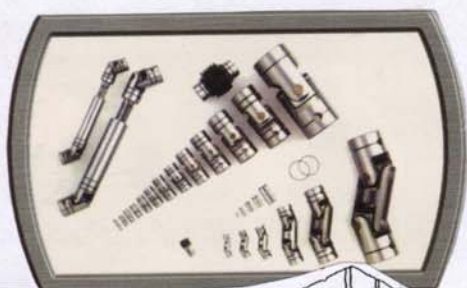


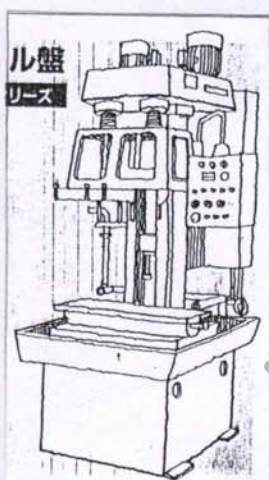
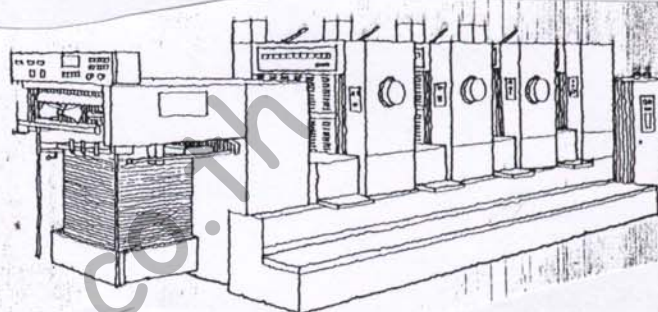
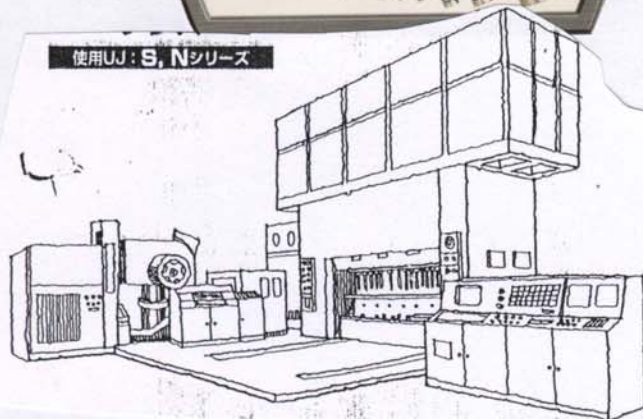
# **KYOWA** UNIVERSAL JOINTS KYOWA Universal Joints

## KYOWA UNIVERSAL JOINTS

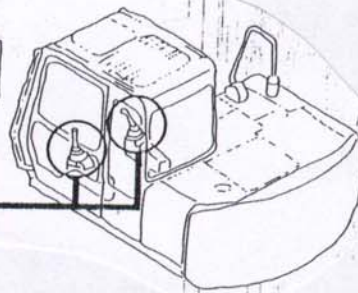
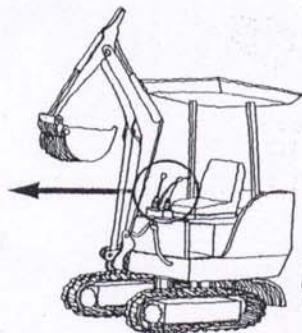
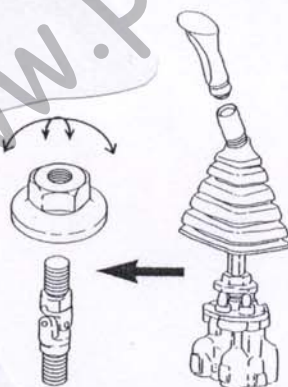
เป็นข้อต่อปรับองศา ผลิตจากประเทศญี่ปุ่น ใช้งานใน  
จุดต่อเพลลา 2 จุด



使用UJ: S, Nシリーズ

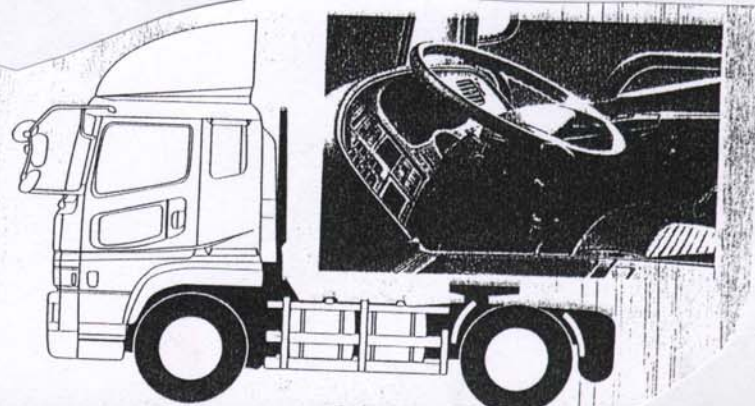
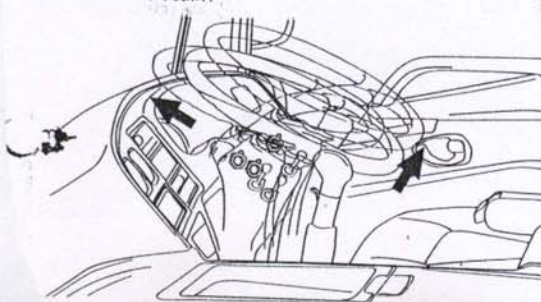


ル盤  
リース



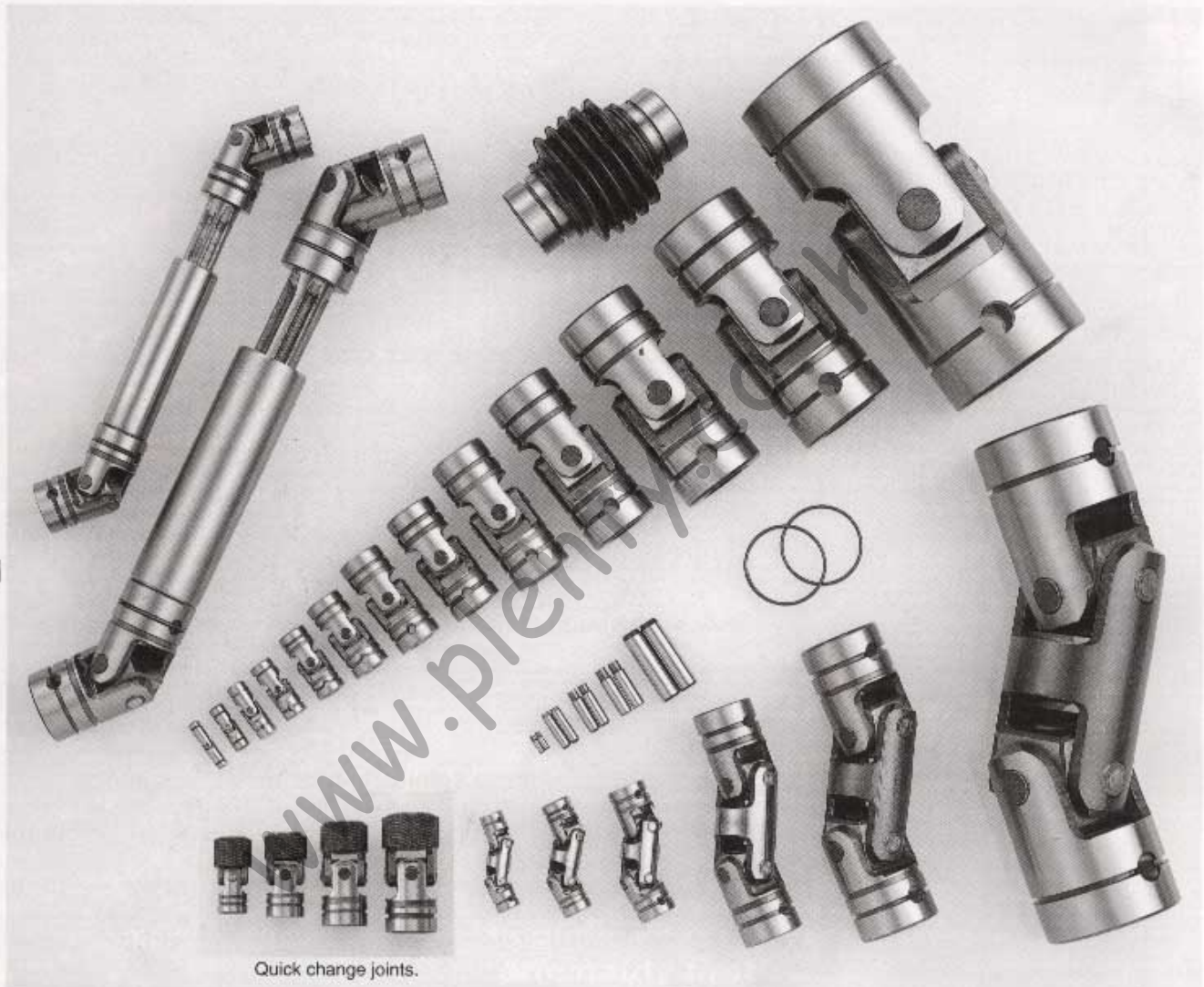
使用UJ: Nシリーズ

- トレーラーのブレーキ操作レバー
- 運転席での手元操作





# S Series High precision standard top type



High precision standard top type (JIS B1454 C type, CC type)

## Features

**Inside Diameter :** 3 - 50 mm

**Wide Products Range :** Pin Type, keyway type and quick change type as standard items.

**Compact with big transmission capacity**

**High Rotation Accuracy**

**Long Durability :** Made of alloy steel SCM415 with case hardened.

**"Masterpiece of Top Type Joint" :** Well balanced in all aspects, including accuracy, strength, life and cost.

## Main application

Multiple spindle drilling machines, levellers, printing machines, wood working machines, presses, construction equipment, welding machines, industrial sewing machines, medical equipment, book binding machines, rush-mat making machines, testing machines, food processing machines, etc.

## F Series



General purpose small cross type

### Features

Inside Diameter : 16 - 40 mm  
 Compact  
 Accurate rotation  
 Lubrication free  
 Good for high speed and continuous running  
 Additional processing possible.

### Main application

Multiple spindle drilling machines, levellers, printing machines, wood working machines, presses, construction equipment, pumps, food processing machines, etc.

## C Series



Special small cross type

### Features

Cold-forged yoke  
 Compact  
 Excellent in rotating precision  
 Non-lubricating type  
 Continuous operation availability.  
 Mainly suited to mass production.

### Main application

Agricultural machines, combines, rice planting machines, lawn mowers, conveyors, construction equipment, dollies, wood working machines, printing machines, etc.



## H Series



Steering joint (custom-made)

### Features

Cold-forged yoke  
Compact  
Yoke of high rigidity  
Lubrication free  
Applicable for critical use and functional control

### Main application

Automobiles, forklift trucks, dollies, agricultural machines, tractors, rice planting machines, construction equipment, wood working machines, presses, etc.

## K Series



Industrial propeller shaft type

### Features

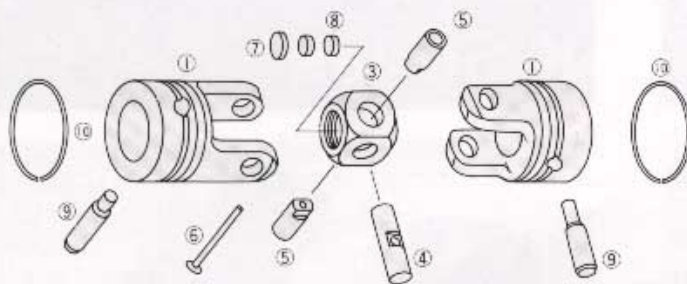
Transmission torque 400 to 4000 N.m  
Continuous operation is permissible.

### Main application

General industrial machines, plants, construction equipment, parking equipment, wood working machines, factory machines, levelers, roll making machines, printing machines, paper making machines, vehicles, etc.

