U086

Universal Joint

Instruction Manual

(A series, 190 series, P series)

Be sure to read this manual before using the product.
Improper handling may result in an accident.
Be sure to retain this manual after reading it.

- Serious personal injury may result if the universal joint is contacted while it is operating or if the universal joint is damaged and the parts fly off.
  Provide adequate preventive measures such as installing a cover to prevent inadvertent contact or to keep the parts from flying off.
- NAJICO shall not under any circumstances be responsible for any personal injury or property damage resulting from unauthorized modification, improper use or maintenance, or unsafe operation of the universal joint after delivery.

◎ Signal word

In this instruction manual, the levels of seriousness of danger or hazard are classified and indicated as follows, to ensure safe use and operation.

⚠ Warning	.....	Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.
⚠ Caution	.....	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

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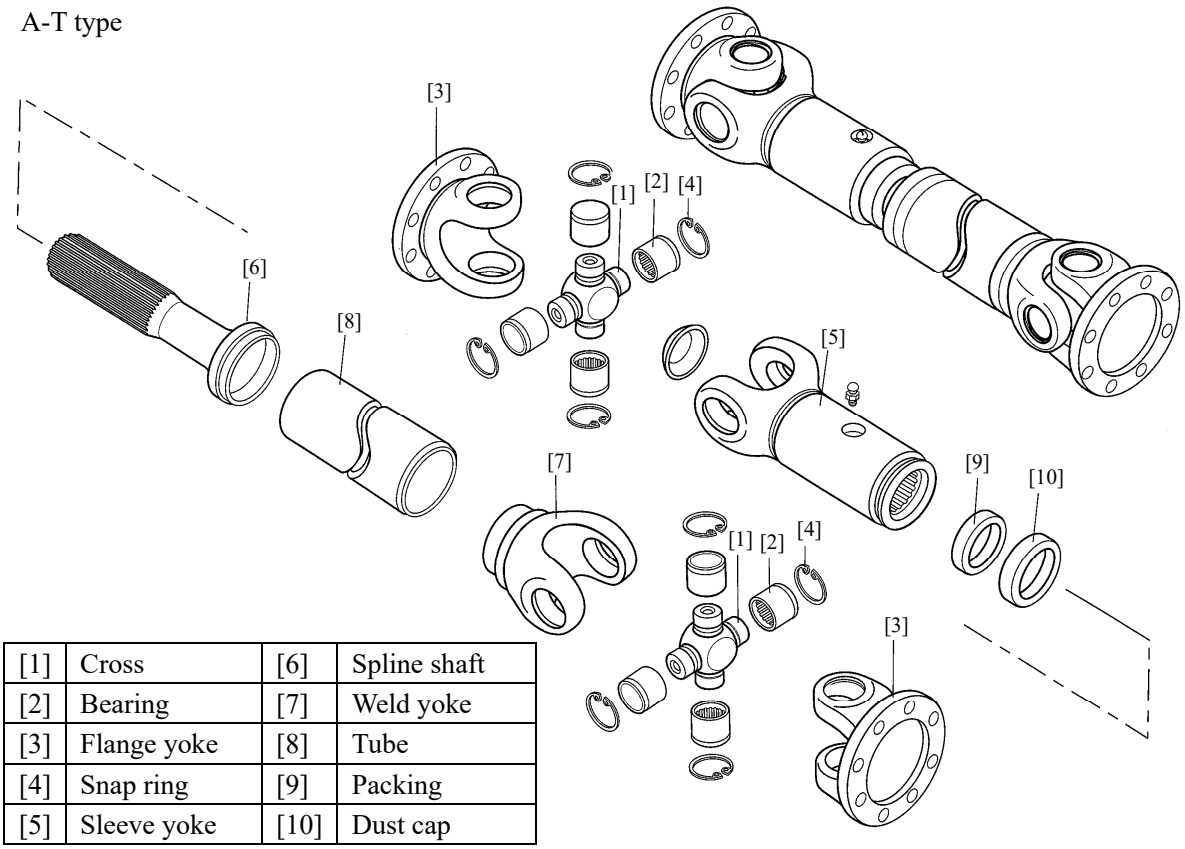
NAJICO

1. Structure and names of parts

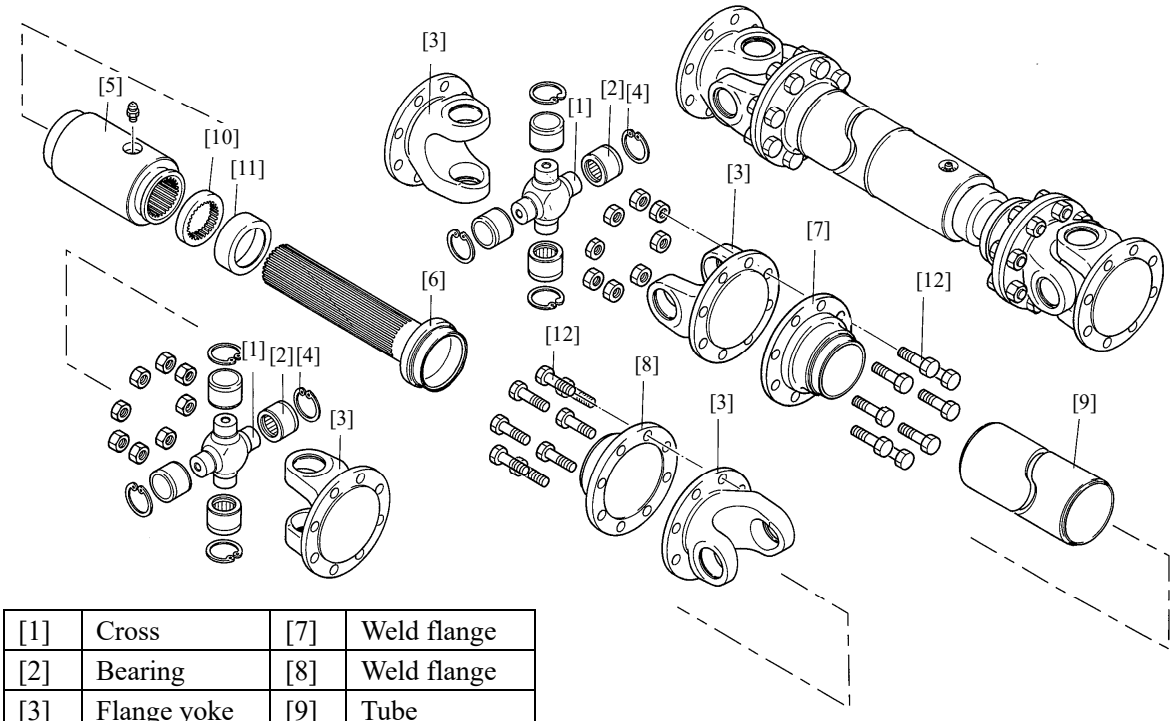
1.1 A series (Figure 1)

A-T type



[1]	Cross	[6]	Spline shaft
[2]	Bearing	[7]	Weld yoke
[3]	Flange yoke	[8]	Tube
[4]	Snap ring	[9]	Packing
[5]	Sleeve yoke	[10]	Dust cap

A-R type



[1]	Cross	[7]	Weld flange
[2]	Bearing	[8]	Weld flange
[3]	Flange yoke	[9]	Tube
[4]	Snap ring	[10]	Packing
[5]	Spline sleeve	[11]	Dust cap
[6]	Spline shaft	[12]	Flange bolt

Figure 1

1.2 190 series (Figure 2)

