	14	15	17	20	24	15	17	18	21	25	18	20	24	27	31	21	24	26	30	34
	Total composite 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
	Runout error	30	33	37	42	48	35	39	44	50	57	38	42	46	52	60	46	51	57	64	74	52	57	63	70	80
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
	Tooth-to-tooth error	17	19	21	25	28	20	22	26	29	34	21	25	27	31	38	27	30	33	40	46	31	34	39	44	50
	Total composite 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
	Runout 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
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
	Tooth-to-tooth error	25	28	31	35	43	29	33	39	44	51	32	35	41	47	53	41	45	50	57	69	46	51	56	66	75
	Total composite 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
	Runout 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

4. Other Points to Consider in the Selection Process

- ① There are various footnotes to the product pages under the headings of “CAUTION” and “NOTE”. Please consider them carefully when selecting these products.
- ② There may be slight differences in color or shape of products shown in the photographs from the actual products.
- ③ KHK reserves the right to make changes in specifications and dimensions without notice.
- ④ KHK standard Worms and Worm Wheels are made for general commercial machinery. Please avoid using them for precision positioning applications.
- ⑤ KHK is ready to produce and supply custom order products. When you require specific gears different from KHK Stock Gears please contact our distributor for quotation. Also, please refer to page 16 “KHK Custom Order Products”.



Worm Gear Pair



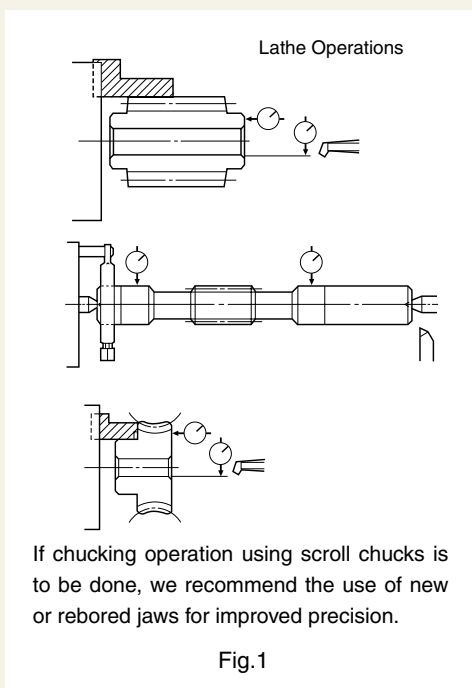
Application Hints

In order to use KHK stock worms and worm wheels 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.

KHK CO., LTD. TECHNICAL DEPARTMENT
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E-mail export@khkgears.co.jp

1. Caution on Performing Secondary Operations

- ① If you are reboring, it is important to pay special attention to locating the center in order to avoid runout. (Fig.1)
The reference datum for gear cutting or grinding is the bore.
(For worm shafts, it is ground portion of the shaft.) Therefore, use the bore or shaft 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.

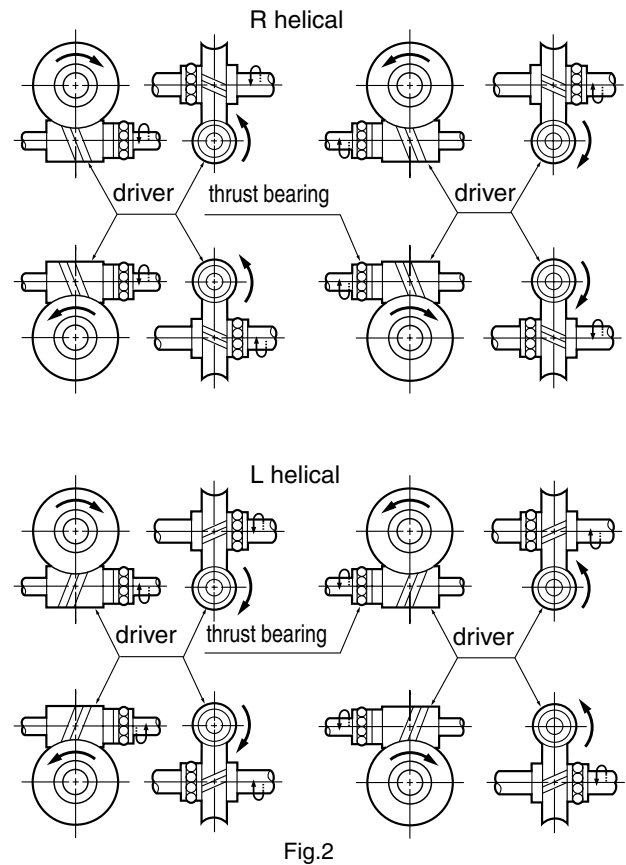


- ② To open up the bore to its maximum, calculate the bore size so that the tooth strength is weaker than the strength of the remaining material.
- ③ Some of SWG and KWG ground worms in small modules become hardened during heat treatment to the depth of 1 to 2mm below the root. Caution must be exercised when performing secondary operations on the bore.
- ④ Heat treating SW worms will increase lead and pressure angle errors. Therefore, pay special attention to the backlash and tooth contact.
- ⑤ PG plastic worm wheels are susceptible to effects of temperature and moisture. Dimensions may change between during remachining operations and afterwards.

2. Points of Caution in Assembling

- ① KHK stock worms and worm wheels are designed such that when assembled according to the specified mounting distance with a tolerance of H7-H8, the backlash shown in the product tables is obtained. Do not attempt to eliminate backlash by pushing worms into worm wheels or operate with the worm shifted in the direction along the tooth.
- ② Because of the helix of the gear teeth, worms and worm wheels produce axial thrust forces. The directions of thrust depend on the hand of the helix and the direction of rotation. This is illustrated below in Fig.2. The bearings must be selected properly to be able to handle these thrust forces.

Direction of rotation and thrust force



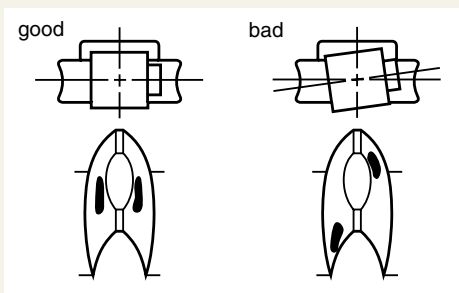
③ Overall Length Tolerance of Worms

Type	Series	Total length(mm)	
		0~99	100~200
Bore Type	KWGD L	0 -0.1	
	SWG, SW SUW	0 -0.15	0 -0.2
Shaft Type	KWGDLS KWG	Normal tolerance	

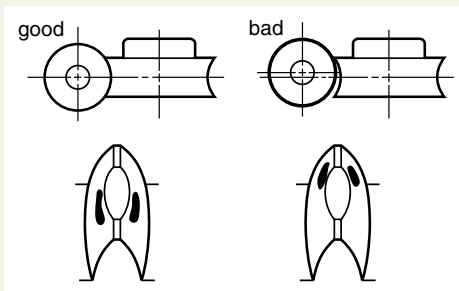


- ④ Because large thrust forces act on worms, if they are not secured to the shaft firmly, they tend to shift. Use of step shafts, set screws, dowel pins, etc., are recommended. Also, check for loosening of bearings due to thrust forces.
- ⑤ How well the worms and worm wheels are assembled has large effects on the friction of the unit. The tooth contact at the time of assembly must be checked for correctness as shown below.

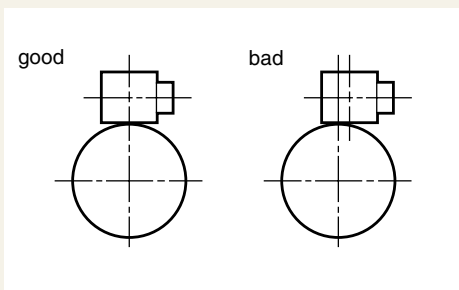
- Verify that the worm axis is perpendicular to the worm wheel axis.



- Check for the worm axis to be in the center of the worm wheel face width.



- Confirm that the center of the worm wheel goes through the midpoint of the worm length. The worm cannot rotate correctly if the worm is engaged close to either end of its length.



3. Notes on Starting Operations

- ① Before operating, check the following:
 - Are the gears firmly mounted on the shafts?
 - Have you eliminated uneven tooth contact?
 - Does the gear mesh have a proper amount of backlash?
(Please avoid the condition of no backlash)
 - Is there sufficient lubrication?
- ② If the gears are exposed, install a safety cover for protection. Never touch gears while they are in motion.
- ③ Check the noise and vibration while the machine is in operation for any unusual conditions. If an abnormality is encountered, recheck the gears and assembly conditions. Also, check lubrication after start-up. Sometimes, when the unit is initially being operated, lubricating oil deteriorates rapidly.
- ④ Worm gear drives generate more heat than other types of gear drives. Extra care should be exercised in the selection and amount of lubricant.

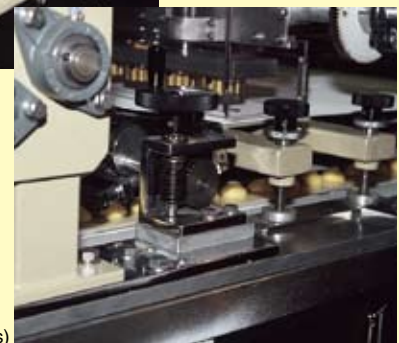
4. Other Points to Consider in Applications

- ① KHK products are individually packaged to avoid damage. Depending on how they are handled, it is still possible to deform or break them. It is important to exercise care in handling these parts.
- ② Check the products as they are being taken out of the boxes. If any of them are rusted, scratched or dented, please return to the dealer where they were bought, for exchange.
- ③ KHK cannot guarantee the precision of gears once the customer performs a secondary operation on them.

Example of KHK Gear Applications



Food Processing Machine (Worm Gear)



Confectionery making machine (Worm Gears)



Worm Gear Pair

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 require 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.

1. 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.

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 guide 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)

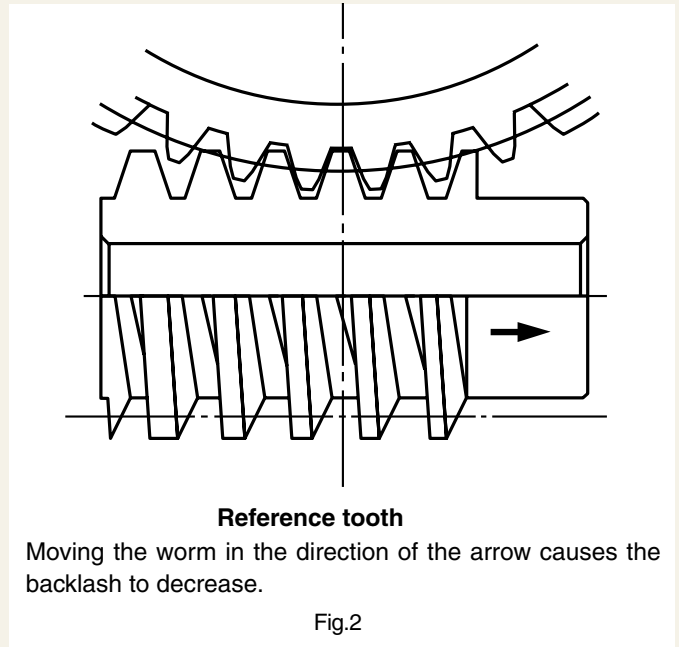


Fig.2

CAUTION: The KHK duplex worm is designed so that, for all modules, the backlash reduces by 0.02mm when the worm is shifted 1mm.

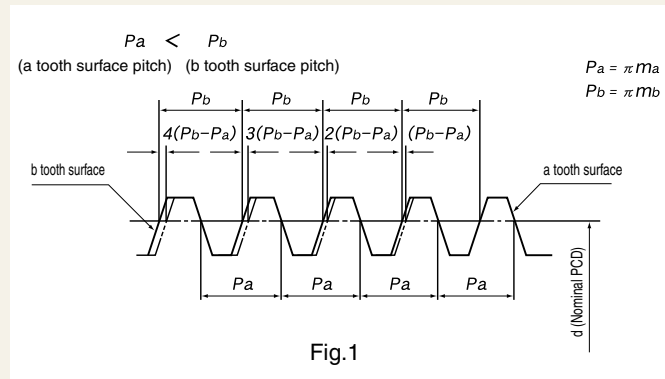


Fig.1

CAUTION: The amount of change in backlash (Δj 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 and m_b are duplex modules from the table.



2. Point of caution during assembly

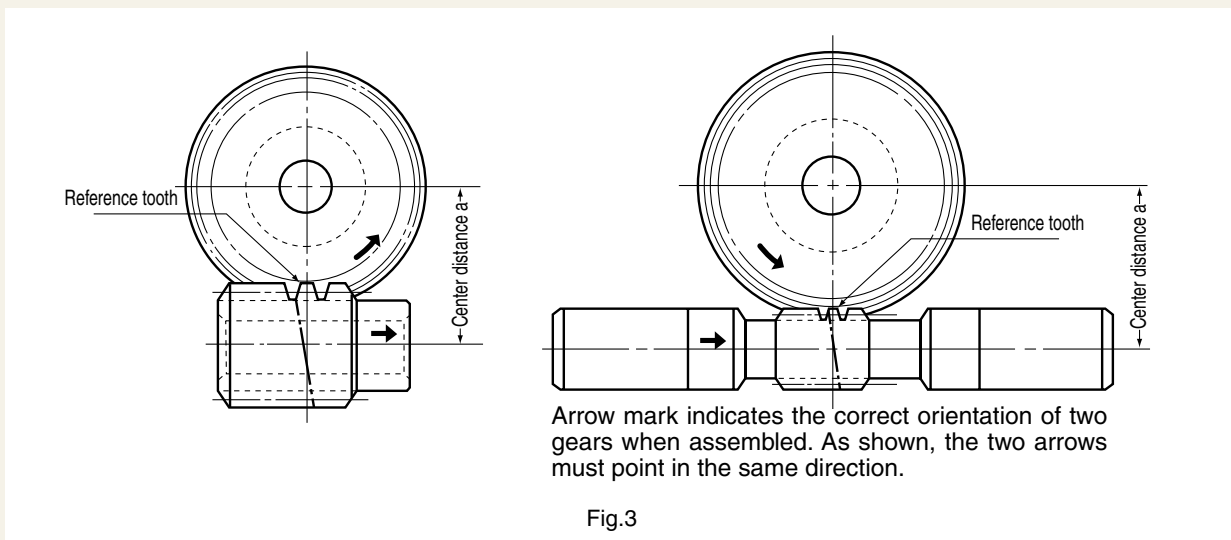
KHK duplex worm gears differs in module between the right and left tooth surface and, therefore, you must orient the worm and worm wheel properly. Please carefully verify the following two aspects before proceeding with assembly.

■ 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. Should the assembly be incorrect, the center distance “a” will become larger than the normal distance, resulting in difficulty of assembly and improper gear engagement. (Fig.3)

■ Verifying the reference position

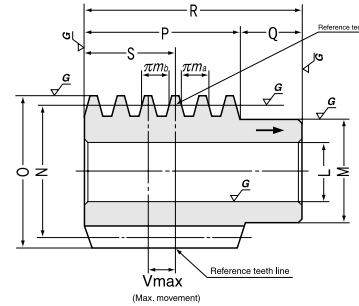
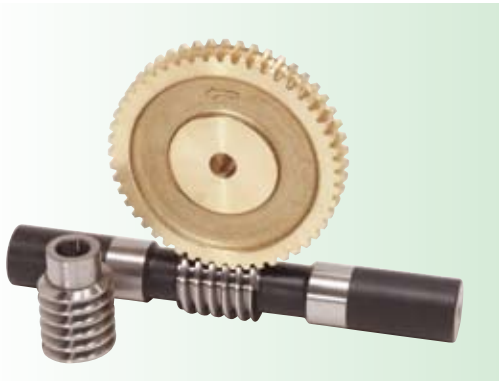
A V-groove (60°, 0.3mm deep line) on tip peripheral of the duplex worm tooth marks the reference tooth. The gear set is designated to have a backlash of nearly zero (± 0.03) when the reference tooth is positioned in alignment with the center of rotation of the worm wheel with the center distance set at the value “a” (Fig.3)



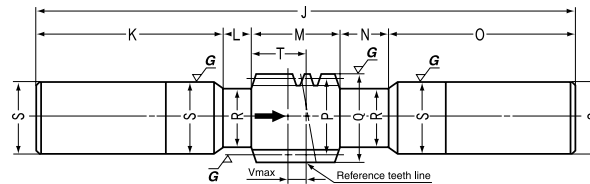


KWGDL(S) Duplex Worms, AGDL Worm Wheels

Nominal Axial Module **2**



W4 Shape



W6 Shape

Module 2 Duplex Worms

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						L _{H7}	M	N	O	P	Q	R
KWGDL2-R1	m2	1	3°41'	R	W4	14	25	31	35	36	14	50

Module 2 Duplex Worm Shafts

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWGDL2-R1	m2	1	3°41'	R	W6	220	75	13	36	21	75	31

Module 2 Duplex Worm Wheels

Catalog No.	Reduction ratio	Nominal axial module	No. of teeth	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width
							A _{H7}	B	C	D	D'	E	F
AGDL2-20R1	20	m2	20	3°41'	R	H1	12	33	40	44	46	18	15
AGDL2-30R1	30		30	3°41'	R	H1	15	40	60	64	66	18	15
AGDL2-36R1	36		36	3°41'	R	H1	15	45	72	76	78	18	15
AGDL2-40R1	40		40	3°41'	R	H1	15	45	80	84	86	18	15
AGDL2-50R1	50		50	3°41'	R	H1	15	50	100	104	106	18	15
AGDL2-60R1	60		60	3°41'	R	H1	15	60	120	124	126	18	15

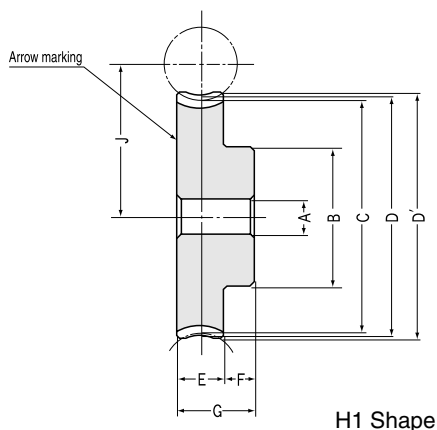
CAUTION: Duplex worms and worm wheels must be mated in a predetermined orientation. Please see the beginning of this section (page 298) for details.
CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.

Worm Gear Pair

KWGDLS · AGDL



Duplex Worms, Worm Wheels



H1 Shape

Specifications

Catalog No.	KWGD L	KWGDLS	AGDL
Precision grade	KHK W 001 grade 1	KHK W 001 grade 1	KHK W 002 grade 1
Reference section of gear	Axial	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	17°30'	17°30'	17°30'
Material	SCM440	SCM440	CAC702 (Formerly JIS A ̢BC2)
Heat treatment	Teeth induction hardened after thermal refining	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	50~55HRC	—
Surface treatment	—	Black oxide except ground surfaces	—
Tooth surface finish	Ground	Ground	Cut
Datum reference surface for gear cutting and grinding	Bore	Shaft (ground portion)	Bore
Secondary Operations	Possible except tooth area	Possible except tooth area	Possible

CAUTION: A ̢BC2 is aluminum bronze.

Position of reference tooth NOTE 1	Max. allowable shift NOTE 2	Weight (kg)	Catalog No.
S	Vmax		
22	8	0.21	KWGD L2-R1

NOTE 1: If the worm and worm wheel are assembled to the standard center distance, it is designated to have a near zero backlash (+/-0.03).

NOTE 2: When the center distance is moved so as to reduce the backlash, V max is the maximum amount that you may shift without causing problems with gear mesh. It is not the recommended adjustment value.

Outside dia.	Neck dia.	Shaft dia. NOTE 3	Position of reference tooth NOTE 1	Max. allowable shift NOTE 2	Weight (kg)	Catalog No.
Q	R	S	T	Vmax		
35	24	30	22	8	1.2	KWGDLS2-R1

NOTE 3: The shaft O.D., S, has the tolerance +0.2/+0.1 except where ground the tolerance is +0.40/+0.35.

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 4	Allowable torque (kgf·m)	Bac4klash (mm)	Weight (kg)	Catalog No.
G	(H)	(I)	J	Surface durability	Surface durability			
33	—	—	35.5	11.2	1.14	0±0.045	0.28	AGDL2-20R1
33	—	—	45.5	24.8	2.53	0±0.045	0.55	AGDL2-30R1
33	—	—	51.5	35.5	3.62	0±0.045	0.79	AGDL2-36R1
33	—	—	55.5	43.6	4.45	0±0.045	0.93	AGDL2-40R1
33	—	—	65.5	66.9	6.83	0±0.045	1.40	AGDL2-50R1
33	—	—	75.5	94.6	9.64	0±0.045	2.04	AGDL2-60R1

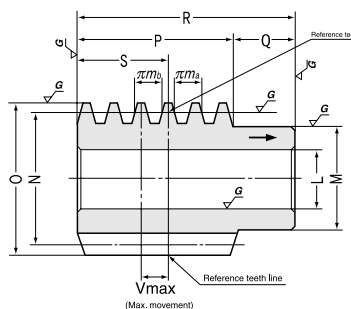
NOTE 4: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The table below shows the allowable worm wheel torques (N·m) at selected worm speeds.

AGDL2 Allowable Worm Wheel Torques (N·m)

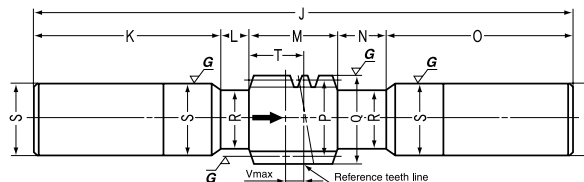
Catalog No.	Worms min ⁻¹						
	30	100	300	600	900	1200	1800
AGDL2-20R1	21	17.45	13.63	11.22	9.84	8.94	7.75
AGDL2-30R1	44.3	37.3	29.6	24.8	21.9	19.8	17.43
AGDL2-36R1	62.3	52.6	42	35.5	31.3	28.4	25
AGDL2-40R1	75.8	64	51.4	43.6	38.5	34.9	30.7
AGDL2-50R1	114.5	96.8	78.4	66.9	59.5	54.2	47.6
AGDL2-60R1	160.2	136	110.4	94.6	84.9	77.2	68.1

Worm Gear Pair

KWGD L · KWGDLS · AGDL



W4 Shape



W6 Shape

Module 2.5 Duplex Worms

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						L _{H7}	M	N	O	P	Q	R
KWGD2.5-R1	m2.5	1	3°52'	R	W4	18	30	37	42	48	17	65

Module 2.5 Duplex Worm Shafts

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWGD2.5-R1	m2.5	1	3°52'	R	W6	260	85	16	48	26	85	37

Module 2.5 Duplex Worm Wheels

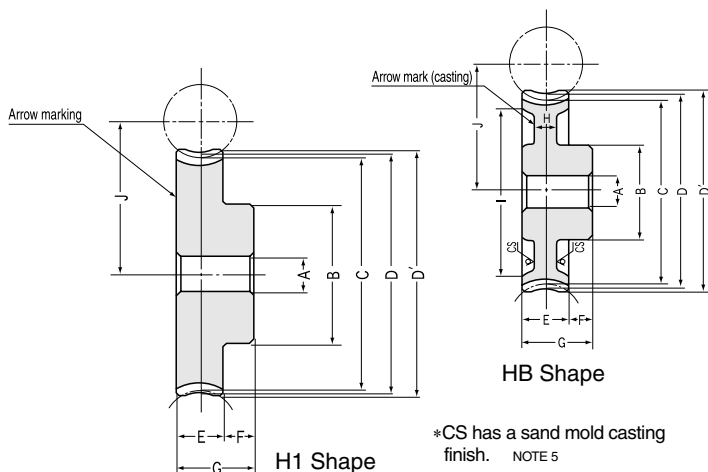
Catalog No.	Reduction ratio	Nominal axial module	No. of teeth	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width
							A _{H7}	B	C	D	D'	E	F
AGDL2.5-20R1	20	m2.5	20	3°52'	R	H1	15	40	50	55	57.5	22	15
AGDL2.5-30R1	30		30	3°52'	R	H1	15	40	75	80	82.5	22	15
AGDL2.5-36R1	36		36	3°52'	R	H1	15	45	90	95	97.5	22	15
AGDL2.5-40R1	40		40	3°52'	R	HB	15	45	100	105	107.5	22	15
AGDL2.5-50R1	50		50	3°52'	R	HB	15	60	125	130	132.5	22	15
AGDL2.5-60R1	60		60	3°52'	R	HB	15	80	150	155	157.5	22	15

CAUTION: Duplex worms and worm wheels must be mated in a predetermined orientation. Please see the beginning of this section (page 298) for details.

CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.



Duplex Worms, Worm Wheels



Specifications

Catalog No.	KWGDL	KWGDS	AGDL
Precision grade	KHK W 001 grade 1	KHK W 001 grade 1	KHK W 002 grade 1
Reference section of gear	Axial	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	17°30'	17°30'	17°30'
Material	SCM440	SCM440	CAC702 (Formerly JIS A & BC2)
Heat treatment	Teeth induction hardened after thermal refining	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	50~55HRC	—
Surface treatment	—	Black oxide except ground surfaces	—
Tooth surface finish	Ground	Ground	Cut
Datum reference surface for gear cutting and grinding	Bore	Shaft (ground portion)	Bore
Secondary Operations	Possible except tooth area	Possible except tooth area	Possible

CAUTION: A & BC2 is aluminum bronze.

Position of reference tooth NOTE 1	Max. allowable shift NOTE 2	Weight (kg)	Catalog No.
S	Vmax	0.37	KWGDL2.5-R1

NOTE 1: If the worm and worm wheel are assembled to the standard center distance, it is designated to have a near zero backlash (+/-0.03).

NOTE 2: When the center distance is moved so as to reduce the backlash, V max is the maximum amount that you may shift without causing problems with gear mesh. It is not the recommended adjustment value.

Outside dia.	Neck dia.	Shaft dia. NOTE 3	Position of reference tooth NOTE 1	Max. allowable shift NOTE 2	Weight (kg)	Catalog No.
Q	R	S	T	Vmax	2.10	KWGDS2.5-R1

NOTE 3: The shaft O.D., S, has the tolerance +0.2/+0.1 except where ground the tolerance is +0.40/+0.35.

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 4	Allowable torque (kgf·m)	Bac4klash (mm)	Weight (kg)	Catalog No.
G	(H)	(I)	J	Surface durability	Surface durability			
37	—	—	43.5	20.1	2.05	0±0.045	0.50	AGDL2.5-20R1
37	—	—	56	44.5	4.54	0±0.045	0.77	AGDL2.5-30R1
37	—	—	63.5	63.8	6.50	0±0.045	1.07	AGDL2.5-36R1
37	(10)	(86)	68.5	78.3	7.98	0±0.045	1.24	AGDL2.5-40R1
37	(12)	(108)	81	120	12.3	0±0.045	2.09	AGDL2.5-50R1
37	(12)	(133)	93.5	170	17.3	0±0.045	3.11	AGDL2.5-60R1

NOTE 4: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The table below shows the allowable worm wheel torques (N·m) at selected worm speeds.

NOTE 5: The dimension tolerance of CS parts are the very coarse grade of JIS B 0405.

AGDL2.5 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worms min ⁻¹						
	30	100	300	600	900	1200	1800
AGDL2.5-20R1	38.1	31.4	24.5	20.1	17.6	16.04	13.75
AGDL2.5-30R1	80.5	67.1	53.1	44.5	39.1	35.5	30.9
AGDL2.5-36R1	113.2	94.5	75.5	63.8	56	51	44.3
AGDL2.5-40R1	137.8	115	92.4	78.3	68.8	62.7	54.4
AGDL2.5-50R1	208	174	141	120.1	106.3	97.3	84.3
AGDL2.5-60R1	291	245	198.4	169.8	151.8	138.5	120.8

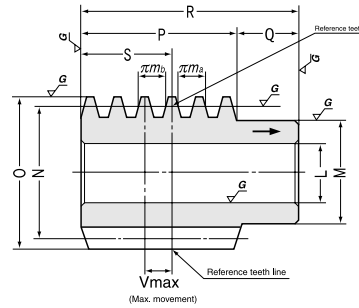
Worm Gear Pair

KWGDL · KWGDS · AGDL

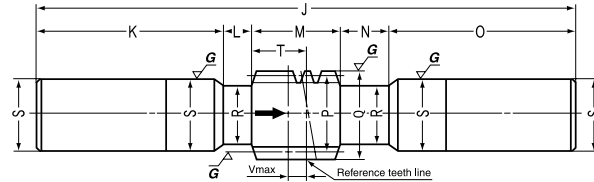


KWGDL(S) Duplex Worms, AGDL Worm Wheels

Nominal Axial Module **3**



W4 Shape



W6 Shape

Module 3 Duplex Worms

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						L _{H7}	M	N	O	P	Q	R
KWGDL3-R1	m3	1	3°54'	R	W4	20	35	44	50	54	20	74

Module 3 Duplex Worm Shafts

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWGDL3-R1	m3	1	3°54'	R	W6	300	100	18	54	28	100	44

Module 3 Duplex Worm Wheels

Catalog No.	Reduction ratio	Nominal axial module	No. of teeth	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width
							A _{H7}	B	C	D	D'	E	F
AGDL3-20R1	20	m3	20	3°54'	R	H1	20	50	60	66	69	28	17
AGDL3-30R1	30		30	3°54'	R	H1	20	55	90	96	99	28	17
AGDL3-36R1	36		36	3°54'	R	H1	20	60	108	114	117	28	17
AGDL3-40R1	40		40	3°54'	R	HB	20	60	120	126	129	28	17
AGDL3-50R1	50		50	3°54'	R	HB	20	70	150	156	159	28	17
AGDL3-60R1	60		60	3°54'	R	HB	20	80	180	186	189	28	17

CAUTION: Duplex worms and worm wheels must be mated in a predetermined orientation. Please see the beginning of this section (page 298) for details.

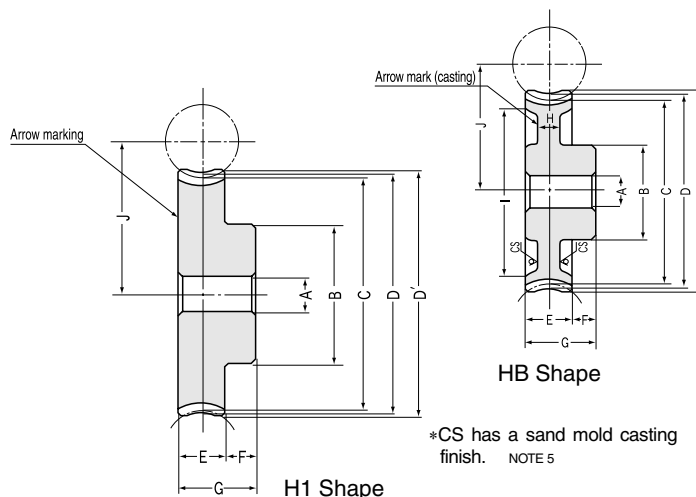
CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.

Worm Gear Pair

KWGDL · KWGDL(S) · AGDL



Duplex Worms, Worm Wheels



Specifications			
Catalog No.	KWGDL	KWGDL S	AGDL
Precision grade	KHK W 001 grade 1	KHK W 001 grade 1	KHK W 002 grade 1
Reference section of gear	Axial	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	17°30'	17°30'	17°30'
Material	SCM440	SCM440	CAC702 (Formerly JIS A & BC2)
Heat treatment	Teeth induction hardened after thermal refining	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	50~55HRC	—
Surface treatment	—	Black oxide except ground surfaces	—
Tooth surface finish	Ground	Ground	Cut
Datum reference surface for gear cutting and grinding	Bore	Shaft (ground portion)	Bore
Secondary Operations	Possible except tooth area	Possible except tooth area	Possible

CAUTION: A & BC2 is aluminum bronze.

Position of reference tooth NOTE 1	Max. allowable shift NOTE 2	Weight (kg)	Catalog No.
S	Vmax	0.61	KWGDL3-R1
32	10		

NOTE 1: If the worm and worm wheel are assembled to the standard center distance, it is designated to have a near zero backlash (+/-0.03).

NOTE 2: When the center distance is moved so as to reduce the backlash, V max is the maximum amount that you may shift without causing problems with gear mesh. It is not the recommended adjustment value.

Outside dia.	Neck dia.	Shaft dia. NOTE 3	Position of reference tooth NOTE 1	Max. allowable shift NOTE 2	Weight (kg)	Catalog No.
Q	R	S	T	Vmax	3.00	KWGDL S3-R1
50	34	40	32	10		

NOTE 3: The shaft O.D., S, has the tolerance +0.2/+0.1 except where ground the tolerance is +0.40/+0.35.

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 4	Allowable torque (kgf·m)	Backlash	Weight	Catalog No.
G	(H)	(I)	J	Surface durability	Surface durability	(mm)	(kg)	
45	—	—	52	33.8	3.45	0±0.045	0.88	AGDL3-20R1
45	—	—	67	74.7	7.61	0±0.045	1.78	AGDL3-30R1
45	—	—	76	107	10.9	0±0.045	2.48	AGDL3-36R1
45	(14)	(106)	82	131	13.4	0±0.045	2.36	AGDL3-40R1
45	(14)	(134)	97	202	20.6	0±0.045	3.48	AGDL3-50R1
45	(14)	(164)	112	285	29.0	0±0.045	4.74	AGDL3-60R1

NOTE 4: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The table below shows the allowable worm wheel torques (N·m) at selected worm speeds.

NOTE 5: The dimension tolerance of CS parts are the very coarse grade of JIS B 0405.

AGDL3 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worms min ⁻¹						
	30	100	300	600	900	1200	1800
AGDL3-20R1	65	53.3	41.5	33.8	29.5	26.9	22.8
AGDL3-30R1	137.4	113.9	90	74.7	65.5	59.5	51.2
AGDL3-36R1	193.2	160.4	128	107	93.8	85.6	73.4
AGDL3-40R1	235	195.2	156.6	131.3	115.2	105.3	90.1
AGDL3-50R1	355	295	239	202	178.2	163.4	139.7
AGDL3-60R1	497	415	336	285	254	233	200

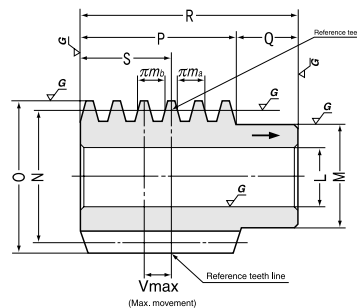
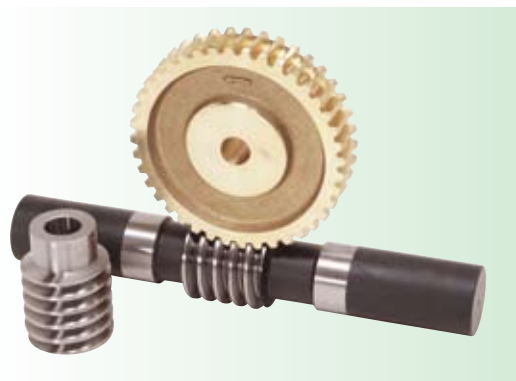
Worm Gear Pair

K W G D L · K W G D L S · A G D L

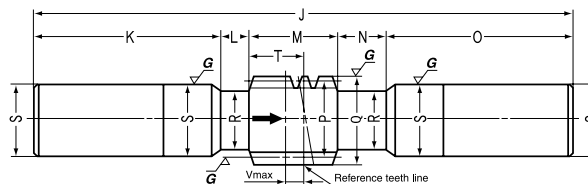


KWGDL(S) Duplex Worms, AGDL Worm Wheels

Nominal Axial Module **3.5**



W4 Shape



W6 Shape

Module 3.5 Duplex Worms

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	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	m3.5	1	3°47'	R	W4	24	44	53	60	62	23	85

Module 3.5 Duplex Worm Shafts

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWGDL3.5-R1	m3.5	1	3°47'	R	W6	330	110	18	62	30	110	53

Module 3.5 Duplex Worm Wheels

Catalog No.	Reduction ratio	Nominal axial module	No. of teeth	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width
							A _{H7}	B	C	D	D'	E	F
AGDL3.5-20R1	20	m3.5	20	3°47'	R	H1	20	55	70	77	80.5	32	18
AGDL3.5-30R1	30		30	3°47'	R	H1	20	60	105	112	115.5	32	18
AGDL3.5-36R1	36		36	3°47'	R	H1	20	70	126	133	136.5	32	18
AGDL3.5-40R1	40		40	3°47'	R	HB	20	70	140	147	150.5	32	18
AGDL3.5-50R1	50		50	3°47'	R	HB	20	80	175	182	185.5	32	18
AGDL3.5-60R1	60		60	3°47'	R	HB	20	90	210	217	220.5	32	18

CAUTION: Duplex worms and worm wheels must be mated in a predetermined orientation. Please see the beginning of this section (page 298) for details.

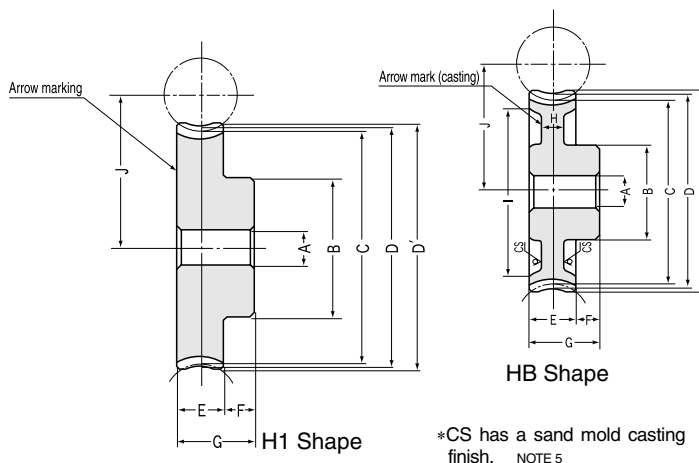
CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.

Worm Gear Pair

KWGDL · KWGDL(S) · AGDL



Duplex Worms, Worm Wheels



Specifications			
Catalog No.	KWGD L	KWGDLS	AGDL
Precision grade	KHK W 001 grade 1	KHK W 001 grade 1	KHK W 002 grade 1
Reference section of gear	Axial	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	17°30'	17°30'	17°30'
Material	SCM440	SCM440	CAC702 (Formerly JIS A & BC2)
Heat treatment	Teeth induction hardened after thermal refining	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	50~55HRC	—
Surface treatment	—	Black oxide except ground surfaces	—
Tooth surface finish	Ground	Ground	Cut
Datum reference surface for gear cutting and grinding	Bore	Shaft (ground portion)	Bore
Secondary Operations	Possible except tooth area	Possible except tooth area	Possible

CAUTION: A & BC2 is aluminum bronze.

Shaft dia. NOTE 3	Position of reference tooth NOTE 1	Weight (kg)	Catalog No.
S	Vmax		
37	12	1.05	KWGD L3.5-R1

NOTE 1: If the worm and worm wheel are assembled to the standard center distance, it is designated to have a near zero backlash (+/-0.03).

NOTE 2: When the center distance is moved so as to reduce the backlash, V max is the maximum amount that you may shift without causing problems with gear mesh. It is not the recommended adjustment value.

Outside dia.	Neck dia.	Shaft dia. NOTE 3	Position of reference tooth NOTE 1	Max. allowable shift NOTE 2	Weight (kg)	Catalog No.
Q	R	S	T	Vmax		
60	42	48	37	12	5.00	KWGDLS3.5-R1

NOTE 3: The shaft O.D., S, has the tolerance +0.2/+0.1 except where ground the tolerance is +0.40/+0.35.

Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 4	Allowable torque (kgf·m)	Backlash	Weight	Catalog No.
G	(H)	(I)	J	Surface durability	Surface durability	(mm)	(kg)	
50	—	—	61.5	50.4	5.14	0±0.045	1.34	AGDL3.5-20R1
50	—	—	79	111	11.4	0±0.045	2.73	AGDL3.5-30R1
50	—	—	89.5	160	16.3	0±0.045	3.95	AGDL3.5-36R1
50	(15)	(124)	96.5	196	20	0±0.045	3.58	AGDL3.5-40R1
50	(16)	(155)	114	301	30.6	0±0.045	5.44	AGDL3.5-50R1
50	(16)	(189)	131.5	425	43.3	0±0.045	7.31	AGDL3.5-60R1

NOTE 4: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The table below shows the allowable worm wheel torques (N·m) at selected worm speeds.

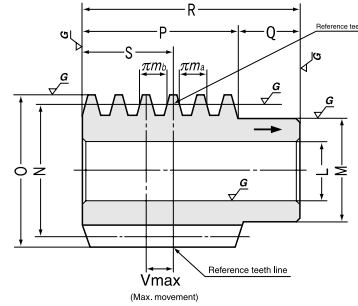
NOTE 5: The dimension tolerance of CS parts are the very coarse grade of JIS B 0405.

AGDL3.5 Allowable Worm Wheel Torques (N·m)

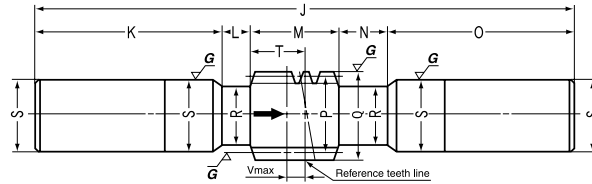
Catalog No.	Worms min ⁻¹						
	30	100	300	600	900	1200	1800
AGDL3.5-20R1	98.5	80.4	62.5	50.4	44.2	40	33.7
AGDL3.5-30R1	208	171.9	135.6	111.3	98.1	88.3	75.7
AGDL3.5-36R1	293	242	192.9	159.5	140.7	127	108.6
AGDL3.5-40R1	356	295	236	195.8	172.7	156.2	133.3
AGDL3.5-50R1	538	446	360	301	267	243	207
AGDL3.5-60R1	753	627	506	425	381	345	296

Worm Gear Pair

K W G D L · K W G D L S · A G D L



W4 Shape



W6 Shape

Module 4 Duplex Worms

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						L _{H7}	M	N	O	P	Q	R
KWGDL4-R1	m4	1	3°41'	R	W4	28	50	62	70	74	26	100

Module 4 Duplex Worm Shafts

Catalog No.	Nominal axial module	Number of start	Nominal lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWGDL54-R1	m4	1	3°41'	R	W6	360	120	16	74	30	120	62

Module 4 Duplex Worm Wheels

Catalog No.	Reduction ratio	Nominal axial module	No. of teeth	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width	Hub width
							A _{H7}	B	C	D	D'	E	F
AGDL4-20R1	20	m4	20	3°41'	R	H1	20	60	80	88	92	35	20
AGDL4-30R1	30		30	3°41'	R	HB	20	65	120	128	132	35	20
AGDL4-36R1	36		36	3°41'	R	HB	20	75	144	152	156	35	20
AGDL4-40R1	40		40	3°41'	R	HB	20	75	160	168	172	35	20
AGDL4-50R1	50		50	3°41'	R	HB	20	90	200	208	212	35	20
AGDL4-60R1	60		60	3°41'	R	H5	30	120	240	248	252	35	20

CAUTION: Duplex worms and worm wheels must be mated in a predetermined orientation. Please see the beginning of this section (page 298) for details.

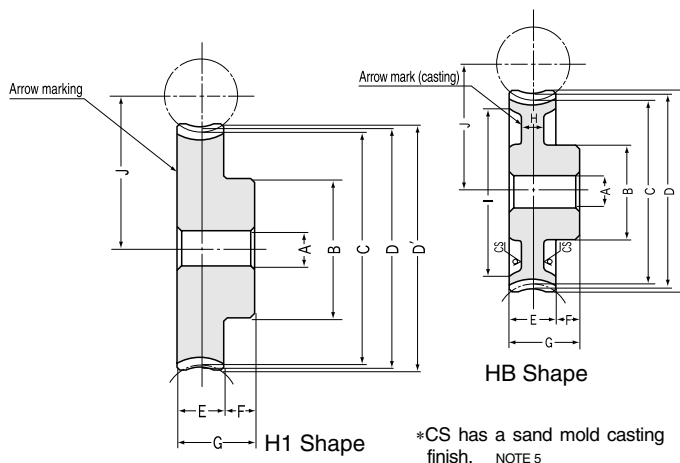
CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.

Worm Gear Pair

KWGDL · KWGDL(S) · AGDL



Duplex Worms, Worm Wheels



*CS has a sand mold casting finish. NOTE 5

Specifications			
Catalog No.	KWGDL	KWGDS	AGDL
Precision grade	KHK W 001 grade 1	KHK W 001 grade 1	KHK W 002 grade 1
Reference section of gear	Axial	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	17°30'	17°30'	17°30'
Material	SCM440	SCM440	CAC702 (Formerly JIS A 2 BC2) (Hub of H5 shape is S45C)
Heat treatment	Teeth induction hardened after thermal refining	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	50~55HRC	—
Surface treatment	—	Black oxide except ground surfaces	—
Tooth surface finish	Ground	Ground	Cut
Datum reference surface for gear cutting and grinding	Bore	Shaft (ground portion)	Bore
Secondary Operations	Possible except tooth area	Possible except tooth area	Possible

CAUTION: A & BC2 is aluminum bronze.

Position of reference tooth NOTE 1	Max. allowable shift NOTE 2	Weight (kg)	Catalog No.
S	Vmax		
44	14	1.67	KWGDL4-R1

NOTE 1: If the worm and worm wheel are assembled to the standard center distance, it is designated to have a near zero backlash (+/-0.03).

NOTE 2: When the center distance is moved so as to reduce the backlash, V max is the maximum amount that you may shift without causing problems with gear mesh. It is not the recommended adjustment value.

Outside dia.	Neck dia.	Shaft dia. NOTE 3	Position of reference tooth NOTE 1	Max. allowable shift NOTE 2	Weight (kg)	Catalog No.
Q	R	S	T	Vmax		
70	50	56	44	14	7.40	KWGDS4-R1

NOTE 3: The shaft O.D., S, has the tolerance +0.2/+0.1 except where ground the tolerance is +0.40/+0.35.

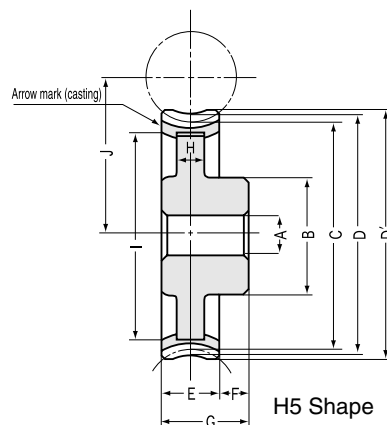
Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) NOTE 4	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
G	(H)	(I)	J	Surface durability	Surface durability			
55	—	—	71	67.9	6.92	0±0.045	1.92	AGDL4-20R1
55	(17)	(99)	91	150	15.3	0±0.045	3.23	AGDL4-30R1
55	(17)	(121)	103	215	21.9	0±0.045	4.44	AGDL4-36R1
55	(17)	(137)	111	264	26.9	0±0.045	5.2	AGDL4-40R1
55	(17)	(177)	131	405	41.3	0±0.045	7.69	AGDL4-50R1
55	(17)	(200)	151	572	58.4	0±0.045	11.7	AGDL4-60R1

NOTE 4: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The table below shows the allowable worm wheel torques (N·m) at selected worm speeds.

NOTE 5: The dimension tolerance of CS parts are the very coarse grade of JIS B 0405.

