

Other Products

Spur
Gears

Helical
Gears

Internal
Gears

Racks

CP Racks
& Pinions

Miter
Gears







Bevel
Gears

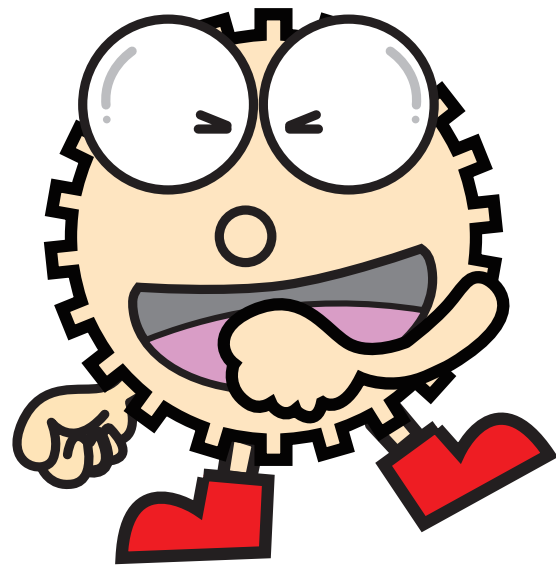
Screw
Gears

Worm
Gear Pairs

Bevel
Gearboxes

Other
Products

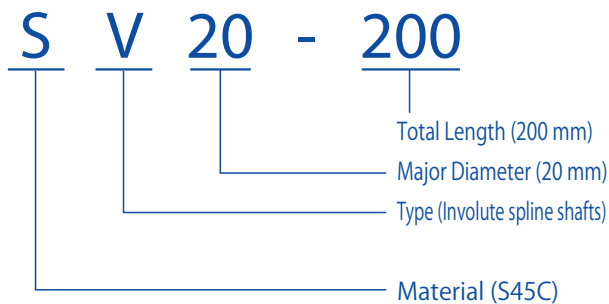
SRT/SRT-C Ratchets & Pawls  Material: S45C Heat Treatment: Gear teeth induction hardened P2.09 ~ 12.57 Page 430	SRTB/SRT-C Ratchets & Pawls  Material: S45C Heat Treatment: Gear teeth induction hardened P2.09 ~ 12.57 Page 432	GC/GC-I Gear Couplings  Material: S45C Heat Treatment: Gear teeth induction hardened m2, 2.5 Page 434	SV/SVI Involute Spline Shafts, Spline Bushings  Material: S45C Heat Treatment: Thermal refined m1.667 Page 436	GCU Gear Assembly Kit  Page 438	DLS Rack & Pinion Lubrication System  New Page 440
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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) Other Products



Material
S S45C

Type
RT Pawls and Ratchets
GC Gear Coupling
V Involute Spline



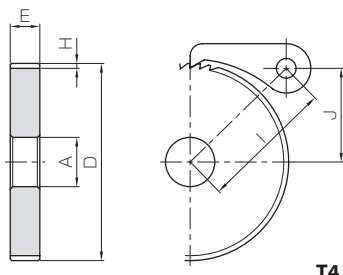
SRT Ratchets

J Series

Pitch 2.09 ~ 12.57



Specifications	
Angle of teeth	60°
Material	S45C
Heat treatment	Induction hardened teeth
Tooth hardness	50 ~ 60HRC
Surface treatment	Black oxide coating



T4

■ Features 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 No.	Pitch	No. of teeth	Shape	Bore		Outside dia.	Face width	Hub width	Total length	Depth of teeth	Center distance	Mounting distance	Allowable torque (N · m)	Allowable torque (kgf · m)	Weight (kg)
				A	B										
SRT2/3-50	2.09	50	T4	10		33.3	6	—	6	1	33.84	15.67	3.07	0.31	0.035
SRT2/3-60		60		10		40							4.10	0.42	0.053
SRT2/3-80		80		12		53.3							6.00	0.61	0.096
SRT2/3-90		90		12		60							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	3.14	50	T4	12		50	12	—	12	1.6	45.48	23.4	14.7	1.50	0.16
SRT1-60		60		15		60							19.5	1.99	0.24
SRT1-80		80		15		80							29.4	3.00	0.44
SRT1-90		90		15		90							34.5	3.52	0.56
SRT1-100		100		15		100					62.16	48.4	39.4	4.02	0.70
SRT2-30	6.28	30	T4	15		60	15	—	15	3.1	61.23	26.9	29.0	2.96	0.28
SRT2-40		40		15		80							49.2	5.02	0.53
SRT2-50		50		15		100							70.8	7.22	0.85
SRT2-60		60		15		120							94.3	9.61	1.24
SRT3-30	9.42	30	T4	15		90	20	—	20	5	76.32	40	92.6	9.44	0.86
SRT3-40		40		20		120							158	16.1	1.58
SRT3-50		50		20		150							229	23.3	2.54
SRT4-30	12.57	30	T4	20		120	25	—	25	7.4	95.74	52.6	226	23.0	1.89
SRT4-40		40		20		160							385	39.3	3.53
SRT4-50		50		20		200							559	57.0	5.66

[Caution on Product Characteristics] ① Regarding SRTB ratchets with hubs, please note the direction of teeth, viewed from the hub side. KHK can produce ratchets that have teeth pointed in the opposite direction as a custom order item.

[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).

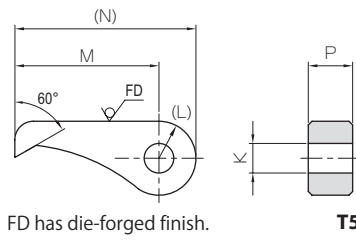


SRT-C Pawls

Pitch 2.09 ~ 12.57



Specifications	
Angle of teeth	60°
Material	S45C
Heat treatment	Induction hardened teeth
Tooth hardness	50 ~ 60HRC
Surface treatment	Black oxide coating



* FD has die-forged finish.

