■ Moment of Inertia of KBX Bevel Box

Unit: kg·m^2

Model	Item	Pinion Axis (X)	Gear Axis (Y)
L	KBX-101L	4.45×10^{-6}	4.45×10^{-6}
	KBX-102L	2.16×10^{-6}	8.65×10^{-6}
	KBX-151L	5.30×10^{-5}	5.30×10^{-5}
	KBX-152L	3.65×10^{-5}	1.47×10^{-4}
	KBX-201L	1.79×10^{-4}	1.79×10^{-4}
	KBX-202L	7.85×10^{-5}	3.15×10^{-4}
T	KBX-101T	4.75×10^{-6}	4.75×10^{-6}
	KBX-102T	2.23×10^{-6}	8.93×10^{-6}
	KBX-151T	5.60×10^{-5}	5.60×10^{-5}
	KBX-152T	3.37×10^{-5}	1.50×10^{-4}
	KBX-201T	1.94×10^{-4}	1.94×10^{-4}
	KBX-202T	8.20×10^{-5}	3.28×10^{-4}

[NOTES] Consider the indicated moment of inertia as reference values.

■ Moment of Inertia of CBX Bevel Box
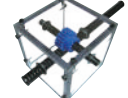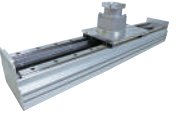
Unit: kg·m^2

Model	Item	Pinion Axis (X)	Gear Axis (Y)
L	CBX-191L	4.00×10^{-4}	4.00×10^{-4}
	CBX-192L	1.86×10^{-4}	7.43×10^{-4}
	CBX-251L	2.48×10^{-3}	2.48×10^{-3}
	CBX-252L	1.03×10^{-3}	4.13×10^{-3}
	CBX-321L	4.00×10^{-3}	4.00×10^{-3}
	CBX-322L	1.29×10^{-3}	5.18×10^{-3}
	CBX-401L	8.95×10^{-3}	8.95×10^{-3}
	CBX-402L	3.83×10^{-3}	1.53×10^{-2}
T	CBX-191T	4.05×10^{-4}	4.05×10^{-4}
	CBX-192T	1.87×10^{-4}	7.48×10^{-4}
	CBX-251T	2.50×10^{-3}	2.50×10^{-3}
	CBX-252T	1.04×10^{-3}	4.15×10^{-3}
	CBX-321T	4.08×10^{-3}	4.08×10^{-3}
	CBX-322T	1.31×10^{-3}	5.25×10^{-3}
	CBX-401T	9.20×10^{-3}	9.20×10^{-3}
	CBX-402T	3.88×10^{-3}	1.55×10^{-2}

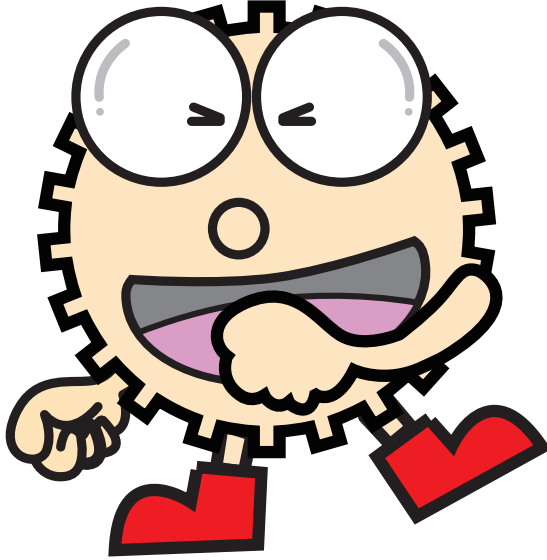[NOTES] Consider the indicated moment of inertia as reference values.

◉ Other Products

SRT/SRT-C Ratchets & Pawls	SRTB/SRT-C Ratchets & Pawls	GC/GC-I Gear Couplings	SV/SVI Involute Spline Shafts, Spline Bushings	GCU Gear Assembly Kit	DLS Rack & Pinion Lubrication System
Ⓙ	Ⓜ	Ⓙ			Ⓜ
Material: S45C	Material: S45C	Material: S45C	Material: S45C	Material: -	Material: -
P2.09~12.57　Page 464	P2.09~12.57　Page 466	m2, 2.5　Page 468	m1.667　Page 470	Page 472	Page 474

Racks & Pinions Aluminum Frame Transport Device
Material: -　Page 30

Ⓜ Includes Made to Order

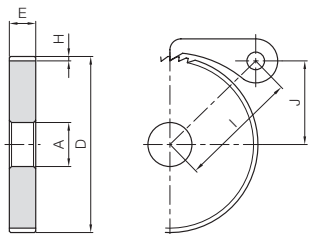## Catalog Number of KHK Stock Gears

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

(Example) Other Products

S V 20 - 200

- Total Length (200mm)
- Outer diameter (20mm)
- Type
- (Involute Spline Shafts)
- Material (S45C)

Material
S　S45C

Type
RT　Ratchets
GC　Gear Couplings
V　Involute Spline

Ratchets

Specifications

Tooth groove angle	60°
Material	S45C
Heat treatment	Gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

T4

J Series

T4K

To order J Series products, please specify: **Catalog No. + J + BORE**.
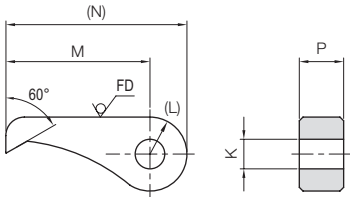
■ Characteristics of Pawls and Ratchets

● A simple structure used to restrict the rotational direction in one-way.