AGDL4 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worms min ⁻¹						
	30	100	300	600	900	1200	1800
AGDL4-20R1	134.4	109.2	84.8	67.9	59.7	53.4	44.8
AGDL4-30R1	284	234	183.9	150.1	132.4	117.9	100.7
AGDL4-36R1	400	329	262	215	189.9	169.5	144.4
AGDL4-40R1	486	400	320	264	233	208	177.3
AGDL4-50R1	735	605	488	405	361	324	275
AGDL4-60R1	1028	851	687	572	515	461	393

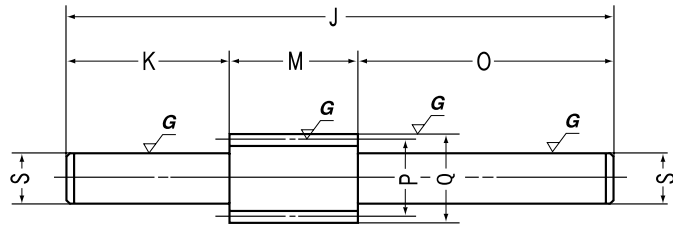


Worm Gear Pair

KWGDL · KWGDS · AGDL



KWG Ground Worm Shafts, AG Worm Wheels Axial Modules 0.5~0.8



W5 Shape

Module 0.5 Ground Worm Shafts

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG0.5-R1	m0.5	1	3°11'	R	W5	65	19	—	12	—	34	9
KWG0.5-R2		2	6°20'	R	W5	65	19	—	12	—	34	9

Module 0.5 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
AG0.5-20R1	20	m0.5	20	1	3°11'	R	HA	4	9	10	—	11	5
AG0.5-20R2	10		20	2	6°20'	R	HA	4	9	10	—	11	5
AG0.5-30R1	30		30	1	3°11'	R	HA	4	12	15	—	16	5
AG0.5-30R2	15		30	2	6°20'	R	HA	4	12	15	—	16	5
AG0.5-40R1	40		40	1	3°11'	R	HA	5	15	20	—	21	5
AG0.5-50R1	50		50	1	3°11'	R	HA	5	20	25	—	26	5
AG0.5-60R1	60	60	1	3°11'	R	HA	5	25	30	—	31	5	

Module 0.8 Ground Worm Shafts

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG0.8-R1	m0.8	1	3°49'	R	W5	85	25	—	20	—	40	12
KWG0.8-R2		2	7°36'	R	W5	85	25	—	20	—	40	12

Module 0.8 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
AG0.8-20R1	20	m0.8	20	1	3°49'	R	HA	5	12	16	—	17.6	8
AG0.8-20R2	10		20	2	7°36'	R	HA	5	12	16	—	17.6	8
AG0.8-30R1	30		30	1	3°49'	R	HA	5	18	24	—	25.6	8
AG0.8-30R2	15		30	2	7°36'	R	HA	5	18	24	—	25.6	8
AG0.8-40R1	40		40	1	3°49'	R	HA	6	20	32	—	33.6	8
AG0.8-50R1	50		50	1	3°49'	R	HA	8	25	40	—	41.6	8
AG0.8-60R1	60	60	1	3°49'	R	HA	8	25	48	—	49.6	8	

CAUTION: The root area of teeth on worm shafts is very hard due to heat treatment. Extra caution is urged for any secondary operations.
CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.

AG0.5 Allowable Worm Wheel Torques (N.m)

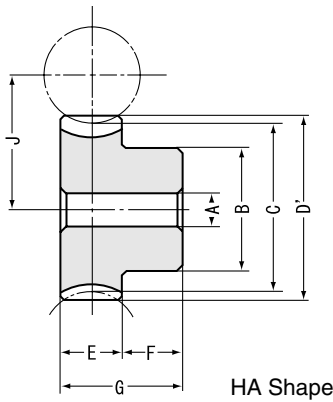
Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG0.5-20R1	0.52	0.44	0.36	0.30	0.26	0.24	0.21
AG0.5-20R2	0.51	0.42	0.33	0.27	0.24	0.22	0.19
AG0.5-30R1	1.09	0.94	0.77	0.65	0.58	0.53	0.48
AG0.5-30R2	1.09	0.92	0.73	0.60	0.54	0.49	0.43
AG0.5-40R1	1.86	1.60	1.34	1.15	1.02	0.94	0.84
AG0.5-50R1	2.82	2.42	2.05	1.77	1.58	1.46	1.30
AG0.5-60R1	3.94	3.41	2.89	2.50	2.26	2.08	1.87

Worm Gear Pair

K
W
G
·
A
G



Ground Worm Shafts, Worm Wheels



HA Shape

Specifications

Catalog No.	KWG	AG
Precision grade	KHK W 001 grade 2	KHK W 002 grade 2
Reference section of gear	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	SCM440	CAC702 (Formerly JIS A/BC2)
Heat treatment	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	—
Surface treatment	—	—
Tooth surface finish	Ground	Cut
<small>Datum reference surface for gear cutting and grinding</small>	Shaft (ground portion)	Bore
Secondary Operations	Possible except tooth area	Possible

CAUTION: A/BC2 is aluminum bronze.

Outside dia.	Neck dia.	Shaft dia.	Weight (kg)	Catalog No.
Q	R	S _{h7}		
10	—	6	0.02	KWG0.5-R1
10	—	6	0.02	KWG0.5-R2

Hub width	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	G	(H)	(I)	J	Surface durability	Surface durability			
7	12	—	—	9.50	0.30	0.030	0.02~0.14	0.01	AG0.5-20R1
7	12	—	—	9.50	0.27	0.030	0.02~0.14	0.01	AG0.5-20R2
7	12	—	—	12.0	0.65	0.070	0.02~0.14	0.01	AG0.5-30R1
7	12	—	—	12.0	0.60	0.060	0.02~0.14	0.01	AG0.5-30R2
7	12	—	—	14.5	1.15	0.12	0.02~0.14	0.02	AG0.5-40R1
7	12	—	—	17.0	1.77	0.18	0.02~0.14	0.04	AG0.5-50R1
7	12	—	—	19.5	2.50	0.25	0.02~0.14	0.06	AG0.5-60R1

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Outside dia.	Neck dia.	Shaft dia.	Weight (kg)	Catalog No.
Q	R	S _{h7}		
13.6	—	8	0.04	KWG0.8-R1
13.6	—	8	0.04	KWG0.8-R2

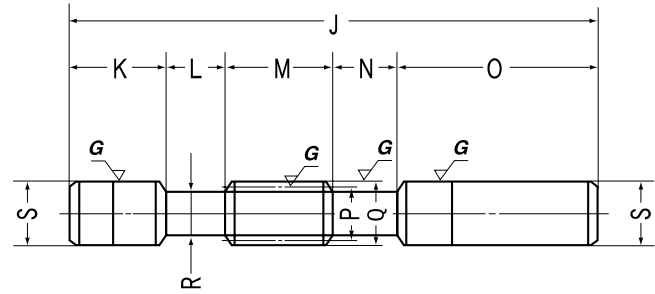
Hub width	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	G	(H)	(I)	J	Surface durability	Surface durability			
8	16	—	—	14.0	1.00	0.10	0.02~0.14	0.02	AG0.8-20R1
8	16	—	—	14.0	0.91	0.09	0.02~0.14	0.02	AG0.8-20R2
8	16	—	—	18.0	2.20	0.22	0.02~0.14	0.04	AG0.8-30R1
8	16	—	—	18.0	2.02	0.21	0.02~0.14	0.04	AG0.8-30R2
8	16	—	—	22.0	3.87	0.39	0.02~0.14	0.07	AG0.8-40R1
8	16	—	—	26.0	5.94	0.61	0.02~0.14	0.11	AG0.8-50R1
8	16	—	—	30.0	8.39	0.86	0.02~0.14	0.14	AG0.8-60R1

AG0.8 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG0.8-20R1	1.78	1.50	1.21	1.00	0.88	0.82	0.71
AG0.8-20R2	1.76	1.44	1.11	0.91	0.80	0.74	0.63
AG0.8-30R1	3.77	3.21	2.62	2.20	1.96	1.81	1.61
AG0.8-30R2	3.75	3.14	2.46	2.02	1.80	1.65	1.45
AG0.8-40R1	6.45	5.49	4.55	3.87	3.46	3.19	2.83
AG0.8-50R1	9.75	8.31	6.94	5.94	5.34	4.96	4.38
AG0.8-60R1	13.6	11.7	9.77	8.39	7.63	7.05	6.27

Worm Gear Pair

KWG · AG



W6 Shape

Module 1 Ground Worm Shafts

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG1-R1	m1	1	3°35'	R	W6	140	35	10	30	10	55	16
KWG1-R2		2	7°08'	R	W6	140	35	10	30	10	55	16

Module 1 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
AG1-20R1	20	m1	20	1	3°35'	R	H1	6	16	20	22	23	10
AG1-20R2	10		20	2	7°08'	R	H1	6	16	20	22	23	10
AG1-30R1	30		30	1	3°35'	R	H1	6	20	30	32	33	10
AG1-30R2	15		30	2	7°08'	R	H1	6	20	30	32	33	10
AG1-40R1	40		40	1	3°35'	R	H1	8	26	40	42	43	10
AG1-50R1	50	50	1	3°35'	R	H1	8	30	50	52	53	10	
AG1-60R1	60	60	1	3°35'	R	H1	10	35	60	62	63	10	

Module 1.5 Ground Worm Shafts

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG1.5-R1	m1.5	1	3°26'	R	W6	190	50	15	40	15	70	25
KWG1.5-R2		2	6°51'	R	W6	190	50	15	40	15	70	25

Module 1.5 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
AG1.5-20R1	20	m1.5	20	1	3°26'	R	H1	8	22	30	33	34.5	14
AG1.5-20R2	10		20	2	6°51'	R	H1	8	22	30	33	34.5	14
AG1.5-30R1	30		30	1	3°26'	R	H1	10	30	45	48	49.5	14
AG1.5-30R2	15		30	2	6°51'	R	H1	10	30	45	48	49.5	14
AG1.5-40R1	40		40	1	3°26'	R	H1	12	35	60	63	64.5	14
AG1.5-50R1	50	50	1	3°26'	R	H1	12	45	75	78	79.5	14	
AG1.5-60R1	60	60	1	3°26'	R	H1	12	50	90	93	94.5	14	

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.
CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.

AG1 Allowable Worm Wheel Torques (N·m)

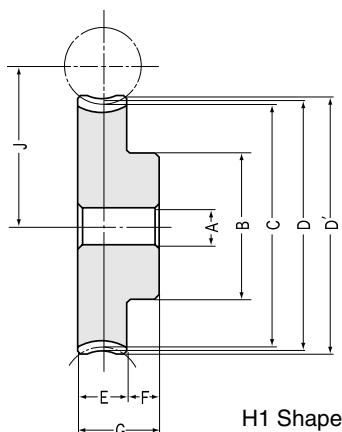
Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG1-20R1	3.35	2.79	2.23	1.83	1.63	1.50	1.30
AG1-20R2	3.31	2.69	2.06	1.68	1.48	1.35	1.15
AG1-30R1	7.08	5.98	4.84	4.05	3.63	3.31	2.92
AG1-30R2	7.03	5.84	4.56	3.72	3.33	3.03	2.63
AG1-40R1	12.1	10.2	8.43	7.12	6.38	5.86	5.13
AG1-50R1	18.3	15.5	12.9	10.9	9.87	9.09	7.95
AG1-60R1	25.6	21.8	18.1	15.4	14.1	12.9	11.4

Worm Gear Pair

K
G
W
A
G



Ground Worm Shafts, Worm Wheels



Specifications		
Catalog No.	KWG	AG
Precision grade	KHK W 001 grade 2	KHK W 002 grade 2
Reference section of gear	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	SCM440	CAC702 (Formerly JIS A/BC2)
Heat treatment	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	—
Surface treatment	—	—
Tooth surface finish	Ground	Cut
<small>Datum reference surface for gear cutting and grinding</small>	Shaft (ground portion)	Bore
Secondary Operations	Possible except tooth area	Possible

CAUTION: A/BC2 is aluminum bronze.

Outside dia.	Neck dia.	Shaft dia. <small>NOTE 1</small>	Weight (kg)	Catalog No.
Q	R	S		
18	13	18	0.25	KWG1-R1
18	13	18	0.25	KWG1-R2

NOTE 1: The shaft O.D., S, has the tolerance +0.2/+0.1 except where ground the tolerance is +0.40/+0.35.

Hub width	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 2</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	G	(H)	(I)	J	Surface durability	Surface durability			
10	20	—	—	18.0	1.83	0.19	0.08~0.19	0.05	AG1-20R1
10	20	—	—	18.0	1.68	0.17	0.08~0.19	0.05	AG1-20R2
10	20	—	—	23.0	4.05	0.41	0.08~0.19	0.08	AG1-30R1
10	20	—	—	23.0	3.72	0.38	0.08~0.19	0.08	AG1-30R2
10	20	—	—	28.0	7.12	0.73	0.08~0.19	0.15	AG1-40R1
10	20	—	—	33.0	10.9	1.11	0.08~0.19	0.23	AG1-50R1
10	20	—	—	38.0	15.4	1.57	0.08~0.19	0.32	AG1-60R1

NOTE 2: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Outside dia.	Neck dia.	Shaft dia.	Weight (kg)	Catalog No.
Q	R	S		
28	21	26	0.74	KWG1.5-R1
28	21	26	0.74	KWG1.5-R2

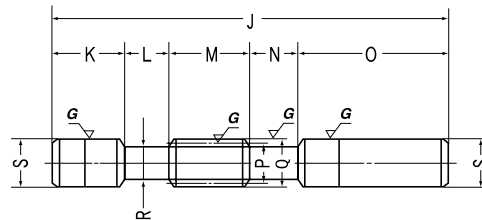
Hub width	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 2</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	G	(H)	(I)	J	Surface durability	Surface durability			
10	24	—	—	27.5	5.30	0.54	0.10~0.21	0.099	AG1.5-20R1
10	24	—	—	27.5	4.87	0.50	0.10~0.21	0.099	AG1.5-20R2
10	24	—	—	35.0	11.7	1.19	0.10~0.21	0.22	AG1.5-30R1
10	24	—	—	35.0	10.8	1.10	0.10~0.21	0.22	AG1.5-30R2
10	24	—	—	42.5	20.6	2.10	0.10~0.21	0.36	AG1.5-40R1
10	24	—	—	50.0	31.6	3.22	0.10~0.21	0.58	AG1.5-50R1
10	24	—	—	57.5	44.7	4.55	0.10~0.21	0.81	AG1.5-60R1

■ AG1.5 Allowable Worm Wheel Torques (N·m)

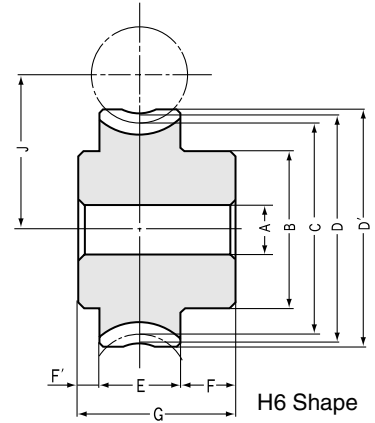
Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG1.5-20R1	9.84	8.18	6.40	5.30	4.68	4.25	3.68
AG1.5-20R2	9.72	7.87	5.92	4.87	4.25	3.83	3.27
AG1.5-30R1	20.8	17.5	13.9	11.7	10.4	9.40	8.28
AG1.5-30R2	20.7	17.1	13.1	10.8	9.56	8.58	7.46
AG1.5-40R1	35.6	30.0	24.2	20.6	18.3	16.6	14.6
AG1.5-50R1	53.8	45.4	36.9	31.6	28.3	25.8	22.6
AG1.5-60R1	75.3	63.8	51.9	44.7	40.4	36.7	32.4

Worm Gear Pair

K
W
G
·
A
G



W6 Shape



H6 Shape

Module 2 Ground Worm Shafts

Catalog No.	Axial module	Number of start	Lead angle	Hand of thread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG2-R1	m2	1	5°12'	R	W6	200	35	25	40	25	75	22
KWG2-R2		2	10°18'	R	W6	200	35	25	40	25	75	22

Module 2 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Profile shift coefficient <small>NOTE 1</small>	Helix angle	Hand of thread	Shape <small>NOTE 4</small>	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
									A _{H7}	B	C	D	D'	E
AGF2-20R1	20	m2	20	1	-0.5	5°12'	R	H6	12	32	40	42	44	18
AGF2-20R2	10		20	2	-0.5	10°18'	R	H6	12	32	40	42	44	18
AGF2-25R1	25		25	1	-0.5	5°12'	R	H6	12	35	50	52	54	18
AGF2-30R1	30		30	1	-0.5	5°12'	R	H6	12	38	60	62	64	18
AGF2-30R2	15		30	2	-0.5	10°18'	R	H6	12	38	60	62	64	18
AGF2-36R1	36		36	1	0	5°12'	R	H6	12	40	72	76	78	18
AGF2-40R1	40		40	1	-0.5	5°12'	R	H8	12	45	80	82	84	18
AGF2-48R1	48		48	1	+0.5	5°12'	R	H9	12	50	96	102	104	18
AGF2-50R1	50		50	1	-0.5	5°12'	R	H9	12	50	100	102	104	18
AGF2-60R1	60		60	1	-0.5	5°12'	R	H9	12	50	120	122	124	18

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

NOTE 1: These worm wheels are profile shifted except the 36 tooth gear.

Module 2.5 Ground Worm Shafts

Catalog No.	Axial module	Number of start	Lead angle	Hand of thread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG2.5-R1	m2.5	1	4°46'	R	W6	250	50	27	46	27	100	30
KWG2.5-R2		2	9°28'	R	W6	250	50	27	46	27	100	30

Module 2.5 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Profile shift coefficient	Helix angle	Hand of thread	Shape <small>NOTE 4</small>	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
									A _{H7}	B	C	D	D'	E
AGF2.5-20R1	20	m2.5	20	1	0	4°46'	R	H6	12	35	50	55	57.5	20
AGF2.5-20R2	10		20	2	0	9°28'	R	H6	12	35	50	55	57.5	20
AGF2.5-25R1	25		25	1	0	4°46'	R	H6	12	40	62.5	67.5	70	20
AGF2.5-30R1	30		30	1	0	4°46'	R	H6	12	40	75	80	82.5	20
AGF2.5-30R2	15		30	2	0	9°28'	R	H6	12	40	75	80	82.5	20
AGF2.5-36R1	36		36	1	0	4°46'	R	H8	12	45	90	95	97.5	20
AGF2.5-40R1	40		40	1	0	4°46'	R	H9	12	45	100	105	107.5	20
AGF2.5-48R1	48		48	1	0	4°46'	R	H9	12	50	120	125	127.5	20
AGF2.5-50R1	50		50	1	0	4°46'	R	H9	12	55	125	130	132.5	20
AGF2.5-60R1	60		60	1	0	4°46'	R	H9	12	60	150	155	157.5	20

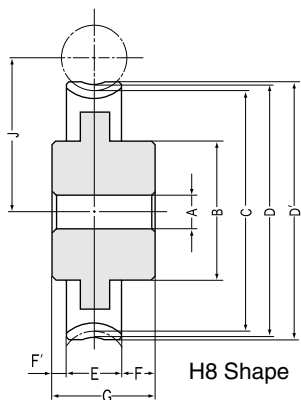
CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.

AGF2 Allowable Worm Wheel Torques (N·m)

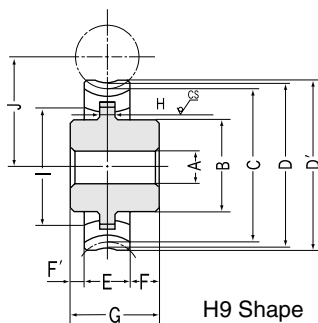
Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AGF2-20R1	19.4	16.1	12.8	10.5	9.30	8.49	7.31
AGF2-20R2	19.9	16.1	12.2	9.99	8.75	7.92	6.74
AGF2-25R1	29.4	24.5	19.6	16.3	14.4	13.2	11.4
AGF2-30R1	41.1	34.5	27.7	23.2	20.7	18.8	16.4
AGF2-30R2	42.3	35.0	27.0	22.1	19.9	17.7	15.4
AGF2-36R1	57.8	48.6	39.3	33.2	29.6	27.0	23.6
AGF2-40R1	70.3	59.2	48.1	40.7	36.4	33.2	28.9
AGF2-48R1	98.5	83.0	68.0	57.9	51.9	47.5	41.3
AGF2-50R1	106	89.5	73.4	62.5	56.2	51.5	44.9
AGF2-60R1	149	126	103	88.4	80.3	73.3	64.2



Ground Worm Shafts, Worm Wheels



H8 Shape



H9 Shape

*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Outside dia.	Neck dia.	Shaft dia. <small>NOTE 2</small>	Weight (kg)	Catalog No.
Q	R	S		
26	17	25	0.70	KWG2-R1
26	17	25	0.70	KWG2-R2

NOTE 2: The shaft O.D., S, has the tolerance +0.2/+0.1 except where ground the tolerance is +0.40/+0.35.

Hub width (R)	Hub width (L)	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 3</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	F'	G	(H)	(I)	J	Surface durability	Surface durability			
12	5	35	—	—	30	10.5	1.07	0.11~0.24	0.25	AGF2-20R1
12	5	35	—	—	30	9.99	1.02	0.11~0.24	0.25	AGF2-20R2
12	5	35	—	—	35	16.3	1.66	0.11~0.24	0.35	AGF2-25R1
12	5	35	—	—	40	23.2	2.36	0.11~0.24	0.50	AGF2-30R1
12	5	35	—	—	40	22.1	2.35	0.11~0.24	0.50	AGF2-30R2
12	5	35	—	—	47	33.2	3.38	0.11~0.24	0.70	AGF2-36R1
12	5	35	—	—	50	40.7	4.15	0.11~0.24	0.80	AGF2-40R1
12	5	35	(10)	(76)	60	57.9	5.90	0.11~0.24	1.10	AGF2-48R1
12	5	35	(12)	(81)	60	62.5	6.38	0.11~0.24	1.10	AGF2-50R1
12	5	35	(12)	(96)	70	88.4	9.01	0.11~0.24	1.50	AGF2-60R1

NOTE 3: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Outside dia.	Neck dia.	Shaft dia. <small>NOTE 2</small>	Weight (kg)	Catalog No.
Q	R	S		
35	23	30	1.30	KWG2.5-R1
35	23	30	1.30	KWG2.5-R2

Hub width (R)	Hub width (L)	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 3</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	F'	G	(H)	(I)	J	Surface durability	Surface durability			
12	5	35	—	—	30	10.5	1.07	0.11~0.24	0.25	AGF2-20R1
12	5	35	—	—	30	9.99	1.02	0.11~0.24	0.25	AGF2-20R2
12	5	35	—	—	35	16.3	1.66	0.11~0.24	0.35	AGF2-25R1
12	5	35	—	—	40	23.2	2.36	0.11~0.24	0.50	AGF2-30R1
12	5	35	—	—	40	22.1	2.35	0.11~0.24	0.50	AGF2-30R2
12	5	35	—	—	47	33.2	3.38	0.11~0.24	0.70	AGF2-36R1
12	5	35	—	—	50	40.7	4.15	0.11~0.24	0.80	AGF2-40R1
12	5	35	(10)	(76)	60	57.9	5.90	0.11~0.24	1.10	AGF2-48R1
12	5	35	(12)	(81)	60	62.5	6.38	0.11~0.24	1.10	AGF2-50R1
12	5	35	(12)	(96)	70	88.4	9.01	0.11~0.24	1.50	AGF2-60R1

■ AGF2.5 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AGF2.5-20R1	35.1	29.0	22.6	18.6	16.3	14.8	12.8
AGF2.5-20R2	34.6	27.9	20.9	17.1	14.8	13.4	11.3
AGF2.5-25R1	53.0	43.9	34.8	28.9	25.3	23.0	20.0
AGF2.5-30R1	74.1	62.0	49.1	41.2	36.7	32.8	28.7
AGF2.5-30R2	73.6	60.6	46.2	37.8	33.2	29.9	25.8
AGF2.5-36R1	104	87.4	69.8	59.0	51.8	47.1	41.2
AGF2.5-40R1	127	106	85.4	72.4	63.7	57.9	50.5
AGF2.5-48R1	178	149	121	103	90.8	83.1	72.2
AGF2.5-50R1	192	161	130	111	98.4	90.0	78.3
AGF2.5-60R1	268	226	183	157	141	128	112

Specifications		
Catalog No.	KWG	AGF
Precision grade	KHK W 001 grade 2	KHK W 002 grade 2
Reference section of gear	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	SCM440	CAC702(Formerly A & BC2) (Hub of H8, H9 shape is FC200)
Heat treatment	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	—
Surface treatment	—	—
Tooth surface finish	Ground	Cut
<small>Datum reference surface for gear cutting and grinding</small>	Shaft (ground portion)	Bore
Secondary operations	Possible except tooth area	Possible

CAUTION: A & BC2 is aluminum bronze.