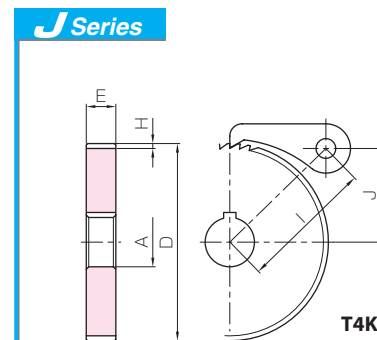
T5

Catalog No.	Shape	K	(L)	M	(N)	P	Weight (kg)
SRT2/3-C	T5	5	(8)	30	(38)	6	0.020
SRT1-C		8	(10)	39	(49)	12	0.057
SRT2-C		10	(12.5)	55	(67.5)	15	0.13
SRT3-C		12	(15)	65	(80)	20	0.23
SRT4-C		13	(18)	80	(98)	25	0.38

- [Caution on Product Characteristics] ① The pawls are designed to prevent reverse rotation. They are not suitable for use as driving ratchets or driving rotation.
- ② SRT2/3-C is manufactured using a lost wax casting method.

SRT

J Series



T4K



Ratchets

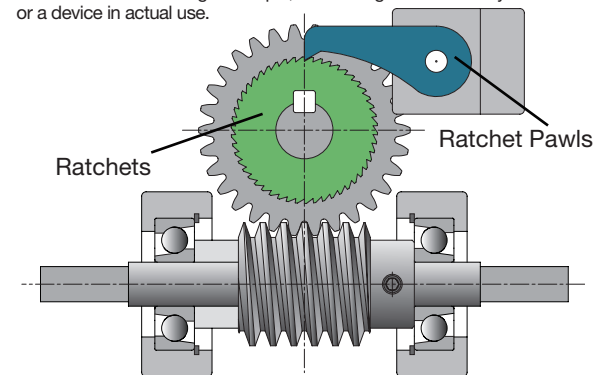
To order J Series products, please specify; **Catalog No. + J + BORE**

Bore	* The product shapes of J Series items are identified by background color.																	
Keyway Js9	10	12	14	15	16	17	18	19	20	22	25	28	30	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 No.	—																	
SRT2/3-50 J 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	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	T4K		
SRT1-100 J BORE					T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	
SRT2-30 J BORE					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	T4K	
SRT2-60 J BORE					T4K	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	T4K	T4K	T4K		
SRT3-40 J BORE										T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K	T4K
SRT3-50 J BORE										T4K	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, requires a lead-time for shipping within 2 working-days (excludes the day ordered), after placing an order.
Please allow additional shipping time to get to your local distributor.
- ② Number of products we can process for one order is 1 to 20 units. For quantities of 21 or more pieces, we need to quote price and lead time.
- ③ Keyways are made according to JIS B1301 standards, Js9 tolerance.
- ④ Areas of products which have been re-worked will not be black oxide coated.

■ Application

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



Example: ratchets used for complete reverse prevention of worm gears

■ Bending Strength of Ratchets

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

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

Also, the SRT Ratchet's allowable torque (TN · 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

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

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

S_F : Safety factor → Assumed 2

r_f : Tooth root radius m

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

Please see our web site for corrections on KHK Catalogs.

SRT-C

Pawls

Spur Gears

Helical Gears

Internal Gears

Racks

CP Racks & Pinions

Miter Gears

Bevel Gears

Screw Gears

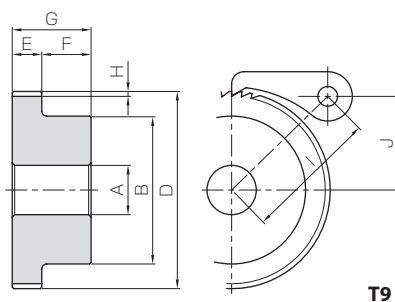
Worm Gear Pairs

Bevel Gearboxes

Other Products



Specifications	
Angle of teeth	60°
Material	S45C
Heat treatment	Induction hardened teeth
Tooth hardness	50 ~ 60HRC
Surface treatment	Black oxide coating



■ Features 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.

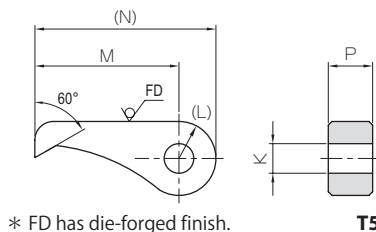
Catalog No.	Pitch	No. of teeth	Shape	Bore		Outside dia.	Face width	Hub width	Total length	Depth of teeth	Center distance	Mounting distance	Allowable torque (N · m)		Weight (kg)
				A	B								Bending strength	Bending strength	
SRTB2/3-50	2.09	50	T9	10	25	33.3	6	10	16	1	33.84	15.67	3.07	0.31	0.067
SRTB2/3-60		60		10	30	40							4.10	0.42	0.10
SRTB2/3-80		80		12	35	53.3							6.00	0.61	0.16
SRTB2/3-90		90		12	40	60							7.11	0.73	0.21
SRTB2/3-100		100		12	40	66.6					44.11	32.33	8.24	0.84	0.24
SRTB1-50	3.14	50	T9	12	35	50	12	12	24	1.6	45.48	23.4	14.7	1.50	0.24
SRTB1-60		60		15	40	60							19.5	1.99	0.34
SRTB1-80		80		15	50	80							29.4	3.00	0.61
SRTB1-90		90		15	50	90							34.5	3.52	0.73
SRTB1-100		100		15	50	100					62.16	48.4	39.4	4.02	0.87
SRTB2-30	6.28	30	T9	15	50	60	15	14	29	3.1	61.23	26.9	29.0	2.96	0.47
SRTB2-40		40		15	60	80							49.2	5.02	0.82
SRTB2-50		50		15	60	100							70.8	7.22	1.14
SRTB2-60		60		15	65	120							94.3	9.61	1.59
SRTB3-30	9.42	30	T9	15	75	90	20	16	36	5	76.32	40	92.6	9.44	1.40
SRTB3-40		40		20	80	120							158	16.1	2.17
SRTB3-50		50		20	85	150							229	23.3	3.22
SRTB4-30	12.57	30	T9	20	90	120	25	18	43	7.4	95.74	52.6	226	23.0	2.75
SRTB4-40		40		20	90	160							385	39.3	4.38
SRTB4-50		50		20	100	200							559	57.0	6.72

- [Caution on Product Characteristics] ① Regarding SRTB ratchets with hubs, please note the direction of teeth, viewed from the hub side. KHK can produce ratchets that have teeth pointed in the opposite direction as a custom order item.
- ② Due to heat treating, some deformation of the bore may occur. It may be necessary to ream the bore to bring to the stated dimensions.