● The tips of pawls and the teeth of ratchets are induction hardened and therefore have superior durability.

Catalog Number	Pitch	No. of teeth	Shape	Bore A	Hub dia. B	Outside dia. D	Face width E	Hub width F	Total length G	Tooth height H	Center distance I	Mounting height J	Allowable torque (N·m) Bending strength	Allowable torque (kgf·m) Bending strength	Weight (kg)
SRT2/3-50		50		10		33.3					33.84	15.67	3.07	0.31	0.035
SRT2/3-60		60		10		40					35.51	19	4.10	0.42	0.053
SRT2/3-80	2.09	80		12	—	53.3	6	—	6	1	39.48	25.67	6.00	0.61	0.096
SRT2/3-90		90		12		60					41.73	29	7.11	0.73	0.12
SRT2/3-100		100		12		66.6					44.11	32.33	8.24	0.84	0.15
SRT1-50		50		12		50					45.48	23.4	14.7	1.50	0.16
SRT1-60		60		15		60					48.24	28.4	19.5	1.99	0.24
SRT1-80	3.14	80		15	—	80	12	—	12	1.6	54.73	38.4	29.4	3.00	0.44
SRT1-90		90		15		90					58.35	43.4	34.5	3.52	0.56
SRT1-100		100	T4	15		100					62.16	48.4	39.4	4.02	0.70
SRT2-30		30				60					61.23	26.9	29.0	2.96	0.28
SRT2-40	6.28	40		15	—	80	15	—	15	3.1	66.23	36.9	49.2	5.02	0.53
SRT2-50		50				100					72.28	46.9	70.8	7.22	0.85
SRT2-60		60				120					79.14	56.9	94.3	9.61	1.24
SRT3-30		30		15		90					76.32	40	92.6	9.44	0.86
SRT3-40	9.42	40		20	—	120	20	—	20	5	85.15	55	158	16.1	1.58
SRT3-50		50		20		150					95.52	70	229	23.3	2.54
SRT4-30		30				120					95.74	52.6	226	23.0	1.89
SRT4-40	12.57	40		20	—	160	25	—	25	7.4	108.03	72.6	385	39.3	3.53
SRT4-50		50				200					122.37	92.6	559	57.0	5.66

[Caution on Product Characteristics] ① The bore may slightly vary due to the effect of heat treatment. When using with the indicated hole diameter, provide machining with a reamer or the like before use.

[Caution on Secondary Operations] ① Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

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

Bore H7																			
Keyway Js9	10	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50	
Screw size	4×1.8		5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8		
Catalog Number	—																		
SRT2/3-50J BORE		T4K	T4K	T4K															
SRT2/3-60 J BORE		T4K	T4K	T4K	T4K	T4K	T4K	T4K											
SRT2/3-80 J BORE			T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K								
SRT2/3-90 J BORE			T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K								
SRT2/3-100 J BORE			T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K						
SRT1-50 J BORE			T4K	T4K	T4K	T4K	T4K	T4K	T4K										
SRT1-60 J BORE				T4K	T4K	T4K	T4K	T4K	T4K	T4K									
SRT1-80 J BORE				T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K						
SRT1-90 J BORE				T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K					
SRT1-100 J BORE				T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K				
SRT2-30 J BORE				T4K	T4K	T4K	T4K	T4K	T4K	T4K									
SRT2-40 J BORE				T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K						
SRT2-50 J BORE				T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K				
SRT2-60 J BORE				T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K			
SRT3-30 J BORE				T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K							
SRT3-40 J BORE									T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K			
SRT3-50 J BORE									T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K			
SRT4-30 J BORE									T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K		
SRT4-40 J BORE									T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K		
SRT4-50 J BORE									T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K		

[Caution on J series] ① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 38 for more details.

② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.

③ Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that tooth phase matching is not performed.

④ Black oxide is not re-applied after hole and key secondary operations.

⑤ Certain products which would otherwise have a very long tapped hole are counterbored. Please see the website for more details.

Ratchet Pawls

Specifications

Tooth angle	60°
Material	S45C
Heat treatment	Pawl induction hardened
Pawl hardness	50 to 60HRC
Surface treatment	Black oxide coating

* FD has a forged finish surface.

T5

Catalog Number	Shape	K	(L)	M	(N)	P	Weight (kg)
SRT2/3-C		5	(8)	30	(38)	6	0.020
SRT1-C		8	(10)	39	(49)	12	0.057
SRT2-C	T5	10	(12.5)	55	(67.5)	15	0.13
SRT3-C		12	(15)	65	(80)	20	0.23
SRT4-C		13	(18)	80	(98)	25	0.38

[Caution on Product Characteristics] ① The ratchet pawl is for preventing reverse rotation. It cannot be used for feeding or indexing.

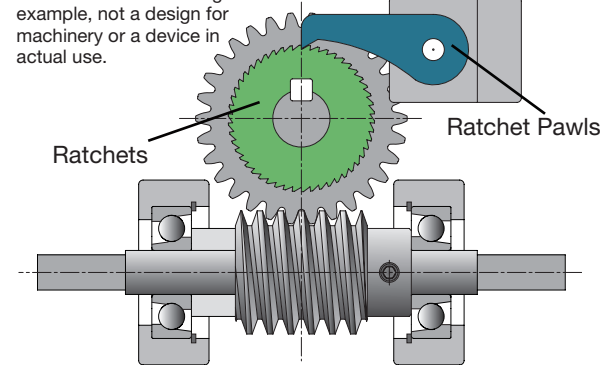② SRT2/3-C is a lost wax product that uses S45C-equivalent material.

■ Application Examples

* The illustration is a design example, not a design for machinery or a device in actual use.