# Standard structure

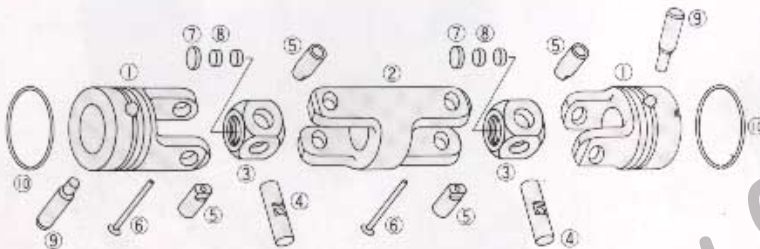
SC-\*\*-00A  
NC-\*\*-00A



1. Drive yoke
2. Double yoke
3. Top
4. Drive pin
5. Drive half pin
6. Rivet pin
7. Plug
8. Felt
9. Heavy duty set pin
10. Ring spring

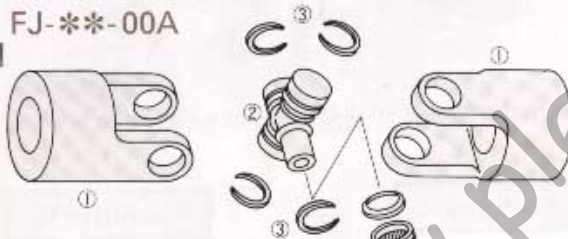
Note: Item nos. 7, 8 are not built into  
SC-03, 04, 05 and NC, ND.

SD-\*\*-00A  
ND-\*\*-00A



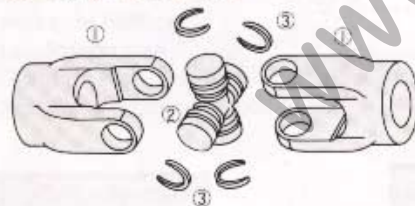
FJ-\*\*-00A

5



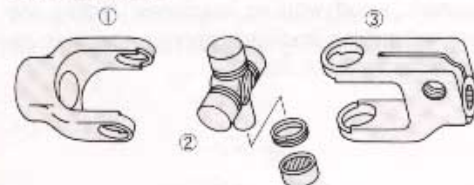
1. Drive yoke
2. Cross kit
3. Snap ring

CF-\*\*-RRA-00



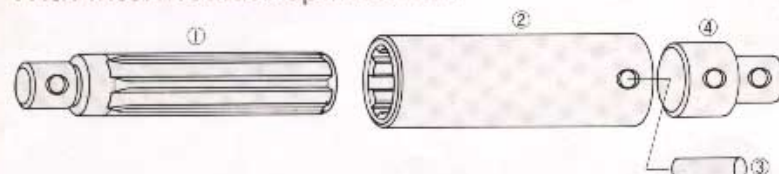
1. Drive yoke
2. Cross kit
3. Snap ring

HJ-RB-\*\*



1. Round yoke
2. Cross kit
3. Bolt yoke

With intermediate spline shaft



1. Spline shaft
2. Sleeve
3. Parallel pin
4. Connecting shaft

# Selection method of S·N Series

In the use of an universal joint, many factors such as rotating speed, angle, torque and lubrication must be considered. The following selection method shows that, firstly, it is checked the total multiplied value of rotating speed, angle and torque is not exceeding the allowable conditional variable shown in each selection table. Secondly, it is checked that each value of the above three factors does not exceed the allowable value each.

## 1. Conditional variable

(Calculation formula)

$$\text{Calculation conditional variable} = \text{Rotating speed (min}^{-1}\text{)} \times \text{angle (}^{\circ}\text{)} \times \text{torque (N.m)}$$

Calculation conditional variable < Allowable conditional variable

## 2. Rotating speed (min<sup>-1</sup>)

Rotating speed × angle coefficient < Allowable rotating speed

Angle coefficient table

Angle	5° and Under	10°	15°	20°	25°	30°
Angle coefficient	1.00	1.05	1.18	1.43	1.82	2.50

## 3. Angle (°)

Angle < Allowable operating angle

## 4. Torque (N.m)

Torque < Allowable torque

### Reference

#### 1. Conversion to International System of Units (SI)

Quantity	Gravitational unit	SI unit
Torque	1 kgf.m	9.8 N.m
Force	1 kgf	9.8 N

#### 2. Calculation formula by SI unit

Relation between torque, transmission capacity and rotating speed

$$T = 60000 \times P / 2 \pi n$$

T: Torque (N.m)

P: Transmission capacity (KW)

n: Rotating speed (min<sup>-1</sup>)



# SC Series Selection table

Item Name	Allowable conditional variable	Allowable rotating speed (min <sup>-1</sup> )	Allowable operating angle (°)	Allowable torque (N.m)	Static breaking torque (N.m)	Static tensile load (N)	GD <sup>2</sup> (kg.cm <sup>2</sup> )	Weight (g)
SC-03-00A	8000	4000	30	0.13	0.4	680	0.001	5
SC-04-00A	13000	3300	30	0.96	2.9	1200	0.003	8
SC-05-00A	21000	2800	30	3.23	9.8	2000	0.007	12
SC-06- **	32000	2500	30	5.3	16	5300	0.015	15
SC-08- **	48000	2200	30	11.6	35	7840	0.044	30
SC-10- **	80000	2000	30	27.4	83	13000	0.13	55
SC-12- **	121000	1800	30	46	140	23000	0.35	110
SC-14- **	151000	1600	30	66	200	26000	0.67	155
SC-16- **	200000	1400	30	102	310	39000	1.5	260
SC-18- **	232000	1200	30	132	400	44000	2.3	345
SC-20- **	273000	1000	30	175	530	52000	3.6	465
SC-22- **	344000	900	30	251	760	68000	5.9	630
SC-25- **	406000	800	30	330	1000	81000	9.7	790
SC-30- **	531000	700	30	495	1500	100000	20	1160
SC-35- **	711000	600	30	792	2400	140000	41	2255
SC-40- **	918000	500	30	1188	3600	180000	77	2730
SC-45- **	1150000	400	30	1584	4800	220000	130	4350
SC-50- **	1400000	300	30	1914	5800	280000	220	5200

Angle	5° and Under	10°	15°	20°	25°	30°
Angle coefficient	1.00	1.05	1.18	1.43	1.82	2.50

## Selection example

When SC series is to be used under a rotating speed of 800min<sup>-1</sup>, an operating angle 15°, and a transmission torque of 10 N.m, the calculation conditional variable 120000 is obtained from the following formula.

$$\text{Rotating speed} \times \text{angle} \times \text{torque} = \text{Conditional variable}$$

$$800 \times 15 \times 10 = 120000$$

Secondly, check the allowable rotating speed of SC-12 according to the following formula.

$$\text{Rotating speed} \times \text{angle coefficient} < \text{Allowable rotating speed}$$

Do the above calculations and compare the allowable conditions to each of the items for SC-12.

1. Conditional variable	120000	<	Allowable conditional variable	121000
2. Rotating speed	800min <sup>-1</sup> × 1.18	<	Allowable rotating speed	1800min <sup>-1</sup>
3. Angle	15°	<	Allowable operating angle	30°
4. Torque	10N.m	<	Allowable torque	46N.m

The universal joint meeting the requirements of the above service conditions, with good lubricating conditions, is the SC-12.

# SD Series Selection table

Item Name	Allowable conditional variable	Allowable rotating speed (min <sup>-1</sup> )	Allowable operating angle (°)	Allowable torque (N.m)	Static breaking torque (N.m)	Static tensile load (N)	GD <sup>2</sup> (kg.cm <sup>2</sup> )	Weight (g)
SD-06- **	32000	2500	one side 30	3.96	12	5300	0.029	30
SD-08- **	48000	2200	one side 30	8.58	26	7840	0.069	50
SD-10- **	80000	2000	one side 30	20.1	61	13000	0.21	95
SD-12- **	121000	1800	one side 30	33	100	23000	0.55	180
SD-14- **	151000	1600	one side 30	46	140	26000	1.0	250
SD-16- **	200000	1400	one side 30	76	230	39000	2.3	410
SD-18- **	232000	1200	one side 30	96	290	44000	3.7	550
SD-20- **	273000	1000	one side 30	129	390	52000	5.7	690
SD-22- **	344000	900	one side 30	185	560	68000	9.1	940
SD-25- **	406000	800	one side 30	248	750	81000	15	1240
SD-30- **	531000	700	one side 30	363	1100	100000	31	1775
SD-35- **	711000	600	one side 30	594	1800	140000	75	3180
SD-40- **	918000	500	one side 30	891	2700	180000	120	4150
SD-45- **	1150000	400	one side 30	1155	3500	220000	210	6225
SD-50- **	1400000	300	one side 30	1419	4300	280000	340	7750

Angle	5° and Under	10°	15°	20°	25°	30°
Angle coefficient	1.00	1.05	1.18	1.43	1.82	2.50

## Selection example

When SD series is to be used under a rotating speed of 300min<sup>-1</sup>, an operating angle 10°, and a transmission torque of 88 N.m, the calculation conditional variable 264000 is obtained from the following formula.

$$\text{Rotating speed} \times \text{angle} \times \text{torque} = \text{Conditional variable}$$

$$300 \times 10 \times 88 = 264000$$

Secondly, check the allowable rotating speed of SD-20 according to the following formula.

$$\text{Rotating speed} \times \text{angle coefficient} < \text{Allowable rotating speed}$$

Do the above calculations and compare the allowable conditions to each of the items for SD-20.

- |                         |                             |   |                                |                       |
|-------------------------|-----------------------------|---|--------------------------------|-----------------------|
| 1. Conditional variable | 264000                      | < | Allowable conditional variable | 273000                |
| 2. Rotating speed       | 300min <sup>-1</sup> × 1.05 | < | Allowable rotating speed       | 1000min <sup>-1</sup> |
| 3. Angle                | 10°                         | < | Allowable operating angle      | 30°                   |
| 4. Torque               | 88N.m                       | < | Allowable torque               | 129N.m                |

The universal joint meeting the requirements of the above service conditions, with good lubricating conditions, is the SD-20.



# SC High precision standard top type

JIS B1454 C type

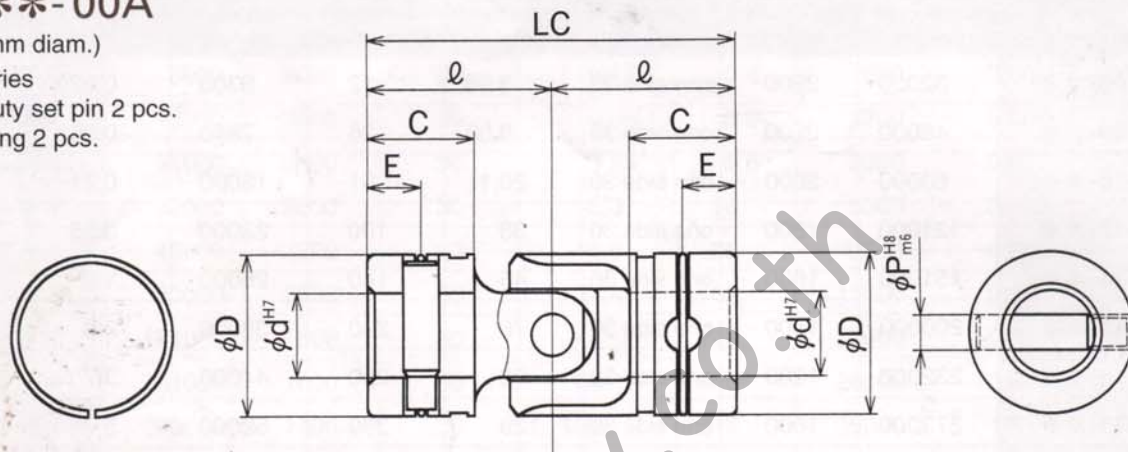
## SC-\*\*-00A

(3 to 50mm diam.)

Accessories

Heavy duty set pin 2 pcs.

Ring spring 2 pcs.



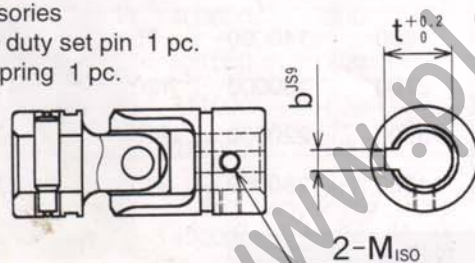
## SC-\*\*-03A (New JIS key)

(6 to 50mm diam.)