- [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).



Specifications	
Angle of teeth	60°
Material	S45C
Heat treatment	Induction hardened teeth
Tooth hardness	50 ~ 60HRC
Surface treatment	Black oxide coating



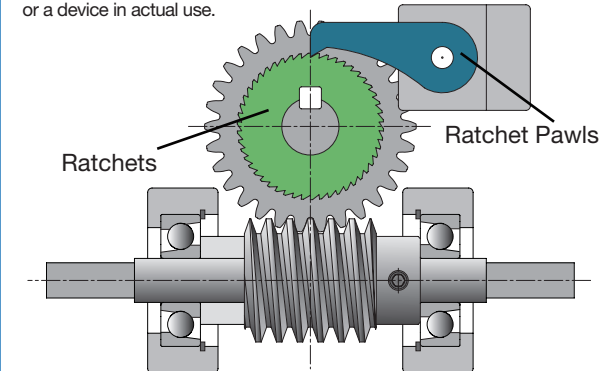
* FD has die-forged finish.

Catalog No.	Shape	K	(L)	M	(N)	P	Weight (kg)
SRT2/3-C	T5	5	(8)	30	(38)	6	0.020
SRT1-C		8	(10)	39	(49)	12	0.057
SRT2-C		10	(12.5)	55	(67.5)	15	0.13
SRT3-C		12	(15)	65	(80)	20	0.23
SRT4-C		13	(18)	80	(98)	25	0.38

- [Caution on Product Characteristics] ① The pawls are designed to prevent reverse rotation. They are not suitable for use as driving ratchets or driving rotation.
- ② SRT2/3-C is manufactured using a lost wax casting method.

■ Application

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



Example: ratchets used for complete reverse prevention of worm gears

■ Bending Strength of Ratchets

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

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

Also, the SRT Ratchet's allowable torque (TN · 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

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

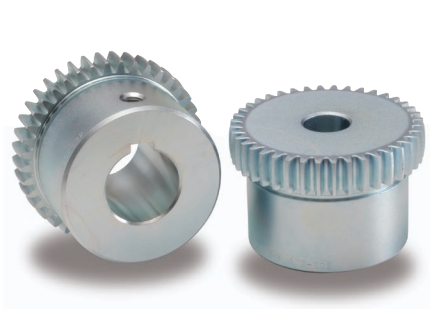
Please see our web site for corrections on KHK Catalogs.



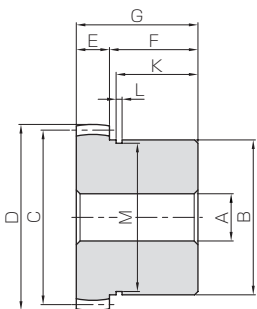
GC Gear Couplings (Inner hub)

Module 2 ~ 2.5

GC



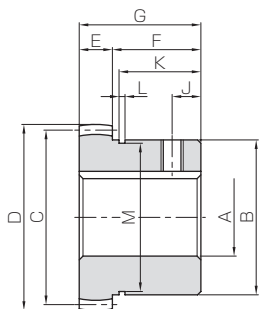
Specifications	
Gear teeth	Standard full depth (Inner hubs are Crowning)
Pressure angle	20°
Material	S45C
Heat treatment	Tooth surface induction hardened
Tooth hardness	50 ~ 60HRC
Surface treatment	Trivalent chromate



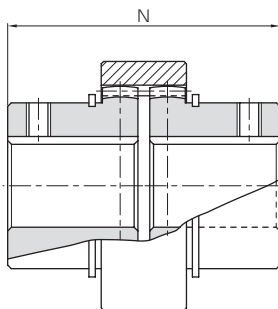
T2

Catalog No.	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Set Screw	
				A _{H8}	B	C	D	E	F	G	Size	J
GC1-12S	m2	25	T2	12	45	50	54	10	25	35	—	—
GC1-20			TK	20							M5	10
GC1-22			TK	22							M6	10
GC1-25			TK	25							M6	10
GC2-20S	m2	40	T2	20	70	80	84	15	40	55	—	—
GC2-30			TK	30							M6	13
GC2-32			TK	32							M10	13
GC2-35			TK	35							M10	13
GC2-40			TK	40							M10	13
GC3-20S	m2.5	42	T2	20	90	105	110	20	45	65	—	—
GC3-45			TK	45							M10	20
GC3-50			TK	50							M10	20

- [Caution on Product Characteristics]
- ① S-type products are of minimum bore depth. Keyways are made according to JIS B1301 standards, Js 9 tolerance.
 - ② For products with a snap ring and a tapped hole, a set screw is included as an accessory.
 - ③ The allowable torques in the table are obtained from the shear strength of keyways. The shear strength of keyway is assumed to be 49MPa (5kgf/mm²).
 - ④ Since trivalent-chromate treatment is applied, changes may occur in the dimensions of the bore, keyway etc., decreasing by a few μ m.
- [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).