Ratchets

Ratchet Pawls

Example: ratchets used for complete reverse prevention of worm gears

■ Bending Strength of Ratchets

The allowable transmission force Fb (N) of ratchets is the value calculated by the following formula.

$$F_b = \sigma_b \cdot \frac{b \cdot e^2}{6} \cdot \frac{1}{h} \cdot \frac{1}{S_F}$$

Also, the SRT Ratchet's allowable torque T (N·m) for bending strength is calculated by the following formula.

$$T = F_b \cdot r_f$$

Where

σ_b : Bending stress → Assumed 225.55MPa (23kgf/mm²)

b : Face width mm → Dimension Table ratchet face width E

e : Root length mm

$$\rightarrow e = h \times \tan\left(60 - \frac{360}{\text{No. of teeth}}\right) \text{ is the calculation}$$

h : Depth of teeth mm → Dimension Table ratchet tooth depth H

S_F : Safety factor → Assumed 2

r_f : Tooth root radius m

$$\rightarrow r_f = \frac{\text{Outside dia. D} - 2h}{2000} \text{ is the calculation}$$

For information on misprints in the catalog, please visit our website.
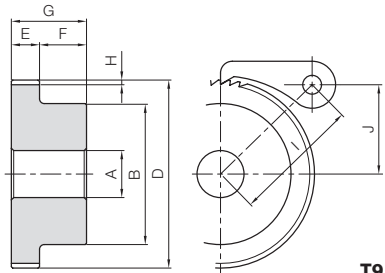
465

SRTB Pitch 2.09~12.57
Ratchets

Made to Order

M

Specifications
Tooth groove angle	60°
Material	S45C
Heat treatment	Gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

T9

■ Characteristics of Pawls and Ratchets
● A simple structure used to restrict the rotational direction in one-way.
● The tips of pawls and the teeth of ratchets are induction hardened and therefore have superior durability.

Catalog Number	Pitch	No. of teeth	Shape	Bore	Hub dia.	Outside dia.	Face width	Hub width	Total length	Tooth height
				A	B	D	E	F	G	H
SRTB2/3-50 (Made to Order)		50		10	25	33.3				
SRTB2/3-60 (Made to Order)		60		10	30	40				
SRTB2/3-80 (Made to Order)	2.09	80		12	35	53.3	6	10	16	1
SRTB2/3-90 (Made to Order)		90		12	40	60				
SRTB2/3-100 (Made to Order)		100		12	40	66.6				
SRTB1-50 (Made to Order)		50		12	35	50				
SRTB1-60 (Made to Order)		60		15	40	60				
SRTB1-80 (Made to Order)	3.14	80		15	50	80	12	12	24	1.6
SRTB1-90 (Made to Order)		90	T9	15	50	90				
SRTB1-100 (Made to Order)		100		15	50	100				
SRTB2-30 (Made to Order)		30			50	60				
SRTB2-40 (Made to Order)	6.28	40		15	60	80	15	14	29	3.1
SRTB2-50 (Made to Order)		50			60	100				
SRTB2-60 (Made to Order)		60			65	120				
SRTB3-30 (Made to Order)		30		15	75	90				
SRTB3-40 (Made to Order)	9.42	40		20	80	120	20	16	36	5
SRTB3-50 (Made to Order)		50		20	85	150				
SRTB4-30 (Made to Order)		30			90	120				
SRTB4-40 (Made to Order)	12.57	40		20	90	160	25	18	43	7.4
SRTB4-50 (Made to Order)		50			100	200				

Center distance	Mounting height	Allowable torque (N·m)	Allowable torque (kgf·m)	Weight (kg)	Catalog Number
I	J	Bending strength	Bending strength		
33.84	15.67	3.07	0.31	0.067	SRTB2/3-50 (Made to Order)
35.51	19	4.10	0.42	0.10	SRTB2/3-60 (Made to Order)
39.48	25.67	6.00	0.61	0.16	SRTB2/3-80 (Made to Order)
41.73	29	7.11	0.73	0.21	SRTB2/3-90 (Made to Order)
44.11	32.33	8.24	0.84	0.24	SRTB2/3-100 (Made to Order)
45.48	23.4	14.7	1.50	0.24	SRTB1-50 (Made to Order)
48.24	28.4	19.5	1.99	0.34	SRTB1-60 (Made to Order)
54.73	38.4	29.4	3.00	0.61	SRTB1-80 (Made to Order)
58.35	43.4	34.5	3.52	0.73	SRTB1-90 (Made to Order)
62.16	48.4	39.4	4.02	0.87	SRTB1-100 (Made to Order)
61.23	26.9	29.0	2.96	0.47	SRTB2-30 (Made to Order)
66.23	36.9	49.2	5.02	0.82	SRTB2-40 (Made to Order)
72.28	46.9	70.8	7.22	1.14	SRTB2-50 (Made to Order)
79.14	56.9	94.3	9.61	1.59	SRTB2-60 (Made to Order)
76.32	40	92.6	9.44	1.40	SRTB3-30 (Made to Order)
85.15	55	158	16.1	2.17	SRTB3-40 (Made to Order)
95.52	70	229	23.3	3.22	SRTB3-50 (Made to Order)
95.74	52.6	226	23.0	2.75	SRTB4-30 (Made to Order)
108.03	72.6	385	39.3	4.38	SRTB4-40 (Made to Order)
122.37	92.6	559	57.0	6.72	SRTB4-50 (Made to Order)

[Caution on Product Characteristics] ① For the ratchet with SRTB hub, pay attention to the orientation of the teeth with respect to the hub. Items with opposite orientation can be made to order.
② The bore may slightly vary due to the effect of heat treatment. When using with the indicated hole diameter, provide machining with a reamer or the like before use.