9 Accessories

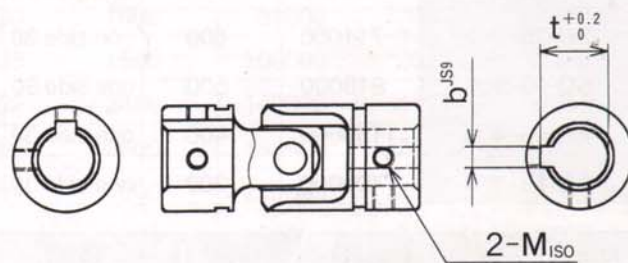
Heavy duty set pin 1 pc.

Ring spring 1 pc.



## SC-\*\*-33A (New JIS key)

(6 to 50mm diam.)



Name	Dimension	d	D	LC	l	C	E	P	b	t	b8	t8	M	KC
SC-03-00A		3	6	26	13	9	2.5	1	—	—	—	—	—	—
SC-04-00A		4	8	24	12	7	4	1.5	—	—	—	—	—	—
SC-05-00A		5	10	30	15	9	5	2	—	—	—	—	—	—
SC-06-**-A		6	12	31	15.5	9	4.5	3	—	—	—	—	3	—
SC-08-**-A		8	15	36	18	10	5	3.5	—	—	—	—	3	25
SC-10-**-A		10	19	42	21	12	6	4.5	3	11.4	4	11.5	5	32
SC-12-**-A		12	23	52	26	15	7.5	5	4	13.8	4	13.5	5	35
SC-14-**-A		14	26	59	29.5	17	8.5	5.8	5	16.3	5	16	6	40
SC-16-**-A		16	30	74	37	22	11	6.5	5	18.3	5	18	6	46
SC-18-**-A		18	33	81	40.5	23.5	11.75	7	6	20.8	5	20	6	52
SC-20-**-A		20	36	87	43.5	25	12.5	8	6	22.8	5	22	6	58
SC-22-**-A		22	40	94	47	27	13.5	9	6	24.8	7	25	6	62
SC-25-**-A		25	44	105	52.5	30	15	10	8	28.3	7	28	8	68
SC-30-**-A		30	51	122	61	35	17.5	11.5	8	33.3	7	33	8	82
SC-35-**-A		35	59	140	70	40	20	13	10	38.3	10	38.5	10	90
SC-40-**-A		40	67	157	78.5	45	22.5	14.5	12	43.3	10	43.5	10	100
SC-45-**-A		45	75	176	88	50	25	16	14	48.8	12	48.5	10	110
SC-50-**-A		50	83	191	95.5	55	27.5	17.5	14	53.8	12	53.5	10	120



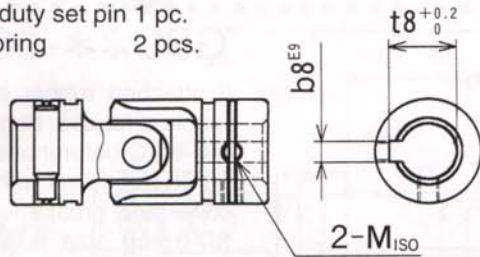
**SC-\*\*-08A**

(10 to 50mm diam.)

Accessories

Heavy duty set pin 1 pc.

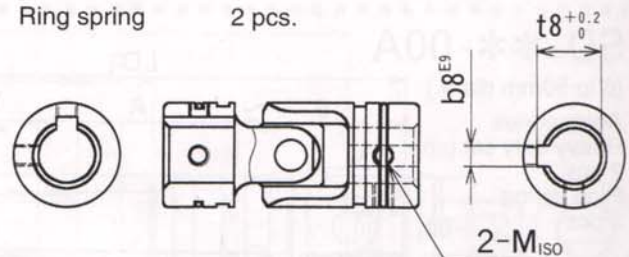
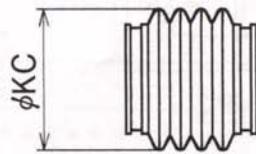
Ring spring 2 pcs.

**SC-\*\*-88A**

(10 to 50mm diam.)

Accessories

Ring spring 2 pcs.

**GBC\*\*-00**

When the rubber cover to be attached is required, denote SC-\*\*\*C. SC-08~30 size is set with rubber cover and grease is sealed. SC-35~50 is attached with special below (accessory). Quick change type is not available with rubber cover.

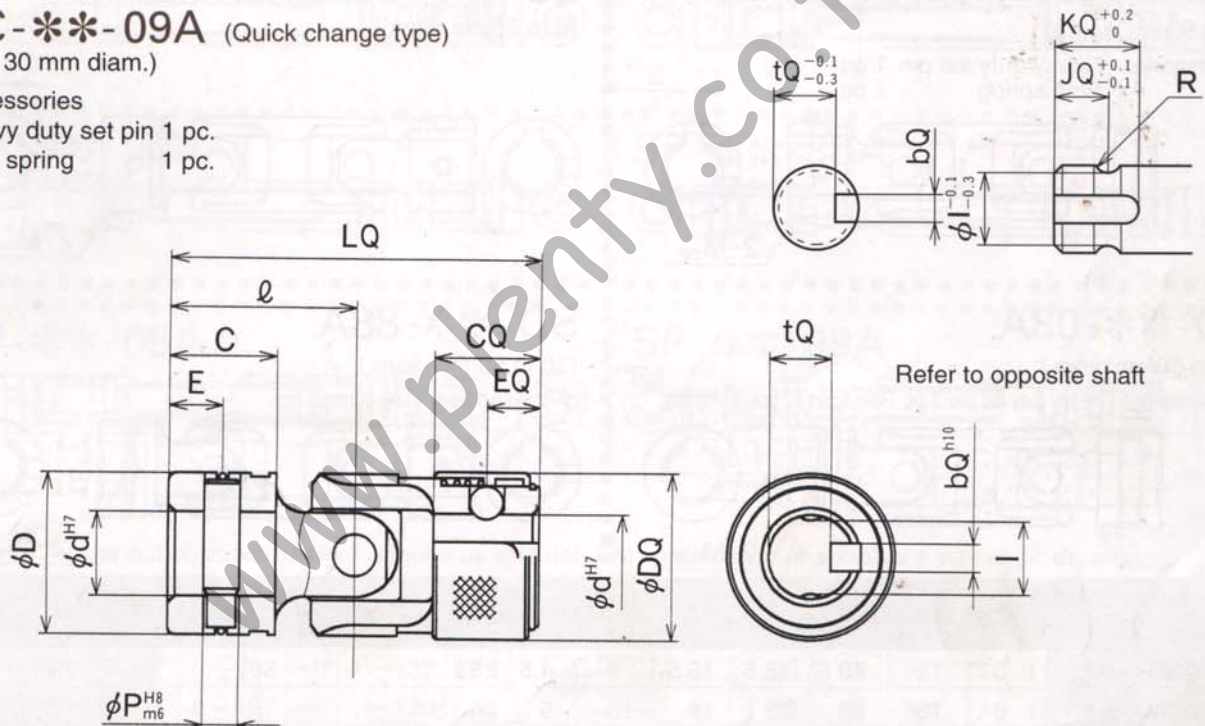
**SC-\*\*-09A** (Quick change type)

(8 to 30 mm diam.)

Accessories

Heavy duty set pin 1 pc.

Ring spring 1 pc.



10

Dimension																
Name	d	D	LQ	l	C	E	P	DQ	CQ	EQ	I	R	JQ	bQ	tQ	KQ
SC-08-09A	8	15	38	18	10	5	3.5	19	12	4	6.56	2	8	3	5.8	10
SC-10-09A	10	19	42	21	12	6	4.5	21.5	12	4	9.06	2	8	4	7.5	9
SC-12-09A	12	23	52	26	15	7.5	5	23.8	15	7.5	10.48	2.4	7.5	4	8.8	12
SC-14-09A	14	26	59	29.5	17	8.5	5.8	29	17	8.5	11.88	2.8	8.5	5	10.3	14
SC-16-09A	16	30	74	37	22	11	6.5	35	22	11	13.3	3.2	11	5	12.3	18
SC-18-09A	18	33	81	40.5	23.5	11.75	7	38	23.5	11.75	15.3	3.2	11.75	5	14.5	21
SC-20-09A	20	36	87	43.5	25	12.5	8	42	25	12.5	17.12	4	12.5	6	16.0	23
SC-22-09A	22	40	94	47	27	13.5	9	44	27	13.5	19.12	4	13.5	6	17.8	25
SC-25-09A	25	44	105	52.5	30	15	10	49	30	15	21.54	4.4	15	7	21	28
SC-30-09A	30	51	122	61	35	17.5	11.5	56	35	17.5	26.95	4.8	17.5	7	25.3	30



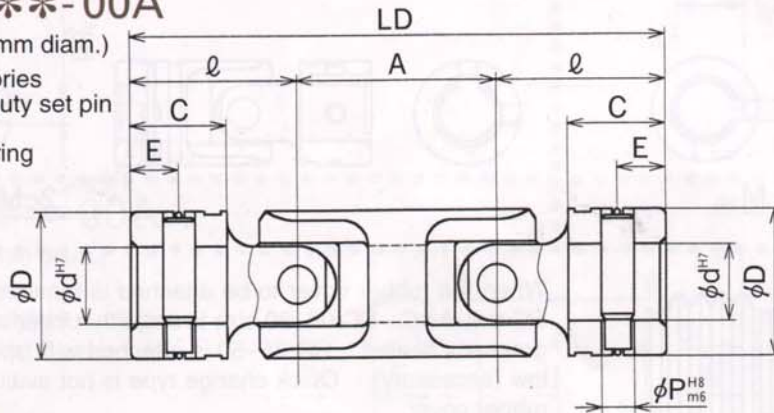
# SD High precision standard top type

JIS B1454 CC type

## SD-\*\*-00A

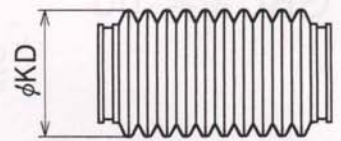
(6 to 50mm diam.)

Accessories  
Heavy duty set pin  
2 pcs.  
Ring spring  
2 pcs



## GBD\*\*-00

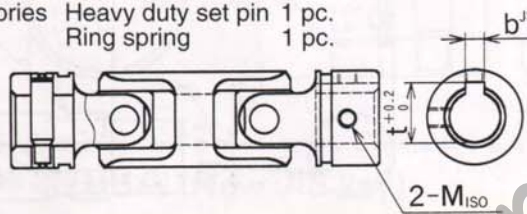
If attached rubber cover is required for use, denote SD-\*\*-\*\*C beforehand. SD-08-30 size is set with rubber cover and grease is sealed. SD-35-50 size is attached with special bellow (accessory).



## SD-\*\*-03A(New JIS key)

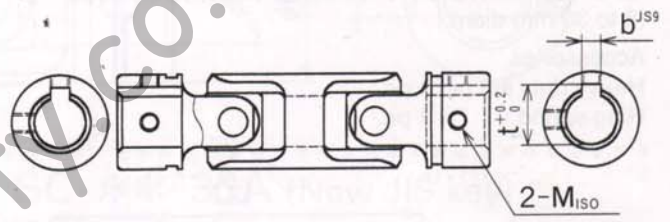
(6 to 50mm diam.)

Accessories Heavy duty set pin 1 pc.  
Ring spring 1 pc.



## SD-\*\*-33A(New JIS key)

(6 to 50mm diam.)

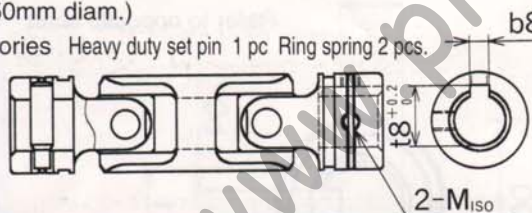


11

## SD-\*\*-08A

(10 to 50mm diam.)