TK



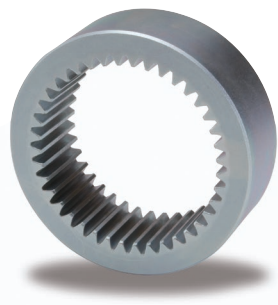
C-Shaped Snap Ring Groove			Total Width of Gear Coupling	Keyway	Allowable torque (N · m)	Allowable torque (kgf · m)	Backlash (mm)	Weight (kg)	Catalog No.
K	L	M	N	WidthxDepth	Shear strength of keyways	Shear strength of keyways			
23	1.95	42.5	73	— 5 x 2.3 7 x 3 7 x 3	— 68.7 98.1 137	— 7.00 10.0 14.0	0.40~0.60	0.43 0.37 0.35 0.32	GC1-12S GC1-20 GC1-22 GC1-25
37	2.7	67	115	— 7 x 3 10 x 3.3 10 x 3.3 10 x 3.3	— 245 294 392 490	— 25.0 30.0 40.0 50.0	0.40~0.60	1.66 1.48 1.42 1.36 1.23	GC2-20S GC2-30 GC2-32 GC2-35 GC2-40
42	3.2	86.5	135	— 12 x 3.3 12 x 3.3	— 785 883	— 80.0 90.0	0.40~0.60	3.43 2.74 2.56	GC3-20S GC3-45 GC3-50



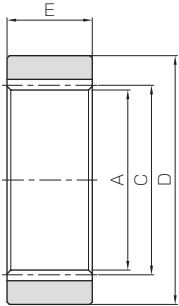
GC-I Gear Couplings (Outer ring)

Module 2 ~ 2.5

GC-I



Specifications	
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C
Heat treatment	Tooth surface induction hardened
Tooth hardness	50 ~ 60HRC
Surface treatment	Trivalent chromate



T1

Catalog No.	Module	No. of teeth	Shape	Internal dia.	Pitch dia.	Outside dia.	Face width	Backlash (mm)	Weight (kg)
				A	C	D	E		
GC1-I	m2	25	T1	46	50	68	25	0.40~0.60	0.33
GC2-I	m2	40		76	80	105	36		1.03
GC3-I	m2.5	42		100	105	145	48		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.
- The gear teeth (inner hubs) are crowned to allow for up to 5° of shaft angle offset.
- Due to the induction hardened gear teeth, these couplings have excellent durability. All surfaces are plated (trivalent chromate).
- The 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 GC2-30 GC2-I (outer ring) x 1 piece and GC2-30 (inner hub) x 2 piece set.

Strength of Gear Couplings

The allowable torque 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 gear coupling, versus shear force of keys, can be calculated from the formula below.

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

b : Key Width mm → Keyway width of inner hubs of the GC Gear Coupling
 L : Key Length mm → Set at -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/mm²)
 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.

Gear Couplings (Inner hub)

Gear Couplings (Outer ring)



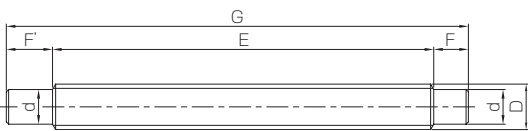
SV Involute Spline Shafts

Module 1.667

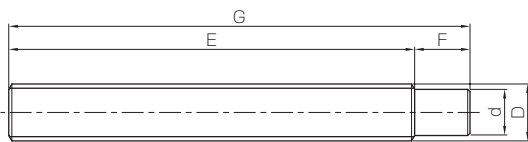
SV



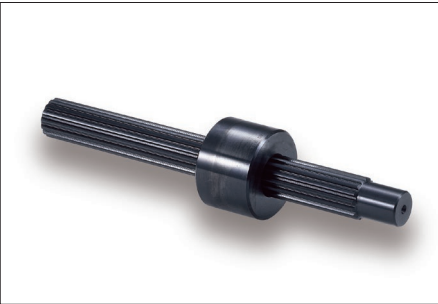
Specifications	
Gear teeth	Stub teeth
Pressure angle	20°
Material	S45C
Heat treatment	Thermal refined
Tooth hardness	200 ~ 270HB
Surface treatment	Black oxide coating



TA



TB



Involute Spline Shafts

Catalog No.	Module	No. of teeth	Shape	Outside dia.	Shaft dia.	Face width	Shaft length (L)	Shaft length (R)	Total length	Backlash (mm)	Weight (kg)
				D	d ^{+0.25 +0.15}	E	F'	F	G		
SV17-170	m1.667	8	TA	16.67	13	135	20	15	170	0.06~0.15	0.26
SV20-200		10	TA	19.67	15	165	20	15	200	0.06~0.15	0.43
SV25-250		13	TB	24.67	20	220	—	30	250	0.06~0.15	0.88
SV30-300		16	TB	29.67	25	270	—	30	300	0.06~0.15	1.55

[Caution on Secondary Operations] ① Be sure not to bend shafts or break teeth when performing secondary operations on SV Involute Spline shafts.

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 alloy) type material as a special custom order item.



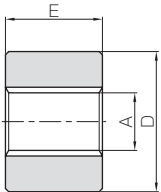
SVI Involute Spline Bushings

Module 1.667

SVI



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



T1

Catalog No.	Module	No. of teeth	Shape	Internal 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	m1.667	8	T1	13.7	40	25	33.2	3.38	0.06~0.15	0.21
SVI20-45		10		16.7	45	30	59.6	6.08	0.06~0.15	0.31
SVI25-55		13		21.7	55	38	125	12.8	0.06~0.15	0.57
SVI30-65		16		26.7	65	45	222	22.6	0.06~0.15	0.93

- [Caution on Product Characteristics]
- ① The allowable torques are calculated based on “The surface strength of Spline”.
 - ② It is essential to apply lubricant on the contact surface of the spline shaft and the bushing. To prevent scuffing, it is recommended to apply lubricating grease. If used in applications where oil contamination is not desirable, solid lubrication is recommended.

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.