[Caution on Secondary Operations] ① Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

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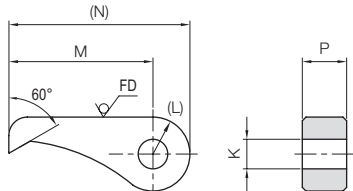

SRT-C Pitch 2.09~12.57
Ratchet Pawls

Pawls

Specifications
Tooth angle	60°
Material	S45C
Heat treatment	Pawl induction hardened
Pawl hardness	50 to 60HRC
Surface treatment	Black oxide coating

* FD has a forged finish surface.

T5

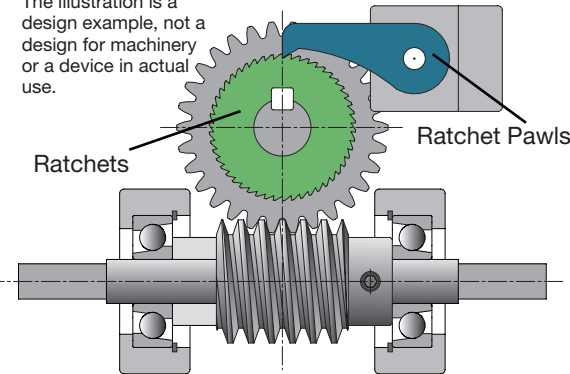| Catalog Number	Shape	K	(L)	M	(N)	P	Weight (kg)
SRT2/3-C		5	(8)	30	(38)	6	0.020
SRT1-C		8	(10)	39	(49)	12	0.057
SRT2-C	T5	10	(12.5)	55	(67.5)	15	0.13
SRT3-C		12	(15)	65	(80)	20	0.23
SRT4-C		13	(18)	80	(98)	25	0.38

[Caution on Product Characteristics] ① The ratchet pawl is for preventing reverse rotation. It cannot be used for feeding or indexing.
② SRT2/3-C is a lost wax product that uses S45C-equivalent material.

■ Application Examples
* The illustration is a design example, not a design for machinery or a device in actual use.

Ratchets

Ratchet Pawls

Example: ratchets used for complete reverse prevention of worm gears

■ Bending Strength of Ratchets
The allowable transmission force F_b (N) of ratchets is the value calculated by the following formula.

$$F_b = \sigma_b \cdot \frac{b \cdot e^2}{6} \cdot \frac{1}{h} \cdot \frac{1}{S_F}$$

Also, the SRT Ratchet's allowable torque T (N·m) for bending strength is calculated by the following formula.

$$T = F_b \cdot r_f$$

Where
σ_b : Bending stress → Assumed 225.55MPa (23kgf/mm^2)
b : Face width mm → Dimension Table ratchet face width E
e : Root length mm

→ $e = h \times \tan\left(60 - \dfrac{360}{\text{No. of teeth}}\right)$ is the calculation

h : Depth of teeth mm → Dimension Table ratchet tooth depth H
S_F : Safety factor → Assumed 2
r_f : Tooth root radius m

→ $r_f = \dfrac{\text{Outside dia. } D - 2h}{2000}$ is the calculation

GC Module 2~2.5
Gear Couplings (Inner Hubs)

Specifications

Gear teeth	Normal teeth (crowning)
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

T2

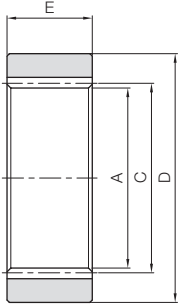| Catalog Number	Module	No. of teeth	Shape	Bore A$_{H8}$	Hub dia. B	Pitch dia. C	Outside dia. D	Face width E	Hub width F	Total length G	C-shaped retaining ring groove K	L	M	Mounting total length N	Backlash (mm)	Weight (kg)
GC1-12S	m2	25	T2	12	45	50	54	10	25	35	23	1.95	42.5	73	0.40~0.60	0.43
GC2-20S	m2	40	T2	20	70	80	84	15	40	55	37	2.7	67	115	0.40~0.60	1.66
GC3-20S	m2.5	42	T2	20	90	105	110	20	45	65	42	3.2	86.5	135	0.40~0.60	3.43

[Caution on Product Characteristics] ① A snap ring is included as an accessory.

[Caution on Secondary Operations] ① Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

J Series

T2K

Catalog Number	J
GC1-12SJ BORE	10
GC2-20SJ BORE	13
GC3-20SJ BORE	20

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

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

Bore H7	12	14	15	16	17	18	19	20	22	25	28	30	32	35	40	45	50
Keyway Js9	4×1.8	5×2.3				6×2.8				8×3.3			10×3.3		12×3.3	14×3.8	
Screw size	M4					M5					M6				M8		M10
GC1-12SJ BORE	*T2K	T2K	T2K	T2K	T2K	T2K	T2K	T2K	T2K	T2K							
GC2-20SJ BORE								*T2K	T2K	T2K	T2K	T2K	T2K	T2K	T2K		
GC3-20SJ BORE								*T2K	T2K	T2K	T2K	T2K	T2K	T2K	T2K	T2K	T2K

[Caution on J series]
① As available-on-request products, these require a lead-time for shipping of 2 working days (excludes the day ordered), after placing an order. Because the machining starts immediately, we cannot accept cancellations. Please see Page 38 for more details.
② Number of pieces we can process for one order is 1 to 20 units. For larger quantities, please request price and delivery quotes.
③ Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that tooth phase matching is not performed.
④ Certain products which would otherwise have a very long tapped hole are counterbored. Please see the Website for more details.
⑤ Areas of products which have been re-worked will not be black oxide coated.
⑥ For products having a tapped hole, a set screw is included.
⑦ Products marked with an * have a bore tolerance of H8.