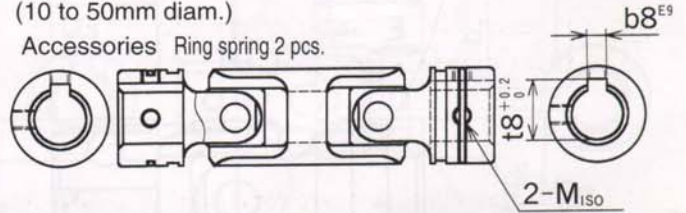
Accessories Heavy duty set pin 1 pc Ring spring 2 pcs.



## SD-\*\*-88A

(10 to 50mm diam.)

Accessories Ring spring 2 pcs.

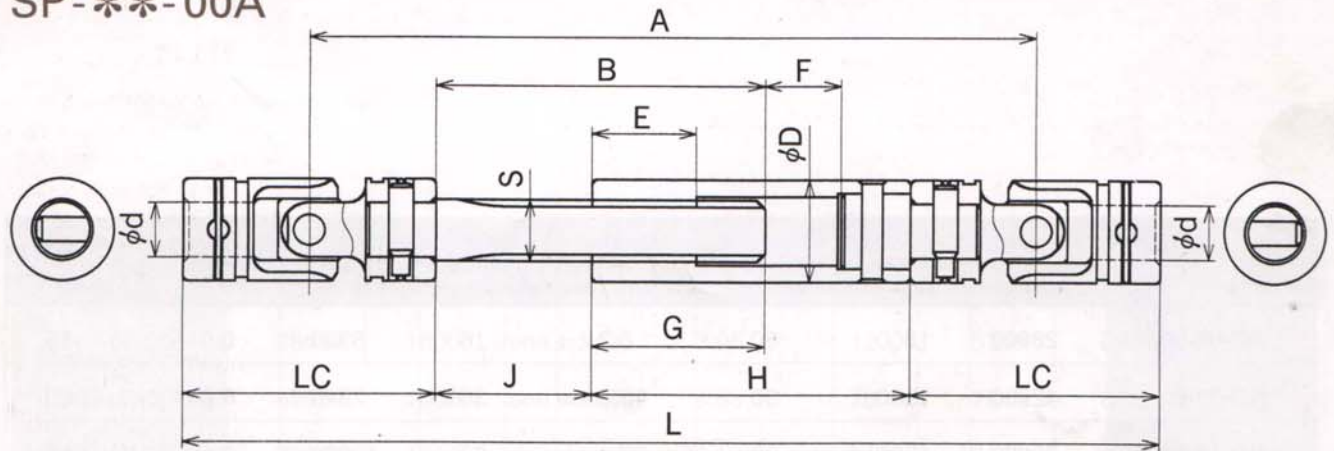


Dimension Name	d	D	LD	A	l	C	E	P	b	t	b8	t8	M	KD
SD-06-**-A	6	12	49.5	18.5	15.5	9	4.5	3	—	—	—	—	3	—
SD-08-**-A	8	15	58	22	18	10	5	3.5	—	—	—	—	3	26
SD-10-**-A	10	19	67.5	25.5	21	12	6	4.5	3	11.4	4	11.5	5	32
SD-12-**-A	12	23	83	31	26	15	7.5	5	4	13.8	4	13.5	5	36
SD-14-**-A	14	26	94.5	35.5	29.5	17	8.5	5.8	5	16.3	5	16	6	40
SD-16-**-A	16	30	117.5	43.5	37	22	11	6.5	5	18.3	5	18	6	46
SD-18-**-A	18	33	129	48	40.5	23.5	11.75	7	6	20.8	5	20	6	52
SD-20-**-A	20	36	139	52	43.5	25	12.5	8	6	22.8	5	22	6	58
SD-22-**-A	22	40	150	56	47	27	13.5	9	6	24.8	7	25	6	62
SD-25-**-A	25	44	168	63	52.5	30	15	10	8	28.3	7	28	8	68
SD-30-**-A	30	51	195	73	61	35	17.5	11.5	8	33.3	7	33	8	82
SD-35-**-A	35	59	224	84	70	40	20	13	10	38.3	10	38.5	10	90
SD-40-**-A	40	67	251	94	78.5	45	22.5	14.5	12	43.3	10	43.5	10	100
SD-45-**-A	45	75	282	106	88	50	25	16	14	48.8	12	48.5	10	110
SD-50-**-A	50	83	304	113	95.5	55	27.5	17.5	14	53.8	12	53.5	10	120

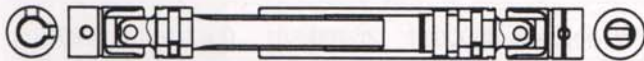


# SP TYPE With intermediate spline

SP-\*\*-00A



SP-\*\*-03A (New JIS key)



SP-\*\*-33A (New JIS key)



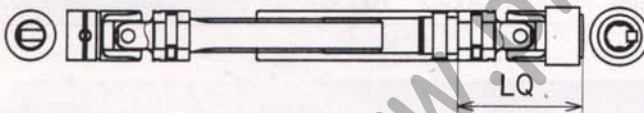
SP-\*\*-08A



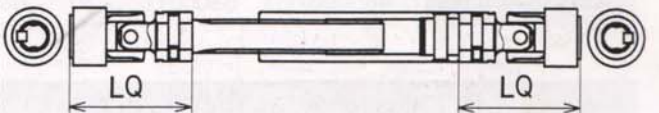
SP-\*\*-88A



SP-\*\*-09A



SP-\*\*-99A



As per out of standard items, inquire us with detailed specification or show us a schematic drawing.

Dimension Name	d	L	Telescopic section	A	B	Spline item S	E	LC	LQ	D	F	G	H	J
SP-08-**A	8	163	+19 -11	127	65	INVOLUTE Diameter=10 m=0.75 z=11	20	36	—	17	11	39	65	26
SP-08-09A	8	167	+17 -13	129	65	INVOLUTE Diameter=10 m=0.75 z=11	20	36	38	17	13	37	65	28
SP-08-99A	8	169	+17 -13	129	65	INVOLUTE Diameter=10 m=0.75 z=11	20	—	38	17	13	37	65	28
SP-10-**A	10	177	+17 -13	135	65	INVOLUTE Diameter=12 m=1.0 z=10	25	42	42	19	13	37	65	28
SP-12-**A	12	225	+16 -16	173	88	16×13×3.5—6	40	52	52	23	16	56	89	32
SP-14-**A	14	240	+14 -18	181	87	16×13×3.5—6	40	59	59	23	18	54	89	33
SP-16-**A	16	308	+35 -23	234	115	20×16×4—6	40	74	74	30	23	75	120	40
SP-18-**A	18	327	+30 -26	246	115	20×16×4—6	40	81	81	30	28	70	120	45
SP-20-**A	20	344	+33 -27	257	118	22×18×5—6	40	87	87	36	27	73	125	45
SP-22-**A	22	360	+28 -30	266	115	25×21×5—6	40	94	94	40	30	68	125	47
SP-25-**A	25	405	+38 -32	300	133	28×23×6—6	45	105	105	44	32	83	145	50
SP-30-**A	30	464	+35 -40	342	145	32×26×6—6	50	122	122	51	40	85	160	60
SP-35-**A	35	515	+35 -45	375	150	38×32×8—6	50	140	—	60	45	85	170	65
SP-40-**A	40	574	+35 -50	417	165	42×36×8—6	60	157	—	67	50	95	190	70
SP-45-**A	45	637	+35 -55	461	180	45×41×8—8	70	176	—	75	55	105	210	75
SP-50-**A	50	697	+35 -60	506	200	52×46×9—8	80	191	—	83	60	115	230	85



# NC Series Selection table

Item Name	Allowable conditional variable	Allowable rotating speed (min <sup>-1</sup> )	Allowable operating angle (°)	Allowable torque (N.m)	Static breaking torque (N.m)	Static tensile load (N)	GD <sup>2</sup> (kg.cm <sup>2</sup> )	Weight (g)
NC-06-00	28000	1800	30	5.3	16	5300	0.015	15
NC-08-00	42000	1500	30	11.6	35	7840	0.044	30
NC-10-00	70000	1300	30	27.4	83	13000	0.13	55
NC-12-00	106000	1100	30	46	140	23000	0.35	110
NC-14-00	133000	1000	30	66	200	26000	0.67	155
NC-16-00	175000	900	30	102	310	39000	1.5	260
NC-18-00	203000	800	30	132	400	44000	2.3	345
NC-20-00	239000	700	30	175	530	52000	3.6	465
NC-22-00	302000	650	30	251	760	68000	5.9	630
NC-25-00	356000	600	30	330	1000	81000	9.7	790
NC-30-00	465000	550	30	495	1500	100000	20	1160

Angle	5° and Under	10°	15°	20°	25°	30°
Angle coefficient	1.00	1.05	1.18	1.43	1.82	2.50

## Selection example (NC-\*\*-05A is not applicable)

When NC series is to be used under a rotating speed of 300 min<sup>-1</sup>, an operating angle 25°, and a transmission torque of 19 N.m, the calculation conditional variable 142500 is obtained from the following formula.

$$\text{Rotating speed} \times \text{angle} \times \text{torque} = \text{Conditional variable}$$

$$300 \times 25 \times 19 = 142500$$

Secondly, check the allowable rotating speed of NC-16 according to the following formula.

$$\text{Rotating speed} \times \text{angle coefficient} < \text{Allowable rotating speed}$$

Do the above calculations and compare the allowable conditions to each of the items for NC-16.

1. Conditional variable — 142500 < Allowable conditional variable — 175000
2. Rotating speed — 300min<sup>-1</sup> × 1.82 < Allowable rotating speed — 900min<sup>-1</sup>
3. Angle — 25° < Allowable operating angle — 30°
4. Torque — 19N.m < Allowable torque — 102N.m

The universal joint meeting the requirements of the above service conditions, with good lubricating conditions, is the NC-16.

# ND Series Selection table

Item Name	Allowable conditional variable	Allowable rotating speed (min <sup>-1</sup> )	Allowable operating angle (°)	Allowable torque (N.m)	Static breaking torque (N.m)	Static tensile load (N)	GD <sup>2</sup> (kg.cm <sup>2</sup> )	Weight (g)
ND-06-00	28000	1800	one side 30	3.96	12	5300	0.029	30
ND-08-00	42000	1500	one side 30	8.58	26	7840	0.069	50
ND-10-00	70000	1300	one side 30	20.1	61	13000	0.21	95
ND-12-00	106000	1100	one side 30	33	100	23000	0.55	180
ND-14-00	133000	1000	one side 30	46	140	26000	1.0	250
ND-16-00	175000	900	one side 30	76	230	39000	2.3	410
ND-18-00	203000	800	one side 30	96	290	44000	3.7	550
ND-20-00	239000	700	one side 30	129	390	52000	5.7	690
ND-22-00	302000	650	one side 30	185	560	68000	9.1	940
ND-25-00	356000	600	one side 30	248	750	81000	15	1240
ND-30-00	465000	550	one side 30	363	1100	100000	31	1775

Angle	5° and Under	10°	15°	20°	25°	30°
Angle coefficient	1.00	1.05	1.18 *	1.43	1.82	2.50

## Selection example (ND-\*\*-05A is not applicable)

When ND series is to be used under a rotating speed of 800min<sup>-1</sup>, an operating angle 20°, and a transmission torque of 10 N.m, the calculation conditional variable 160000 is obtained from the following formula.

$$\text{Rotating speed} \times \text{angle} \times \text{torque} = \text{Conditional variable}$$

$$800 \times 20 \times 10 = 160000$$

Secondly, check the allowable rotating speed of ND-16 according to the following formula.

$$\text{Rotating speed} \times \text{angle coefficient} < \text{Allowable rotating speed}$$

Do the above calculations and compare the allowable conditions to each of the items for ND-16.

$$1. \text{ Conditional variable } \underline{\hspace{2cm}} 160000 < \text{ Allowable conditional variable } \underline{\hspace{2cm}} 175000$$

$$2. \text{ Rotating speed } \underline{\hspace{2cm}} 800\text{min}^{-1} \times 1.43 > \text{ Allowable rotating speed } \underline{\hspace{2cm}} 900\text{min}^{-1}$$

$$3. \text{ Angle } \underline{\hspace{2cm}} 20^\circ < \text{ Allowable operating angle } \underline{\hspace{2cm}} 30^\circ$$

$$4. \text{ Torque } \underline{\hspace{2cm}} 10\text{N.m} < \text{ Allowable torque } \underline{\hspace{2cm}} 76\text{N.m}$$

As the service rotating speed exceeds the the allowable rotating speed under the intended conditions, change the service condition or select another type.