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

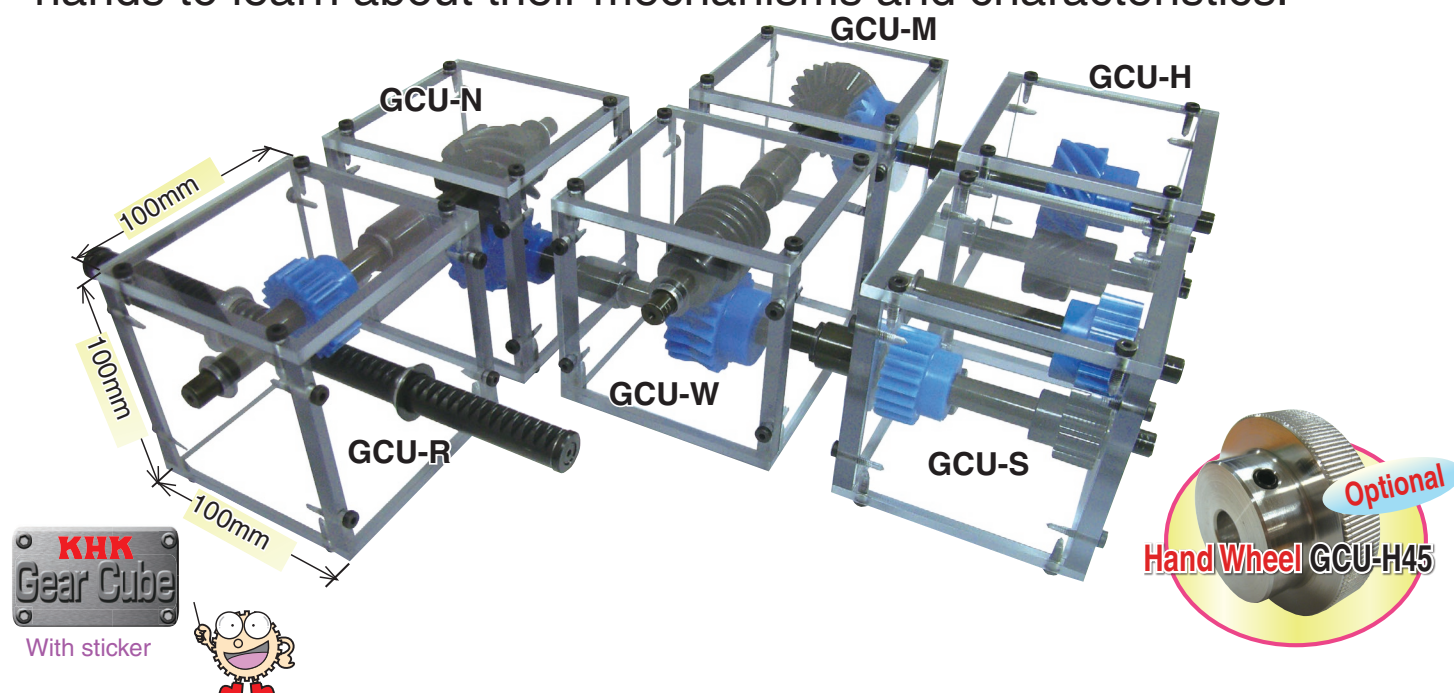
In designing a spline shaft, besides considering the surface strength, we should take into account the torsional and bending stresses of the spline.

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/mm²) (assumed)
 d_w : Contact diameter (mm) → Tip diameter of spline shaft D - h_w



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



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

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.

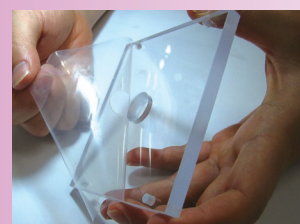


This product is certified by KAWAGUCHI i-mono i-waza

Assembly Procedure

Details are available online

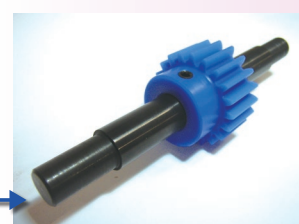
Photo shows GCU-R



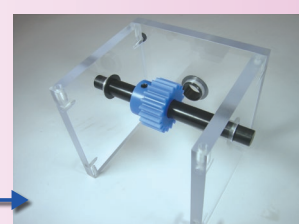
Remove protective sheet



Insert bushing



Set in shaft

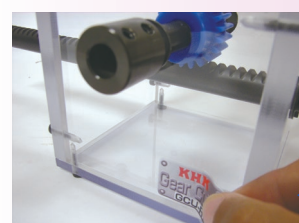


Assemble into frame

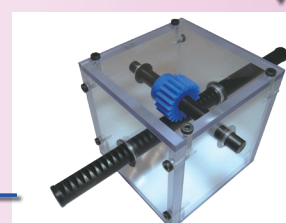


Set Contents

Photo shows GCU-R



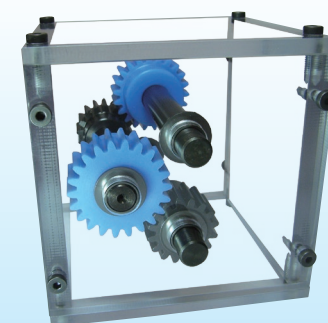
Adhere the sticker and it's complete!



Screw-fasten

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

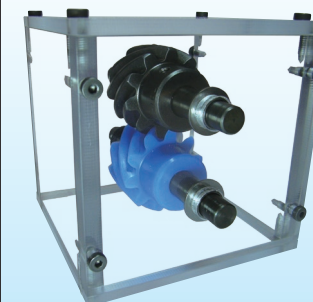
GCU-S Spur Gear Kit



Installation: Parallel Axes
(Two-stage)
Gear Type: Spur Gears
Gears: 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.