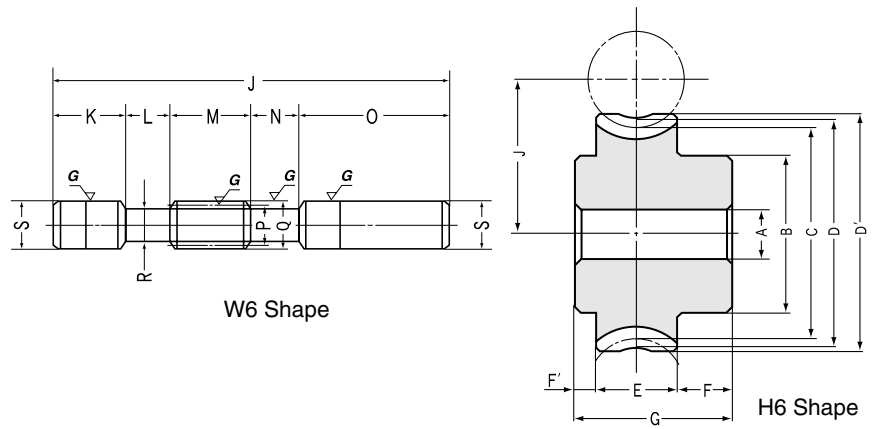
Worm Gear Pair

K W G · A G F



KWG Ground Worm Shafts, AGF Worm Wheels

Axial Modules **3~4**



Module 3 Ground Worm Shafts

Catalog No.	Axial module	Number of start	Lead angle	Hand of thread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG3-R1	m3	1	4°31'	R	W6	300	55	30	60	30	125	38
KWG3-R2		2	8°58'	R	W6	300	55	30	60	30	125	38

Module 3 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Profile shift coefficient	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
									A _{H7}	B	C	D	D'	E
AGF3-20R1	20	m3	20	1	+0.333	4°31'	R	H6	20	50	60	68	71	25
AGF3-20R2	10		20	2	+0.333	8°58'	R	H6	20	50	60	68	71	25
AGF3-25R1	25		25	1	0	4°31'	R	H6	20	55	75	81	84	25
AGF3-30R1	30		30	1	+0.333	4°31'	R	H8	20	55	90	98	101	25
AGF3-30R2	15		30	2	+0.333	8°58'	R	H8	20	55	90	98	101	25
AGF3-36R1	36		36	1	+0.333	4°31'	R	H8	20	60	108	116	119	25
AGF3-40R1	40		40	1	+0.333	4°31'	R	H9	20	65	120	128	131	25
AGF3-48R1	48		48	1	+0.333	4°31'	R	H9	20	70	144	152	155	25
AGF3-50R1	50		50	1	+0.333	4°31'	R	H9	20	75	150	158	161	25
AGF3-60R1	60		60	1	+0.333	4°31'	R	H9	20	80	180	188	191	25

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

Module 4 Ground Worm Shafts

NOTE 1: These worm wheels are profile shifted except the 25 tooth gear.

Catalog No.	Axial module	Number of start	Lead angle	Hand of thread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG4-R1	m4	1	5°43'	R	W6	360	70	32.5	75	32.5	150	40
KWG4-R2		2	11°19'	R	W6	360	70	32.5	75	32.5	150	40

Module 4 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Profile shift coefficient	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
									A _{H7}	B	C	D	D'	E
AGF4-20R1	20	m4	20	1	0	5°43'	R	H6	20	60	80	88	92	30
AGF4-20R2	10		20	2	0	11°19'	R	H6	20	60	80	88	92	30
AGF4-25R1	25		25	1	0	5°43'	R	H6	20	65	100	108	112	30
AGF4-30R1	30		30	1	0	5°43'	R	H8	20	65	120	128	132	30
AGF4-30R2	15		30	2	0	11°19'	R	H8	20	65	120	128	132	30
AGF4-36R1	36		36	1	0	5°43'	R	H9	20	70	144	152	156	30
AGF4-40R1	40		40	1	0	5°43'	R	H9	20	80	160	168	172	30
AGF4-48R1	48		48	1	0	5°43'	R	H9	20	90	192	200	204	30
AGF4-50R1	50		50	1	0	5°43'	R	H9	20	90	200	208	212	30
AGF4-60R1	60		60	1	0	5°43'	R	H0	160	—	240	248	252	30

CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.

AGF3 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AGF3-20R1	59.7	49.1	38.3	31.5	27.5	25.1	21.5
AGF3-20R2	60.2	48.2	36.1	29.5	25.4	23.0	19.4
AGF3-25R1	90.2	74.3	58.8	48.9	42.6	39.0	33.5
AGF3-30R1	126	105	83.1	69.6	61.0	55.4	48.2
AGF3-30R2	128	105	79.8	65.2	57.2	51.6	44.3
AGF3-36R1	178	148	118	99.7	87.5	79.4	69.1
AGF3-40R1	216	180	145	122	108	98.0	84.9
AGF3-48R1	303	252	204	174	153	141	121
AGF3-50R1	326	272	220	188	166	152	132
AGF3-60R1	457	383	310	265	237	217	188

Worm Gear Pair K · G · A · F

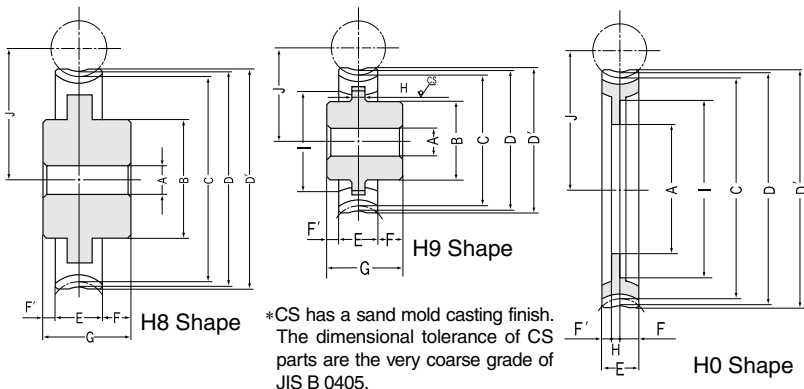


Ground Worm Shafts, Worm Wheels

Specifications

Catalog No.	KWG	AGF
Precision grade	KHK W 001 grade 2	KHK W 002 grade 2
Reference section of gear	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	SCM440	CAC702(Formerly A & BC2) (Hub of H8, H9 shape is FC200)
Heat treatment	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	—
Surface treatment	—	—
Tooth surface finish	Ground	Cut
Datum reference surface for gear cutting and grinding	Shaft (ground portion)	Bore
Secondary Operations	Possible except tooth area	Possible

CAUTION: A & BC2 is aluminum bronze.



Outside dia.	Neck dia.	Shaft dia. <small>NOTE 2</small>	Weight (kg)	Catalog No.
Q	R	S		
44	30	40	2.80	KWG3-R1
44	30	40	2.80	KWG3-R2

NOTE 2: The shaft O.D., S, has the tolerance +0.2/+0.1 except where ground the tolerance is +0.40/+0.35.

Hub width (R)	Hub width (L)	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 3</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	F'	G	(H)	(I)	J	Surface durability	Surface durability			
17.5	7.5	50	—	—	50	31.5	3.21	0.16~0.29	0.90	AGF3-20R1
17.5	7.5	50	—	—	50	29.5	3.01	0.16~0.29	0.90	AGF3-20R2
17.5	7.5	50	—	—	56.5	48.9	4.99	0.16~0.29	1.40	AGF3-25R1
17.5	7.5	50	—	—	65	69.6	7.10	0.16~0.29	1.60	AGF3-30R1
17.5	7.5	50	—	—	65	65.2	6.65	0.16~0.29	1.60	AGF3-30R2
17.5	7.5	50	—	—	74	99.7	10.2	0.16~0.29	2.20	AGF3-36R1
17.5	7.5	50	(16)	(95)	80	122	12.5	0.16~0.29	2.40	AGF3-40R1
17.5	7.5	50	(15)	(120)	92	174	17.7	0.16~0.29	3.30	AGF3-48R1
17.5	7.5	50	(15)	(125)	95	188	19.2	0.16~0.29	3.60	AGF3-50R1
17.5	7.5	50	(15)	(155)	110	265	27.1	0.16~0.29	4.80	AGF3-60R1

NOTE 3: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

NOTE 4: Please avoid secondary operations that affect the strength of the joint between CAC702 and FC200. Also, there may be space in the casting between the two materials, but it will not effect the joint strength.

Outside dia.	Neck dia.	Shaft dia. <small>NOTE 2</small>	Weight (kg)	Catalog No.
Q	R	S		
48	29	45	3.90	KWG4-R1
48	29	45	3.90	KWG4-R2

Hub width (R)	Hub width (L)	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 3</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	F'	G	(H)	(I)	J	Surface durability	Surface durability			
20	10	60	—	—	60	64.6	6.59	0.19~0.32	1.70	AGF4-20R1
20	10	60	—	—	60	61.9	6.31	0.19~0.32	1.70	AGF4-20R2
20	10	60	—	—	70	100	10.2	0.19~0.32	2.60	AGF4-25R1
20	10	60	—	—	80	143	14.6	0.19~0.32	3.20	AGF4-30R1
20	10	60	—	—	80	137	13.9	0.19~0.32	3.20	AGF4-30R2
20	10	60	(20)	(113)	92	204	20.9	0.19~0.32	4.80	AGF4-36R1
20	10	60	(23)	(128)	100	251	25.6	0.19~0.32	5.10	AGF4-40R1
20	10	60	(20)	(160)	116	356	36.3	0.19~0.32	7.10	AGF4-48R1
20	10	60	(20)	(168)	120	385	39.3	0.19~0.32	7.40	AGF4-50R1
—	—	30	(8)	204	140	544	55.5	0.19~0.32	3.70	AGF4-60R1

AGF4 Allowable Worm Wheel Torques (N·m)

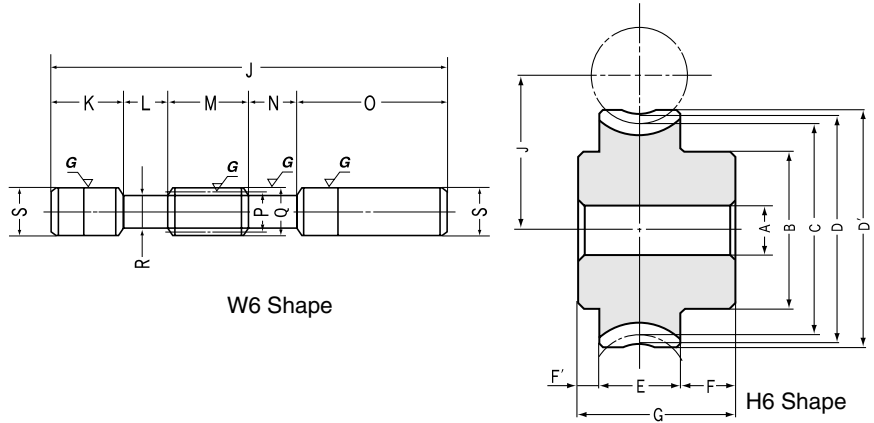
Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AGF4-20R1	123	101	78.8	64.6	56.3	51.5	43.8
AGF4-20R2	127	101	76.0	61.9	53.2	48.3	40.5
AGF4-25R1	186	153	121	100	87.3	79.9	68.5
AGF4-30R1	260	216	171	143	125	114	98.4
AGF4-30R2	270	220	168	137	120	108	92.2
AGF4-36R1	366	304	243	204	179	164	141
AGF4-40R1	445	370	297	251	220	201	173
AGF4-48R1	624	519	420	356	314	288	248
AGF4-50R1	673	560	454	385	340	312	269
AGF4-60R1	941	788	638	544	486	444	385

Worm Gear Pair

K W G · A G F



KWG Ground Worm Shafts, AGF Worm Wheels Axial Modules 5~6



Module 5 Ground Worm Shafts

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	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

Module 5 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Profile shift coefficient	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
									A _{H7}	B	C	D	D'	E
AGF5-20R1	20	m5	20	1	0	5°43'	R	H6	22	75	100	110	115	35
AGF5-25R1	25		25	1	0	5°43'	R	H6	22	75	125	135	140	35
AGF5-30R1	30		30	1	0	5°43'	R	H9	22	75	150	160	165	35
AGF5-36R1	36		36	1	0	5°43'	R	H9	22	90	180	190	195	35
AGF5-40R1	40		40	1	0	5°43'	R	H9	22	110	200	210	215	35
AGF5-48R1	48	m5	48	1	0	5°43'	R	H0	140	—	240	250	255	35
AGF5-50R1	50		50	1	0	5°43'	R	H0	150	—	250	260	265	35
AGF5-60R1	60		60	1	0	5°43'	R	H0	200	—	300	310	315	35

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

Module 6 Ground Worm Shafts

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Total length	Shaft length (L)	Neck length (L)	Face width	Neck length (R)	Shaft length (R)	Pitch dia.
						J	K	L	M	N	O	P
KWG6-R1	m6	1	5°43'	R	W6	400	60	40	100	40	160	60

Module 6 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Profile shift coefficient	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
									A _{H7}	B	C	D	D'	E
AGF6-20R1	20	m6	20	1	0	5°43'	R	H6	25	85	120	132	138	40
AGF6-25R1	25		25	1	0	5°43'	R	H6	25	90	150	162	168	40
AGF6-30R1	30		30	1	0	5°43'	R	H9	25	100	180	192	198	40
AGF6-36R1	36		36	1	0	5°43'	R	H9	25	110	216	228	234	40
AGF6-40R1	40		40	1	0	5°43'	R	H0	130	—	240	252	258	40
AGF6-48R1	48	m6	48	1	0	5°43'	R	H0	180	—	288	300	306	40
AGF6-50R1	50		50	1	0	5°43'	R	H0	190	—	300	312	318	40
AGF6-60R1	60		60	1	0	5°43'	R	H0	250	—	360	372	378	40

CAUTION: Do not take heavy cuts when performing secondary operations on worm shafts to avoid bending them.

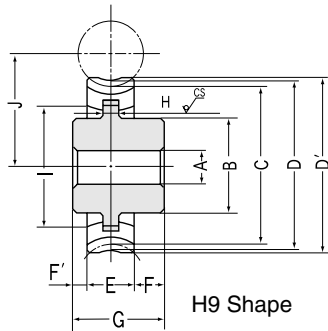
AGF5 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AGF5-20R1	211	172	134	108	95.0	86.2	72.7
AGF5-25R1	319	261	206	168	147	134	114
AGF5-30R1	446	369	291	239	211	191	164
AGF5-36R1	627	519	414	343	302	274	234
AGF5-40R1	763	632	506	421	371	337	288
AGF5-48R1	1070	886	715	598	530	483	411
AGF5-50R1	1150	956	772	646	574	523	446
AGF5-60R1	1610	1340	1090	913	820	744	639

Worm Gear Pair KWFGA

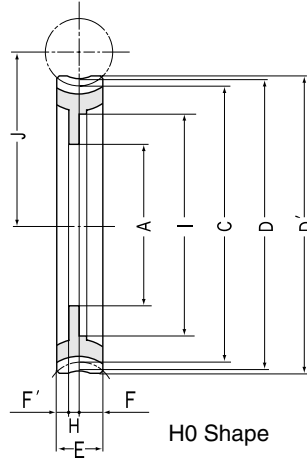


Ground Worm Shafts, Worm Wheels



H9 Shape

*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.



H0 Shape

Outside dia.	Neck dia.	Shaft dia. <small>NOTE 1</small>	Weight (kg)	Catalog No.
Q	R	S		
60	36	50	7.80	KWG5-R1

NOTE 1: The shaft O.D., S, has the tolerance +0.2/+0.1 except where ground the tolerance is +0.40/+0.35.

Specifications

Catalog No.	KWG	AGF
Precision grade	KHK W 001 grade 2	KHK W 002 grade 2
Reference section of gear	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	SCM440	CAC702(Formerly A & BC2) (Hub of H9 shape is FC200)
Heat treatment	Teeth induction hardened after thermal refining	—
Tooth hardness	50~55HRC	—
Surface treatment	—	—
Tooth surface finish	Ground	Cut
<small>Datum reference surface for gear cutting and grinding</small>	Shaft (ground portion)	Bore
Secondary Operations	Possible except tooth area	Possible

CAUTION: A & BC2 is aluminum bronze.

Hub width (R)	Hub width (L)	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 2</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	F'	G	(H)	(I)	J	Surface durability	Surface durability			
23	12	70	—	—	75	108	11.1	0.22~0.35	3.30	AGF5-20R1
23	12	70	—	—	87.5	168	17.2	0.22~0.35	4.40	AGF5-25R1
23	12	70	(25)	(115)	100	239	24.4	0.22~0.35	5.40	AGF5-30R1
23	12	70	(25)	(140)	115	343	35.0	0.22~0.35	7.70	AGF5-36R1
23	12	70	(26)	(162)	125	421	42.9	0.22~0.35	10.0	AGF5-40R1
—	—	35	10	(195)	145	598	61.0	0.22~0.35	5.10	AGF5-48R1
—	—	35	10	(205)	150	646	65.9	0.22~0.35	5.30	AGF5-50R1
—	—	35	10	(255)	175	913	93.1	0.22~0.35	6.50	AGF5-60R1

NOTE 2: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

NOTE 3: Please avoid secondary operations that affect the strength of the joint between CAC702 and FC200. Also, there may be space in the casting between the two materials, but it will not affect the joint strength.

Outside dia.	Neck dia.	Shaft dia. <small>NOTE 1</small>	Weight (kg)	Catalog No.
Q	R	S		
72	44	60	8.20	KWG6-R1

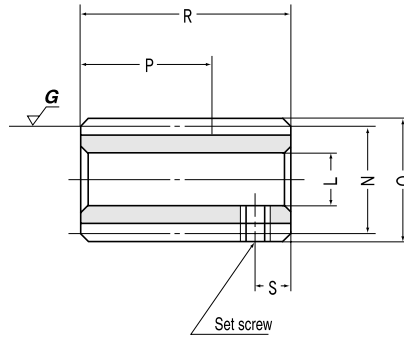
Hub width (R)	Hub width (L)	Total length	Web thickness	Web O.D.	Mounting distance	Allowable torque (N·m) <small>NOTE 2</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	F'	G	(H)	(I)	J	Surface durability	Surface durability			
23	12	75	—	—	90	167	17.0	0.24~0.37	4.50	AGF6-20R1
23	12	75	—	—	105	259	26.4	0.24~0.37	7.20	AGF6-25R1
23	12	75	(30)	(135)	120	368	37.6	0.24~0.37	9.10	AGF6-30R1
23	12	75	(30)	(172)	138	528	53.8	0.24~0.37	13.0	AGF6-36R1
—	—	40	12	(190)	150	648	66.1	0.24~0.37	6.30	AGF6-40R1
—	—	40	12	(240)	174	920	93.8	0.24~0.37	7.70	AGF6-48R1
—	—	40	12	(250)	180	994	101	0.24~0.37	8.20	AGF6-50R1
—	—	40	12	(310)	210	1410	143	0.24~0.37	10.1	AGF6-60R1

AGF6 Allowable Worm Wheel Torques (N·m)

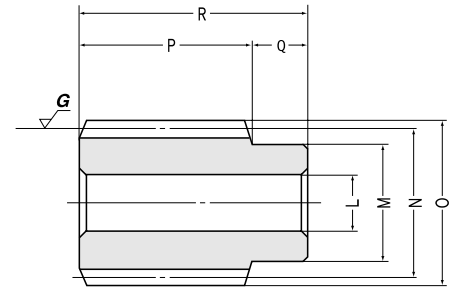
Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AGF6-20R1	329	268	208	167	146	131	110
AGF6-25R1	497	405	319	259	227	204	173
AGF6-30R1	696	572	451	368	325	290	248
AGF6-36R1	978	806	641	528	466	417	355
AGF6-40R1	1190	981	784	648	572	513	436
AGF6-48R1	1670	1380	1110	920	816	735	628
AGF6-50R1	1800	1480	1200	994	885	796	676
AGF6-60R1	2520	2090	1680	1410	1260	1130	969



SWG Ground Worms, AG Worm Wheels Axial Modules 1 ~ 1.5



W2 Shape



W1 Shape

Module 1 Ground Worms

Catalog No.	Axial module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SWG1-R1	m1	1	3°35'	R	W2	8	—	16	18	20	—	—
SWG1-R2		2	7°08'	R	W2	8	—	16	18	20	—	—

Module 1 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
AG1-20R1	20	m1	20	1	3°35'	R	H1	6	16	20	22	23	10
AG1-20R2	10		20	2	7°08'	R	H1	6	16	20	22	23	10
AG1-30R1	30		30	1	3°35'	R	H1	6	20	30	32	33	10
AG1-30R2	15		30	2	7°08'	R	H1	6	20	30	32	33	10
AG1-40R1	40		40	1	3°35'	R	H1	8	26	40	42	43	10
AG1-50R1	50	m1	50	1	3°35'	R	H1	8	30	50	52	53	10
AG1-60R1	60		60	1	3°35'	R	H1	10	35	60	62	63	10

Module 1.5 Ground Worms

Catalog No.	Axial module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SWG1.5-R1	m1.5	1	3°26'	R	W1	10	20	25	28	30	10	—
SWG1.5-R2		2	6°51'	R	W1	10	20	25	28	30	10	—

Module 1.5 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
AG1.5-20R1	20	m1.5	20	1	3°26'	R	H1	8	22	30	33	34.5	14
AG1.5-20R2	10		20	2	6°51'	R	H1	8	22	30	33	34.5	14
AG1.5-30R1	30		30	1	3°26'	R	H1	10	30	45	48	49.5	14
AG1.5-30R2	15		30	2	6°51'	R	H1	10	30	45	48	49.5	14
AG1.5-40R1	40		40	1	3°26'	R	H1	12	35	60	63	64.5	14
AG1.5-50R1	50	m1.5	50	1	3°26'	R	H1	12	45	75	78	79.5	14
AG1.5-60R1	60		60	1	3°26'	R	H1	12	50	90	93	94.5	14

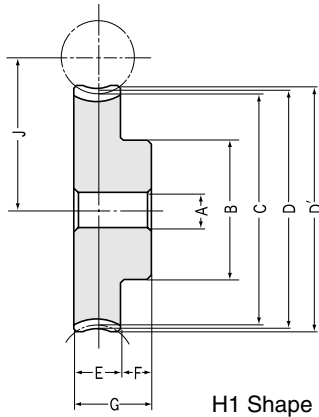
CAUTION: The root area of teeth on worms is very hard due to heat treatment. Extra caution is urged for any secondary operations. This caution applied especially to remachining the bore of W2 shape worms.

AG1 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG1-20R1	3.35	2.79	2.23	1.83	1.63	1.50	1.30
AG1-20R2	3.31	2.69	2.06	1.68	1.48	1.35	1.15
AG1-30R1	7.08	5.98	4.84	4.05	3.63	3.31	2.92
AG1-30R2	7.03	5.84	4.56	3.72	3.33	3.03	2.63
AG1-40R1	12.1	10.2	8.43	7.12	6.38	5.86	5.13
AG1-50R1	18.3	15.5	12.9	10.9	9.87	9.09	7.95
AG1-60R1	25.6	21.8	18.1	15.4	14.1	12.9	11.4

Worm Gear Pair

S
W
G
·
A
G



H1 Shape

Specifications

Catalog No.	SWG	AG
Precision grade	KHK W 001 grade 2	KHK W 002 grade 2
Reference section of gear	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	S45C	CAC702 (Formerly JIS A/BC2)
Heat treatment	Teeth induction hardened	—
Tooth hardness	48~53HRC	—
Surface treatment	Black oxide except ground surfaces	—
Tooth surface finish	Ground	Cut
<small>Datum reference surface for gear cutting and grinding</small>	Bore	Bore
Secondary operations	Possible except tooth area	Possible

CAUTION: A/BC2 is aluminum bronze.