GC-I
Gear Couplings (Outer Rings)

Gear Couplings

Specifications

Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Gear teeth induction hardened
Tooth hardness	50 to 60HRC
Surface treatment	Black oxide coating

T1

Catalog Number	Module	No. of teeth	Shape	Inside dia. A	Pitch dia. C	Outside dia. D	Face width E	Backlash (mm)	Weight (kg)
GC1-I	m2	25	T1	46	50	68	25	0.40~0.60	0.33
GC2-I	m2	40	T1	76	80	105	36	0.40~0.60	1.03
GC3-I	m2.5	42	T1	100	105	145	48	0.40~0.60	2.96

[Caution on Secondary Operations] ① Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).

■ Characteristics of Gear Couplings
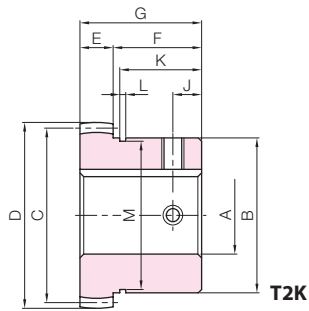
● There are many ways to couple shafts to transmit power. We have developed these standardized gear couplings of our own design. They are easier to connect or disconnect than chain couplings.

● As the external gear (inner cylinder) is crowned, the shaft angle can be up to 5°.

● Due to the induction hardened gear teeth, these couplings have excellent durability.

● The GCJ units are machined complete with keyways, set screw holes and finished bores and are ready for immediate installation. We also offer minimum bore models for users who want to perform their own secondary operations.

■ Gear Coupling Ordering Method

Gear coupling outer rings and inner hubs can each be purchased individually: however, normal usage requires a set of 1 outer ring and 2 inner hubs.

<E.g.> For 1 set of GC2-20S
GC2-I (outer ring) x 1 piece and GC2-20S (inner hub) x 2 piece set.

■ Strength of Gear Couplings

The allowable torques of the gear couplings are determined in accordance with the shear strength of the keys.
Allowable shear force of keys F (N) is calculated from the following formula.

$$F = b \cdot L \cdot \sigma \cdot \frac{1}{S}$$

Additionally, allowable torques T(N·m) of the inner hubs of the GC gear coupling is calculated using the following formula.

$$T = \frac{F \cdot d}{2000}$$

b : Key Width mm → Keyway width of inner hubs of the GC Gear Coupling
L : Key Length mm → Set at G-2 mm from the total length of the inner hub of the GC Gear Coupling
σ : Allowable Shear Force of keys → Set at 49MPa (5kgf/mm^2)
S : Safety Factor → Optionally set
d : Bore size (mm) → Bore size A of the inner hub of the GC Gear Coupling
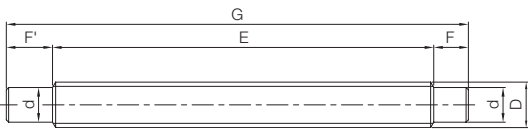
Caution: Safety Factor (S) must be set at a value between 1 to 3, depending on the load types or the coupling displacement.
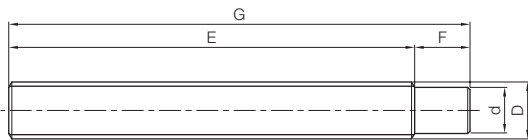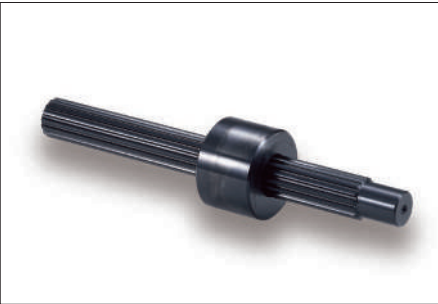
SV Module 1.667
Involute Spline Shafts

Specifications	
Gear teeth	Stub teeth
Pressure angle	20°
Material	S45C
Heat treatment	Thermal refined
Tooth hardness	200 to 270HB
Surface treatment	Black oxide coating

TA

TB

Catalog Number	Module	No. of teeth	Shape	Outside dia.	Hub dia.	Face width	Hub width (left)	Hub width (right)	Total length	Backlash (mm)	Weight (kg)
				D	d $^{+0.25}_{+0.15}$	E	F'	F	G		
SV17-170		8	TA	16.67	13	135	20	15	170		0.26
SV20-200	*m*1.667	10	TA	19.67	15	165	20	15	200	0.06~0.15	0.43
SV25-250		13	TB	24.67	20	220	—	30	250		0.88
SV30-300		16	TB	29.67	25	270	—	30	300		1.55

[Caution on Secondary Operations] ① When modifying the SV involute spline shaft with secondary operations, be careful not to crush the teeth or bend the shaft.

■ Characteristics of Involute Spline Shafts
● SV and SVI series are made according to the automotive involute spline standard, JIS B 1603: 1995 (Straight cylindrical involute splines, backlash 0.06 to 0.15).
● Involute spline shafts and bushings are thermal refined to have good abrasion-resistance.
● Spline bushings may be made in CAC (copper) type material as a special custom order item.