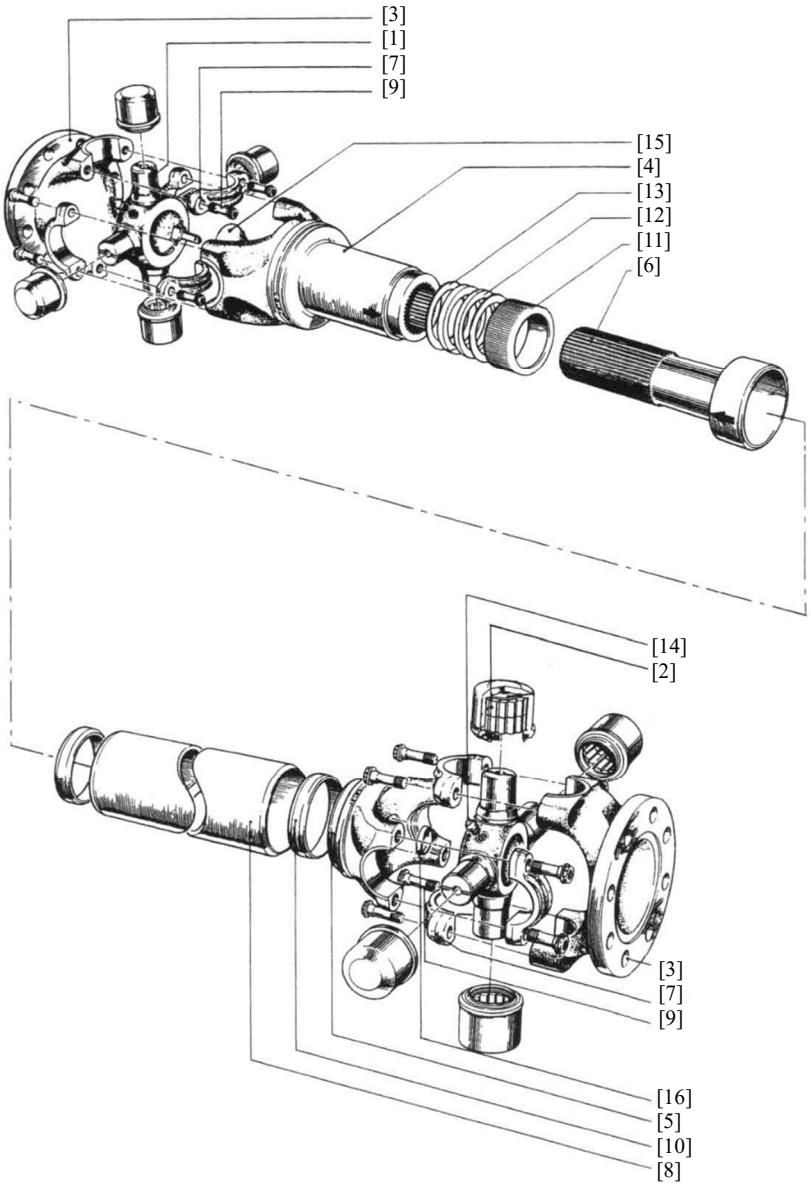
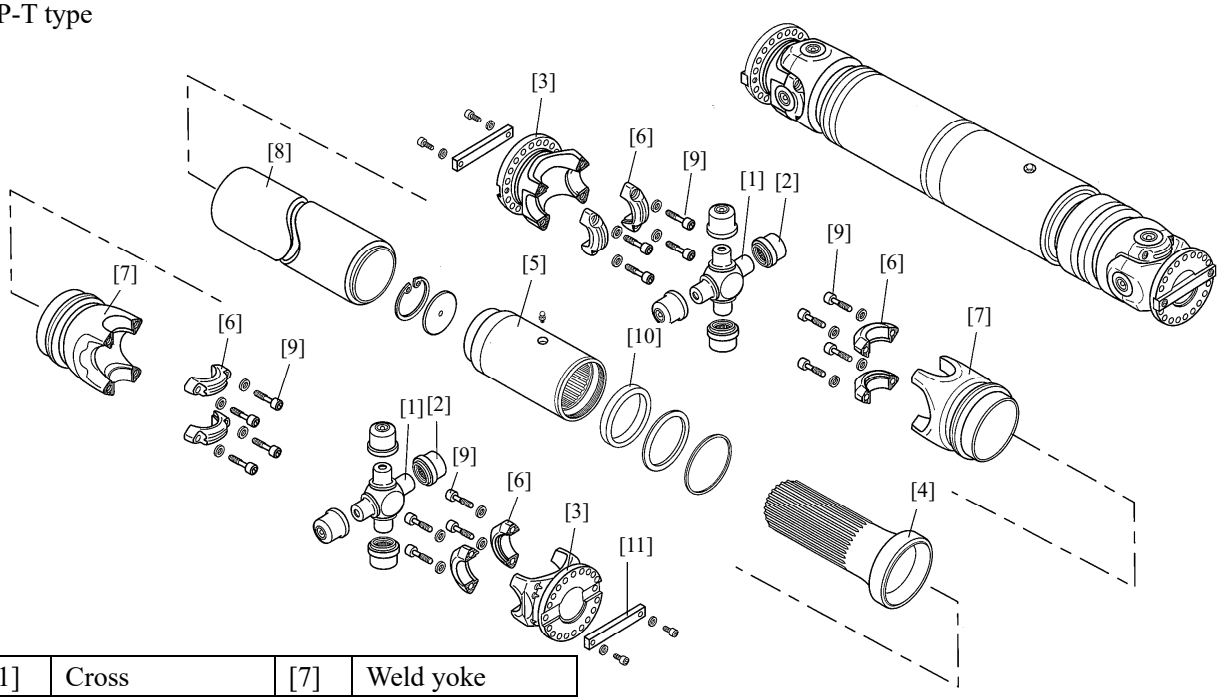


Figure 2

[1]	Cross
[2]	Bearing
[3]	Flange yoke
[4]	Sleeve yoke
[5]	Weld yoke
[6]	Spline shaft
[7]	Bearing cap
[8]	Tube
[9]	Cap bolt
[10]	Backing ring
[11]	Dust cap
[12]	Packing
[13]	Side plate
[14]	Grease nipple
[15]	Seal plate
[16]	End plate

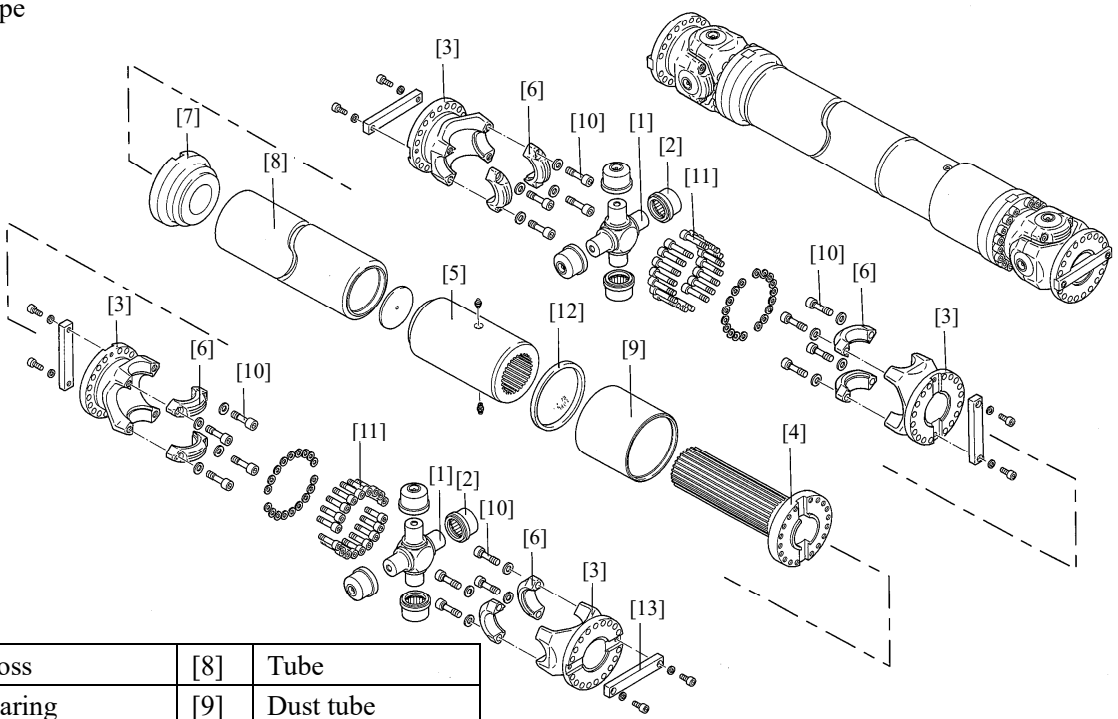
1.3 P series (Figure 3)

P-T type



[1]	Cross	[7]	Weld yoke
[2]	Bearing	[8]	Tube
[3]	Flange yoke	[9]	Cap bolt
[4]	Spline shaft	[10]	Packing
[5]	Spline sleeve	[11]	Flange key
[6]	Bearing cap		

P-R type



[1]	Cross	[8]	Tube
[2]	Bearing	[9]	Dust tube
[3]	Flange yoke	[10]	Cap bolt
[4]	Spline flange	[11]	Flange bolt
[5]	Spline sleeve	[12]	Packing
[6]	Bearing cap	[13]	Flange key
[7]	Weld flange		

Figure 3

2. Transport and storage

Each universal joint is delivered after it is thoroughly inspected for balance and rotation accuracy such as swiveling.

Please follow the following instructions during transportation and storage to maintain the rotation accuracy as delivered.