Total length R	Screw <small>NOTE 1</small>		Weight (kg)	Catalog No.
	Size	S		
32	M4	5	0.05	SWG1-R1
32	M4	5	0.05	SWG1-R2

NOTE 1: The W2 shape worms are supplied with set screws.

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 2</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
10	20	—	—	18.0	1.83	0.19	0.08~0.19	0.05	AG1-20R1
10	20	—	—	18.0	1.68	0.17	0.08~0.19	0.05	AG1-20R2
10	20	—	—	23.0	4.05	0.41	0.08~0.19	0.08	AG1-30R1
10	20	—	—	23.0	3.72	0.38	0.08~0.19	0.08	AG1-30R2
10	20	—	—	28.0	7.12	0.73	0.08~0.19	0.15	AG1-40R1
10	20	—	—	33.0	10.9	1.11	0.08~0.19	0.23	AG1-50R1
10	20	—	—	38.0	15.4	1.57	0.08~0.19	0.32	AG1-60R1

NOTE 2: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
40	—	—	0.09	SWG1.5-R1
40	—	—	0.09	SWG1.5-R2

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 2</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
10	24	—	—	27.5	5.30	0.54	0.10~0.21	0.099	AG1.5-20R1
10	24	—	—	27.5	4.87	0.50	0.10~0.21	0.099	AG1.5-20R2
10	24	—	—	35.0	11.7	1.19	0.10~0.21	0.22	AG1.5-30R1
10	24	—	—	35.0	10.8	1.10	0.10~0.21	0.22	AG1.5-30R2
10	24	—	—	42.5	20.6	2.10	0.10~0.21	0.36	AG1.5-40R1
10	24	—	—	50.0	31.6	3.22	0.10~0.21	0.58	AG1.5-50R1
10	24	—	—	57.5	44.7	4.55	0.10~0.21	0.81	AG1.5-60R1

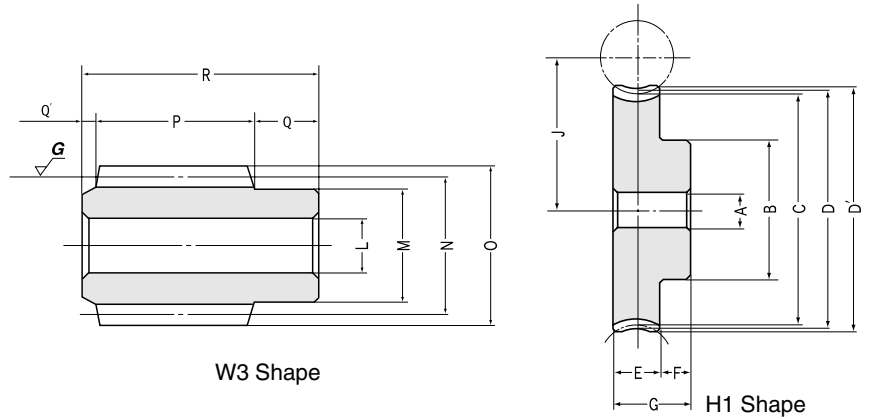
AG1.5 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG1.5-20R1	9.84	8.18	6.40	5.30	4.68	4.25	3.68
AG1.5-20R2	9.72	7.87	5.92	4.87	4.25	3.83	3.27
AG1.5-30R1	20.8	17.5	13.9	11.7	10.4	9.40	8.28
AG1.5-30R2	20.7	17.1	13.1	10.8	9.56	8.58	7.46
AG1.5-40R1	35.6	30.0	24.2	20.6	18.3	16.6	14.6
AG1.5-50R1	53.8	45.4	36.9	31.6	28.3	25.8	22.6
AG1.5-60R1	75.3	63.8	51.9	44.7	40.4	36.7	32.4



SWG Ground Worms, AG Worm Wheels

Axial Modules **2~2.5**



Module 2 Ground Worms

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SWG2-R1	m2	1	3°41'	R	W3	12	25	31	35	32	15	3
SWG2-R2		2	7°21'	R	W3	12	25	31	35	32	15	3

Module 2 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	NOTE 2	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
									A _{H7}	B	C	D	D'	E
AG2-20R1	20	m2	20	1	3°41'	R	H1	12	33	40	44	46	18	
AG2-20R2	10		20	2	7°21'	R	H1	12	33	40	44	46	18	
AG2-30R1	30		30	1	3°41'	R	H4	12	40	60	64	66	18	
AG2-30R2	15		30	2	7°21'	R	H4	12	40	60	64	66	18	
AG2-40R1	40		40	1	3°41'	R	H4	12	45	80	84	86	18	
AG2-50R1	50		50	1	3°41'	R	H5	12	50	100	104	106	18	
AG2-60R1	60	60	1	3°41'	R	H5	12	55	120	124	126	18		

Module 2.5 Ground Worms

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SWG2.5-R1	m2.5	1	3°52'	R	W3	15	30	37	42	45	17	3
SWG2.5-R2		2	7°42'	R	W3	15	30	37	42	45	17	3

Module 2.5 Worm Wheels

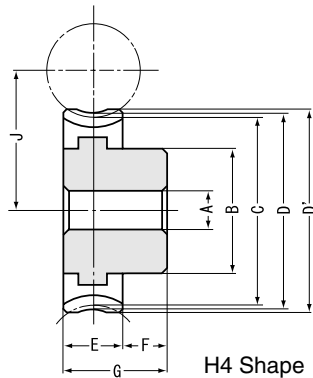
Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	NOTE 2	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
									A _{H7}	B	C	D	D'	E
AG2.5-20R1	20	m2.5	20	1	3°52'	R	H1	12	35	50	55	57.5	20	
AG2.5-20R2	10		20	2	7°42'	R	H1	12	35	50	55	57.5	20	
AG2.5-30R1	30		30	1	3°52'	R	H4	12	40	75	80	82.5	20	
AG2.5-30R2	15		30	2	7°42'	R	H4	12	40	75	80	82.5	20	
AG2.5-40R1	40		40	1	3°52'	R	H5	15	45	100	105	107.5	20	
AG2.5-50R1	50		50	1	3°52'	R	H5	15	55	125	130	132.5	20	
AG2.5-60R1	60	60	1	3°52'	R	H5	15	60	150	155	157.5	20		

AG2 Allowable Worm Wheel Torques (N·m)

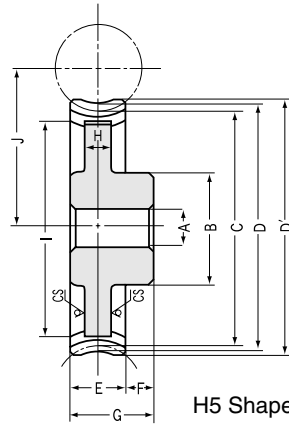
Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG2-20R1	21.0	17.5	13.6	11.2	9.84	8.94	7.75
AG2-20R2	20.7	16.8	12.6	10.3	8.93	8.05	6.89
AG2-30R1	44.3	37.3	29.6	24.8	21.9	19.8	17.4
AG2-30R2	44.0	36.5	27.8	22.8	20.1	18.0	15.7
AG2-40R1	75.8	64.0	51.4	43.6	38.5	34.9	30.7
AG2-50R1	115	96.8	78.4	66.9	59.5	54.2	47.6
AG2-60R1	160	136	110	94.6	84.9	77.2	68.1

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

Worm Gear Pair



H4 Shape



H5 Shape

*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Specifications

Catalog No.	SWG	AG
Precision grade	KHK W 001 grade 2	KHK W 002 grade 2
Reference section of gear	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	S45C	CAC702(Formerly A & BC2) (Hub of H4, H5 shape is FC200)
Heat treatment	Teeth induction hardened	—
Tooth hardness	48~53HRC	—
Surface treatment	Black oxide except ground surfaces	—
Tooth surface finish	Ground	Cut
Datum reference surface for gear cutting and grinding	Bore	Bore
Secondary operations	Possible except tooth area	Possible

CAUTION: A & BC2 is aluminum bronze.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
50	—	—	0.20	SWG2-R1
50	—	—	0.20	SWG2-R2

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) NOTE 1 Surface durability	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)	Catalog No.
15	33	—	—	35.5	11.2	1.14	0.11~0.24	0.29	AG2-20R1
15	33	—	—	35.5	10.3	1.05	0.11~0.24	0.29	AG2-20R2
15	33	—	—	45.5	24.8	2.53	0.11~0.24	0.55	AG2-30R1
15	33	—	—	45.5	22.8	2.32	0.11~0.24	0.55	AG2-30R2
15	33	—	—	55.5	43.6	4.45	0.11~0.24	0.85	AG2-40R1
15	33	(8)	(83)	65.5	66.9	6.83	0.11~0.24	0.95	AG2-50R1
15	33	(11)	(100)	75.5	94.6	9.64	0.11~0.24	1.50	AG2-60R1

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

NOTE 2: Please avoid secondary operations that affect the strength of the joint between CAC702 and FC200. Also, there may be space in the casting between the two materials, but it will not affect the joint strength.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
65	—	—	0.40	SWG2.5-R1
65	—	—	0.40	SWG2.5-R2

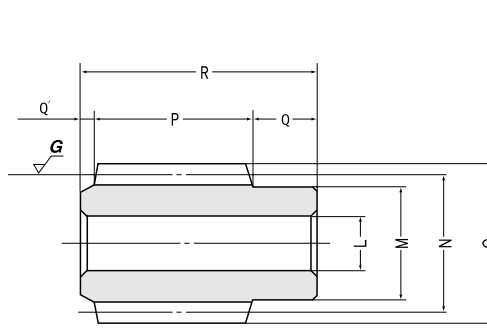
Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) NOTE 1 Surface durability	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)	Catalog No.
14	34	—	—	43.5	18.3	1.87	0.14~0.27	0.40	AG2.5-20R1
14	34	—	—	43.5	16.8	1.72	0.14~0.27	0.40	AG2.5-20R2
14	34	—	—	56.0	40.5	4.13	0.14~0.27	0.80	AG2.5-30R1
14	34	—	—	56.0	37.2	3.79	0.14~0.27	0.80	AG2.5-30R2
14	34	(11)	(81)	68.5	71.2	7.26	0.14~0.27	1.40	AG2.5-40R1
14	34	(12)	(106)	81.0	109	11.1	0.14~0.27	2.10	AG2.5-50R1
14	34	(12)	(130)	93.5	154	15.7	0.14~0.27	2.30	AG2.5-60R1

AG2.5 Allowable Worm Wheel Torques (N·m)

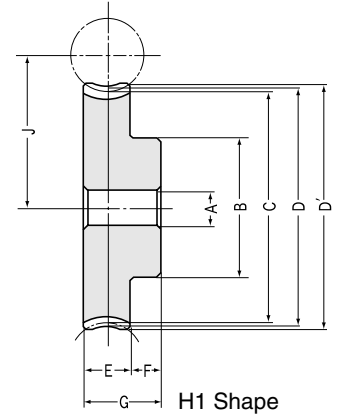
Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG2.5-20R1	34.6	28.5	22.3	18.3	16.0	14.6	12.5
AG2.5-20R2	34.2	27.4	20.6	16.8	14.5	13.1	11.1
AG2.5-30R1	73.2	61.0	48.3	40.5	35.5	32.2	28.1
AG2.5-30R2	72.7	59.6	45.5	37.2	32.6	29.4	25.3
AG2.5-40R1	125	105	84.0	71.2	62.5	57.0	49.5
AG2.5-50R1	189	158	128	109	96.7	88.5	76.7
AG2.5-60R1	265	222	180	154	138	126	110



SWG Ground Worms, AG Worm Wheels Axial Modules 3~4



W3 Shape



H1 Shape

Module 3 Ground Worms

Catalog No.	Axial module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						LH7	M	N	O	P	Q	Q'
SWG3-R1	m3	1	3°54'	R	W3	16	35	44	50	50	20	4
SWG3-R2		2	7°46'	R	W3	16	35	44	50	50	20	4
SWG3-R3		3	11°34'	R	W3	16	35	44	50	50	20	4

Module 3 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape <small>NOTE 2</small>	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
AG3-20R1	20	m3	20	1	3°54'	R	H1	20	50	60	66	69	25
AG3-20R2	10		20	2	7°46'	R	H1	20	50	60	66	69	25
AG3-30R1	30		30	1	3°54'	R	H4	20	55	90	96	99	25
AG3-30R2	15		30	2	7°46'	R	H4	20	55	90	96	99	25
AG3-30R3	10		30	3	11°34'	R	H4	20	55	90	96	99	25
AG3-40R1	40		40	1	3°54'	R	H5	20	65	120	126	129	25
AG3-45R3	15	45	3	11°34'	R	H5	20	70	135	141	144	25	
AG3-50R1	50	50	1	3°54'	R	H5	20	75	150	156	159	25	
AG3-60R1	60	60	1	3°54'	R	H5	20	85	180	186	189	25	

Module 4 Ground Worms

Catalog No.	Axial module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						LH7	M	N	O	P	Q	Q'
SWG4-R1	m4	1	3°41'	R	W3	22	50	62	70	70	25	5
SWG4-R2		2	7°21'	R	W3	22	50	62	70	70	25	5
SWG4-R3		3	10°57'	R	W3	22	50	62	70	70	25	5

Module 4 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape <small>NOTE 2</small>	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
AG4-20R1	20	m4	20	1	3°41'	R	H1	20	60	80	88	92	30
AG4-20R2	10		20	2	7°21'	R	H1	20	60	80	88	92	30
AG4-30R1	30		30	1	3°41'	R	H4	20	65	120	128	132	30
AG4-30R2	15		30	2	7°21'	R	H4	20	65	120	128	132	30
AG4-30R3	10		30	3	10°57'	R	H4	20	65	120	128	132	30
AG4-40R1	40		40	1	3°41'	R	H5	20	80	160	168	172	30
AG4-45R3	15	45	3	10°57'	R	H5	20	90	180	188	192	30	
AG4-50R1	50	50	1	3°41'	R	H5	20	90	200	208	212	30	
AG4-60R1	60	60	1	3°41'	R	H5	20	100	240	248	252	30	

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

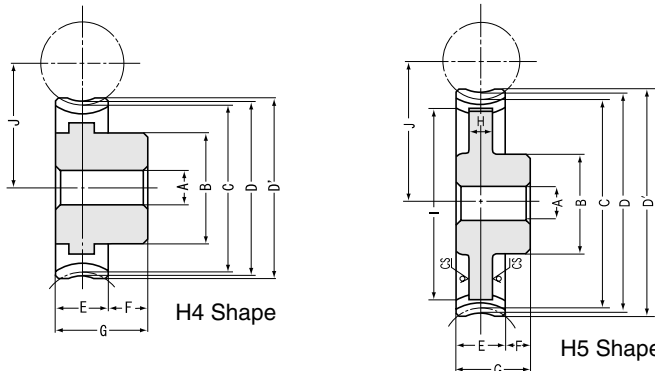
AG3 Allowable Worm Wheel Torques (N.m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG3-20R1	59.5	48.8	38.0	30.9	27.0	24.7	20.9
AG3-20R2	58.7	46.9	35.1	28.4	24.5	22.2	18.5
AG3-30R1	126	104.3	82.4	68.4	59.9	54.5	46.9
AG3-30R2	125	102	77.6	62.8	55.1	49.7	42.2
AG3-30R3	129	103	77.1	62.4	53.8	48.7	40.6
AG3-40R1	215	179	143	120	106	96.4	82.5
AG3-45R3	274	224	171	138	121	109	92.6
AG3-50R1	325	270	219	185	163	150	128
AG3-60R1	455	380	308	261	233	213	183

Worm Gear Pair



Ground Worms, Worm Wheels



*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Specifications

Catalog No.	SWG	AG
Precision grade	KHK W 001 grade 2	KHK W 002 grade 2
Reference section of gear	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	S45C	CAC702(Formerly A & BC2) (Hub of H4,H5 shape is FC200)
Heat treatment	Teeth induction hardened	—
Tooth hardness	48~53HRC	—
Surface treatment	Black oxide except ground surfaces	—
Tooth surface finish	Ground	Cut
Datum reference surface for gear cutting and grinding	Bore	Bore
Secondary operations	Possible except tooth area	Possible

CAUTION: A & BC2 is aluminum bronze.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
74	—	—	0.60	SWG3-R1
74	—	—	0.60	SWG3-R2
74	—	—	0.60	SWG3-R3

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small> Surface durability	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)	Catalog No.
18	43	—	—	52.0	30.9	3.15	0.16~0.29	0.75	AG3-20R1
18	43	—	—	52.0	28.4	2.90	0.16~0.29	0.75	AG3-20R2
18	43	—	—	67.0	68.4	6.97	0.16~0.29	1.40	AG3-30R1
18	43	—	—	67.0	62.8	6.40	0.16~0.29	1.40	AG3-30R2
18	43	—	—	67.0	62.4	6.36	0.16~0.29	1.40	AG3-30R3
18	43	(10)	(103)	82.0	120	12.3	0.16~0.29	2.30	AG3-40R1
18	43	(11)	(120)	89.5	138	14.1	0.16~0.29	2.50	AG3-45R3
18	43	(15)	(130)	97.0	185	18.8	0.16~0.29	3.20	AG3-50R1
18	43	(15)	(155)	112	261	26.6	0.16~0.29	4.30	AG3-60R1

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
100	—	—	1.70	SWG4-R1
100	—	—	1.70	SWG4-R2
100	—	—	1.70	SWG4-R3

NOTE 2: Please avoid secondary operations that affect the strength of the joint between CAC702 and FC200. Also, there may be space in the casting between the two materials, but it will not affect the joint strength.

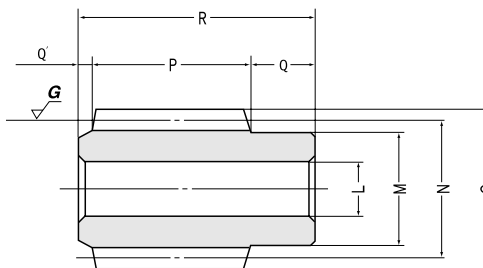
Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small> Surface durability	Allowable torque (kgf·m) Surface durability	Backlash (mm)	Weight (kg)	Catalog No.
20	50	—	—	71.0	58.2	5.94	0.19~0.32	1.50	AG4-20R1
20	50	—	—	71.0	53.5	5.45	0.19~0.32	1.50	AG4-20R2
20	50	—	—	91.0	129	13.1	0.19~0.32	2.50	AG4-30R1
20	50	—	—	91.0	118	12.1	0.19~0.32	2.50	AG4-30R2
20	50	—	—	91.0	117	12.0	0.19~0.32	2.50	AG4-30R3
20	50	(15)	(133)	111	226	23.1	0.19~0.32	4.40	AG4-40R1
20	50	(16)	(153)	121	259	26.4	0.19~0.32	5.50	AG4-45R3
20	50	(16)	(173)	131	347	35.4	0.19~0.32	6.50	AG4-50R1
20	50	(17)	(210)	151	491	50.0	0.19~0.32	8.50	AG4-60R1

AG4 Allowable Worm Wheel Torques (N-m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG4-20R1	115	93.6	72.7	58.2	51.1	45.7	38.4
AG4-20R2	114	90.0	67.2	53.5	46.4	41.2	34.1
AG4-30R1	244	200	158	129	114	101	86.3
AG4-30R2	242	196	148	118	104	92.2	77.6
AG4-30R3	250	198	147	117	102	90.2	74.7
AG4-40R1	417	343	274	226	200	179	152
AG4-45R3	531	430	326	259	229	202	170
AG4-50R1	630	519	418	347	309	277	236
AG4-60R1	881	730	589	491	441	395	337

Worm Gear Pair

S
W
G
·
A
G



W3 Shape

Module 5 Ground Worms

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SWG5-R1	m5	1	4°05'	R	W3	25	56	70	80	85	30	5
SWG5-R2		2	8°08'	R	W3	25	56	70	80	85	30	5

Module 5 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of tread	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'	R	H4	22	75	100	110	115	35
AG5-30R1	30		30	1	4°05'	R	H5	22	75	150	160	165	35
AG5-30R2	15		30	2	8°08'	R	H5	22	75	150	160	165	35
AG5-40R1	40		40	1	4°05'	R	H5	22	110	200	210	215	35
AG5-50R1	50		50	1	4°05'	R	H5	22	120	250	260	265	35
AG5-60R1	60	60	1	4°05'	R	H5	22	130	300	310	315	35	

Module 6 Ground Worms

Catalog No.	Axial module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SWG6-R1	m6	1	4°17'	R	W3	30	63	80	92	100	35	5
SWG6-R2		2	8°32'	R	W3	30	63	80	92	100	35	5

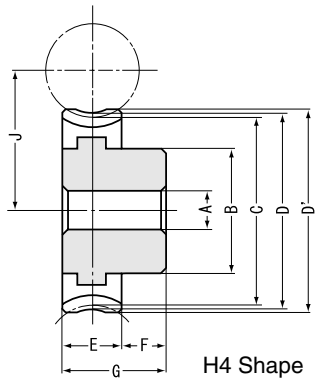
Module 6 Worm Wheels

Catalog No.	Reduction ratio	Transverse module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
AG6-20R1	20	m6	20	1	4°17'	R	H4	25	85	120	132	138	40
AG6-20R2	10		20	2	8°32'	R	H4	25	85	120	132	138	40
AG6-30R1	30		30	1	4°17'	R	H5	25	100	180	192	198	40
AG6-30R2	15		30	2	8°32'	R	H5	25	100	180	192	198	40
AG6-40R1	40		40	1	4°17'	R	H5	25	120	240	252	258	40
AG6-50R1	50		50	1	4°17'	R	H5	25	130	300	312	318	40
AG6-60R1	60	60	1	4°17'	R	H5	25	150	360	372	378	40	

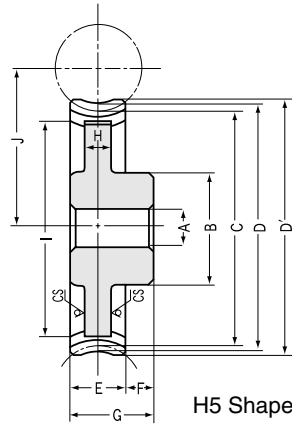
AG5 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG5-20R1	202	163	127	101	88.4	79.0	65.5
AG5-20R2	200	157	117	93.2	80.2	71.1	58.1
AG5-30R1	427	348	275	224	196	175	147
AG5-30R2	425	340	259	206	180	159	132
AG5-40R1	731	597	478	394	346	309	259
AG5-50R1	1110	903	729	605	534	479	402
AG5-60R1	1550	1270	1030	855	763	682	575

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.



H4 Shape



H5 Shape

*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Specifications

Catalog No.	SWG	AG
Precision grade	KHK W 001 grade 2	KHK W 002 grade 2
Reference section of gear	Axial	Rotating plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	S45C	CAC702(Formerly A & BC2) (Hub of H4, H5 shape is FC200)
Heat treatment	Teeth induction hardened	—
Tooth hardness	48~53HRC	—
Surface treatment	Black oxide except ground surface	—
Tooth surface finish	Ground	Cut
<small>Datum reference surface for gear cutting and grinding</small>	Bore	Bore
Secondary operations	Possible except tooth area	Possible

CAUTION: A, B, BC2 is aluminum bronze.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
120	—	—	2.80	SWG5-R1
120	—	—	2.80	SWG5-R2

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
25	60	—	—	85.0	101	10.3	0.22~0.35	2.70	AG5-20R1
25	60	—	—	85.0	93.2	9.50	0.22~0.35	2.70	AG5-20R2
25	60	(21)	(120)	110	224	22.9	0.22~0.35	5.00	AG5-30R1
25	60	(21)	(120)	110	206	21.0	0.22~0.35	5.00	AG5-30R2
25	60	(23)	(168)	135	394	40.2	0.22~0.35	8.00	AG5-40R1
25	60	(23)	(215)	160	605	61.7	0.22~0.35	13.0	AG5-50R1
25	60	(24)	(260)	185	855	87.1	0.22~0.35	17.0	AG5-60R1

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
140	—	—	4.30	SWG6-R1
140	—	—	4.30	SWG6-R2

NOTE 2: Please avoid secondary operations that affect the strength of the joint between CAC702 and FC200. Also, there may be space in the casting between the two materials, but it will not affect the joint strength.