# NC Popular top type

JIS B1454 C type

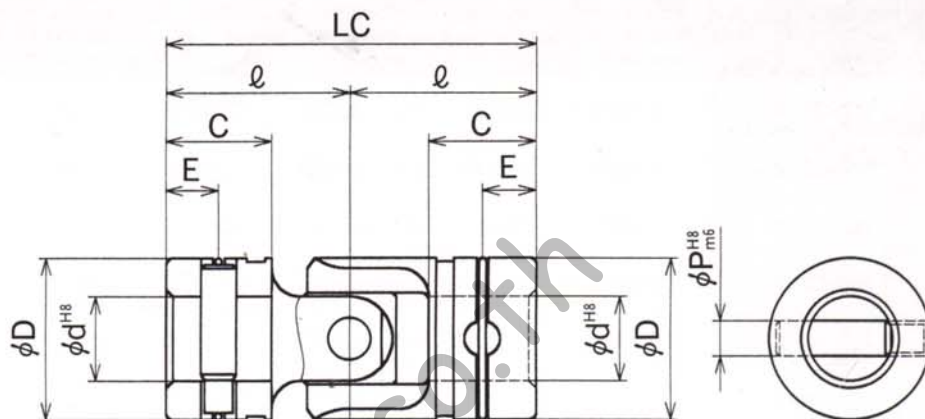
## NC-\*\*-00A

(6 to 30mm diam.)

Accessories

Heavy duty set pin 2 pcs.

Ring spring 2 pcs.



Accessories Heavy duty set pin 1 pc Ring spring 2 pc

## NC-\*\*-05A

(6 to 30mm diam.)

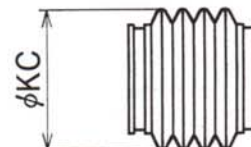
- 15 Non-hardening of the drive yoke body allows additional processing.



## GBC-\*\*-00

(8 to 30mm diam.)

When rubber cover attachment is intended for use, denote NC-\*\*\*C beforehand.



Dimension Name	d	D	LD	l	C	E	LD	A	P	KC	KD
N*-06-*A	6	12	31	15.5	9	4.5	49.5	18.5	3	—	—
N*-08-*A	8	15	36	18	10	5	58	22	3.5	25	26
N*-10-*A	10	20	42	21	12	6	67.5	25.5	4.5	32	32
N*-12-*A	12	23	52	26	15	7.5	83	31	5	35	36
N*-14-*A	14	26	59	29.5	17	8.5	94.5	35.5	5.8	40	40
N*-16-*A	16	30	74	37	22	11	117.5	43.5	6.5	46	46
N*-18-*A	18	33	81	40.5	23.5	11.75	129	48	7	52	52
N*-20-*A	20	36	87	43.5	25	12.5	139	52	8	58	58
N*-22-*A	22	40	94	47	27	13.5	150	56	9	62	62
N*-25-*A	25	44	105	52.5	30	15	168	63	10	68	68
N*-30-*A	30	51	122	61	35	17.5	195	73	11.5	82	82

## ND Popular top type

JIS B1454 CC type

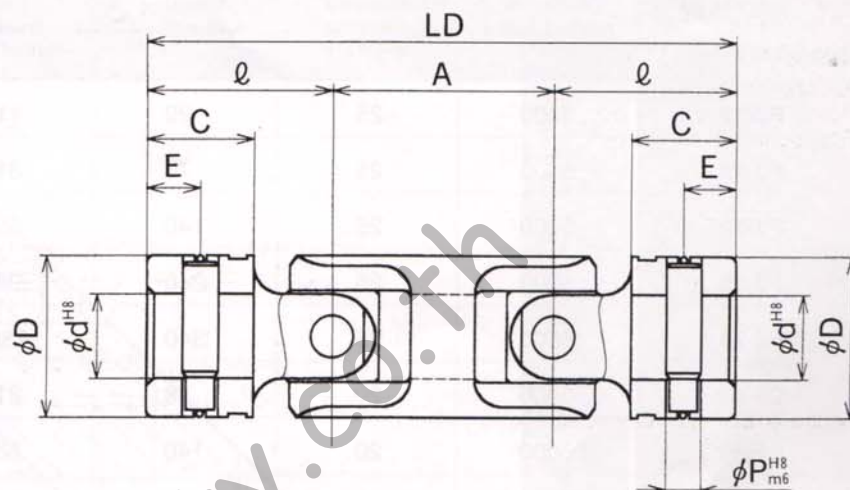
### ND-\*\*-00A

(6 to 30mm diam.)

Accessories

Heavy duty set pin 2 pcs.

Ring spring 2 pcs.



### ND-\*\*-05A

(6 to 30mm diam.)

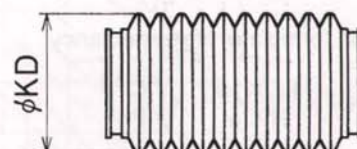
Non-hardening of the drive yoke body allows additional processing.



### GBD-\*\*-00

(8 to 30mm diam.)

When rubber cover attachment is intended for use, denote ND-\*\*-\*\*C beforehand.



## NP TYPE With intermediate spline shaft

Intermediate spline shaft attachment type is available.  
Refer to SP-\*\*-00A on page 12.





# FJ·CF Series Selection table

Item Name	Allowable rotating speed (min <sup>-1</sup> )	Allowable operating angle (°)	Allowable torque (N.m)	Static breaking torque (N.m)	GD <sup>2</sup> (kg.cm <sup>2</sup> )	Weight (g)
FJ-32	5000	25	29	110	1.5	250
FJ-42	5000	25	78	310	5.2	600
FJ-52	5000	25	140	580	18	1100
FJ-59	5000	25	240	960	40	1500
FJ-70	3500	25	340	1300	77	2700
CF-42	5000	20	78	310	3.6	390
CF-52	5000	20	140	580	14	760
CF-59	5000	20	240	960	17	970

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Relation between rotating speed and angle

$$\text{Rotating speed (min}^{-1}\text{)} \times \text{Angle (}^{\circ}\text{)} < 18000$$

Calculation formula of life expectancy

$$LH = \frac{1.5 \times 10^6}{N \times \alpha} \times \left( \frac{C}{P} \right)^3$$

$$P = \frac{T \times 10^3}{\cos \alpha \times \ell}$$

LH = Life expectancy (H)

N = Rotating speed (min<sup>-1</sup>)

$\alpha$  = Angle (°)

C = Load rating of needle bearing (N)

P = Load imposed on needle bearing (N)

T = Shaft torque (N.m)

$\ell$  = Distance between points of torque application of cross kit (mm)

## Calculation example

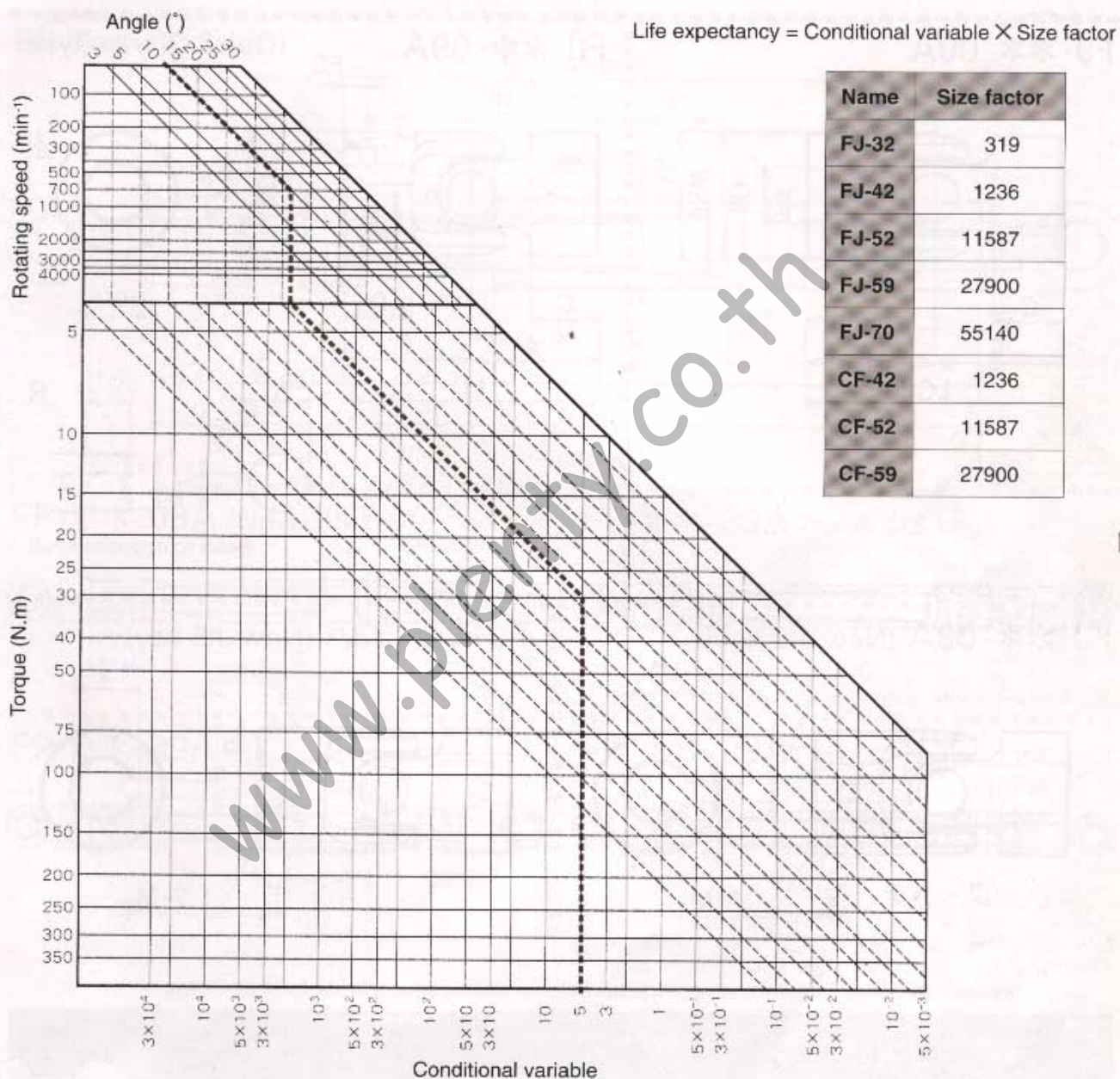
Life of the FJ-42 type under the following conditions, rotating speed 700 min<sup>-1</sup>, angle 10°, and torque 30 N.m, is calculated below.

$$P = \frac{30 \times 10^3}{\cos 10^{\circ} \times 29.3} \approx 1040 \text{ N}$$

$$LH = \frac{1.5 \times 10^6}{700 \times 10} \times \left( \frac{3200}{1040} \right)^3 \approx 6200 \text{ h}$$

Name	C(N)	$\ell$ (mm)
FJ-32	2700	22.15
FJ-42	3200	29.3
FJ-52	5600	35.3
FJ-59	6400	41.4
FJ-70	7000	47.5
CF-42	3200	29.3
CF-52	5600	35.3
CF-59	6400	41.4

Note: NBR (butadiene acrylonitrile rubber) is used for oil seal. Consider secular deterioration which occurs irrespective of calculated life expectancy.



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**Example**

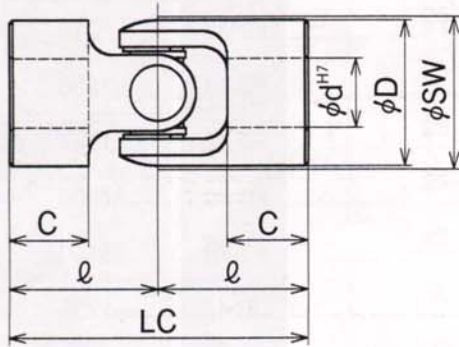
The life expectancy of type FJ/CF-42 under the following condition, refraction angle  $10^\circ$ , rotating speed  $700\text{min}^{-1}$ , torque  $30\text{ N.m}$  is obtained as follows.