⚠ Warning

- **Since a universal joint with a spline moves in the axial direction, secure the spline to prevent it from sliding out in the axial direction when lifting the universal joint, or lift it horizontally as shown in the figures below.**
- **Do not stand under the lifted universal joint, because there is a risk of injury in case the universal joint falls down.**
- **The yoke on the cross kit (cross and bearings) of the universal joint swings freely, and therefore must not be supported. There is also a risk of hands or fingers being crushed if caught in the yoke. To prevent this, do not insert hands into part A in Figure 4.**

- Keep the universal joint in a horizontal position during transport.
  When transporting the universal joint, use a wooden box for packing to prevent external injury, and do not pack it together with other metallic equipment.
- Use hemp, nylon or wire rope for lifting the universal joint and follow the procedures described in Figure 4. When doing so, ensure that the rope is not applied to the cross or bearings to prevent damage to the bearing oil seals, etc.
- Furthermore, the left and right flange yokes will tilt when the universal joint is suspended. They may interfere with their respective paired yokes, causing paint to peel. Appropriate protection must therefore be provided with a cushioning material.
- Be sure to keep the spline from slipping out when lifting the universal joint, because there is no stopper for the spline section.
- Do not remove or change the position of the balance weight attached to the yoke.
  If it is removed, or the position is changed, balance will be lost, resulting in vibrations and shorter life expectancy.
- When carrying the cross kit on its own, the cross and bearings are not secured, and may slip out if tilted. Be sure to carry it in horizontally.

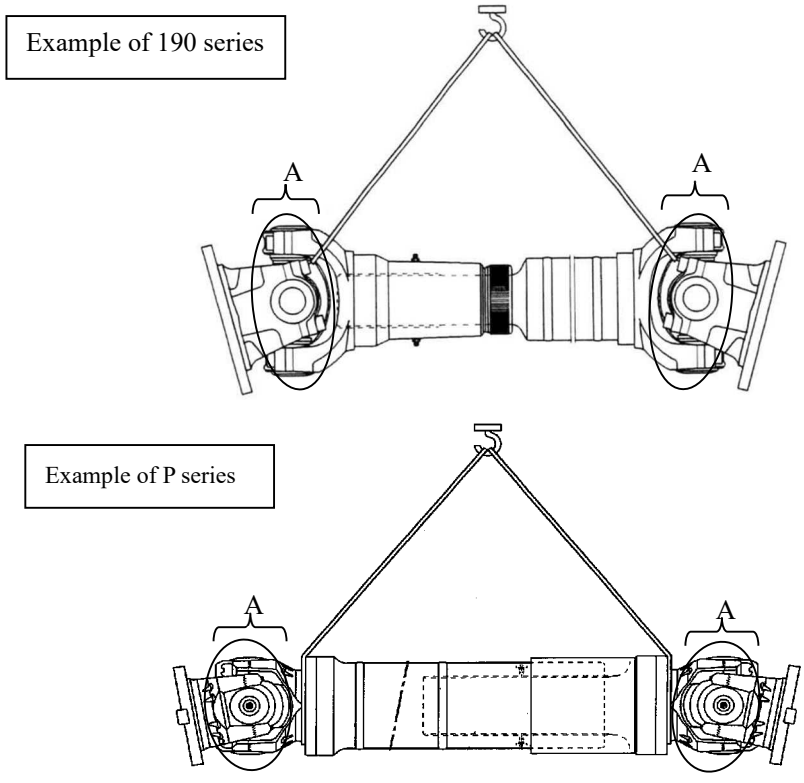
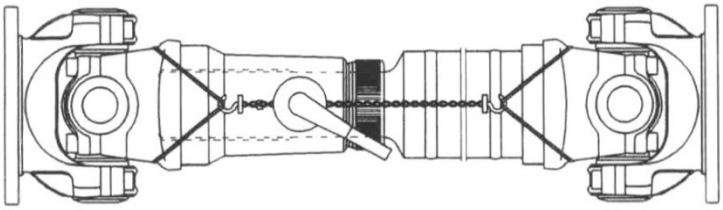


Figure 4 Transport methods

- Secure the middle section with wires or such when the universal joint needs to be lifted in a tilted position. (Figure 5)

190 series



P series

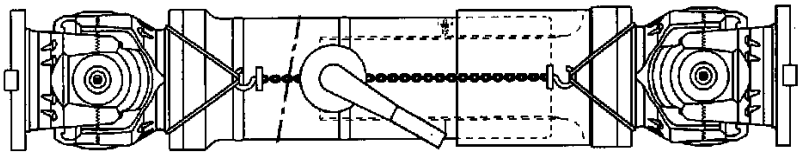
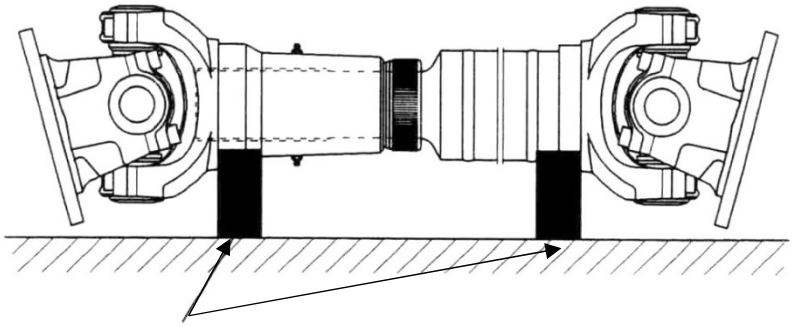


Figure 5

- For long-term storage, place the universal joint on wooden supports, and ensure that no excessive force is applied to the cross kits (cross and bearings) at both ends (Figure 6). Also, be sure to cover the universal joint with fabric or vinyl sheet to protect from dust during storage. When using the universal joint after a long-term storage, be sure to supply grease sufficiently before use. Refer to “5. Greasing” on page 8 for details.
- Store the universal joint indoors and avoid high humidity or temperature. Also avoid places where there is exposure to direct sunlight or risk of contact with chemicals or salt water. The seals (incl. oil seals attached to bearings) and packing will deteriorate after long-term storage. Even if unused, please replace these parts 5 years after manufacture.
- If the universal joint has a spline structure, keep the spline in a contracted position for storage.

190 series



P series

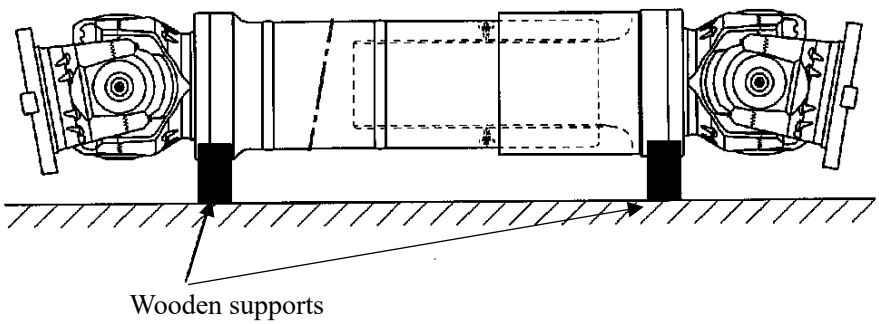


Figure 6 Storage method

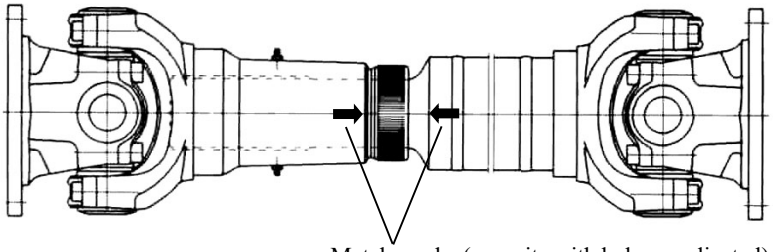
3. Precautions for installation

⚠Warning
When installing the universal joint in equipment, secure the yoke with hemp or nylon rope to prevent it from swinging. **Otherwise, there is a risk of getting hands or fingers caught in the yoke or colliding with other equipment.**

When installing the universal joint in equipment, pay attention to the following points to ensure correct installation.

- Ensure that the phase of the yokes at both ends of the universal joint is aligned. Units with balance adjusted have match marks stamped as shown in Figure 7.

190 series



P series

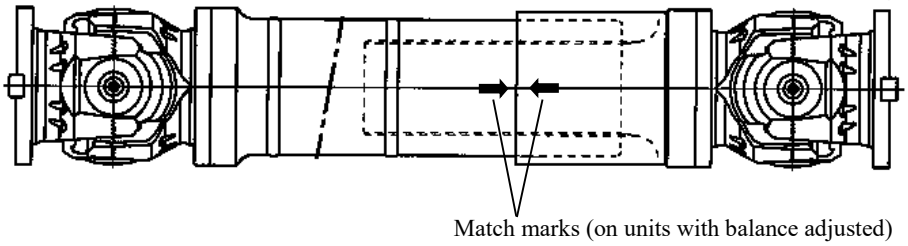


Figure 7 Match marks

- Completely remove antirust agent, paint, oil, rust, dust, etc. from the flange sections on both ends of the universal joint, bolt surface, and the flange mounting surface on the equipment side.
- Ensure that the mounting surface accuracy of the flange on the equipment side (Figure 8) satisfies the values in the following table.