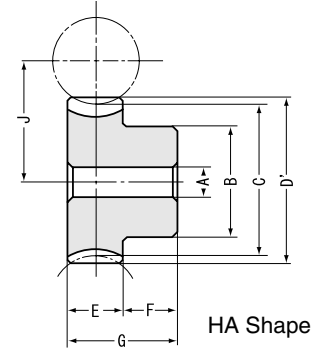
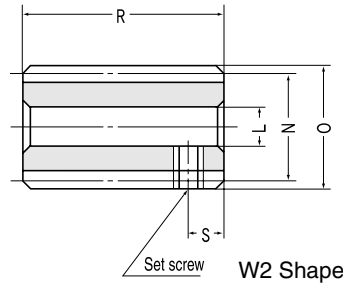
Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
30	70	—	—	100	157	16.0	0.24~0.37	5.50	AG6-20R1
30	70	—	—	100	145	14.8	0.24~0.37	5.50	AG6-20R2
30	70	(26)	(142)	130	346	35.3	0.24~0.37	8.80	AG6-30R1
30	70	(26)	(142)	130	321	32.8	0.24~0.37	8.80	AG6-30R2
30	70	(28)	(200)	160	609	62.1	0.24~0.37	14.0	AG6-40R1
30	70	(30)	(258)	190	935	95.3	0.24~0.37	23.0	AG6-50R1
30	70	(30)	(312)	220	1320	135	0.24~0.37	29.0	AG6-60R1

AG6 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm						
	30	100	300	600	900	1200	1800
AG6-20R1	315	252	196	157	135	121	99.6
AG6-20R2	314	244	182	145	124	110	89.3
AG6-30R1	666	538	424	346	300	267	224
AG6-30R2	668	532	403	321	278	246	203
AG6-40R1	1140	923	738	609	528	472	394
AG6-50R1	1720	1400	1130	935	816	733	611
AG6-60R1	2410	1960	1580	1320	1170	1040	875



SW Worms, BG·CG Worm Wheels Normal Modules 0.8~1



Module 0.8 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H8}	M	N	O	P	Q	Q'
SW0.8-R1	m0.8	1	3°17'	R	W2	6	—	14	15.6	—	—	—
SW0.8-R2		2	6°34'	R	W2	6	—	14	15.6	—	—	—

Module 0.8 Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
BG0.8-20R1	20	m0.8	20	1	3°17'	R	HA	5	12	16.03	—	17.6	9
BG0.8-20R2	10		20	2	6°34'	R	HA	5	12	16.11	—	17.6	9
BG0.8-30R1	30		30	1	3°17'	R	HA	5	18	24.04	—	25.6	9
BG0.8-30R2	15		30	2	6°34'	R	HA	5	18	24.16	—	25.6	9
BG0.8-40R1	40		40	1	3°17'	R	HA	6	20	32.05	—	33.6	9
BG0.8-50R1	50		50	1	3°17'	R	HA	8	25	40.06	—	41.6	9

Module 1 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H8}	M	N	O	P	Q	Q'
SW1-R1	m1	1	3°35'	R	W2	6	—	16	18	—	—	—
SW1-R2		2	7°11'	R	W2	6	—	16	18	—	—	—

Module 1 BG Worm Wheels

Material: CAC406C NOTE 1

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
BG1-20R1	20	m1	20	1	3°35'	R	H1	6	16	20.05	22	23	10
BG1-20R2	10		20	2	7°11'	R	H1	6	16	20.16	22	23	10
BG1-30R1	30		30	1	3°35'	R	H1	6	20	30.07	32	33	10
BG1-30R2	15		30	2	7°11'	R	H1	6	20	30.24	32	33	10
BG1-40R1 NOTE 1	40		40	1	3°35'	R	H1	8	26	40.08	42	43	10
BG1-50R1 NOTE 1	50		50	1	3°35'	R	H1	8	30	50.1	52	53	10

Module 1 CG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
CG1-60R1	60	m1	60	1	3°35'	R	HB	10	30	60.12	62	63	10
CG1-80R1	80		80	1	3°35'	R	HB	10	35	80.16	82	83	10
CG1-100R1	100		100	1	3°35'	R	H2	10	40	100.2	102	103	10
CG1-120R1	120		120	1	3°35'	R	H2	10	40	120.24	122	123	10

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: Heat treating the tooth area of these worms is not recommended since it will introduce errors in the lead and pressure angles, producing poor gear mesh.

CAUTION: SUW worms may also be used to mate with BG and CG worm wheels.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

NOTE 1: The material of BG1-40R1 and 50R1 is CAC502A.

■ BG0.8 Allowable Worm Wheel Torques (N·m)

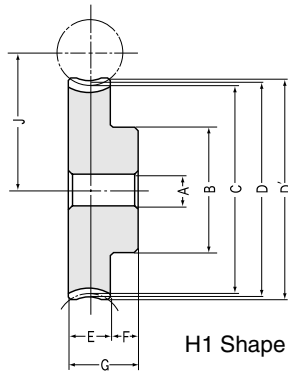
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
BG0.8-20R1	1.05	0.88	0.71	0.58	0.52	0.48
BG0.8-20R2	1.06	0.86	0.66	0.54	0.48	0.44
BG0.8-30R1	2.23	1.89	1.53	1.29	1.15	1.06
BG0.8-30R2	2.24	1.87	1.46	1.20	1.07	0.98
BG0.8-40R1	3.81	3.24	2.67	2.26	2.02	1.87
BG0.8-50R1	5.76	4.90	4.07	3.47	3.13	2.90
BG0.8-60R1	8.06	6.88	5.73	4.90	4.46	4.12

Worm Gear Pair

S
W
·
B
·
G
·
C



Worms, Worm Wheels



H1 Shape

Specifications

Catalog No.	SW	BG	CG
Precision grade	KHK W 001 grade 4	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane	Normal plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth	Standard full depth
Normal pressure angle	20°	20°	20°
Material	S45C	CAC406C(Formerly BC6) CAC502A(Formerly PBC2)	FC200
Heat treatment	—	—	—
Tooth hardness	Less than 194HB	—	—
Surface treatment	Black oxide	—	—
Tooth surface finish	Thread rolled	Cut	Cut
Datum reference surface for gear cutting	Bore	Bore	Bore
Secondary Operations	Possible	Possible	Possible

Total length R	Screw <small>NOTE 2</small>		Weight (kg)	Catalog No.
	Size	S		
30	M4	5	0.03	SW0.8-R1
30	M4	5	0.03	SW0.8-R2

NOTE 2: The W2 shape worms are supplied with a set screw.

Hub width F	Total length G	Mounting distance J	Allowable torque (N·m) <small>NOTE 3</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
9	18	15	0.88	0.090	0.04~0.22	0.02	BG0.8-20R1
9	18	15	0.86	0.088	0.04~0.22	0.02	BG0.8-20R2
9	18	19	1.89	0.19	0.04~0.22	0.05	BG0.8-30R1
9	18	19	1.87	0.19	0.04~0.22	0.05	BG0.8-30R2
9	18	23	3.24	0.33	0.04~0.22	0.08	BG0.8-40R1
9	18	27	4.90	0.50	0.04~0.22	0.12	BG0.8-50R1

NOTE 3: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
32	M4	5	0.04	SW1-R1
32	M4	5	0.04	SW1-R2

Hub width F	Total length G	Mounting distance J	Allowable torque (N·m)	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
10	20	18	1.58	0.16	0.06~0.24	0.04	BG1-20R1
10	20	18	1.54	0.16	0.06~0.24	0.04	BG1-20R2
10	20	23	3.38	0.34	0.06~0.24	0.09	BG1-30R1
10	20	23	3.35	0.34	0.06~0.24	0.09	BG1-30R2
10	20	28	5.79	0.59	0.06~0.24	0.15	BG1-40R1
10	20	33	8.76	0.89	0.06~0.24	0.20	BG1-50R1

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m)	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
10	20	(6)	(51)	38	7.39	0.75	0.06~0.24	0.20	CG1-60R1
10	20	(6)	(70)	48	12.6	1.28	0.06~0.24	0.30	CG1-80R1
10	20	(6)	(91)	58	19.0	1.94	0.06~0.24	0.40	CG1-100R1
10	20	(6)	(111)	68	26.7	2.73	0.06~0.24	0.60	CG1-120R1

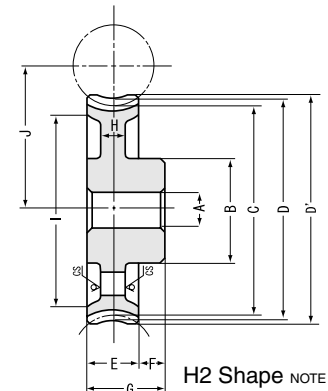
NOTE 4: The H2 shape worm wheels have cast lightening holes in the web.

■ BG1 Allowable Worm Wheel Torques (N·m)

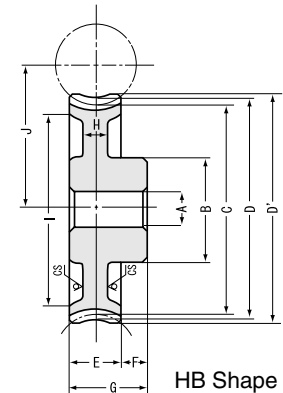
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
BG1-20R1	1.89	1.58	1.26	1.04	0.92	0.85
BG1-20R2	1.90	1.54	1.18	0.97	0.85	0.78
BG1-30R1	4.00	3.38	2.74	2.29	2.05	1.87
BG1-30R2	4.03	3.35	2.62	2.14	1.91	1.74
BG1-40R1	6.85	5.79	4.76	4.03	3.61	3.31
BG1-50R1	10.3	8.76	7.27	6.18	5.58	5.14

■ CG1 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm					
	30	100	300	600	900	1200
CG1-60R1	8.69	7.39	6.14	5.24	4.78	4.39
CG1-80R1	14.7	12.6	10.5	9.11	8.30	7.72
CG1-100R1	21.9	19.0	16.0	13.9	12.7	11.9
CG1-120R1	30.5	26.7	22.5	19.6	18.0	16.7



H2 Shape NOTE 5

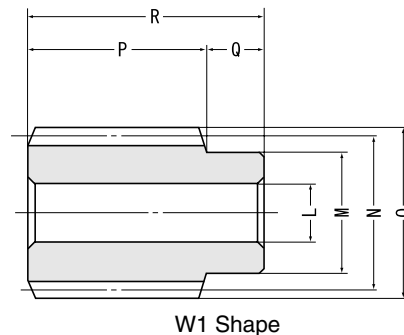
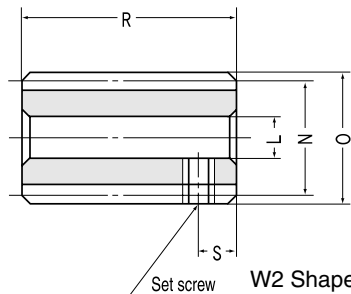


HB Shape

*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.



SW Worms, BG-CG Worm Wheels Normal Modules 1.25~1.5



Module 1.25 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						LH8	M	N	O	P	Q	Q'
SW1.25-R1	m1.25	1	3°25'	R	W2	8	—	21	23.5	—	—	—
SW1.25-R2		2	6°50'	R	W2	8	—	21	23.5	—	—	—

Module 1.25 Worm Wheels

Material: CAC502A NOTE 2

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
BG1.25-20R1	20	m1.25	20	1	3°25'	R	H1	6	20	25.04	27.5	28.75	11
BG1.25-20R2	10		20	2	6°50'	R	H1	6	20	25.18	27.5	28.75	11
BG1.25-30R1	30		30	1	3°25'	R	H1	6	25	37.57	40	41.25	11
BG1.25-30R2	15		30	2	6°50'	R	H1	6	25	37.77	40	41.25	11
BG1.25-40R1	40		40	1	3°25'	R	H1	8	30	50.09	52.5	53.75	11
BG1.25-50R1	50		50	1	3°25'	R	H1	8	40	62.61	65	66.25	11

Module 1.5 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						LH7	M	N	O	P	Q	Q'
SW1.5-R1	m1.5	1	3°26'	R	W1	8	20	25	28	30	10	—
SW1.5-R2		2	6°54'	R	W1	8	20	25	28	30	10	—

Module 1.5 BG Worm Wheels

Material: CAC502A NOTE 2

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
BG1.5-20R1	20	m1.5	20	1	3°26'	R	H1	8	22	30.05	33	34.5	12
BG1.5-20R2	10		20	2	6°54'	R	H1	8	22	30.22	33	34.5	12
BG1.5-30R1	30		30	1	3°26'	R	H1	10	30	45.08	48	49.5	12
BG1.5-30R2	15		30	2	6°54'	R	H1	10	30	45.33	48	49.5	12
BG1.5-40R1	40		40	1	3°26'	R	H1	12	30	60.11	63	64.5	12
BG1.5-50R1	50		50	1	3°26'	R	H1	12	40	75.13	78	79.5	14

Module 1.5 CG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
CG1.5-30R1	30	m1.5	30	1	3°26'	R	H1	10	30	45.08	48	49.5	12
CG1.5-40R1	40		40	1	3°26'	R	H1	12	30	60.11	63	64.5	12
CG1.5-50R1	50		50	1	3°26'	R	HB	12	40	75.13	78	79.5	14
CG1.5-60R1	60		60	1	3°26'	R	HB	12	40	90.16	93	94.5	14
CG1.5-80R1	80		80	1	3°26'	R	H2	15	50	120.22	123	124.5	14
CG1.5-100R1	100		100	1	3°26'	R	H2	15	50	150.27	153	154.5	14

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: Heat treating the tooth area of these worms is not recommended since it will introduce errors in the lead and pressure angles, producing poor gear mesh.

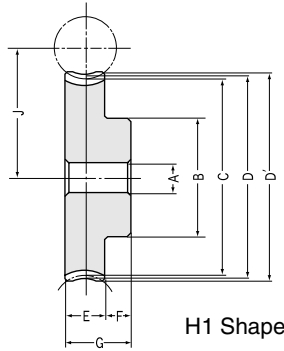
CAUTION: SUW worms may also be used to mate with BG and CG worm wheels.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

NOTE 1: Material of BG1.25-20R1 and 20R2, BG1.5-20R1, 20R2 is CAC406C.

■ BG1.25 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm					
	30	100	300	600	900	1200
BG1.25-20R1	3.19	2.65	2.10	1.72	1.53	1.40
BG1.25-20R2	3.19	2.58	1.96	1.60	1.40	1.27
BG1.25-30R1	6.75	5.67	4.56	3.81	3.40	3.09
BG1.25-30R2	6.77	5.60	4.33	3.54	3.16	2.85
BG1.25-40R1	11.5	9.71	7.92	6.70	5.98	5.47
BG1.25-50R1	17.4	14.7	12.1	10.3	9.25	8.49



H1 Shape

Total length R	Screw <i>NOTE 2</i>		Weight (kg)	Catalog No.
	Size	S		
37	M5	5	0.09	SW1.25-R1
37	M5	5	0.09	SW1.25-R2

NOTE 2: W2 shape worms are supplied with a set screw.

Hub width F	Total length G	Mounting distance J	Allowable torque (N·m) <i>NOTE 3</i>		Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
9	20	23	2.65	0.27	0.08~0.26	0.065	BG1.25-20R1
9	20	23	2.58	0.26	0.08~0.26	0.065	BG1.25-20R2
9	20	29.25	5.67	0.58	0.08~0.26	0.14	BG1.25-30R1
9	20	29.25	5.60	0.57	0.08~0.26	0.14	BG1.25-30R2
9	20	35.5	9.71	0.99	0.08~0.26	0.23	BG1.25-40R1
9	20	41.75	14.7	1.50	0.08~0.26	0.37	BG1.25-50R1

NOTE 3: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N-m) at selected worm speeds.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
40	—	—	0.12	SW1.5-R1
40	—	—	0.12	SW1.5-R2

Hub width F	Total length G	Mounting distance J	Allowable torque (N·m) <i>NOTE 3</i>		Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
10	22	27.5	3.96	0.40	0.08~0.26	0.10	BG1.5-20R1
10	22	27.5	3.85	0.39	0.08~0.26	0.10	BG1.5-20R2
10	22	35	8.47	0.86	0.08~0.26	0.22	BG1.5-30R1
10	22	35	8.37	0.85	0.08~0.26	0.22	BG1.5-30R2
10	22	42.5	14.5	1.48	0.08~0.26	0.32	BG1.5-40R1
10	24	50	25.6	2.61	0.08~0.26	0.58	BG1.5-50R1

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <i>NOTE 3</i>		Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
10	22	—	—	35	5.08	0.52	0.08~0.26	0.17	CG1.5-30R1
10	22	—	—	42.5	8.71	0.89	0.08~0.26	0.25	CG1.5-40R1
10	24	(6)	(62)	50	15.4	1.57	0.08~0.26	0.42	CG1.5-50R1
10	24	(4)	(79)	57.5	21.6	2.20	0.08~0.26	0.50	CG1.5-60R1
10	24	(9)	(112)	72.5	36.8	3.76	0.08~0.26	0.75	CG1.5-80R1
10	24	(7)	(138)	87.5	55.6	5.67	0.08~0.26	1.00	CG1.5-100R1

NOTE 4: The H2 shape worm gears have cast lightening holes in the web.

■ BG1.5 Allowable Worm Wheel Torques(N-m)

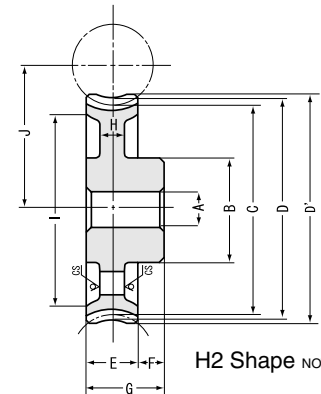
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
BG1.5-20R1	4.76	3.96	3.10	2.56	2.27	2.06
BG1.5-20R2	4.75	3.85	2.89	2.38	2.08	1.87
BG1.5-30R1	10.1	8.47	6.72	5.67	5.03	4.55
BG1.5-30R2	10.1	8.37	6.40	5.26	4.67	4.20
BG1.5-40R1	17.2	14.5	11.7	9.96	8.86	8.04
BG1.5-50R1	30.4	25.6	20.8	17.8	16.0	14.6

■ CG1.5 Allowable Worm Wheel Torques (N-m)

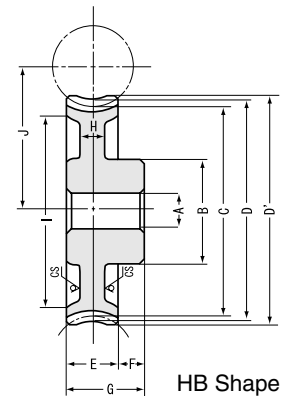
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
CG1.5-30R1	6.04	5.08	4.03	3.40	3.02	2.73
CG1.5-40R1	10.3	8.71	7.01	5.98	5.31	4.83
CG1.5-50R1	18.2	15.4	12.5	10.7	9.59	8.74
CG1.5-60R1	25.5	21.6	17.6	15.1	13.7	12.4
CG1.5-80R1	43.1	36.8	30.1	26.3	23.8	21.9
CG1.5-100R1	64.4	55.6	45.8	40.1	36.4	33.6

Specifications

Catalog No.	SW	BG	CG
Precision grade	KHK W 001 grade 4	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane	Normal plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth	Standard full depth
Normal pressure angle	20°	20°	20°
Material	S45C	CAC406C(Formerly BC6) CAC502A(Formerly PBC2)	FC200
Heat treatment	—	—	—
Tooth hardness	Less than 194HB	—	—
Surface treatment	Black oxide	—	—
Tooth surface finish	Thread rolled	Cut	Cut
Datum reference surface for gear cutting	Bore	Bore	Bore
Secondary Operations	Possible	Possible	Possible



H2 Shape *NOTE 5*

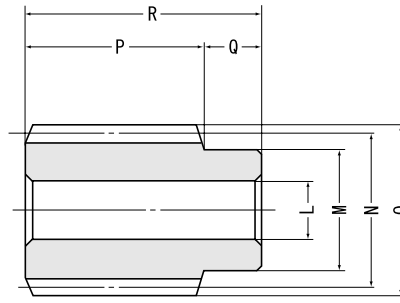


HB Shape

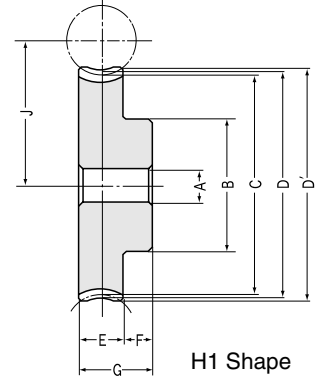
*CS has a sand mold casing finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.



SW Worms, BG·CG Worm Wheels Normal Module 2



W1 Shape



H1 Shape

Module 2 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SW2-R1	m2	1	3°42'	R	W1	12	25	31	35	32	14	—
SW2-R2		2	7°25'	R	W1	12	25	31	35	32	14	—
SW2-L1	m2	1	3°42'	L	W1	12	25	31	35	32	14	—
SW2-L2		2	7°25'	L	W1	12	25	31	35	32	14	—

Module 2 BG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
BG2-20R1	20	m2	20	1	3°42'	R	H1	12	33	40.08	44	46	22
BG2-20R2	10		20	2	7°25'	R	H1	12	33	40.34	44	46	22
BG2-20L1	20		20	1	3°42'	L	H1	12	33	40.08	44	46	22
BG2-20L2	10		20	2	7°25'	L	H1	12	33	40.34	44	46	22

Module 2 CG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
CG2-20R1	20	m2	20	1	3°42'	R	H1	12	33	40.08	44	46	22
CG2-20R2	10		20	2	7°25'	R	H1	12	33	40.34	44	46	22
CG2-30R1	30		30	1	3°42'	R	H1	12	40	60.13	64	66	22
CG2-30R2	15		30	2	7°25'	R	H1	12	40	60.51	64	66	22
CG2-40R1	40		40	1	3°42'	R	H1	12	45	80.17	84	86	22
CG2-50R1	50		50	1	3°42'	R	HB	12	48	100.21	104	106	22
CG2-50R2	25		50	2	7°25'	R	HB	12	48	100.84	104	106	22
CG2-60R1	60		60	1	3°42'	R	HB	12	60	120.25	124	126	22
CG2-20L1	20		20	1	3°42'	L	H1	12	33	40.08	44	46	22
CG2-20L2	10		20	2	7°25'	L	H1	12	33	40.34	44	46	22
CG2-30L1	30		30	1	3°42'	L	H1	12	40	60.13	64	66	22
CG2-30L2	15		30	2	7°25'	L	H1	12	40	60.51	64	66	22
CG2-40L1	40		40	1	3°42'	L	H1	12	45	80.17	84	86	22
CG2-50L1	50		50	1	3°42'	L	HB	12	48	100.21	104	106	22
CG2-50L2	25		50	2	7°25'	L	HB	12	48	100.84	104	106	22
CG2-60L1	60		60	1	3°42'	L	HB	12	60	120.25	124	126	22

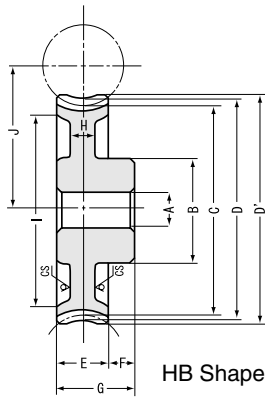
CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: Heat treating the tooth area of these worms is not recommended since it will introduce errors in the lead and pressure angles, producing poor gear mesh.