Descend along the slanting line of  $10^\circ$  to the point where it intersects with the cross line of  $700\text{min}^{-1}$ . From the intersection, vertically descend to the basic heavy line. From the rating line, descend along a  $45^\circ$  slanting line to the point where it intersects the cross line of  $30\text{ N.m}$ . Then vertically descend from the intersection to the conditional variable line to get approx. 5. Multiplying size factor 1236 will result in a 6180 hours life expectancy.



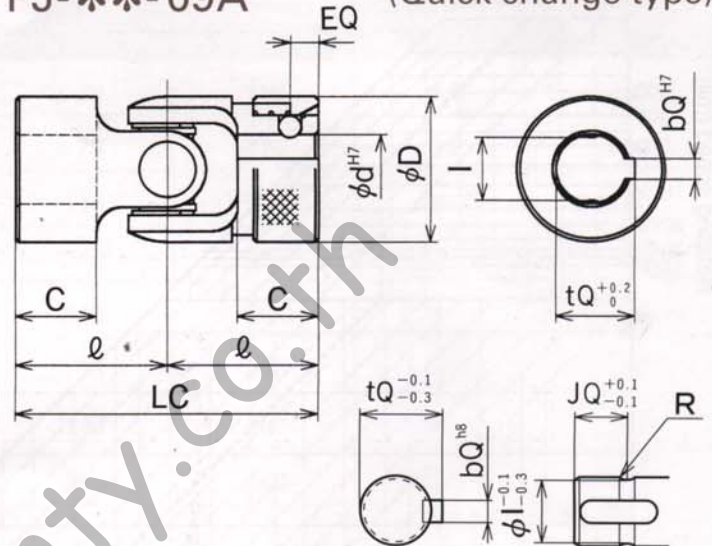
# FJ General purpose small cross type

FJ-\*\*-00A



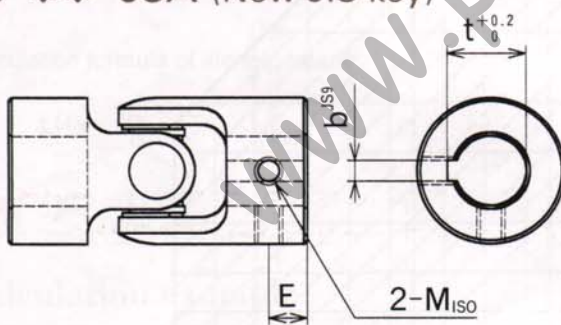
FJ-\*\*-09A

(Quick change type)

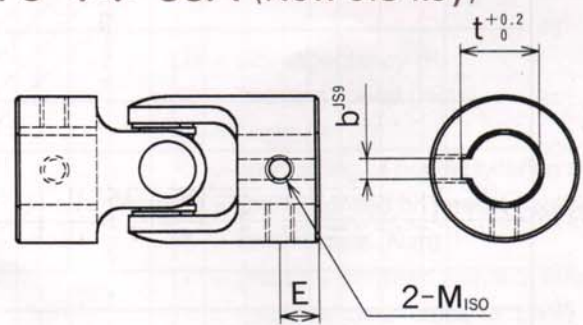


Refer to opposite shaft.

FJ-\*\*-03A (New JIS key)



FJ-\*\*-33A (New JIS key)

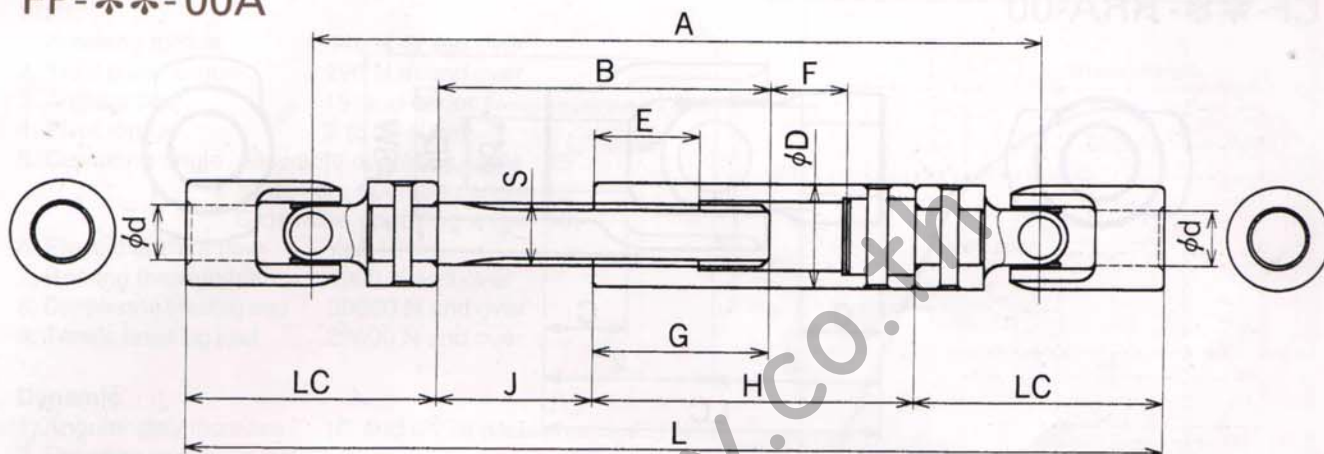


Dimension	d	D	LC	l	C	E	b	t	M	EQ	I	R	JQ	bQ	tQ	Rotational diameter SW
Name																
FJ-32-**A	16	32	65	32.5	18	9	5	18.3	6	8	13.3	3.2	10	5	18	33
FJ-42-**A	20	42	86	43	23	11	6	22.8	8	8	18.3	3.2	15	5	23.1	43
FJ-52-**A	25	52	108	54	30	14	8	28.3	8	10	22.53	4.4	20	7	28	53
FJ-59-**A	30	59	140	70	40	20	8	33.3	8	11	26.95	4.8	29	7	33	61
FJ-70-**A	40	70	160	80	45	22	12	43.3	12	12	37.36	5.2	33	10	43.4	70

Non-hardening of drive yoke body allows additional processing.

# FP TYPE With intermediate spline

FP-\*\*-00A



FP-\*\*-03A (New JIS key)



FP-\*\*-33A (New JIS key)



FP-\*\*-39A



FP-\*\*-99A



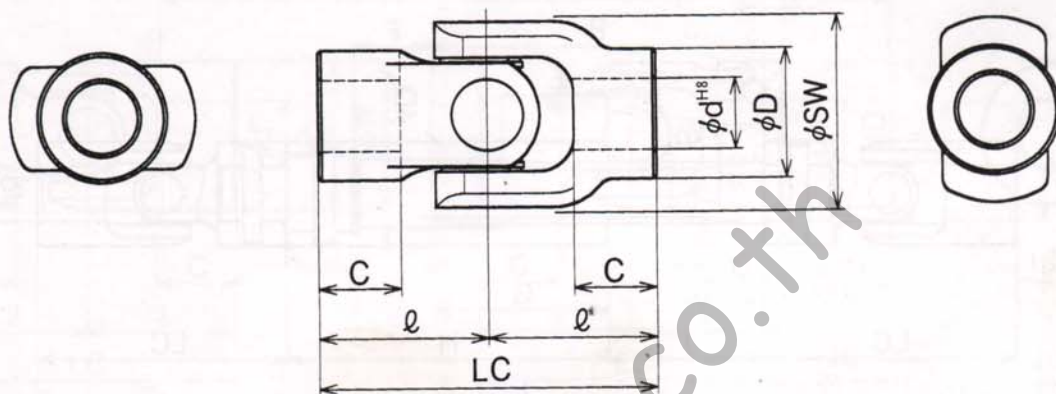
As per out of standard items, inquire us with detailed specification or show us a schematic drawing.

Dimension Name	d	L	Telescopic section	A	B	Involute spline item S	B	LC	D	F	G	H	J
FP-32-**A	16	290	+37 -21	225	117	INVOLUTE Diameter=17 m=1.0 z=15	30	65	26	21	67	110	50
FP-42-**A	20	340	+34 -26	254	117	INVOLUTE Diameter=20 m=1.0 z=18	40	86	30	26	74	125	43
FP-52-**A	25	400	+16 -34	292	120	INVOLUTE Diameter=25 m=1.25 z=18	50	108	40	34	61	125	59
FP-59-**A	30	495	+20 -45	355	135	INVOLUTE Diameter=30 m=1.667 z=16	50	140	44	45	70	150	65
FP-70-**A	40	570	+20 -50	410	155	INVOLUTE Diameter=40 m=1.667 z=22	60	160	60	50	80	175	75



## CF Special small cross type

CF-\*\*-RRA-00



21	Dimension Name	d	D	LC	$\ell$	C	Rotational diameter SW
	CF-42-RRA-00	16	32.5	76	38	18	43
	CF-52-RRA-00	20	36.5	94	47	23	53
	CF-59-RRA-00	25	42.5	104	52	25	60



Selection method is the same as that of FJ series.  
Inquire us intermediate spline shaft and double type.

### CP TYPE

With intermediate spline shaft



### HP TYPE

Steering joint with intermediate shaft



Inquire us intermediate shaft and double type.

# HJ Steering joint

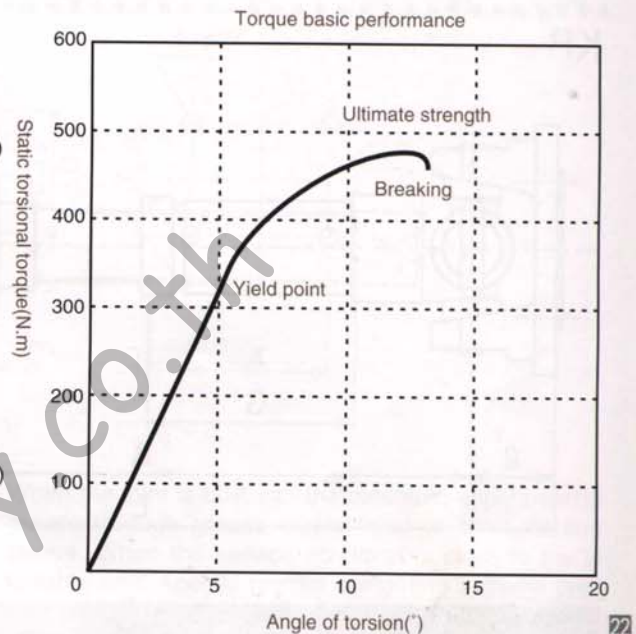
## Basic performance

### Static

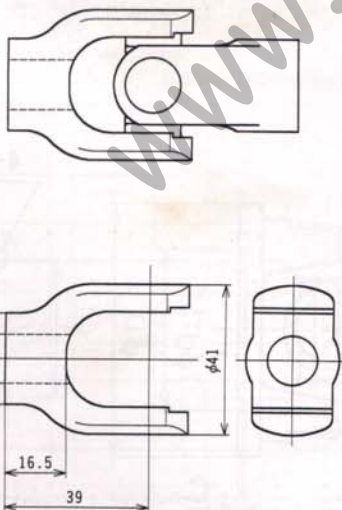
1. Breaking torque 440 N.m and over
2. Yield point torque 290 N.m and over
3. Angular play 15' and under (Measuring torque  $\pm 1$  N.m)
4. Pivot torque 2 to 20 N.cm
5. Operating angle Allowable operating angle 35°  
Stationary operating angle 45°  
Crosswise operating angle 90°
6. Electric current flow Yes
7. Bearing through load 4900 N and over
8. Compressive breaking load 39000 N and over
9. Tensile breaking load 29000 N and over

### Dynamic

1. Angular play increase 10' and under (Measuring torque  $\pm 1$  N.m)
2. Repeated endurance test  
Cycle 400000 times  
1 Cycle 2 sec  
Rotating angle  $\pm 180^\circ$   
Setting angle 35°  
Load torque 29 N.m