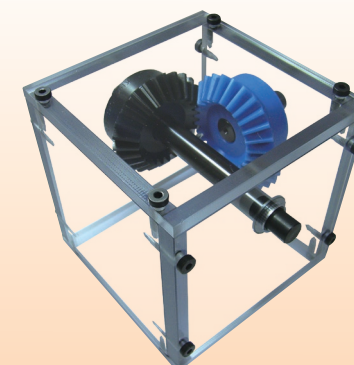
GCU-H Helical Gear Kit



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.

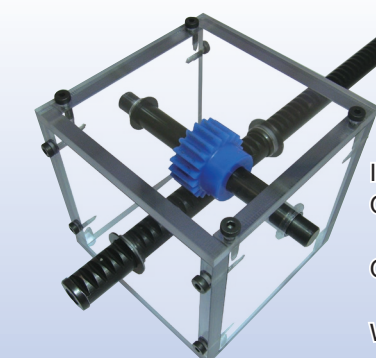
GCU-M Miter Gear Kit



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

Use of bevel gears allows the changing of the shaft angle by 90 degrees. Applications include the changing of the direction of power.

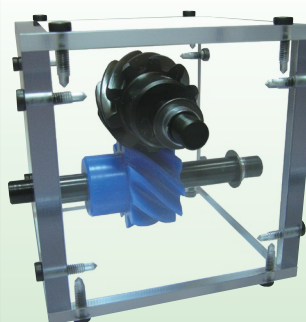
GCU-R Rack Kit



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

Use of racks enables the conversion of rotation motion to linear motion. Applications include devices that provide lift.

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

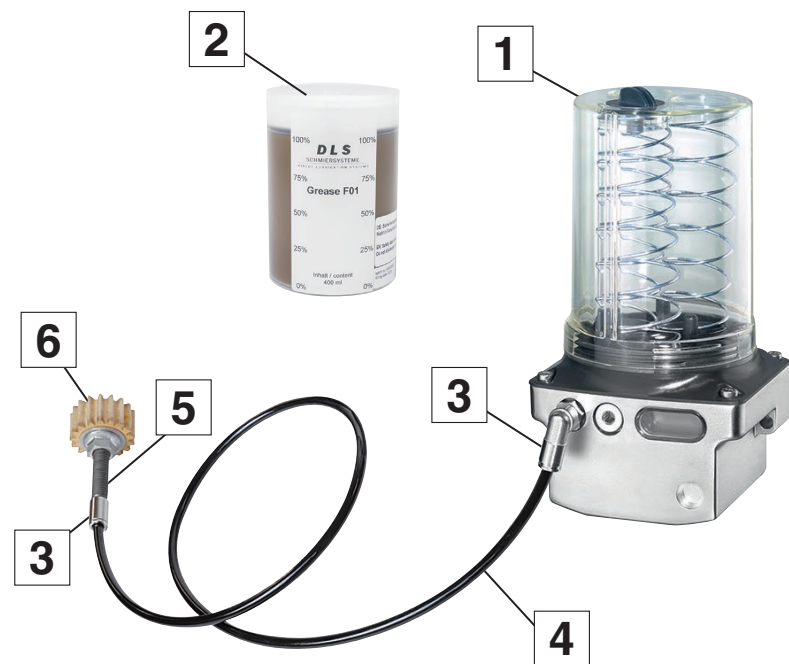


Installation: Nonparallel and nonintersecting gears
Gear Type: Worm Gear Pair
Gears: SW2-R1
PG2-20R1
Gear Ratio: 20
Weight: Approx. 1kg

Worm Gear Pairs can be used to make large reductions in speed in a single phase. The worm gear cannot be driven by the worm wheel due to inherent self-locking.



System Configuration



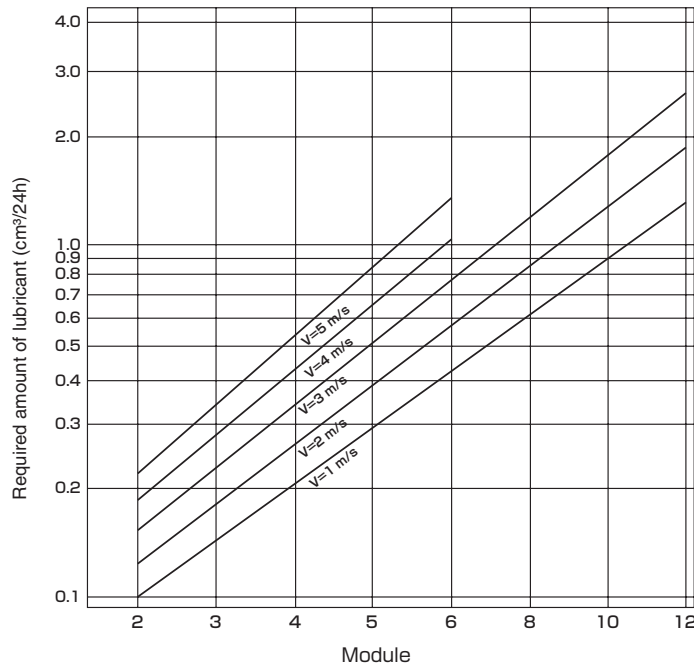
NO.	Product Name
1	Flex pump
2	Grease cartridge
3	Tube connector
4	Tube
5	Mounting shaft
6	Lubricating gear

Features

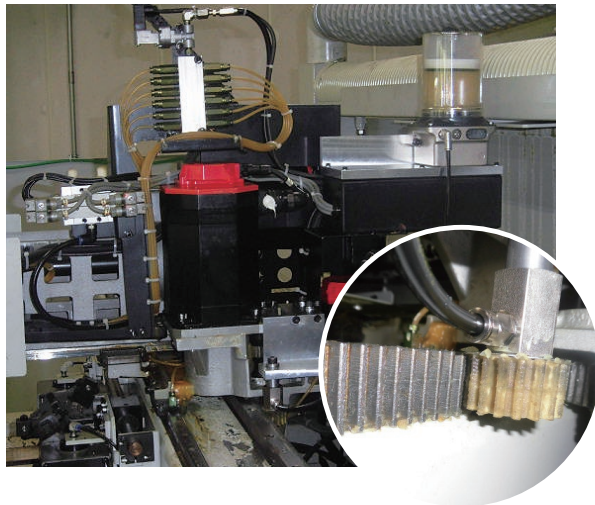
- Ideal lubrication system for racks & pinions used in open environments.
- A small amount of grease extruded from the pump is automatically supplied through the lubricating gear.
- Integration is possible with the control system of the machine in use, to adjust the amount of lubricant* according to the application.
- Grease is applied by a polyurethane lubricating gear to form a uniform lubricating film.
- Grease up to consistency No. 3 can be used regardless of the manufacturer.
- Special grease GC-F01 does not drip or pollute the machine.
- Optimized lubricant improves the durability of racks & pinions and reduces the maintenance costs.