CAUTION: SUW worms may also be used to mate with BG and CG worm wheels.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

Worm Gear Pair



*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Specifications

Catalog No.	SW	BG	CG
Precision grade	KHK W 001 grade 4	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane	Normal plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth	Standard full depth
Normal pressure angle	14° 30'	14° 30'	14° 30'
Material	S45C	CAC502A(Formerly PBC2)	FC200
Heat treatment	—	—	—
Tooth hardness	Less than 194HB	—	—
Surface treatment	Black oxide	—	—
Tooth surface finish	Thread rolled	Cut	Cut
<small>Datum reference surface for gear cutting</small>	Bore	Bore	Bore
Secondary Operations	Possible	Possible	Possible

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
46	—	—	0.20	SW2-R1
46	—	—	0.20	SW2-R2
46	—	—	0.20	SW2-L1
46	—	—	0.20	SW2-L2

Hub width F	Total length G	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
13	35	35.5	10.2	1.05	0.10~0.28	0.3	BG2-20R1
13	35	35.5	10.0	1.02	0.10~0.28	0.3	BG2-20R2
13	35	35.5	10.2	1.05	0.10~0.28	0.3	BG2-20L1
13	35	35.5	10.0	1.02	0.10~0.28	0.3	BG2-20L2

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
13	35	—	—	35.5	6.15	0.63	0.10~0.28	0.25	CG2-20R1
13	35	—	—	35.5	6.00	0.61	0.10~0.28	0.25	CG2-20R2
13	35	—	—	45.5	13.1	1.34	0.10~0.28	0.53	CG2-30R1
13	35	—	—	45.5	13.1	1.33	0.10~0.28	0.53	CG2-30R2
13	35	—	—	55.5	22.5	2.30	0.10~0.28	0.90	CG2-40R1
13	35	(7)	(88)	65.5	34.1	3.48	0.10~0.28	1.00	CG2-50R1
13	35	(7)	(88)	65.5	34.0	3.46	0.10~0.28	1.00	CG2-50R2
13	35	(7)	(108)	75.5	47.9	4.89	0.10~0.28	1.30	CG2-60R1
13	35	—	—	35.5	6.15	0.63	0.10~0.28	0.25	CG2-20L1
13	35	—	—	35.5	6.00	0.61	0.10~0.28	0.25	CG2-20L2
13	35	—	—	45.5	13.1	1.34	0.10~0.28	0.53	CG2-30L1
13	35	—	—	45.5	13.1	1.33	0.10~0.28	0.53	CG2-30L2
13	35	—	—	55.5	22.5	2.30	0.10~0.28	0.90	CG2-40L1
13	35	(7)	(88)	65.5	34.1	3.48	0.10~0.28	1.00	CG2-50L1
13	35	(7)	(88)	65.5	34.0	3.46	0.10~0.28	1.00	CG2-50L2
13	35	(7)	(108)	75.5	47.9	4.89	0.10~0.28	1.30	CG2-60L1

■ BG2 Allowable Worm Wheel Torques (N·m)

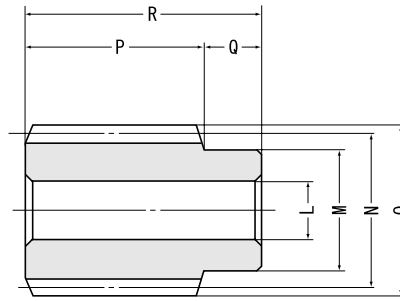
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
BG2-20R1	12.3	10.2	8.00	6.59	5.78	5.25
BG2-20R2	12.3	10.0	7.51	6.15	5.32	4.80

■ CG2 Allowable Worm Wheel Torques (N·m)

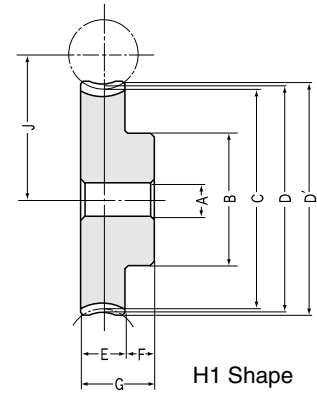
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
CG2-20R1	7.38	6.15	4.80	3.95	3.47	3.15
CG2-20R2	7.40	6.00	4.51	3.69	3.19	2.88
CG2-30R1	15.6	13.1	10.4	8.74	7.70	6.96
CG2-30R2	15.7	13.1	9.96	8.15	7.18	6.45
CG2-40R1	26.7	22.5	18.1	15.4	13.55	12.3
CG2-50R1	40.3	34.1	27.6	23.6	21.0	19.1
CG2-50R2	40.7	34.0	26.9	22.4	19.6	17.8
CG2-60R1	56.4	47.9	38.9	33.3	29.9	27.2



SW Worms, BG·CG Worm Wheels Normal Module **2.5**



W1 Shape



H1 Shape

Module 2.5 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SW2.5-R1	m2.5	1	3°52'	R	W1	15	30	37	42	45	18	—
SW2.5-R2		2	7°46'	R	W1	15	30	37	42	45	18	—
SW2.5-L1	m2.5	1	3°52'	L	W1	15	30	37	42	45	18	—
SW2.5-L2		2	7°46'	L	W1	15	30	37	42	45	18	—

Module 2.5 BG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
BG2.5-20R1	20	m2.5	20	1	3°52'	R	H1	12	35	50.11	55	57.5	22
BG2.5-20R2	10		20	2	7°46'	R	H1	12	35	50.46	55	57.5	22
BG2.5-20L1	20		20	1	3°52'	L	H1	12	35	50.11	55	57.5	22
BG2.5-20L2	10		20	2	7°46'	L	H1	12	35	50.46	55	57.5	22

Module 2.5 CG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
CG2.5-20R1	20	m2.5	20	1	3°52'	R	H1	12	35	50.11	55	57.5	22
CG2.5-20R2	10		20	2	7°46'	R	H1	12	35	50.46	55	57.5	22
CG2.5-30R1	30		30	1	3°52'	R	HB	12	40	75.17	80	82.5	22
CG2.5-30R2	15		30	2	7°46'	R	HB	12	40	75.68	80	82.5	22
CG2.5-40R1	40		40	1	3°52'	R	HB	15	45	100.23	105	107.5	22
CG2.5-50R1	50		50	1	3°52'	R	HB	15	50	125.29	130	132.5	22
CG2.5-50R2	25		50	2	7°46'	R	HB	15	50	126.16	130	132.5	22
CG2.5-60R1	60		60	1	3°52'	R	HB	15	55	150.34	155	157.5	22
CG2.5-20L1	20		20	1	3°52'	L	H1	12	35	50.11	55	57.5	22
CG2.5-20L2	10		20	2	7°46'	L	H1	12	35	50.46	55	57.5	22
CG2.5-30L1	30		30	1	3°52'	L	HB	12	40	75.17	80	82.5	22
CG2.5-30L2	15		30	2	7°46'	L	HB	12	40	75.68	80	82.5	22
CG2.5-40L1	40		40	1	3°52'	L	HB	15	45	100.23	105	107.5	22
CG2.5-50L1	50		50	1	3°52'	L	HB	15	50	125.29	130	132.5	22
CG2.5-50L2	25		50	2	7°46'	L	HB	15	50	126.16	130	132.5	22
CG2.5-60L1	60		60	1	3°52'	L	HB	15	55	150.34	155	157.5	22

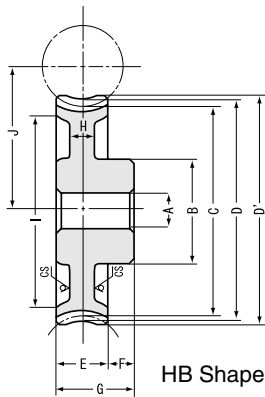
CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: Heat treating the tooth area of these worms is not recommended since it will introduce errors in the lead and pressure angles, producing poor gear mesh.

CAUTION: SUW worms may also be used to mate with BG and CG worm wheels.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

Worm Gear Pair



*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Specifications

Catalog No.	SW	BG	CG
Precision grade	KHK W 001 grade 4	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane	Normal plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth	Standard full depth
Normal pressure angle	20°	20°	20°
Material	S45C	CAC502A(Formerly PBC2)	FC200
Heat treatment	—	—	—
Tooth hardness	Less than 194HB	—	—
Surface treatment	Black oxide	—	—
Tooth surface finish	Cut	Cut	Cut
<small>Datum reference surface for gear cutting</small>	Bore	Bore	Bore
Secondary Operations	Possible	Possible	Possible

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
63	—	—	0.40	SW2.5-R1
63	—	—	0.40	SW2.5-R2
63	—	—	0.40	SW2.5-L1
63	—	—	0.40	SW2.5-L2

Hub width F	Total length G	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
14	36	43.5	17.7	1.81	0.13~0.31	0.40	BG2.5-20R1
14	36	43.5	17.3	1.76	0.13~0.31	0.40	BG2.5-20R2
14	36	43.5	17.7	1.81	0.13~0.31	0.40	BG2.5-20L1
14	36	43.5	17.3	1.76	0.13~0.31	0.40	BG2.5-20L2

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
14	36	—	—	43.5	10.6	1.09	0.13~0.31	0.40	CG2.5-20R1
14	36	—	—	43.5	10.4	1.06	0.13~0.31	0.40	CG2.5-20R2
14	36	(10)	(60)	56	22.8	2.32	0.13~0.31	0.80	CG2.5-30R1
14	36	(10)	(60)	56	22.5	2.30	0.13~0.31	0.80	CG2.5-30R2
14	36	(9)	(86)	68.5	39.0	3.98	0.13~0.31	1.40	CG2.5-40R1
14	36	(9)	(110)	81	59.0	6.02	0.13~0.31	1.90	CG2.5-50R1
14	36	(9)	(110)	81	58.6	5.98	0.13~0.31	1.90	CG2.5-50R2
14	36	(9)	(136)	93.5	82.9	8.46	0.13~0.31	2.30	CG2.5-60R1
14	36	—	—	43.5	10.6	1.09	0.13~0.31	0.40	CG2.5-20L1
14	36	—	—	43.5	10.4	1.06	0.13~0.31	0.40	CG2.5-20L2
14	36	(10)	(60)	56	22.8	2.32	0.13~0.31	0.80	CG2.5-30L1
14	36	(10)	(60)	56	22.5	2.30	0.13~0.31	0.80	CG2.5-30L2
14	36	(9)	(86)	68.5	39.0	3.98	0.13~0.31	1.40	CG2.5-40L1
14	36	(9)	(110)	81	59.0	6.02	0.13~0.31	1.90	CG2.5-50L1
14	36	(9)	(110)	81	58.6	5.98	0.13~0.31	1.90	CG2.5-50L2
14	36	(9)	(136)	93.5	82.9	8.46	0.13~0.31	2.30	CG2.5-60L1

■ BG2.5 Allowable Worm Wheel Torques (N·m)

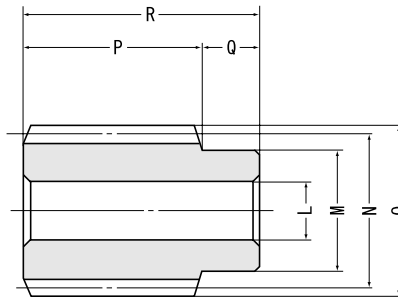
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
BG2.5-20R1	21.5	17.7	13.8	11.4	9.94	9.07
BG2.5-20R2	21.5	17.3	13.0	10.6	9.14	8.27

■ CG2.5 Allowable Worm Wheel Torques (N·m)

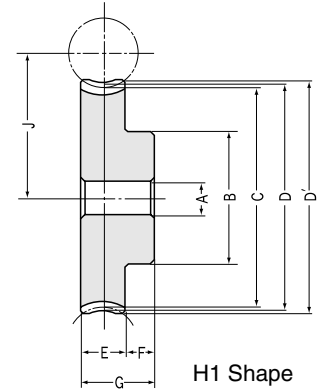
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
CG2.5-20R1	12.9	10.6	8.30	6.83	5.97	5.44
CG2.5-20R2	12.9	10.4	7.78	6.36	5.49	4.96
CG2.5-30R1	27.3	22.8	18.0	15.1	13.2	12.0
CG2.5-30R2	27.5	22.5	17.2	14.1	12.3	11.1
CG2.5-40R1	46.7	39.0	31.3	26.5	23.3	21.2
CG2.5-50R1	70.6	59.0	47.8	40.7	36.1	33.0
CG2.5-50R2	71.1	58.6	46.4	38.6	33.6	30.7
CG2.5-60R1	98.8	82.9	67.3	57.6	51.5	47.0



SW Worms, BG-CG Worm Wheels **Normal Module 3**



W1 Shape



H1 Shape

Module 3 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SW3-R1	m3	1	3°55'	R	W1	16	35	44	50	50	20	—
SW3-R2		2	7°50'	R	W1	16	35	44	50	50	20	—
SW3-L1	m3	1	3°55'	L	W1	16	35	44	50	50	20	—
SW3-L2		2	7°50'	L	W1	16	35	44	50	50	20	—

Module 3 BG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
BG3-20R1	20	m3	20	1	3°55'	R	H1	20	50	60.14	66	69	28
BG3-20R2	10		20	2	7°50'	R	H1	20	50	60.57	66	69	28
BG3-20L1	20		20	1	3°55'	L	H1	20	50	60.14	66	69	28
BG3-20L2	10		20	2	7°50'	L	H1	20	50	60.57	66	69	28

Module 3 CG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
CG3-20R1	20	m3	20	1	3°55'	R	H1	20	50	60.14	66	69	28
CG3-20R2	10		20	2	7°50'	R	H1	20	50	60.57	66	69	28
CG3-30R1	30		30	1	3°55'	R	H1	20	55	90.21	96	99	28
CG3-30R2	15		30	2	7°50'	R	H1	20	55	90.85	96	99	28
CG3-40R1	40		40	1	3°55'	R	HB	20	55	120.28	126	129	30
CG3-50R1	50		50	1	3°55'	R	HB	20	63	150.35	156	159	30
CG3-50R2	25		50	2	7°50'	R	HB	20	63	151.41	156	159	30
CG3-60R1	60		60	1	3°55'	R	HB	20	70	180.42	186	189	30
CG3-20L1	20		20	1	3°55'	L	H1	20	50	60.14	66	69	28
CG3-20L2	10		20	2	7°50'	L	H1	20	50	60.57	66	69	28
CG3-30L1	30		30	1	3°55'	L	H1	20	55	90.21	96	99	28
CG3-30L2	15		30	2	7°50'	L	H1	20	55	90.85	96	99	28
CG3-40L1	40		40	1	3°55'	L	HB	20	55	120.28	126	129	30
CG3-50L1	50		50	1	3°55'	L	HB	20	63	150.35	156	159	30
CG3-50L2	25		50	2	7°50'	L	HB	20	63	151.41	156	159	30
CG3-60L1	60		60	1	3°55'	L	HB	20	70	180.42	186	189	30

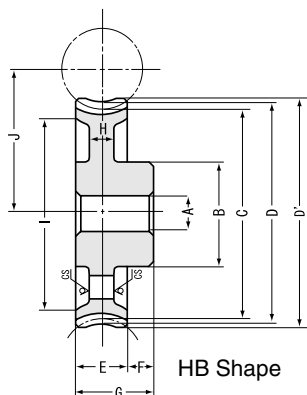
CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: Heat treating the tooth area of these worms is not recommended since it will introduce errors in the lead and pressure angles, producing poor gear mesh.

CAUTION: SUW worms may also be used to mate with BG and CG worm gears.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

Worm Gear Pair



*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Specifications			
Catalog No.	SW	BG	CG
Precision grade	KHK W 001 grade 4	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane	Normal plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth	Standard full depth
Normal pressure angle	14° 30'	14° 30'	14° 30'
Material	S45C	CAC502A (Formerly PBC2)	FC200
Heat treatment	—	—	—
Tooth hardness	Less than 194HB	—	—
Surface treatment	Black oxide	—	—
Tooth surface finish	Cut	Cut	Cut
<small>Datum reference surface for gear cutting</small>	Bore	Bore	Bore
Secondary Operations	Possible	Possible	Possible

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
70	—	—	0.60	SW3-R1
70	—	—	0.60	SW3-R2
70	—	—	0.60	SW3-L1
70	—	—	0.60	SW3-L2

Hub width F	Total length G	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
15	43	52	30.1	3.07	0.15~0.33	0.84	BG3-20R1
15	43	52	29.5	3.01	0.15~0.33	0.84	BG3-20R2
15	43	52	30.1	3.07	0.15~0.33	0.84	BG3-20L1
15	43	52	29.5	3.01	0.15~0.33	0.84	BG3-20L2

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
15	43	—	—	52	18.1	1.84	0.15~0.33	0.70	CG3-20R1
15	43	—	—	52	17.7	1.80	0.15~0.33	0.70	CG3-20R2
15	43	—	—	67	38.7	3.94	0.15~0.33	1.40	CG3-30R1
15	43	—	—	67	38.5	3.92	0.15~0.33	1.40	CG3-30R2
15	45	(9)	(107)	82	66.3	6.76	0.15~0.33	1.90	CG3-40R1
15	45	(9)	(138)	97	100	10.2	0.15~0.33	2.50	CG3-50R1
15	45	(9)	(138)	97	100	10.2	0.15~0.33	2.50	CG3-50R2
15	45	(9)	(166)	112	141	14.4	0.15~0.33	4.00	CG3-60R1
15	43	—	—	52	18.1	1.84	0.15~0.33	0.70	CG3-20L1
15	43	—	—	52	17.7	1.80	0.15~0.33	0.70	CG3-20L2
15	43	—	—	67	38.7	3.94	0.15~0.33	1.40	CG3-30L1
15	43	—	—	67	38.5	3.92	0.15~0.33	1.40	CG3-30L2
15	45	(9)	(107)	82	66.3	6.76	0.15~0.33	1.90	CG3-40L1
15	45	(9)	(138)	97	100	10.2	0.15~0.33	2.50	CG3-50L1
15	45	(9)	(138)	97	100	10.2	0.15~0.33	2.50	CG3-50L2
15	45	(9)	(166)	112	141	14.4	0.15~0.33	4.00	CG3-60L1

■ BG3 Allowable Worm Wheel Torques (N·m)

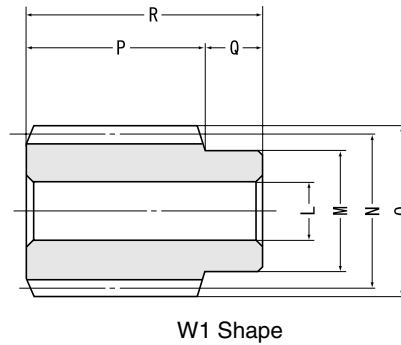
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
BG3-20R1	36.8	30.1	23.5	19.1	16.7	15.2
BG3-20R2	37.0	29.5	22.1	17.9	15.4	14.0

■ CG3 Allowable Worm Wheel Torques (N·m)

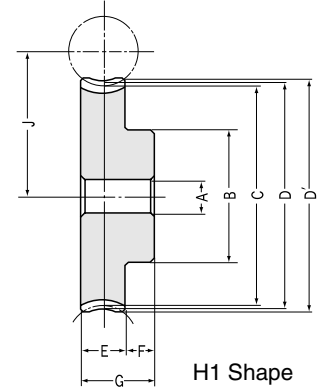
Catalog No.	Worm rpm				
	30	100	300	600	900
CG3-20R1	22.1	18.1	14.1	11.5	10.0
CG3-20R2	22.2	17.7	13.3	10.7	9.24
CG3-30R1	46.6	38.7	30.6	25.4	22.2
CG3-30R2	47.2	38.5	29.3	23.7	20.8
CG3-40R1	79.8	66.3	53.2	44.6	39.1
CG3-50R1	121	100	81.1	68.4	60.5
CG3-50R2	122	100	79.1	65.1	56.7
CG3-60R1	169	141	114	96.7	86.3



SW Worms, BG·CG Worm Wheels Normal Module 4



W1 Shape



H1 Shape

Module 4 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SW4-R1	m4	1	3°42'	R	W1	22	50	62	70	70	25	—
SW4-R2		2	7°25'	R	W1	22	50	62	70	70	25	—
SW4-L1	m4	1	3°42'	L	W1	22	50	62	70	70	25	—
SW4-L2		2	7°25'	L	W1	22	50	62	70	70	25	—

Module 4 BG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
BG4-20R1	20	m4	20	1	3°42'	R	H1	20	60	80.17	88	90	35
BG4-20R2	10		20	2	7°25'	R	H1	20	60	80.67	88	90	35
BG4-20L1	20		20	1	3°42'	L	H1	20	60	80.17	88	90	35
BG4-20L2	10		20	2	7°25'	L	H1	20	60	80.67	88	90	35

Module 4 CG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape <small>NOTE 2</small>	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
CG4-20R1	20	m4	20	1	3°42'	R	H1	20	60	80.17	88	90	35
CG4-20R2	10		20	2	7°25'	R	H1	20	60	80.67	88	90	35
CG4-30R1	30		30	1	3°42'	R	HB	20	60	120.25	128	130	35
CG4-30R2	15		30	2	7°25'	R	HB	20	60	120.01	128	130	35
CG4-40R1	40		40	1	3°42'	R	HB	20	70	160.33	168	171	35
CG4-50R1	50		50	1	3°42'	R	H2	20	70	200.42	208	211	35
CG4-50R2	25		50	2	7°25'	R	H2	20	70	201.69	208	211	35
CG4-60R1	60		60	1	3°42'	R	H2	20	80	240.5	248	251	35
CG4-20L1	20		20	1	3°42'	L	H1	20	60	80.17	88	90	35
CG4-20L2	10		20	2	7°25'	L	H1	20	60	80.67	88	90	35
CG4-30L1	30		30	1	3°42'	L	HB	20	60	120.25	128	130	35
CG4-30L2	15		30	2	7°25'	L	HB	20	60	120.01	128	130	35
CG4-40L1	40		40	1	3°42'	L	HB	20	70	160.33	168	171	35
CG4-50L1	50		50	1	3°42'	L	H2	20	70	200.42	208	211	35
CG4-50L2	25		50	2	7°25'	L	H2	20	70	201.69	208	211	35
CG4-60L1	60		60	1	3°42'	L	H2	20	80	240.5	248	251	35

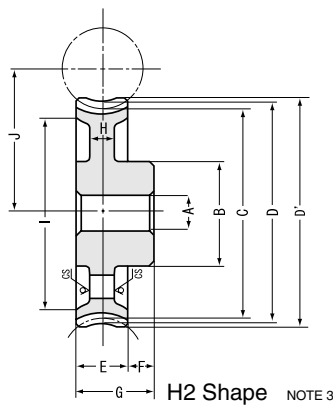
CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: Heat treating the tooth area of these worms is not recommended since it will introduce errors in the lead and pressure angles, producing poor gear mesh.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

NOTE 2: The H2 shape worm gears have casting lightening holes in the web.