SVI Module 1.667
Involute Spline Bushings

Bushings

Specifications	
Gear teeth	Stub teeth
Pressure angle	20°
Material	S45C
Heat treatment	Thermal refined
Tooth hardness	200 to 270HB
Surface treatment	Black oxide coating

T1
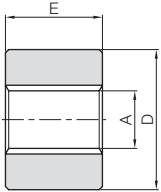
Catalog Number	Module	No. of teeth	Shape	Outside dia.	Outside dia.	Face width	Allowable torque (N·m)	Allowable torque (kgf·m)	Backlash (mm)	Weight (kg)
				A	D	E	Surface durability	Surface durability		
SVI17-40		8		13.7	40	25	33.2	3.38		0.21
SVI20-45	*m*1.667	10	T1	16.7	45	30	59.6	6.08	0.06~0.15	0.31
SVI25-55		13		21.7	55	38	125	12.8		0.57
SVI30-65		16		26.7	65	45	222	22.6		0.93

[Caution on Product Characteristics] ① The allowable torque shown are reference values calculated from "Surface strength of splines" on Page 471.
② Lubrication is always required on the mating surface of the spline shaft and hub.

■ Surface Strength of Splines
The design concept of the spline surface strength is the same as that of a key. Here is the formula for the allowable transmission force F(N) of spline.

$$F = \eta \cdot z \cdot h_w \cdot l \cdot \sigma$$

And the formula of allowable torque T (N·m) of spline with respect to the surface strength.

$$T = \frac{F \cdot d_w}{2000}$$

In designing a spline shaft, besides considering the surface strength, we should take into account the torsional and bending stresses of the spline.
Where

η : Contact ratio of surface → 0.75 (assumed)

z : Number of teeth → number of teeth of spline from the table

h_w : Contact depth of tooth (mm) → 1.485

l : Contact length of spline → spline hub face width E from the table

σ : Allowable surface stress of spline → 19.61MPa (2kgf/mm^2) (assumed)

d_w : Contact diameter (mm) → Tip diameter of spline shaft D - h_w

470

471

For information on misprints in the catalog, please visit our website.

See the gears with your own eyes and move them with your own hands to learn about their mechanisms and characteristics.

GCU-M

GCU-N

GCU-H

100mm

100mm

100mm

GCU-W

GCU-R

GCU-S

KHK Gear Cube

With sticker

Optional

GCU-H45 **Hand Wheel**

* These kits are not for actual use to transmit power. Please use only as representations of gear systems.

This product is certified by KAWAGUCHI i-mono i-waza

KAWAGUCHI i-mono

■ Features of GearCube

● Assembly kits can be connected flexibly.
● The frame is made of polycarbonate with high transparency and impact resistance.
● Gears combine MC nylon and metal, making lubrication unnecessary.
● An instruction manual is included, enabling easily assembly by anyone.

Assembly Procedure
Details are available on the Japanese website

Photo shows GCU-R

Remove protective sheet | Insert bushing | Set in shaft | Assemble into frame

Set Contents

Photo shows GCU-R

Adhere the sticker and it's **complete!** | Screw-fasten

All six types of assembly kit and input/output shafts can be connected.

GCU-S Spur Gear Kit

Installation: Parallel Axes (Two-stage)
Gear Type: Spur Gear
Used Product: 2 units of SS1.5-16
2 units of PS1.5-22
Gear Ratio: 1.89
Weight: Approx. 1kg

The Gear Kit contains a two-stage spur gear train and allows speed increases / reductions, and includes the most commonly used combinations of gears.

GCU-H Helical Gear Kit

Installation: Parallel Axes
Gear Type: Helical Gears (also for Screw Gears)
Gears: SN2.5-10L PN2.5-10R
Gear Ratio: 1
Weight: Approx. 1kg

Helical gears have more strength than spur gears of the same dimensions and have the advantage of being less noisy.

GCU-M Miter Gear Kit

Installation: Intersecting Axes
Gear Type: Miter
Gears: SM2-25 PM2-25
Gear Ratio: 1
Weight: Approx. 1kg

The shaft angle of bevel gears can be changed by 90°.
It is used to change the direction of the power.

GCU-R Rack Kit

Installation: Parallel Axes
Gear Type: Racks & Pinions
Used Product: SRO1.5-500 PS1.5-20
Weight: Approx. 1kg

Racks can be used to convert rotation to linear. They are used for elevating devices, etc.

GCU-N Screw Gear Kit

Installation: Nonparallel and nonintersecting gears
Gear Type: Screw Gears
Gears: SN2.5-10R PN2.5-10R
Gear Ratio: 1
Weight: Approx. 1kg

Screw Gears are helical gears used in nonparallel and nonintersecting situations. Applications include devices like conveyers with light loads.

GCU-W Worm Gear Pair Kit

Installation: Nonparallel and nonintersecting gears
Gear Type: Worm Gear Pair
Gears: SW2-R1 PG2-20R1
Gear Ratio: 20
Weight: Approx. 1kg

Large deceleration can be made in one step. The worm gear cannot be driven by the worm wheel due to inherent self-locking.

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

ラック＆ピニオン 潤滑システム

■システム構成

NO.	製品名
1	フレックスポンプ
2	グリースカートリッジ
3	チューブコネクター
4	チューブ
5	マウント軸
6	潤滑歯車

■特　長

●オープン環境下で使用されるラック＆ピニオンに最適な潤滑システムです。
●ポンプから押し出した微量のグリースが潤滑歯車を介して自動的に供給されます。
●用途に合わせて潤滑剤の量※を調整できます。
●ポンプの異常を検知し、エラー信号を発信します。
●ポリウレタン製潤滑歯車によりグリースを塗布するため均一な潤滑膜が形成されます。
●ちょう度番号２号までのグリースならばメーカーを問わず使用可能です。
●特殊グリース GC－F01 は、グリース垂れがなく機械を汚しません。
●潤滑剤の最適化でラック＆ピニオンの耐久性がアップし、メンテナンスコストも削減できます。