* Please use the required amount of lubricant in Table 1 as a guide depending on the module of the product used and the peripheral speed (m/s).

Table 1. Required amount of lubricant



Application Examples



Flex pump

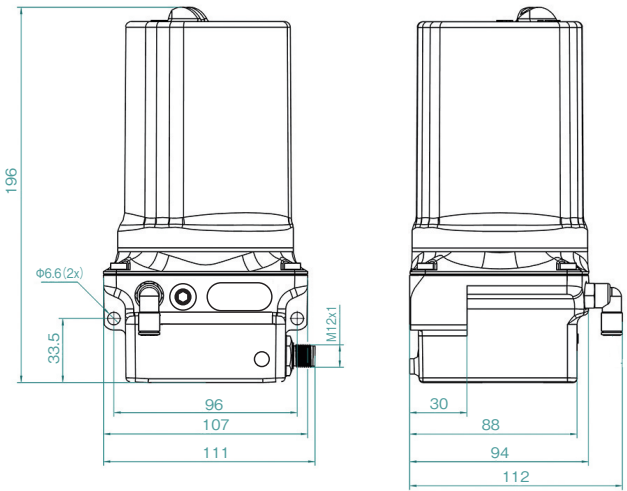
FP400

Mark compatible product.

24 VDC automatic time controlled lubrication pump



* Tube connector (right angle type) and power cable (5 m) are included.



Flex pump

FP400B

Mark compatible product.

3 V battery automatic time controlled lubrication pump



* Tube connector (right angle type) and 3 V battery are included as accessories.

Specifications	
Dimensions (W x H x D)	Max: 112 x 196 x 94 mm
Weight (no lubricant)	1120 g
Operation method	Piston pump type
Lubricating oil amount	400cm³
Lubricant supply amount	0.15 cm³/pulse
Operating pressure	Up to 70 bar
Lubricant	Grease of consistency up to NLGI No. 3
Operating temperature	-25 to 70°C
Number of outlets	1 port
How to connect pipes	Tube T-6 x 4, available up to 10 m
Operating voltage	24 VDC (battery type is 3 V)
Consumption voltage (24 VDC)	I _{max} ≤ 350 mA
Mounting direction	Omni-directional mounting available
Control device	Built-in, electronic type
Pressure monitor	Built-in, electronic type
Lubricant level monitor	Built-in, lead contact type
Malfunction signal	Error detection / grease depletion, back pressure rise, etc.
Dustproof/waterproof class	IEC Standard IP54

Grease cartridge

GC-F01

Special grease that contains additives considering the optimum adhesion to metal surfaces.
Ideal for racks & pinions used in high-temperature and high-load environments.



Specifications	
Consistency number	No. 1
Dropping point	220°C
Operating temperature range	-30 to 150°C
Withstand pressure load	4800N
Internal capacity	400cm³

Tube

T-6x4

This tube has excellent pressure resistance, elasticity, restoring force and bending strength.
GC-F01 grease is provided before shipment.



Specifications	
Material	Polyamide 6
Outer diameter x inner diameter x Length	6x4x5000(mm)

Tube connector

TCS/TCR

A tube connector with hex socket with high fluidity and sealing characteristics provided by the O-ring.

Straight Type



- TCS-M6
- TCS-G1/8

Right Angle Type



- TCR-M6
- TCR-G1/8

Specifications	
Material	CW614N (brass)
Surface treatment	Nickel plated
Operating pressure	Up to 80 bar
Operating temperature	-30 to 100°C

Note: Catalog codes M6 and G1/8 are the screw sizes.
Please select according to the connected screw of the mounting shaft.



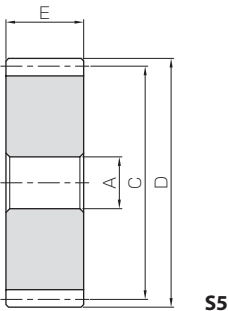
DLS Schmiersysteme

PUS/PUSCP Lubricated Spur Gears

Module 1.5 ~ 6 Circular pitch 5, 10

Lubrication Spur Gears

New Product



Specifications	
Gear teeth	Standard full depth
Pressure angle	20°
Material	Polyurethane foam

Catalog Number	Module	No. of teeth	Shape	Bore	Pitch dia.	Outside dia.	Face width	Mounting shaft to be set
				A	C	D	E	
PUS1.5-24	m1.5	24	S5	12	36	39	15	MAS1.5 or MAR1.5
PUS2-17	m2	17			34	38	20	MAS2 or MAR2
PUS2.5-17	m2.5				42.5	47.5	24	MAS2.5 or MAR2.5
PUS3-17	m3				51	57	30	MAS3 or MAR3
PUS4-17	m4				68	76	40	MAS4 or MAR4
PUS5-17	m5			85	95	50	MAS5 or MAR5	
PUS6-17	m6	17	S5	20	102	114	60	MAS6 or MAR6
PUS8-17 (made to order)	m8				136	152	80	MAS8 or MAR8
PUS10-17 (made to order)	m10				170	190	100	MAS10 or MAR10

Catalog Number	Pitch mm (Module)	No. of teeth	Shape	Bore	Pitch dia.	Outside dia.	Face width	Mounting shaft to be set
				A	C	D	E	
PUSCP5-24	CP5 (1.5915)	24	S5	12	38.2	41.4	15	MAS1.5 or MAR1.5
PUSCP10-15	CP10 (3.1831)	15			47.7	54.1	30	MAS3 or MAR3

- [Application Hints] ① Can be used in temperatures from -30 to 150° C.
② Setting is possible to either a rack or a pinion, but we recommend a pinion as it can provide proper lubrication.
③ Avoid operations with high load until grease is applied to the gear teeth of the rack gears and pinion gears.