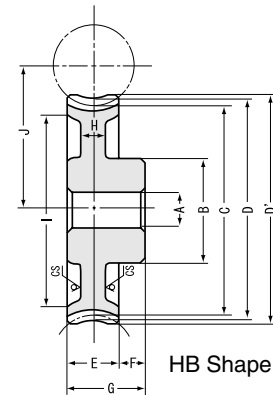


H2 Shape NOTE 3

*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
95	—	—	1.70	SW4-R1
95	—	—	1.70	SW4-R2
95	—	—	1.70	SW4-L1
95	—	—	1.70	SW4-L2

Hub width F	Total length G	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>		Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
17	52	71	61.7	6.29	0.17~0.37	1.80	BG4-20R1
17	52	71	60.0	6.12	0.17~0.37	1.80	BG4-20R2
17	52	71	61.7	6.29	0.17~0.37	1.80	BG4-20L1
17	52	71	60.0	6.12	0.17~0.37	1.80	BG4-20L2



HB Shape

*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N·m) <small>NOTE 1</small>		Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
17	52	—	—	71	37.0	3.77	0.17~0.37	1.50	CG4-20R1
17	52	—	—	71	36.0	3.67	0.17~0.37	1.50	CG4-20R2
17	52	(12)	(96)	91	79.1	8.07	0.17~0.37	2.50	CG4-30R1
17	52	(12)	(96)	91	78.3	7.99	0.17~0.37	2.50	CG4-30R2
17	52	(11)	(136)	111	136	13.8	0.17~0.37	3.70	CG4-40R1
17	52	(12)	(176)	131	205	20.9	0.17~0.37	4.50	CG4-50R1
17	52	(12)	(176)	131	204	20.8	0.17~0.37	4.50	CG4-50R2
17	52	(12)	(218)	151	288	29.4	0.17~0.37	5.00	CG4-60R1
17	52	—	—	71	37.0	3.77	0.17~0.37	1.50	CG4-20L1
17	52	—	—	71	36.0	3.67	0.17~0.37	1.50	CG4-20L2
17	52	(12)	(96)	91	79.1	8.07	0.17~0.37	2.50	CG4-30L1
17	52	(12)	(96)	91	78.3	7.99	0.17~0.37	2.50	CG4-30L2
17	52	(11)	(136)	111	136	13.8	0.17~0.37	3.70	CG4-40L1
17	52	(12)	(176)	131	205	20.9	0.17~0.37	4.50	CG4-50L1
17	52	(12)	(176)	131	204	20.8	0.17~0.37	4.50	CG4-50L2
17	52	(12)	(218)	151	288	29.4	0.17~0.37	5.00	CG4-60L1

■ BG4 Allowable Worm Wheel Torques (N·m)

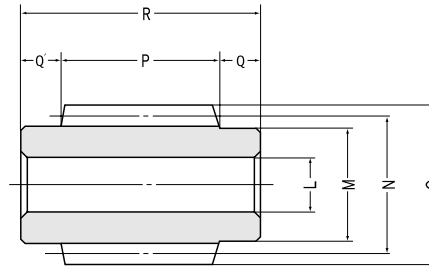
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
BG4-20R1	75.9	61.7	47.9	38.4	33.7	30.1
BG4-20R2	75.9	60.0	44.8	35.7	30.9	27.5

■ CG4 Allowable Worm Wheel Torques (N·m)

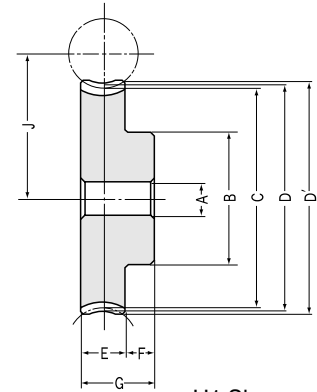
Catalog No.	Worm rpm			
	30	100	300	600
CG4-20R1	45.6	37.0	28.7	23.0
CG4-20R2	45.5	36.0	26.9	21.4
CG4-30R1	96.3	79.1	62.3	50.9
CG4-30R2	96.8	78.3	59.4	47.3
CG4-40R1	165	136	108	89.4
CG4-50R1	249	205	165	137
CG4-50R2	250	204	160	130
CG4-60R1	348	288	233	194



SW Worms, BG·CG Worm Wheels Normal Module 5



W3 Shape



H1 Shape

Module 5 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						L _{H7}	M	N	O	P	Q	Q'
SW5-R1	m5	1	4°06'	R	W3	25	56	70	80	85	20	20
SW5-R2		2	8°13'	R	W3	25	56	70	80	85	20	20

Module 5 BG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
BG5-20R1	20	m5	20	1	4°06'	R	H1	22	75	100.26	110	113	45
BG5-20R2	10		20	2	8°13'	R	H1	22	75	101.04	110	113	45

Module 5 CG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape <small>NOTE 2</small>	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A _{H7}	B	C	D	D'	E
CG5-20R1	20	m5	20	1	4°06'	R	H1	22	75	100.26	110	113	45
CG5-20R2	10		20	2	8°13'	R	H1	22	75	101.04	110	113	45
CG5-30R1	30		30	1	4°06'	R	HB	22	75	150.38	160	163	45
CG5-30R2	15		30	2	8°13'	R	HB	22	75	151.56	160	163	45
CG5-40R1	40		40	1	4°06'	R	H2	22	90	200.51	210	213	45
CG5-50R1	50		50	1	4°06'	R	H2	22	90	250.61	260	263	45
CG5-50R2	25	50	2	8°13'	R	H2	22	90	252.59	260	263	45	
CG5-60R1	60	60	1	4°06'	R	H2	22	100	300.77	310	313	45	

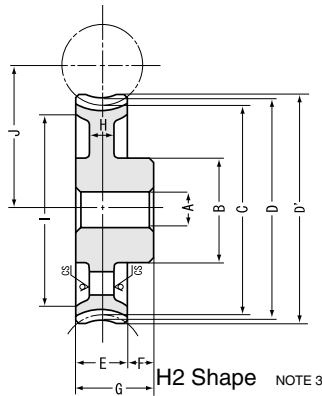
CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: Heat treating the tooth area of these worms is not recommended since it will introduce errors in the lead and pressure angles, producing poor gear mesh.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

NOTE 2: The H2 shape worm gears have casting lightening holes in the web.



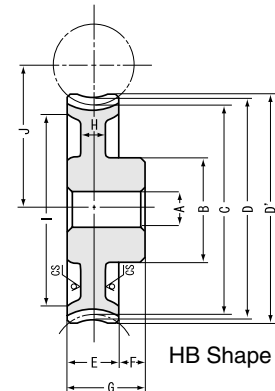
H2 Shape NOTE 3
 *CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Specifications

Catalog No.	SW	BG	CG
Precision grade	KHK W 001 grade 4	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane	Normal plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth	Standard full depth
Normal pressure angle	14° 30'	14° 30'	14° 30'
Material	S45C	CAC502A (Formerly PBC2)	FC200
Heat treatment	—	—	—
Tooth hardness	Less than 194HB	—	—
Surface treatment	Black oxide	—	—
Tooth surface finish	Cut	Cut	Cut
Datum reference surface for gear cutting	Bore	Bore	Bore
Secondary Operations	Possible	Possible	Possible

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
125	—	—	2.90	SW5-R1
125	—	—	2.90	SW5-R2

Hub width F	Total length G	Mounting distance J	Allowable torque (N · m) NOTE 1		Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
20	65	85	117	12.0	0.20~0.40	3.60	BG5-20R1
20	65	85	115	11.7	0.20~0.40	3.60	BG5-20R2
20	72	100	185	18.9	0.22~0.42	6.10	BG6-20R1
20	72	100	183	18.6	0.22~0.42	6.10	BG6-20R2



HB Shape
 *CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N · m) NOTE 1		Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
20	65	—	—	85	70.3	7.17	0.20~0.40	3.00	CG5-20R1
20	65	—	—	85	68.9	7.03	0.20~0.40	3.00	CG5-20R2
20	65	(13)	(127)	110	150	15.3	0.20~0.40	4.40	CG5-30R1
20	65	(13)	(127)	110	150	15.3	0.20~0.40	4.40	CG5-30R2
20	65	(16)	(172)	135	258	26.3	0.20~0.40	7.00	CG5-40R1
20	65	(16)	(223)	160	390	39.8	0.20~0.40	9.20	CG5-50R1
20	65	(16)	(223)	160	390	39.7	0.20~0.40	9.20	CG5-50R2
20	65	(13)	(276)	185	548	55.9	0.20~0.40	13.0	CG5-60R1

■ BG5 Allowable Worm Wheel Torques (N·m)

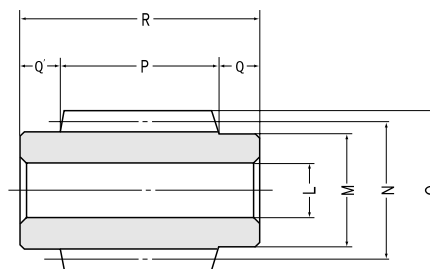
Catalog No.	Worm rpm					
	30	100	300	600	900	1200
BG5-20R1	146	117	91.2	73.0	63.7	56.9
BG5-20R2	146	115	85.8	68.4	58.8	52.2

■ CG5 Allowable Worm Wheel Torques (N·m)

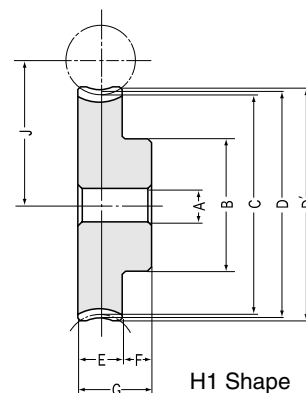
Catalog No.	Worm rpm			
	30	100	300	600
CG5-20R1	87.4	70.3	54.7	43.8
CG5-20R2	87.9	68.9	51.5	41.0
CG5-30R1	185	150	119	96.8
CG5-30R2	187	150	114	90.6
CG5-40R1	316	258	206	170
CG5-50R1	477	390	315	261
CG5-50R2	483	390	307	249
CG5-60R1	668	548	443	369



SW Worms, BG·CG Worm Wheels **Normal Module 6**



W3 Shape



H1 Shape

Module 6 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width (R)	Hub width (L)
						LH7	M	N	O	P	Q	Q'
SW6-R1	m6	1	4°18'	R	W3	30	64	80	92	100	25	25
SW6-R2		2	8°38'	R	W3	30	64	80	92	100	25	25

Module 6 BG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	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	10		20	2	8°38'	R	H1	25	100	121.38	132	136	52

Module 6 CG Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape <small>NOTE 2</small>	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
CG6-20R2	10		20	2	8°38'	R	H1	25	100	121.38	132	136	52
CG6-30R1	30		30	1	4°18'	R	HB	25	100	180.51	192	196	52
CG6-30R2	15		30	2	8°38'	R	HB	25	100	182.06	192	196	52
CG6-40R1	40		40	1	4°18'	R	H2	25	100	240.68	252	256	52
CG6-50R1	50		50	1	4°18'	R	H2	25	100	300.85	312	316	52
CG6-50R2	25	50	2	8°38'	R	H2	25	100	303.44	312	316	52	
CG6-60R1	60	60	1	4°18'	R	H2	25	120	361.02	372	376	52	

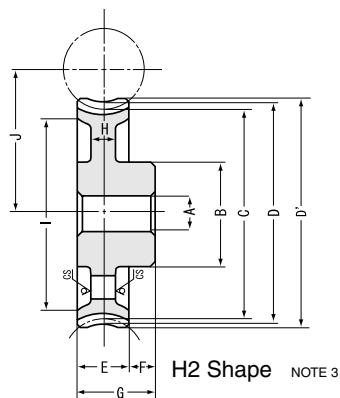
CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: Heat treating the tooth area of these worms is not recommended since it will introduce errors in the lead and pressure angles, producing poor gear mesh.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 294 for more details. The tables below show the allowable worm wheel torques (N·m) at selected worm speeds.

NOTE 2: The H2 shape worm gears have casting lightening holes in the web.



*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.

Total length R	Screw		Weight (kg)	Catalog No.
	Size	S		
150	—	—	4.30	SW6-R1
150	—	—	4.30	SW6-R2

Hub width F	Total length G	Mounting distance J	Allowable torque (N · m) <small>NOTE 1</small>	Allowable torque (kgf · m)	Backlash (mm)	Weight (kg)	Catalog No.
			Surface durability	Surface durability			
20	72	100	185	18.9	0.22~0.42	6.10	BG6-20R1
20	72	100	183	18.6	0.22~0.42	6.10	BG6-20R2

Hub width F	Total length G	Web thickness (H)	Web O.D. (I)	Mounting distance J	Allowable torque (N · m) <small>NOTE 1</small>	Allowable torque (kgf · m)	Backlash (mm)	Weight (kg)	Catalog No.
					Surface durability	Surface durability			
20	72	—	—	100	111	11.3	0.22~0.42	5.10	CG6-20R1
20	72	—	—	100	110	11.2	0.22~0.42	5.10	CG6-20R2
20	72	(15)	(155)	130	237	24.2	0.22~0.42	7.60	CG6-30R1
20	72	(15)	(155)	130	238	24.3	0.22~0.42	7.60	CG6-30R2
20	72	(15)	(213)	160	407	41.5	0.22~0.42	10.0	CG6-40R1
20	72	(16)	(275)	190	615	62.8	0.22~0.42	13.0	CG6-50R1
20	72	(16)	(275)	190	620	63.2	0.22~0.42	13.0	CG6-50R2
20	72	(17)	(336)	220	865	88.2	0.22~0.42	19.0	CG6-60R1

■ BG6 Allowable Worm Wheel Torques (N·m)

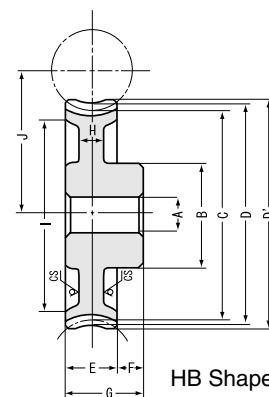
Catalog No.	Worm rpm				
	30	100	300	600	900
BG6-20R1	232	185	144	115	99.2
BG6-20R2	235	183	136	109	92.3

■ CG6 Allowable Worm Wheel Torques (N·m)

Catalog No.	Worm rpm			
	30	100	300	600
CG6-20R1	139	111	86.2	(69.0)
CG6-20R2	141	110	81.8	(65.1)
CG6-30R1	294	237	187	(153)
CG6-30R2	299	238	181	(144)
CG6-40R1	502	407	325	(268)
CG6-50R1	760	615	496	(412)
CG6-50R2	774	620	488	(395)
CG6-60R1	1060	865	698	(582)

Specifications

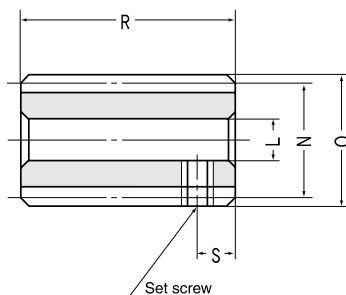
Catalog No.	SW	BG	CG
Precision grade	KHK W 001 grade 4	KHK W 002 grade 4	KHK W 002 grade 4
Reference section of gear	Normal plane	Normal plane	Normal plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth	Standard full depth
Normal pressure angle	14° 30'	14° 30'	14° 30'
Material	S45C	CAC502A (Formerly PBC2)	FC200
Heat treatment	—	—	—
Tooth hardness	Less than 194HB	—	—
Surface treatment	Black oxide	—	—
Tooth surface finish	Cut	Cut	Cut
Datum reference surface for gear cutting	Bore	Bore	Bore
Secondary Operations	Possible	Possible	Possible



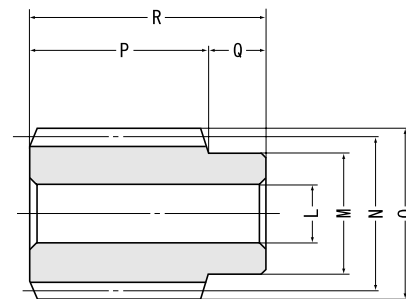
*CS has a sand mold casting finish. The dimensional tolerance of CS parts are the very coarse grade of JIS B 0405.



SUW Worms, PG Plastic Worm Wheels Normal Modules 1 ~ 1.5



W2 Shape



W1 Shape

Module 1 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						LH7	M	N	O	P	Q	R
SUW1-R1	m1	1	3°35'	R	W2	6	—	16	18	—	—	32
SUW1-R2		2	7°11'	R	W2	6	—	16	18	—	—	32

Module 1 Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A	B	C	D	D'	E
PG1-20R1	20	m1	20	1	3°35'	R	H1	6	16	20.04	22	23	10
PG1-20R2	10		20	2	7°11'	R	H1	6	16	20.16	22	23	10
PG1-30R1	30		30	1	3°35'	R	H1	6	20	30.06	32	33	10
PG1-40R1	40		40	1	3°35'	R	H1	8	26	40.08	42	43	10
PG1-50R1	50		50	1	3°35'	R	H1	8	30	50.1	52	53	10

Module 1.5 Worms

Catalog No.	Normal module	Number of start	Lead angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						LH7	M	N	O	P	Q	R
SUW1.5-R1	m1.5	1	3°26'	R	W1	8	20	25	28	30	10	40
SUW1.5-R2		2	6°54'	R	W1	8	20	25	28	30	10	40

Module 1.5 Worm Wheels

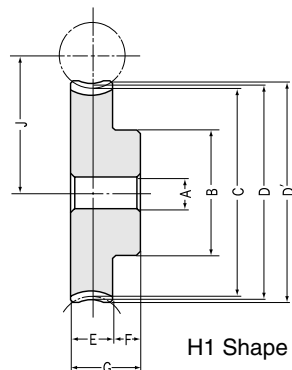
Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of tread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A	B	C	D	D'	E
PG1.5-20R1	20	m1.5	20	1	3°26'	R	H1	8	22	30.05	33	34.5	12
PG1.5-20R2	10		20	2	6°54'	R	H1	8	22	30.22	33	34.5	12

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: SW worms may also be used to mate with PG worm wheels.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

Worm Gear Pair
PG · VCcs



Specifications

Catalog No.	SUW	PG
Precision grade	KHK W 001 grade 4	KHK W 002 grade 5
Reference section of gear	Normal plane	Normal plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20°	20°
Material	SUS303	MC901
Heat treatment	—	—
Tooth hardness	Less than 187HB	—
Surface treatment	—	—
Tooth surface finish	Cut	Cut
Datum reference surface for gear cutting	Bore	Bore
Secondary Operations	Possible	Possible

*Available on special order: Same gears made from SUS304.

Screw <small>NOTE 1</small>		Weight (kg)	Catalog No.
Size	S		
M4	5	0.04	SUW1-R1
M4	5	0.04	SUW1-R2

NOTE 1: The W2 shape worms are supplied with a set screw.

Hub width	Total length	Mounting distance	Allowable torque (N·m) <small>NOTE2</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	G	J	Surface durability	Surface durability			
10	20	18	0.62	0.060	0.07~0.23	0.0060	PG1-20R1
10	20	18	0.62	0.060	0.07~0.23	0.0060	PG1-20R2
10	20	23	1.03	0.10	0.07~0.23	0.01	PG1-30R1
10	20	28	1.49	0.15	0.07~0.23	0.02	PG1-40R1
10	20	33	1.96	0.20	0.07~0.23	0.03	PG1-50R1

Screw		Weight (kg)	Catalog No.
Size	S		
—	—	0.12	SUW1.5-R1
—	—	0.12	SUW1.5-R2

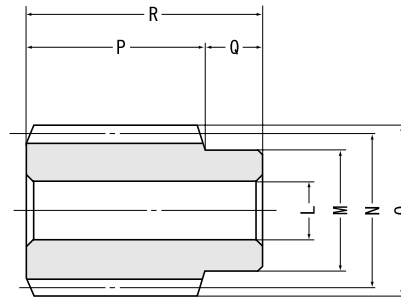
Hub width	Total length	Mounting distance	Allowable torque (N·m) <small>NOTE2</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	G	J	Surface durability	Surface durability			
10	22	27.5	1.66	0.17	0.09~0.25	0.015	PG1.5-20R1
10	22	27.5	1.68	0.17	0.09~0.25	0.015	PG1.5-20R2

NOTE 2: The allowable torques shown in the table are calculated using the Lewis formula.

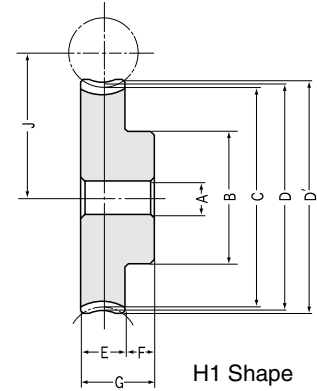


SUW Worms, PG Plastic Worm Wheels

Normal Modules **2~3**



W1 Shape



H1 Shape

Module 2 Worms

Pressure Angle 14 °30'

Catalog No.	Normal module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						LH7	M	N	O	P	Q	R
SUW2-R1	m2	1	3°42'	R	W1	12	25	31	35	32	14	46
SUW2-R2		2	7°25'	R	W1	12	25	31	35	32	14	46

Module 2 Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A	B	C	D	D'	E
PG2-20R1	20	m2	20	1	3°42'	R	H1	10	33	40.08	44	46	22
PG2-20R2	10		20	2	7°25'	R	H1	10	33	40.34	44	46	22

Module 2.5 Worms

Pressure Angle 20 °

Catalog No.	Normal module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						LH7	M	N	O	P	Q	R
SUW2.5-R1	m2.5	1	3°52'	R	W1	15	30	37	42	45	18	63
SUW2.5-R2		2	7°46'	R	W1	15	30	37	42	45	18	63

Module 2.5 Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A	B	C	D	D'	E
PG2.5-20R1	20	m2.5	20	1	3°52'	R	H1	12	35	50.11	55	57.5	22
PG2.5-20R2	10		20	2	7°46'	R	H1	12	35	50.46	55	57.5	22

Module 3 Worms

Pressure Angle 14 °30'

Catalog No.	Normal module	Number of start	Lead angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length
						LH7	M	N	O	P	Q	R
SUW3-R1	m3	1	3°55'	R	W1	16	35	44	50	50	20	70
SUW3-R2		2	7°50'	R	W1	16	35	44	50	50	20	70

Module 3 Worm Wheels

Catalog No.	Reduction ratio	Normal module	No. of teeth	Number of start	Helix angle	Hand of thread	Shape	Bore	Hub dia.	Pitch dia.	Throat dia.	Outside dia.	Face width
								A	B	C	D	D'	E
PG3-20R1	20	m3	20	1	3°55'	R	H1	15	50	60.14	66	69	28
PG3-20R2	10		20	2	7°50'	R	H1	15	50	60.57	66	69	28

CAUTION: Before assembling or performing any secondary operations, please carefully read the "Application Hints" on page 296.

CAUTION: SW worms may also be used to mate with PG worm wheels.

CAUTION: These worm wheels are profile shifted to create the proper center distance.

Worm Gear Pair



Worms, Plastic Worm Wheels

Specifications

Catalog No.	SUW	PG
Precision grade	KHK W 001 grade 4	KHK W 002 grade 5
Reference section of gear	Normal plane	Normal plane
Gear teeth	JIS 3 type Standard full depth	Standard full depth
Normal pressure angle	20° or 14° 30'	20° or 14° 30'
Material	SUS303	MC901
Heat treatment	—	—
Tooth hardness	Less than 187HB	—
Surface treatment	—	—
Tooth surface finish	Cut	Cut
Datum reference surface for gear cutting	Bore	Bore
Secondary Operations	Possible	Possible

*Available on special order: Same gears made from SUS304.

Screw		Weight (kg)	Catalog No.
Size	S		
—	—	0.20	SUW2-R1
—	—	0.20	SUW2-R2

Hub width	Total length	Mounting distance	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	G	J	Surface durability	Surface durability			
13	35	35.5	4.78	0.49	0.10~0.28	0.04	PG2-20R1
13	35	35.5	4.82	0.49	0.10~0.28	0.04	PG2-20R2

Screw		Weight (kg)	Catalog No.
Size	S		
—	—	0.40	SUW2.5-R1
—	—	0.40	SUW2.5-R2

Hub width	Total length	Mounting distance	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	G	J	Surface durability	Surface durability			
14	36	43.5	(8.46)	0.86	0.13~0.31	0.06	PG2.5-20R1
14	36	43.5	(8.54)	0.87	0.13~0.31	0.06	PG2.5-20R2

Screw		Weight (kg)	Catalog No.
Size	S		
—	—	0.60	SUW3-R1
—	—	0.60	SUW3-R2

Hub width	Total length	Mounting distance	Allowable torque (N·m) <small>NOTE 1</small>	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)	Catalog No.
F	G	J	Surface durability	Surface durability			
15	43	52	(13.7)	1.40	0.15~0.33	0.12	PG3-20R1
15	43	52	(13.8)	1.41	0.15~0.33	0.12	PG3-20R2

NOTE 1: The allowable torques shown in the table are calculated using the Lewis formula.