※ご使用製品のモジュールと周速（m /S）により、表１の潤滑剤の必要量を目安にご使用ください。

表１. 潤滑剤の必要量
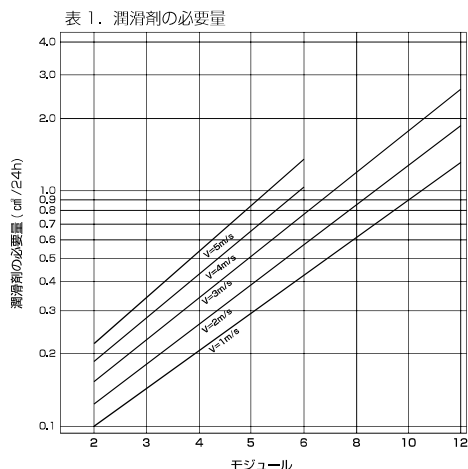
●使用例

フレックスポンプ FP401

CE マーク適合製品です。

DC24V 自動時間制御型潤滑ポンプ
（１口タイプ）

※付属品としてチューブコネクター（直角タイプ）
及び電源ケーブル（５m）が付属しています。

フレックスポンプ FP402

CE マーク適合製品です。

DC24V 自動時間制御型潤滑ポンプ
（２口タイプ）

※付属品としてチューブコネクター（直角タイプ）
及び電源ケーブル（５m）が付属しています。

フレックスポンプ FP400B

CE マーク適合製品です。

6V バッテリー自動時間制御型潤滑ポンプ（１口タイプ）

BT-6V
交換用バッテリー

※付属品としてチューブコネクター（直角タイプ）
及び 6V バッテリーが付属しています。

製品仕様	
寸 法（W × H × D）	最大 111 × 198.5 × 108mm
重 量（潤滑剤なし）	1450g
作動方式	ピストンポンプ式
潤滑油量	400cm³
潤滑剤の最小供給量	0.15cm³
作動圧力	最大 70bar
潤滑剤	NLGI ちょう度番号２号までのグリース
作動温度	−25～70℃
作動電圧	DC24V（バッテリータイプは 6V）
消費電流（DC24V）	Imax. ≦ 350mA
取付方向	全方向取付可
制御装置	内蔵、電子式
圧力モニタ	内蔵、電子式
潤滑剤レベルモニタ	内蔵、リード接点式
エラー検知	グリース切れ／背圧上昇／バッテリーレベル低下
防塵・防水クラス	IEC 規格 IP54

グリースカートリッジ GC-F01

金属表面への最適な接着性を考慮した
添加剤入りの特殊グリースです。
高温かつ高負荷の環境下で使用される
ラック＆ピニオンに最適です。

（空カートリッジ GC-0）

製品仕様	
ちょう度番号	1 号
滴 点	220℃
使用温度範囲	−30～150℃
耐圧荷重	4800N
内 容 量	400cm³

チューブ T-6×4-5 / T-6×4-10

耐圧性、弾性、復元力、屈曲強度に優
れたチューブです。
事前に GC－F01 グリースが充填され
ています。

	製品仕様	
製品名	材料	外径×内径×長さ
T-6 × 4-5	ポリアミド 6	6mm × 4mm × 5m
T-6 × 4-10		6mm × 4mm × 10m

チューブコネクタ TCS・TCR

高い流動性、O リングによるシール特
性がある六角ソケット付チューブコネ
クターです。

■ストレートタイプ

・TCS－M6
・TCS－G1/8

■直角タイプ

・TCR－M6
・TCR－G1/8

製品仕様	
材 料	CW614N（黄銅）
表面処理	ニッケルメッキ
動 作 圧	最大 80bar
動作温度	−30～100℃

注：カタログ記号の M6、G1/8 は、ねじサイズです。
　　マウント軸に合わせてご選定ください。

PUS・PUSCP 潤滑平歯車

受 **Lubrication Spur Gears**

S5

共通仕様	
歯　形	並歯
圧力角	20°
材　料	ポリウレタンフォーム
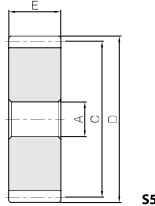
カタログ記号	モジュール	歯数	形状	穴径 A	基準円直径 C	歯先円直径 D	歯幅 E	セットするマウント軸
PUS1.5-24	m1.5	24			36	39	15	MAS1.5 又は MAR1.5
PUS2-17	m2				34	38	20	MAS2 又は MAR2
PUS2.5-17	m2.5				42.5	47.5	24	MAS2.5 又は MAR2.5
PUS3-17	m3	17	S5	12	51	57	30	MAS3 又は MAR3
PUS4-17	m4				68	76	40	MAS4 又は MAR4
PUS5-17	m5			20	85	95	50	MAS5 又は MAR5
PUS6-17	m6				102	114	60	MAS6 又は MAR6
PUS8-17 （受注生産品）	m8	17	S5	20	136	152	80	MAS8 又は MAR8
PUS10-17 （受注生産品）	m10				170	190	100	MAS10 又は MAR10

カタログ記号	ピッチmm（モジュール）	歯数	形状	穴径 A	基準円直径 C	歯先円直径 D	歯幅 E	セットするマウント軸
PUSCP5-24	CP5 (1.5915)	24	S5	12	38.2	41.4	15	MAS1.5 又は MAR1.5
PUSCP10-15	CP10 (3.1831)	15			47.7	54.1	30	MAS3 又は MAR3