Maximum rotation N	X and Y
N ≤500 min^{-1}	≤0.1 mm
500 min^{-1} < N ≤1000 min^{-1}	≤0.06 mm
1000 min^{-1}<N	≤0.04 mm

- Use fastening bolts with sufficient strength for mounting the universal joint on the flange on the equipment side. Tighten the bolts with specified tightening torque.
- After mounting the universal joint, supply grease to the joint section and spline section again, referring to Section 5 “Greasing”.
- Ensure that the cross kit (cross and bearings) and spline move and contract smoothly.

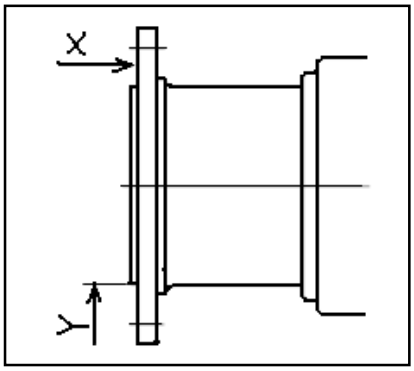


Figure 8
Mounting surface accuracy

4. Inspection

> **⚠ Warning**
>
> **Serious personal injury may result if the universal joint is contacted while it is operating. Before performing inspection or maintenance work, ensure that all motors are turned off and that proper provisions are made to prevent the motors from turning on. Never go near the universal joint while it is rotating.**

- When strange noise, vibration, rattling, heating, oil leak or other abnormality is observed, immediately remove the universal joint from the equipment and perform overhaul.
- Periodic overhaul is necessary even if no abnormality is observed. Standard maintenance interval is one year but determine an appropriate maintenance interval according to the conditions of use.
- NAJICO offers paid services such as overhaul, maintenance, repair and rework. Please feel free to contact us.

Observed condition		Recommended action
Abnormal noise in universal joint	● **Rumbling noise**	
	Abrasion of bearing	Disassemble for inspection.
	Abrasion of spline	Disassemble for inspection.
	● **Loud noise**	
	Damage to cross pin	Replace cross kit.
	Abrasion of plate liner	Replace plate liner
Vibration or rattling of universal joint	● **Eccentricity**	
	Abrasion/abnormality of bearing	Replace cross kit.
	Abrasion of spline	Replace whole middle section.
	Abrasion/abnormality of cross	Replace cross kit.
Heating of bearing	Scuffing between bearing and cross	Replace cross kit.
	Oil leak caused by damage to grease nipple	Replace cross kit.
Oil leak	● **Damage, degradation or deformation of seal**	
	Cross kit (cross and bearings)	Replace cross kit.
	Spline section	Disassemble for inspection.
	● **Damage to grease nipple**	Replace grease nipple.

5. Greasing

At the time of shipping, the bearings for the cross kits on both ends and the spline in between are filled with grease. After the universal joint is installed, apply grease again prior to operation, and periodically.

Observe the following instructions when greasing.

⚠ Caution

- **Use only lithium soap-based grease.**
- **Clean the supply head on the grease nipple.**
- **Keep water or dust from mixing into the grease.**
- **Check that grease is not leaking from the tip of the grease nipple after greasing. If grease leaks out, replace the grease nipple with a new one.**
- **Applying sudden pressure or a large amount of grease during greasing can cause damage to seals.**

5.1 Greasing points

(1) Cross kit (cross and bearings)

Supply grease from the grease nipple on the cross kit (cross and bearings).

(2) Spline

Supply grease evenly from the grease nipples in the middle of spline section.

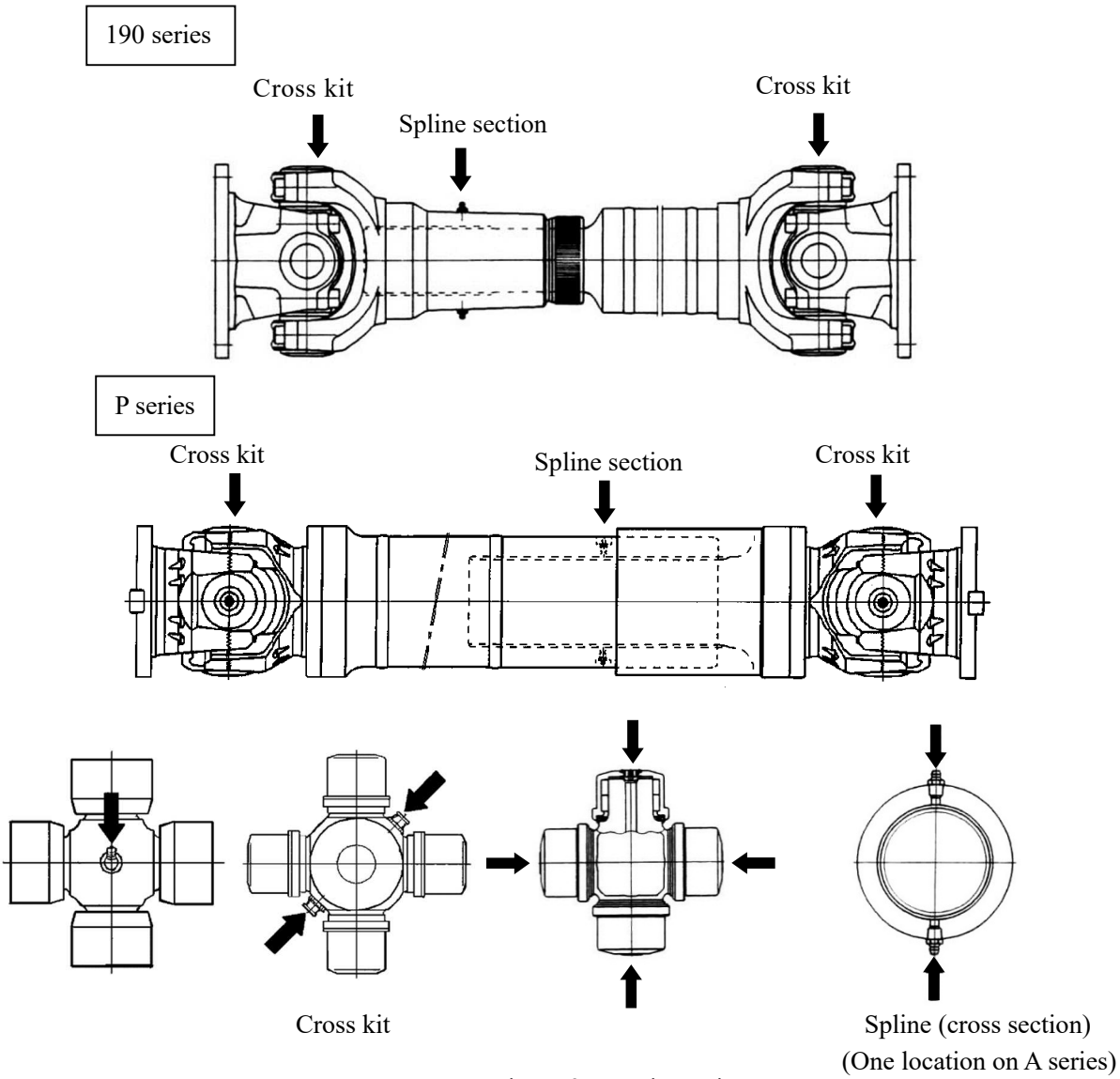
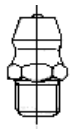


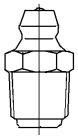
Figure 9 Greasing points

5.2 Grease nipple

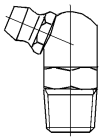
	Cross kit (cross and bearings)	Spline section
A series	JIS B 1575 Type 4 - R1/8 (JIS B 1575 B-PT1/8)	JIS B 1575 Type 1 - M6 x 0.75, JIS B 1575 Type 2 - R1/8 (JIS B 1575 A-M6F,A-PT1/8)
190 series	JIS B 1575 Type 2 - R1/8 (JIS B 1575 A-PT1/8)	JIS B 1575 Type 2 - R1/8 (JIS B 1575 A-PT1/8)
P series	JIS B 1575 Type 1 - M6 x 0.75 (JIS B 1575 A-M6F) However, JIS B 1575 Type 4 - R1/8 is used on P180R and P200R. (JIS B 1575 B-PT1/8)	JIS B 1575 Type 2 - R1/8 (JIS B 1575 A-PT1/8)



JIS B 1575 Type 1 - M6 x 0.75
(JIS B 1575 A-M6F)



JIS B 1575 Type 2 - R1/8
(JIS B 1575 A-PT1/8)



JIS B 1575 Type 4 - R1/8
(JIS B 1575 B-PT 1/8)

Figure 10 Shape of grease nipple [Code in parentheses indicates former JIS code]

5.3 Amount of grease

(1) Supply grease to all four bearing seals of the cross kit (cross and bearings) until dirty grease is discharged and new grease starts to leak out. Typical minimum amount of grease for each model is indicated in the table below.