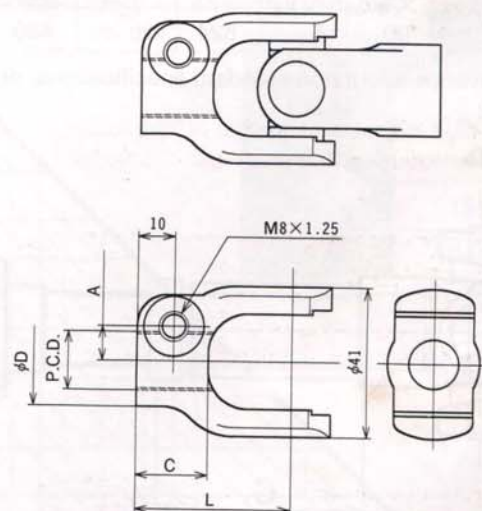


## HJ-RR



$\phi d$
13.5H <sup>8</sup>
15.5H <sup>10</sup>

## HJ-RB



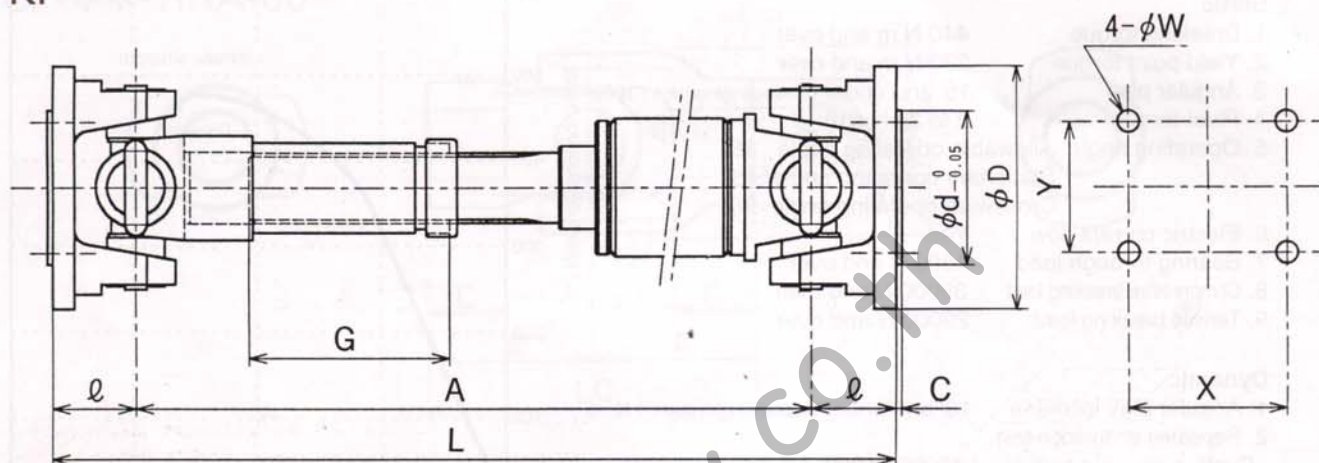
$\phi D$	L	A	C	serration	
				P.C.D.	Z
22	52	9.5	25	15.367	36
22	42	9.5	19.5	15.367	36

Note. 1. Use locking bolt for bolt yoke of not less than strength section 7T.  
 2. Apply 20 N.m to bolt locking torque.  
 3. Use welding or pin to connect shaft and round yoke.  
 4. Be sure to inquire about combination, as the specifications shown in this catalog are.  
 Kyowa's basic specifications.



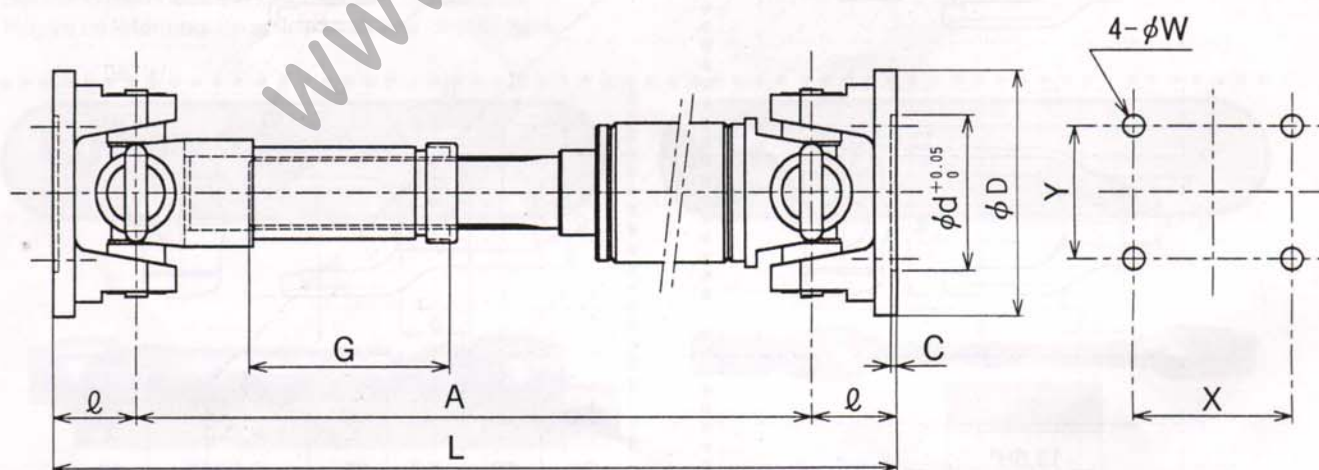
# KP Propeller shaft type

KP



Dimension Name	d	C	L	Telescopic section	A	l	G	W	X	Y	Opposite flange diam. D	Allowable operating angle (°)	Allowable torque (N.m)
KP-04	60.2	1.5	353	+20 -20	280	36.5	80	10.2	61	51	97	15	400
KP-09	85	3	442	+20 -20	350	46	115	12.2	86.5	72.5	134	15	900
KP-20	90	5	624	+20 -20	480	72	135	14.2	118	75	176	15	2000

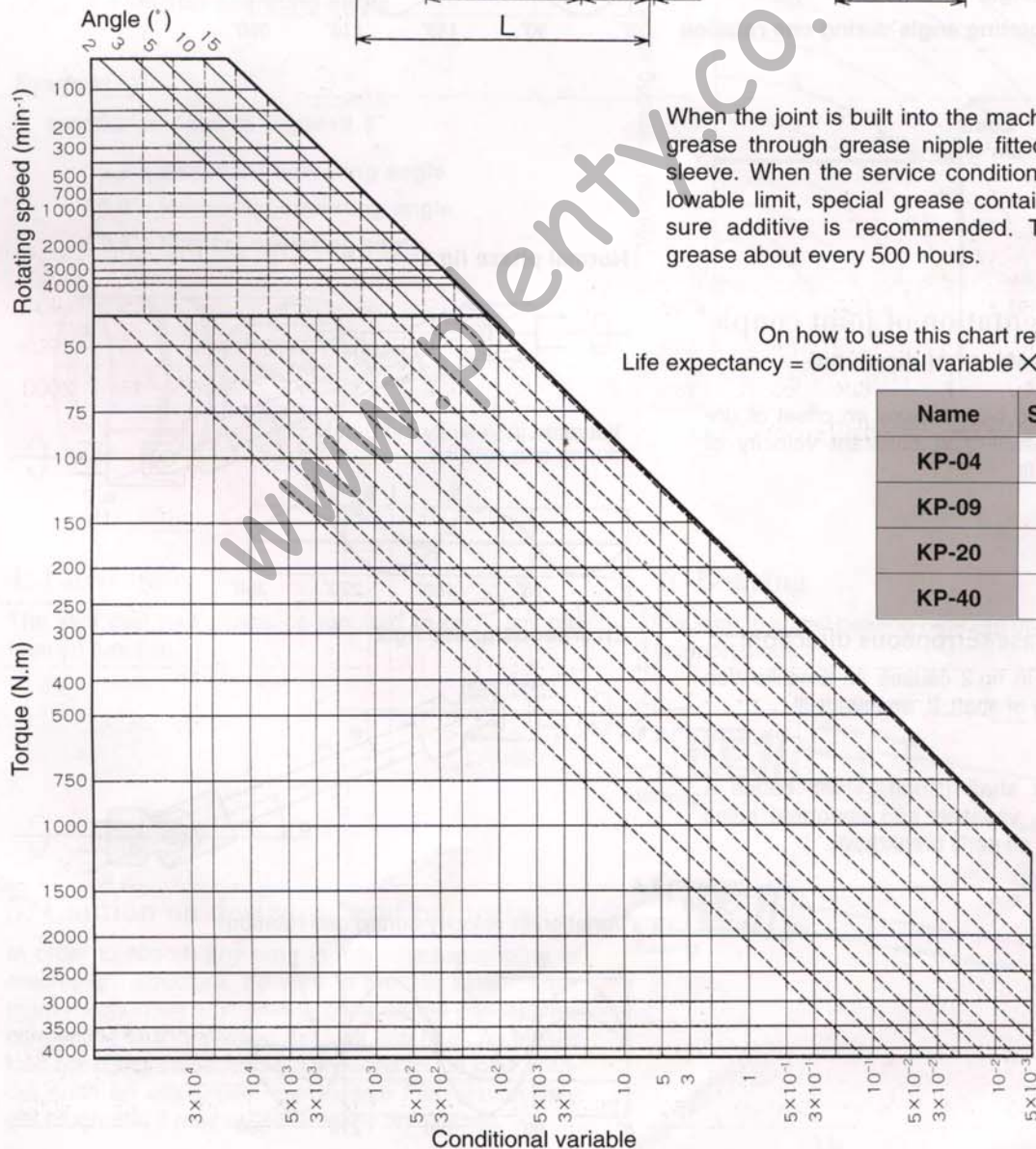
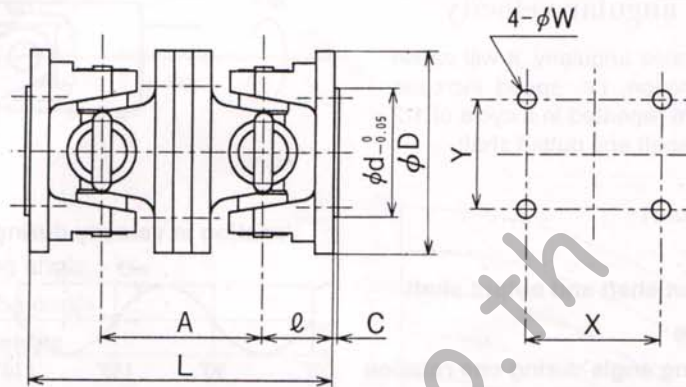
Inquire in advance about non-standard specifications, or indicate with a schematic drawing.



Dimension Name	d	C	L	Telescopic section	A	l	G	W	X	Y	Opposite flange diam. D	Allowable operating angle (°)	Allowable torque (N.m)
KP-40	90	5	601	+20 -20	450	75.5	140	16.2	134	104	206	15	4000

# KD Double type

Dimension Name	d	C	L	A	$\ell$	W	X	Y	Opposite flange diam. D	Allowable operating angle(°)	Allowable torque (N.m)
KD-04	60.2	1.5	156	83	36.5	10.2	61	51	97	15	400
KD-09	85	3	194	102	46	12.2	86.5	72.5	134	15	900
KD-20	90	5	298	154	72	14.2	118	75	176	15	2000





# Engineering section

## 1. Fluctuation of angular velocity

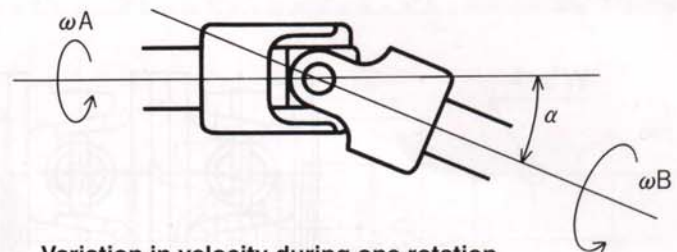
When a single joint rotates angularly, it will cause an unequal velocity motion, i.e. speed increase and speed decrease are repeated in a cycle of 1/2 rotation between input shaft and output shaft.