〔ご使用上の注意〕　①ご使用できる温度範囲は−30 ～ 150℃です。
②ラック又はピニオンどちらにもセットできますが、適切な潤滑ができるピニオンへのセットを推奨致します。
③ラックギヤとピニオンギヤの歯面にグリースが塗布されるまでは負荷運転は避けてください。
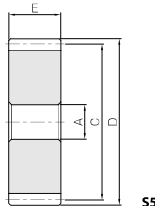
〔受注生産品の注意〕　受注生産品の価格納期は別途お見積りいたします。購入先までご連絡をお願いいたします。

PUH 潤滑はすば歯車

受 **Lubrication Helical Gears**

S5

共通仕様	
歯車基準断面	歯直角
歯　形	並歯
圧力角	20°
ねじれ角	19° 31'41"
材　料	ポリウレタンフォーム

| カタログ記号	モジュール	歯数	ねじれ方向	形状	穴径 A	基準円直径 C	歯先円直径 D	歯幅 E	セットするマウント軸
PUH1.5-24R / PUH1.5-24L	m1.5	24	R / L			38.2	41.2	15	MAS1.5 又は MAR1.5
PUH2-17R / PUH2-17L	m2		R / L		12	36.1	40.1	20	MAS2 又は MAR2
PUH3-17R / PUH3-17L	m3		R / L	S5		54.1	60.1	30	MAS3 又は MAR3
PUH4-17R / PUH4-17L	m4	17	R / L			72.2	80.2	40	MAS4 又は MAR4
PUH5-17R / PUH5-17L	m5		R / L		20	90.2	100.2	50	MAS5 又は MAR5
PUH6-17R / PUH6-17L	m6		R / L			108.2	120.2	60	MAS6 又は MAR6
PUH8-17R / PUH8-17L （受注生産品）	m8		R / L	S5	20	144.3	160.3	80	MAS8 又は MAR8
PUH10-17R / PUH10-17L （受注生産品）	m10	17	R / L			180.4	200.4	100	MAS10 又は MAR10

〔ご使用上の注意〕　①ご使用できる温度範囲は−30 ～ 150℃です。
②ラック又はピニオンどちらにもセットできますが、適切な潤滑ができるピニオンへのセットを推奨致します。
③ラックギヤとピニオンギヤの歯面にグリースが塗布されるまでは負荷運転は避けてください。

〔受注生産品の注意〕　受注生産品の価格納期は別途お見積りいたします。購入先までご連絡をお願いいたします。


潤滑歯車用マウント軸

受 **Mounting Axes**

●ストレートタイプ
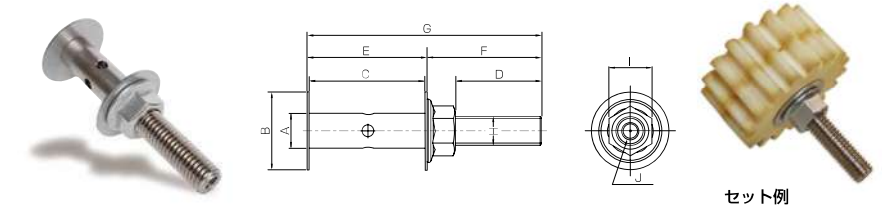
セット例

表面処理：ニッケルメッキ

カタログ記号	A	B	C	D	E	F	G	H 接続ねじ	I	J 接続ねじ
MAS1.5	12	27	15.2	34.2	16.4	44	60.4	M10	15	M6
MAS2			20.2		21.4		61.2			
MAS2.5			24.2	29.8	25.4	39.8	65.2			
MAS3			30.2		31.4		71.2			
MAS4			40.2		41.4		81.2			
MAS5	20	60	50.2	49.1	51.4	64.9	116.3	M16	24	G1/8"
MAS6			60.2		61.4		126.3			
MAS8 （受注生産品）	20	60	80.2	49.1	81.4	64.9	146.3	M16	24	G1/8"
MAS10 （受注生産品）		100	100.2		101.4		166.3			

〔ご使用上の注意〕　①チューブコネクタは付属しておりません。
〔受注生産品の注意〕　受注生産品の価格納期は別途お見積りいたします。購入先までご連絡をお願いいたします。

●直角タイプ
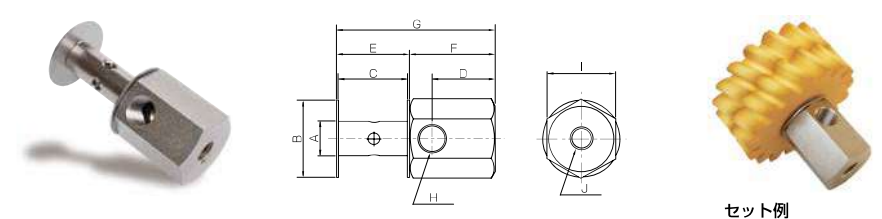
セット例

表面処理：ニッケルメッキ

カタログ記号	A	B	C	D	E	F	G	H 接続ねじ	I	J
MAR1.5	12	27	15.2		16.4		46.4	G1/8"	24	M8×10
MAR2			20.2		21.4		51.4			
MAR2.5			24.2	22	25.4	30	55.4			
MAR3			30.2		31.4		61.4			
MAR4			40.2		41.4		71.4			
MAR5	20	60	50.2		51.4		81.4			
MAR6			60.2		61.4		91.4			
MAR8 （受注生産品）	20	60	80.2	22	81.4	30	111.4	G1/8"	24	M8×10
MAR10 （受注生産品）		100	100.2		101.4		131.4			

〔ご使用上の注意〕　①チューブコネクタは付属しておりません。
〔受注生産品の注意〕　受注生産品の価格納期は別途お見積りいたします。購入先までご連絡をお願いいたします。