(2) Spline, ┌ A series : Supply the amount indicated in the table.
└ 190 series, P series : Supply half the amount indicated from each of the two bearing seals.

Amount of grease (Unit: ml)

		A series				190 series					P series						
		A100R	A125R	A160R	A180R	19050	19055	19060	19065	19070	P180R	P200R	P225R	P250R	P280R	P315R	P355R
Cross kit (cross and bearings)	Periodic	10	18	37	46	30	35	60	70	100	30	60	80	80	100	120	180
	Disassembly/Assembly	25	45	90	115	85	105	170	210	310	80	180	200	220	280	360	520
Spline section	Periodic	25	35	55	65	20	40	45	70	110	60	110	120	150	200	350	560
	Disassembly/Assembly	50	90	130	150	60	120	130	210	320	170	320	360	400	600	1000	1600

5.4 Greasing interval

Standard greasing interval is one to three months.
Please refer to the minimum greasing interval above if the conditions of use are severe, and to the maximum greasing interval above if the conditions are moderate.

5.5 Greasing pressure and temperature

Supply grease at room temperature and at pressure of 3 MPa (30 kgf/cm^2) or less.

5.6 Recommended grease brands

Alvania EP Grease 2 ····· (Shell Lubricants Japan)
EPNOC Grease AP2 ····· (ENEOS)
Daphne Eponex EP2 ····· (Idemitsu Kosan)
Unilite DL2 ····· (Kyodo Yushi)

6. Maintenance

6.1 Disassembly

Before disassembling the universal joint, remove dust, oil, etc. off the outside surface and be sure to keep any foreign substance out of the bearings. Also, before disassembling, stamp match marks on the yokes, bearings and crosses so that they can be aligned in exactly the same positions when the universal joint is reassembled.

6.1.1 Disassembling the Cross Kit (Cross and Bearings)

(1) A series (Figure 11)

[1] Remove the snap ring from the yoke using snap ring pliers, etc.

[2] Remove the bearings by pressing them with a press machine using a jig. Remove the four bearings from the yoke in the same manner. In doing so, be careful not to damage the outer surface of the bearings, the inside and end face of bearing holes in the yoke, and the cross pin section.

[3] Remove the cross from the yoke.

[4] Repeat the same procedure for the other cross kits (crosses and bearings).

*Please refer to individual manuals on disassembly for details.

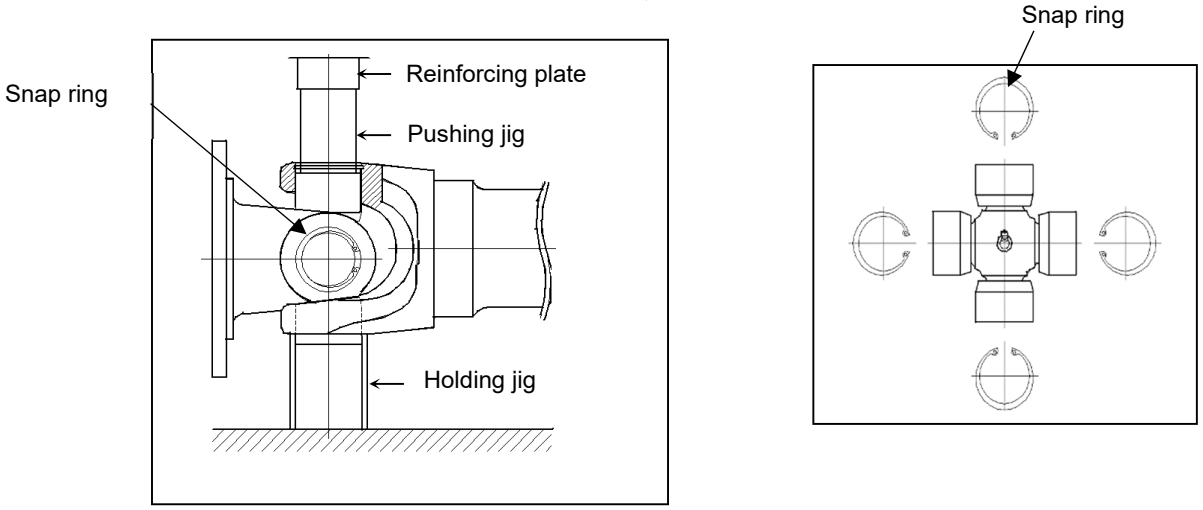


Figure 11 Cross kit (cross and bearings) disassembly

(2) 190 series, P series (Figure 12)

[1] Remove the cap bolt stopper and the cap bolt

[2] Remove the bearing cap by alternately striking both sides of it with a plastic hammer.
In doing so, be sure not to strike the matching surface between the yoke and cap or the outer lace of the bearing.

[3] The cross kit can be removed from the yoke by inserting a bar between the yoke and the cross and lifting the bar lightly.
Be careful not to drop the cross kit.

[4] Repeat the above procedure for the cross kit (cross and bearings) at the other end.

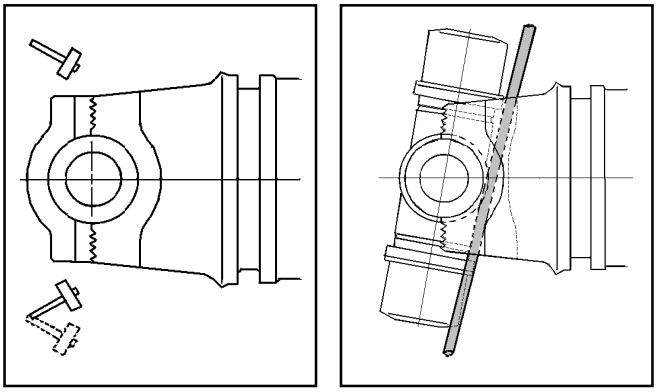


Figure 12 Cross kit (cross and bearings) disassembly

6.1.2 Disassembling the spline section

Loosen the dust cap and remove it from the sleeve yoke after checking the match marks for uniting the same phase. Then pull out the spline.

6.2 Inspection after disassembly

After disassembly, replace any part with a new genuine part if it is damaged or not meeting the criteria for application limits provided below. Please contact us for replacement parts after checking the part name, code and serial number on the drawings.
When you have internal criteria for application limits and if they are more stringent than the criteria provided below, continue to use those criteria.

6.2.1 Inspection items and methods

Section to be inspected	Inspection items and methods	Criteria for replacement
Whole unit	Visually check the main unit for rust, corrosion, etc.	Replace the part if there is severe rust or corrosion.
* Cross kit (cross and bearings)	After disassembly and cleaning, visually check the cross pin, bearing outer lace and rolling surface of rollers for abrasion, flaking or indentation.	Replace with a new cross kit if there is damage. Replace cap bolt at every disassembly.
	Check the R part at the base of cross pin for cracks with MT or PT.	Replace with a new cross kit if there are any cracks.
	Visually check the bottom plate for crack, chip or abnormal abrasion.	Replace with a new cross kit if there is damage.
	Visually check the seal for degradation, deformation or abnormal abrasion.	Replace with a new cross kit if there is damage.
	Gap (play) in radial direction must be within the criteria when cross and bearings are matched.	Replace with a new cross kit if play is over the criteria.
Yoke section	Visually check the whole yoke and bearing holes for rust or corrosion. Check bearing holes for crack and dimensions.	Replace the part if there is severe rust or corrosion. Replace the part if there is a crack. Replace the part if dimensions of bearing hole are over the criteria.
Spline section	After disassembly and cleaning, visually check the male and female tooth flank for abrasion or scuffing.	Replace the whole middle section if there is damage. Replace the packing (seal) at every disassembly.
	Check male spline tooth root for cracks using MT or PT.	Replace the whole middle section if there is damage.
	Play (amount of kink in male/female combination) in radial direction must be within the criteria.	Replace the whole middle section if play is over the criteria.
	Play (amount of backlash in male/female combination) in rotational direction must be within the criteria.	
Welded part (incl. welded part of balance weight)	Visually check the welded part for rust or corrosion. Check the welded part for cracks using UT. For a product with balance weight welded to it, check the welded part for cracks using MT.	Replace the part if there is severe rust or corrosion. Replace the whole middle section (yoke, tube, spline) if there is a crack.

*** If the A series cross kit is removed, replace it with a new one.**
However, if an unused cross kit is removed, the cross only can be used as is.

6.2.2 Cross Kit Usage Limit Criteria (Simple Measurement)

(1) Radial gap (Figure 13)

Gap (backlash) in radial direction must be **0.08 mm or less** when cross and bearings are matched.