Relation between input shaft and output shaft

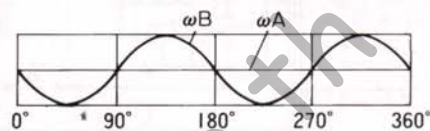
$\alpha$  = Operating angle

$\theta$  = Arbitrary rotating angle during one rotation

$$\omega_B = \frac{\cos \alpha}{1 - \sin^2 \theta \sin^2 \alpha} \omega_A$$



Variation in velocity during one rotation



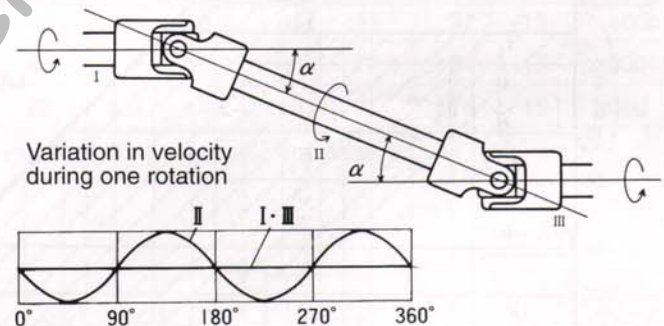
25

## 2. Phase "Orientation of joint couple"

### a. Normal phase (Normal direction)

Setting as shown in fig.1 causes an offset of unequal velocity, resulting in constant velocity of shaft I and shaft III.

Normal phase fig.1



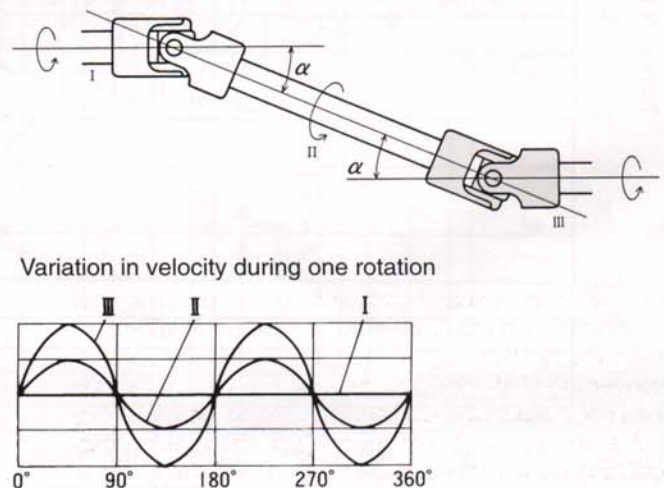
### b. Erroneous phase (Erroneous direction)

Setting as shown in fig.2 causes an amplification of unequal velocity of shaft II and shaft III.

Note:

Torsion of output shaft (Shaft III) will cause a torque fluctuation, vibration and abnormal noise which may lead to an early breakdown.

Erroneous phase fig.2



### 3. Resultant operating angle

When the universal joint refracts simultaneously on both horizontal and vertical planes, it is necessary to find the resultant refractive angle.

$$\tan \theta = \sqrt{\tan^2 \alpha + \tan^2 \beta}$$

$\theta$  = Resultant operating angle

$\alpha$  = Horizontal operating angle

$\beta$  = Vertical operating angle

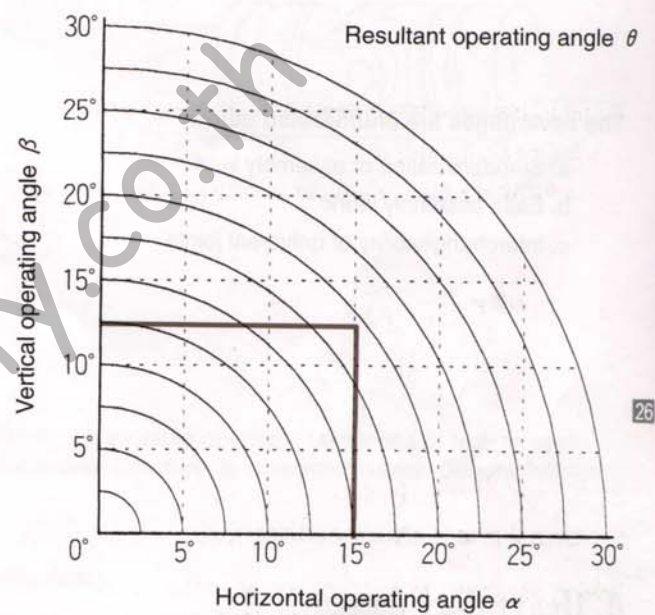
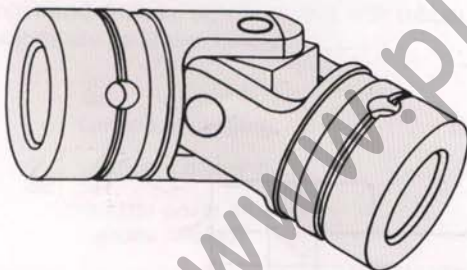
#### Example

$$\tan 19.2^\circ = \sqrt{\tan^2 15^\circ + \tan^2 12.5^\circ}$$

19.2° = Resultant operating angle

15.0° = Horizontal operating angle

12.5° = Vertical operating angle

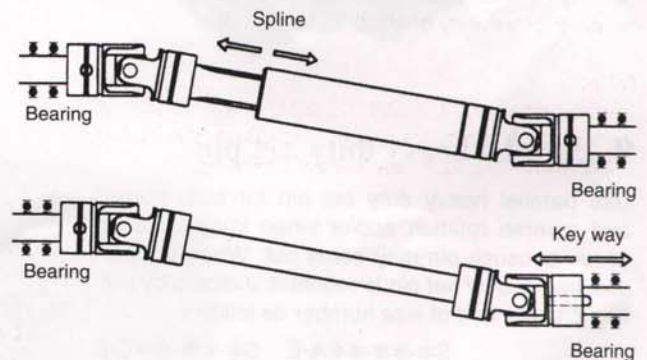


### 4. Clearance

The joint part has clearance required to allow smooth rotation function.

### 6. Bearing

Be sure to install bearing near the universal joint of support shaft.



### 5. Caution on designing and mounting

In order to absorb any error in machine assembling or mechanical structure, be sure to provide axial adjustment mechanism at least one point on the consecutive connecting shaft including the joint and thus, no tensile load nor compressive load are imposed on the joint. Without such an adjustment mechanism the rotation may get rough and it may cause an early breakdown.



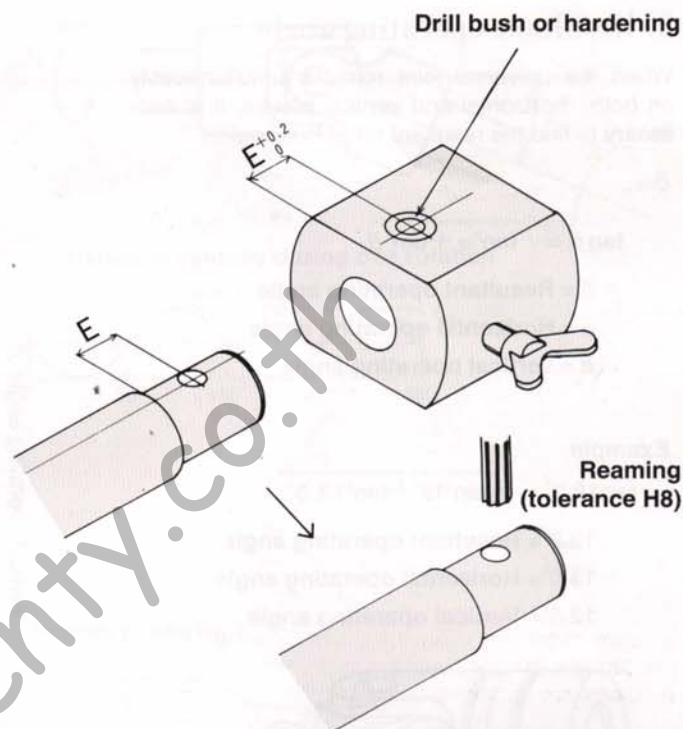
# Engineering section

## 7. To facilitate assembly work

The set pin hole of Kyowa universal joints are accurately machined by special machines beforehand. Therefore, it is advisable to use a simple drilling jig for the shaft in case of continuous use.

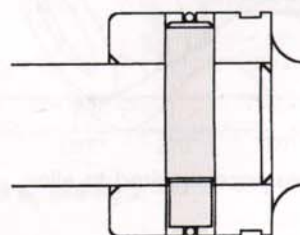
The advantages are enumerated below.

- Standardization of assembly work
- Ease assembly work
- Interchangeability of universal joints



## 8. Heavy duty set pin

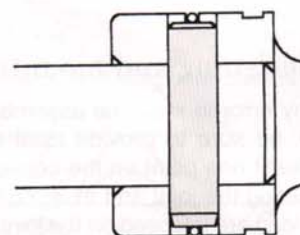
- It is made of alloy steel SCM415 case hardened and has a grinded finish to tolerance m6.
- The significant part is stepped and pulled as shown in the figure at right.
- Slight misalignment in the pin hole of opposite shaft is permitted, but finish the pin hole to an accuracy of about H8.
- Sale of parts is available.



## 9. Parallel heavy duty set pin

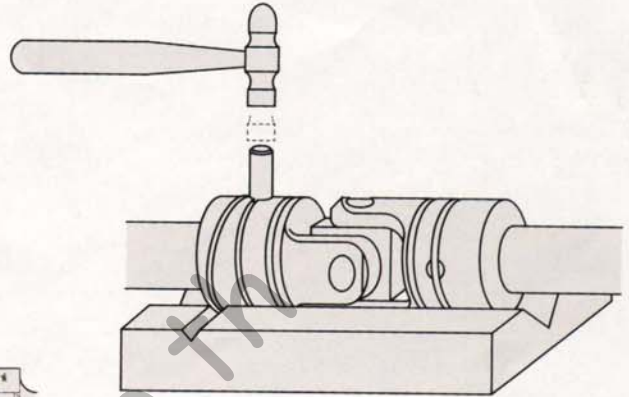
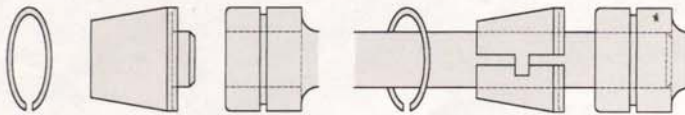
Use parallel heavy duty set pin for both normal and reverse rotation and/or when impact motion occur, because pin may come out. When the parallel heavy duty set pin is required, indicate by putting E to the end of size number as follows.

S\*-\*-\*-\*A-E S\*-\*-\*-\*C-E  
N\*-\*-\*-\*A-E N\*-\*-\*-\*C-E



## 10. Handling of ring spring

- 1) Disassembling of ring spring that has been set once could destroy the spring effect.
- 2) Preparation of the tool as shown in the figure will facilitate assembly work.
- 3) Be sure not to leave the ring spring suspended around the joint for a long time, or tap it with a hammer.



## 11. Lubrication (S·N series)

Be sure to provide initial lubrication at an initial operation. Under unfavorable operation conditions of high temperature, danger and dust, an universal joint with rubber cover, grease sealed structure, is recommendatory. General lubrication methods are as shown below.

- A. — Grease application  
 — Lubricant dripping  
 — Rubber cover attached (grease sealed)

- B. — Jet lubrication  
 — Mist lubrication  
 — Oil bath

When the service condition is close to allowable conditional variable, compulsory lubrication (B) is necessary.

Performance of rubber cover and grease

	Material	Freezing resistant	Heat resistant
Rubber cover	NBR	-20°	100°
Grease	Cup grease	-5°	70°



### Reference

#### 1. Conversion to International System of Units "SI"

Amount	Gravity unit	SI Units
Torque	1kgf.m	9.8N.m
Force	1kgf	9.8N

#### 2. Calculation formula by SI Units

Relation between transmission torque and rotating speed

$$T = 60000 \times P / 2 \pi n$$

T : Torque (N.m)

P : Transmission capacity (KW)

n : Rotating speed (min<sup>-1</sup>)