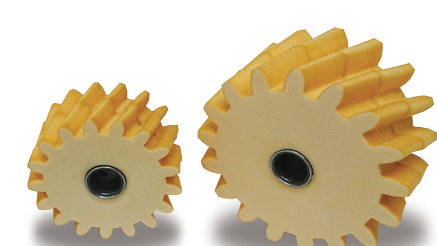
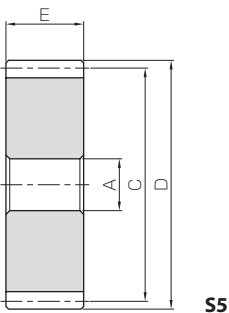
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PUH Lubricated Helical Gears

Module 1.5 ~ 6

Lubrication Helical Gears

New Product



Specifications	
Reference section of gear	Normal plane
Gear teeth	Standard full depth
Pressure angle	20°
Helix angle	19°31'41"
Material	Polyurethane foam

Catalog Number	Module	No. of teeth	Direction of spiral	Shape	Bore	Pitch dia.	Outside dia.	Face width	Mounting shaft to be set
					A	C	D	E	
PUH1.5-24R PUH1.5-24L	m1.5	24	R L	S5	12	38.2	41.2	15	MAS1.5 or MAR1.5
PUH2-17R PUH2-17L	m2	17	R L			36.1	40.1	20	MAS2 or MAR2
PUH3-17R PUH3-17L	m3		R L			54.1	60.1	30	MAS3 or MAR3
PUH4-17R PUH4-17L	m4		R L			72.2	80.2	40	MAS4 or MAR4
PUH5-17R PUH5-17L	m5		R L		20	90.2	100.2	50	MAS5 or MAR5
PUH6-17R PUH6-17L	m6		R L			108.2	120.2	60	MAS6 or MAR6
PUH8-17R PUH8-17L (made to order)	m8	17	R L	S5	20	144.3	160.3	80	MAS8 or MAR8
PUH10-17R PUH10-17L (made to order)	m10		R L			180.4	200.4	100	MAS10 or MAR10

- [Application Hints] ① Can be used in temperatures from -30 to 150° C.
② Setting is possible to either a rack or a pinion, but we recommend a pinion as it can provide proper lubrication.
③ Avoid operations with high load until grease is applied to the gear teeth of the racks & pinions.



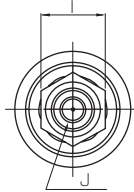
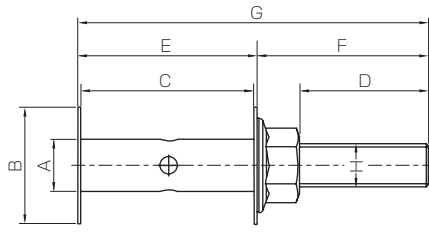
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Mounting Shaft for Lubricated Gears

Mounting Axes

New Product

● Straight Type



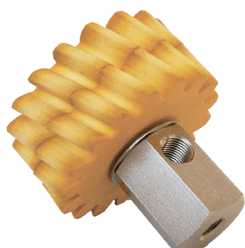
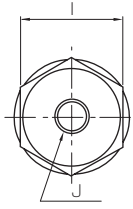
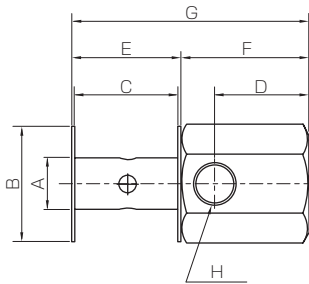
Set Example

Surface treatment: Nickel plated

Catalog Number	A	B	C	D	E	F	G	H	I	J
										Connected screw
MAS1.5	12	27	15.2	34.2	16.4	44	60.4	M10	15	M6
MAS2			20.2	29.8	21.4	39.8	61.2			
MAS2.5			24.2	29.8	25.4	39.8	65.2			
MAS3			30.2	29.8	31.4	39.8	71.2			
MAS4			40.2	29.8	41.4	39.8	81.2			
MAS5			50.2	49.1	51.4	64.9	116.3			
MAS6	20	60	60.2	49.1	61.4	64.9	126.3	M16	24	G1/8"
MAS8 (made to order)	20	60	80.2	49.1	81.4	64.9	146.3	M16	24	G1/8"
MAS10 (made to order)		100	100.2	49.1	101.4	64.9	166.3			

[Application Hints] ① Tube connector is not included.

● Right Angle Type



Set Example

Surface treatment: Nickel plated

Catalog Number	A	B	C	D	E	F	G	H	I	J
								Connected screw		
MAR1.5	12	27	15.2	22	16.4	30	46.4	G1/8"	24	M8×10
MAR2			20.2		21.4		51.4			
MAR2.5			24.2		25.4		55.4			
MAR3			30.2		31.4		61.4			
MAR4			40.2		41.4		71.4			
MAR5			50.2		51.4		81.4			
MAR6	20	60	60.2	22	61.4	30	91.4	G1/8"	24	M8×10
MAR8 (made to order)	20	60	80.2		81.4		111.4			
MAR10 (made to order)		100	100.2		101.4		131.4			

[Application Hints] ① Tube connector is not included.