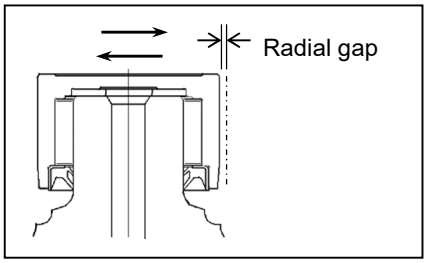


Figure 13

(2) Damage to rolling surface of cross pin (Figure 14)

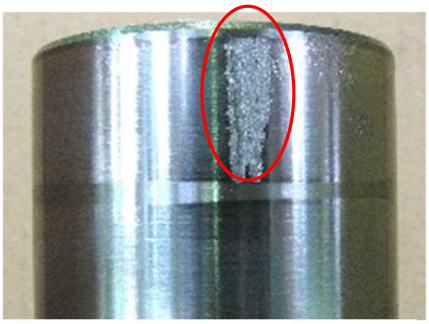
If any damage is found on the rolling surface of the cross pin, including flaking, abrasion and indentation, replace the cross kit with a new one.

(A) Brinelling

Dents made on the rolling surface by scuffing of foreign substance or by impact. (Brinelling marks)

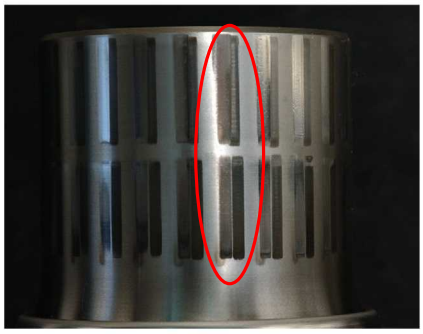
(B) Flaking (peeling)

The rolling surface peels off in flakes. The surface can become extremely uneven after peeling.



(C) Fletching

Rolling surface produces rusty abrasion powder and makes dents at the pitch of roller.



(D) Indentations made by excessive load

Indentations are made on the roller surface by the pressure of the roller.

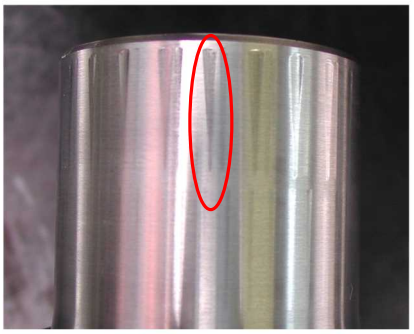


Figure 14 Examples of damage to rolling surface of cross pin

(Caution)

Even if no dam age is found on the rolling surface of the cross pin, be sure to replace the cross kit (cross and bearing) with a new one when the bearing has reached the product life or may reach the product life before the next inspection.

For A series, replace the cross kit (cross and bearing) with a new one at every disassembly to maintain the ac curacy of the bearings.

6.2.3 Criteria for application limits in the spline section

(1) Play in radial direction (amount of kink in male/female combination) (Figure 15)

K=A/B
A: Dial gauge reading
(Difference between [1] and [2] in mm)
B: Length of spline engagement
Distance from spline center to dial gauge measurement point (mm)

Criteria: **K < 0.002**

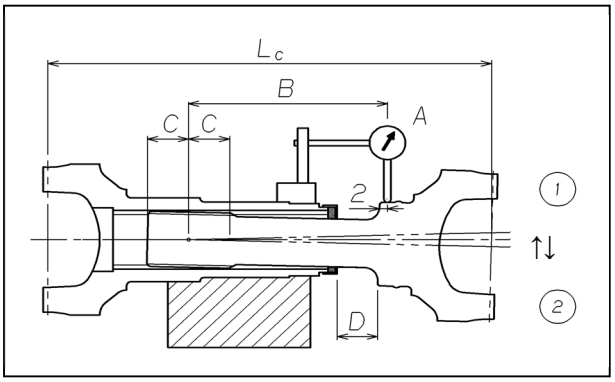


Figure 15 Play in radial direction in spline section

(2) Play in rotational direction
(male-female combination backlash) (Figure 16)

ε= A × r / R
A: Dial gauge reading
(Difference between [1] and [2] in mm)
r: Radius of spline reference pitch (mm)
R: Distance from spline center to dial gauge measurement point (mm)

Criteria: **ε < 0.5 mm**

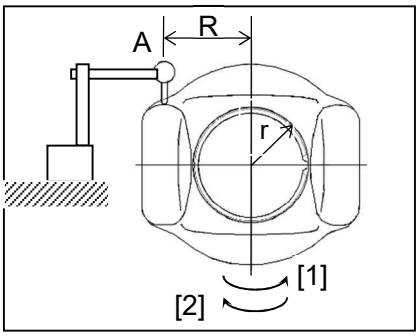


Figure 16 Play in rotational direction

6.2.4 Other points of precaution

- Use light oil for cleaning. Do not use gasoline. Do not wash bearing and cross in the same oil tank with other parts. Wash them separately using new light oil.
- Cap bolts of 190 and P series and flange bolts of other series are expendable parts. Replace them with new ones at every disassembly/reassembly.
- Beware that thickness of snap ring of A series is different from JIS standard and therefore commercial parts cannot be used.
- Do not replace the bearing roller because the outer lace and roller are selectively matched.
- Universal joints to be used at 800 min^{-1} or more have the balance adjusted. Beware that readjustment of balance may become necessary depending on the level and conditions of part replacement.
- If the spline tooth face is damaged, both the male and female splines must be replaced with new ones.

6.3 Assembly

Assembly is performed in the reverse order of assembly. Please pay particular attention to the following points.

- Assemble the universal joint so that the yokes, bearings and crosses are in exactly the same positions as before disassembly, by aligning the match marks stamped prior to disassembly.
- Yokes and bearing caps have match marks stamped at the positions shown in Figure 17. Check that the match marks are the same signs.
- Assemble the universal joint so that the yokes on both ends are in the same phase. Universal joints to be used at 800 min^{-1} or more have the balance adjusted and have match marks stamped. Check that match marks are stamped.
- Tighten the grease nipples so that there is no slack.
- For A series, check that snap ring is securely engaged in the groove.
- After assembly is complete, supply grease to the cross kit (cross and bearings) and spline.
- Ensure that the cross kit (cross and bearings) and spline move and contract smoothly.
- If the A series cross kit (cross and bearings) does not move smoothly, adjust by lightly tapping the base of the yoke with a plastic hammer.

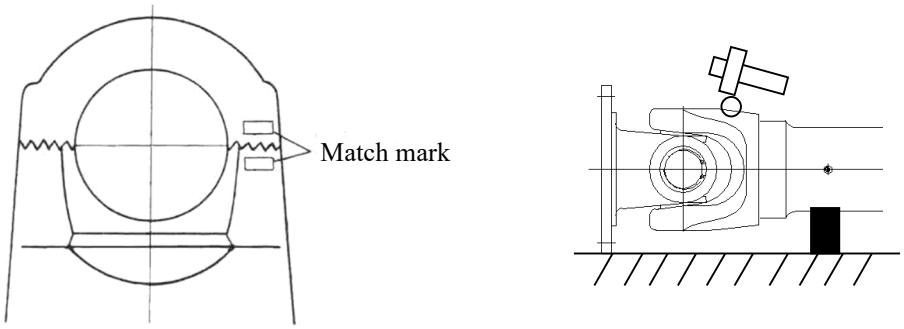


Figure 17

6.3.1 Tightening the cap bolts (190 series, P series)

Cap bolts and washers are expendable parts. Replace them with new ones at every disassembly/ assembly.
After coating the thread part and the bearing surface with lubricant, tighten the cap bolts at the tightening torque specified in the table below.
With 190 series products, provide a locking using a wire (soft steel: code BWG#16) after tightening the bolts. (Figure 18)

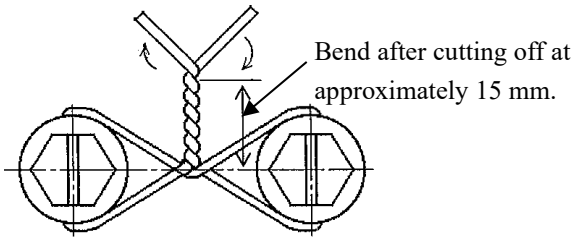


Figure 18

(1) 190 series

Size	Tightening torque N•m (kgf•m)	ND* mm	WAF** mm	Lubricant for coating
19050	137(14)	M14 x 1.5	12	Machine oil
19055	216(22)	M16 x 1.5	14	
19060	324(33)	M18 x 1.5	14	
19065	451(46)	M20 x 1.5	17	
19070	490(50)	M22 x 1.5	17	

Note: Machine oil should be #140 or equivalent.

(2) P series

Size	Tightening torque N•m (kgf•m)	ND* mm	WAF** mm	Lubricant for coating
P180	195(20)	M14 x 1.5	12	Machine oil
P200	305(31)	M16 x 1.5	14	
P225	425(43.5)	M18 x 2	14	
P250	595(61)	M20 x 2	17	
P280	805(82)	M22 x 2	17	
P315	1050(107)	M24 x 2	19	
P355	950(97)	M27 x 2	19	MOLYKOTE (M_OS_2)
P400	1300(132.5)	M30 x 2	22	
P450	1780(181.5)	M33 x 2	24	
P500	2300(235) Or, Tighten at a 45° rotation angle after tightening at 1200 (122.5).	M36×2	27	
P550	2940(300) Or, Tighten at a 60° rotation angle after tightening at 1200 (122.5).	M39×2	27	

Note: Machine oil should be #140 or equivalent.

⚠ Caution

- **Be sure to tighten the cap bolts at specified tightening torque. Otherwise, the bolts may break during rotation due to excessive or deficient tightening torque.**
- **Be sure to use the specified lubricant for coating because tightening torque varies significantly with lubricant.**
- **Cap bolts are important parts. Be sure to use genuine parts.**

6.3.2 Tightening the flange bolts

Flange bolts, washers, nuts and lockings are expendable parts. Replace them with new ones at every disassembly/assembly.

After coating the thread part and the bearing surface with lubricant, tighten the cap bolts at the tightening torque specified in the table below.

⚠ Caution

- **Be sure to tighten the flange bolts at specified tightening torque. Otherwise, the bolts may break during rotation due to excessive or deficient tightening torque.**
- **For 190 series, bend the lock plate to provide a locking after tightening the flange bolts.**
- **Be sure to use the lubricants specified in the table below for coating the thread part and the bearing surface.**
- **Flange bolts are important parts. Be sure to use genuine parts.**

Tightening torque for flange bolts

Size	Tightening torque N•m (kgf•m)	ND* mm	WAF** mm	Strength class	Lubricant for coating	Bolt type
A100	73(7.4)	M10 x 1.5	16	10.9	Machine oil	Hexagon bolt JIS B 1180
A125	127(13)	M12 x 1.75	18			
A160	196(20)	M14 x 2	21			
A180	304(31)	M16 x 2	24			
19050	304(31)	M16 x 2	24	10.9	Machine oil	Hexagon bolt JIS B 1180
19055	412(42)	M18 x 2.5	27			
19060	578(59)	M20 x 2.5	30			
19065	774(79)	M22 x 2.5	34			
19070	774(79)	M22 x 2.5	34			
P180	196(20)	M14 x 2	12	12.9	Machine oil	Hexagon bolt JIS B 1176
P200	196(20)	M14 x 2	12			
P225	196(20)	M14 x 2	12			
P250	304(31)	M16 x 2	14			
P280	412(42)	M18 x 2.5	14			
P315	578(59)	M20 x 2.5	17			
P355	774(79)	M22 x 2.5	17	10.9		
P400	1000(102)	M24 x 3	19			
P450	1460(149)	M27 x 3	19			
P500	1989(203)	M30 x 3.5	22			
P550	2675(273)	M33 x 3.5	24			

Note: Machine oil should be #140 or equivalent.

6.3.3 Assembling the spline dust cap

- For A series, caulk four points on the dust cap (DUC) in the spline section. ... Figure 19
- Press the dust cap firmly by hand so that there is no gap between the edge of sleeve yoke (SLY) and the packing (PCK).
- With the dust cap firmly pressed, use a square bar to caulk four points evenly.
  Caulk diagonal points to prevent the dust cap from tilting.
  Caulk width should be about 15 to 20 mm.
  Caulk the dust cap until it contacts the bottom of the sleeve yoke.

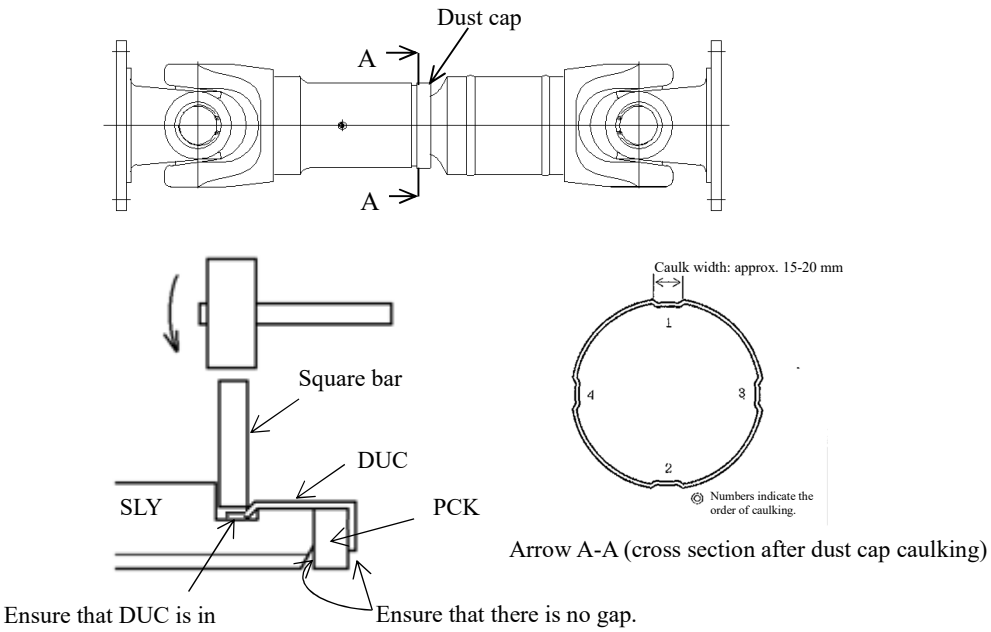


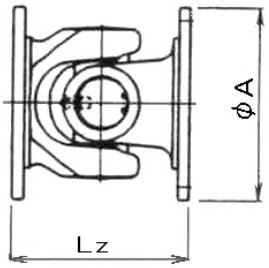
Figure 19

7. Service parts

7.1 A series

Single joint (SJ)

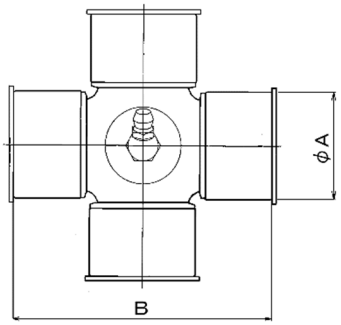
Size	Lz mm	A mm	Mass (kg)	Part number
A100R	120	120	5	7 A100R 02 000 000
A125R	138	150	8	7 A125R 02 000 000
A160R	174	180	16	7 A160R 02 000 000
A180R	196	225	26	7 A180R 02 000 000



Cross kit (CRK)

Size	φA mm	B mm	Mass (kg)	Part number
A100	35	85.4	1.0	7 A100R 08 000 000
A125	42	105	1.7	7 A125R 08 000 000
A160	52	133	3.2	7 A160R 08 000 000
A180	57	150	4.5	7 A180R 08 000 000

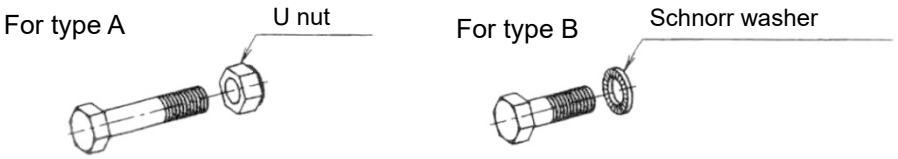
Component parts Cross: 1
Bearings: 4 (with thrust washers)
Snap rings: 4
Grease nipple: 1



Flange bolt kit (BNK)

Size	Applicable CF type	Quantity per kit			Part number	Sales unit
		Bolt	Nut	Torsional stop		
A100	A	1	1	-	6 A100R 02 010 000	16
	B	1	-	1	6 A100R 02 001 000	16
A125	A	1	1	-	6 A125R 02 010 000	16
	B	1	-	1	6 A125R 02 001 000	16
A160	A	1	1	-	6 A160R 02 010 000	16
	B	1	-	1	6 A160R 02 001 000	16
A180	A	1	1	-	6 A180R 02 010 000	16
	B	1	-	1	6 A180R 02 001 000	16

* Please refer to the catalog for differences between type A and type B.

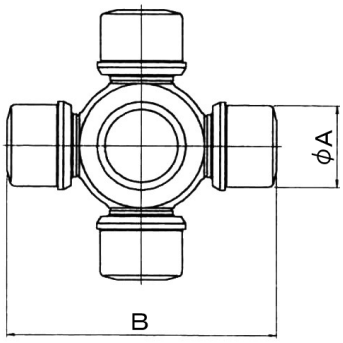


7.2 190 series

Cross kit (CRK)

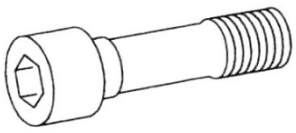
Size	φA mm	B mm	Mass (kg)	Part number
19050	65	220	7.7	7 19050 06 000 000
19055	74	244	11	7 19055 06 000 000
19060	83	280	15	7 19060 06 000 000
19065	95	308	23	7 19065 06 000 000
19070	110	340	30	7 19070 06 000 000

Component parts Cross: 1
Bearings: 4 (with thrust washers)
Grease nipple: 2



Cap bolt (CBO)

Size	CBO nominal diameter	Part number	Sales unit
19050	M14	1 19050 26 100 000	16
19055	M16	1 19055 26 100 000	16
19060	M18	1 19060 26 002 000	16
19065	M20	1 19065 26 002 000	16
19070	M22	1 19070 26 101 000	16

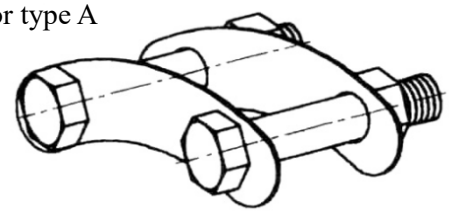


Flange bolt kit (BNK)

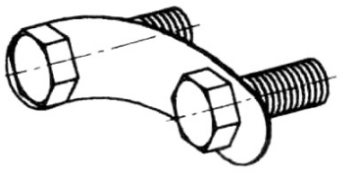
Size	Applicable CF type	Quantity per kit			Part number	Sales unit
		Bolt	Nut	Torsional stop		
19050	A	2	2	2	6 19050 02 010 000	8
	B	2	-	1	6 19050 02 106 000	8
19055	A	2	2	2	6 19055 02 010 000	8
	B	2	-	1	6 19055 02 001 000	8
19060	A	2	2	2	6 19060 02 010 000	8
	B	2	-	1	6 19060 02 100 000	8
19065	A	2	2	2	6 19065 02 010 000	8
	B	2	-	1	6 19065 02 001 000	8
19070	A	2	2	2	6 19070 02 010 000	10
	B	2	-	1	6 19070 02 001 000	10

* Please refer to the catalog for differences between type A and type B.

For type A



For type B

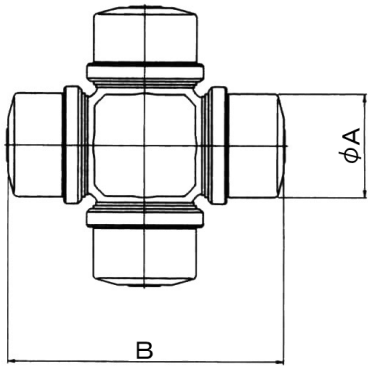


7.3 P series

Cross kit (CRK)

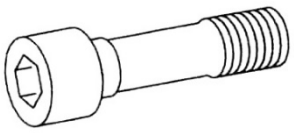
Size	φA mm	B mm	Mass (kg)	Part number
P180	64	176	8	7 P180R 06 000 000
P200	71	196	9	7 P200R 06 000 000
P225	81	223	15	7 P225R 06 000 000
P250	91	246	20	7 P250R 06 000 000
P280	103	276	28	7 P280R 06 000 000
P315	115	308	40	7 P315R 06 000 000
P355	131	350	60	7 P355R 06 000 000
P400	146	394	85	7 P400R 06 000 000
P450	161	444	120	7 P450R 06 000 000
P500	182	492	160	7 P500R 06 000 000
P550	201	541	210	7 P550R 06 000 000

Component parts
Cross: 1
Bearings: 4
Thrust washers: 4
Grease nipple: 1 (P180, P200 only)
- Other sizes are included in each bearing.



Cap bolt (CBO)

Size	CBO nominal diameter	Part number	Sales unit
P180	M14	6 P180R 03 000 000	16
P200	M16	6 P200R 03 000 000	16
P225	M18	6 P225R 03 000 000	16
P250	M20	6 P250R 03 000 000	16
P280	M22	6 P280R 03 000 000	16
P315	M24	6 P315R 03 000 000	16
P355	M27	6 P355R 03 000 000	16
P400	M30	6 P400R 03 000 000	16
P450	M33	6 P450R 03 000 000	16
P500	M36	6 P500R 03 000 000	16
P550	M39	6 P550R 03 000 000	16

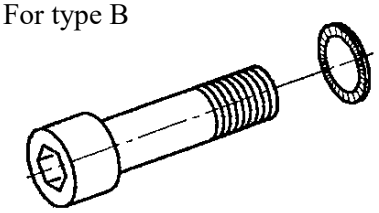


Flange bolt kit (BNK)

Size	Bolt	Torsional stop	Applicable CF type	Sales unit
P180	JIS B 1176 M14× 2 ×35	Schnorr washer Vs 14	B	20
P200	JIS B 1176 M14× 2 ×35	Schnorr washer Vs 14	B	20
P225	JIS B 1176 M14× 2 ×40	Schnorr washer Vs 14	B	36
P250	JIS B 1176 M16× 2 ×45	Schnorr washer Vs 16	B	36
P280	JIS B 1176 M18×2.5×50	Schnorr washer Vs 18	B	36
P315	JIS B 1176 M20×2.5×55	Schnorr washer Vs 20	B	36
P355	JIS B 1176 M22×2.5×60	Schnorr washer Vs 22	B	36
P400	JIS B 1176 M24× 3 ×65	Schnorr washer Vs 24	B	36
P450	JIS B 1176 M27× 3 ×75	Schnorr washer Vs 27	B	36
P500	JIS B 1176 M30×3.5×80	Schnorr washer Vs 30	B	32
P550	JIS B 1176 M33×3.5×95	JIS B 1251 spring washer No. 2, nominal 33, made of steel	B	32

* Please refer to the catalog for details on the CF shape.

For type B



8. Specifications

Please refer to the table below for general specifications and individual delivery specifications for detailed specifications.

Series	Size	Joint rotation outer diameter mm	Transmission torque N•m		Maximum bending angle
			Max.	Fatigue limit	
A series	A100	100	2300	1600	25°
	A125	125	3900	2800	
	A160	160	7800	5600	
	A180	180	12300	8400	
190 series	19050	225	16700	9500	15°
	19055	250	24300	16900	
	19060	285	32900	19900	
	19065	315	49500	34500	
	19070	350	80400	55800	
P series	P180	180	29000	20000	10°
	P200	200	46000	25000	
	P225	225	63000	42000	
	P250	250	83000	57000	
	P280	280	126000	86000	
	P315	315	173000	118000	
	P355	355	258000	175000	
	P400	400	359000	243000	
	P450	450	508000	338000	
	P500	500	672000	454000	
	P550	550	948000	619000	

9. Serial number

Serial number of each universal joint is stamped as a 6-digit or 7-digit code at the position indicated in the figures below.

Please refer to the serial number when contacting us about the product. (Figure 20)

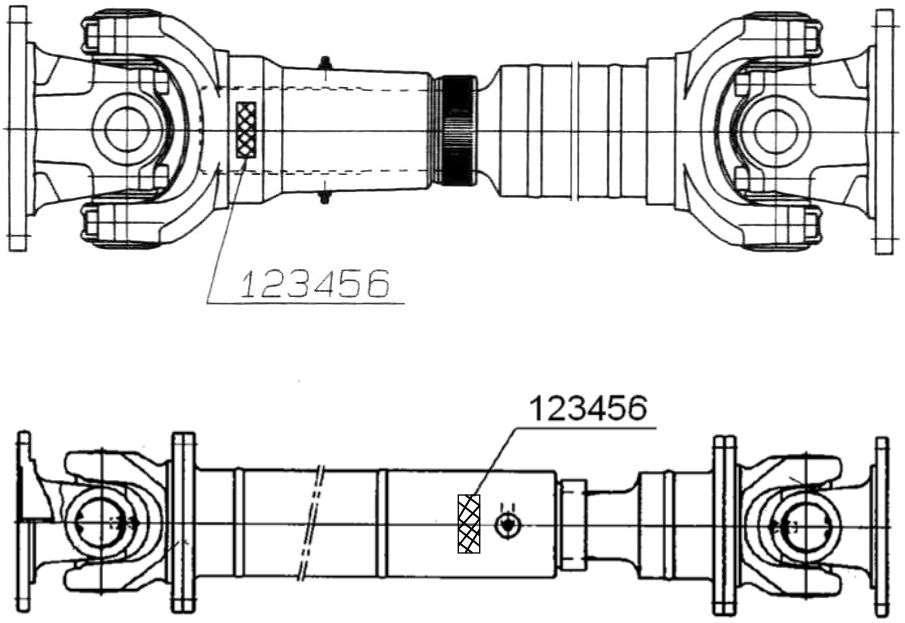


Figure 20

- Contents of this instruction manual pertain to the universal joints made to general specifications. Please refer to individual instruction manuals for the universal joints made to special specifications.
- Contents of this instruction manual are subject to change without prior notice.

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