Control No. : A016-0

OPERATION AND MAINTENANCE MANUAL

COSMIX®

FINE CERAMIC BALL VALVES

Fujikin Incorporated

TABLE OF CONTENTS

1. PROPERTIES OF CERAMICS

Table 1 shows typical properties of ceramics used to manufacture Fujikin valves.

Item	Alumina (99.5%) (Al_2O_3)	Sillicon Nitride (Si_3N_4)	Sillicon Carbide (Sic)
Color	White	Dark Grey	Dark Grey
Specific Gravity	3.8	3.2	3.1
Water Absorbability	0	0.1	0
Bending Strength (MPa)	340	590	490
Rockwell's Hardness (HRA)	89	91	94
Young's Modulus of Elasticity(GPa)	370	290	410
Poisson's Ratio	0.25	0.27	0.16
Linear Expansion Coefficient @40-800°C(×10-⁶)1/°C	7.7	3.7	4.4
Thermal Conductivity @20°C(cal.cm/cm²°C)	0.06	0.03	0.17

Table 1

Vicker's Hardness Comparsion

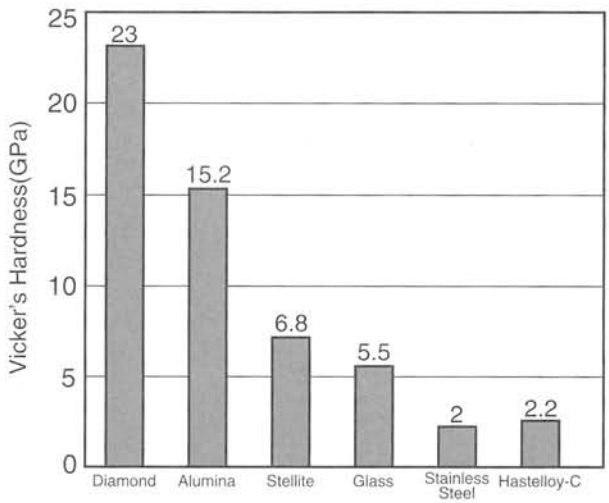


Figure 1

Chemical Resistance Comparsion

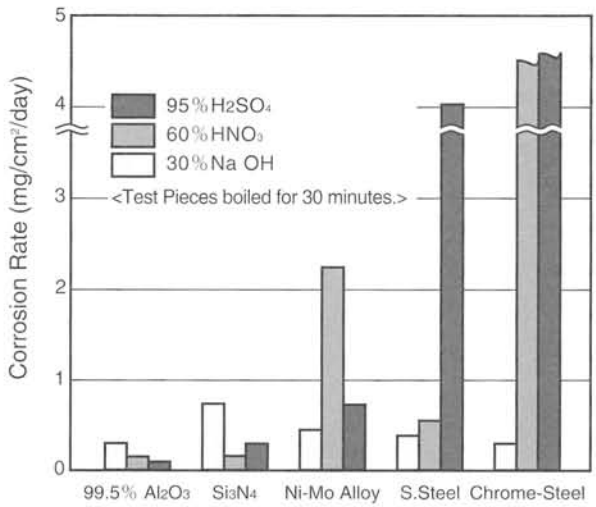


Figure 2

Figure 1 and 2 are comparisons with other materials. Although the corrosion resistance of alumina in alkaline solutions is considered to be weak, its performance is equal to, or superior to the other materials.

In the presence of fluoric acid having a concentration of less than 0.5%, that durability of alumina is apparently sufficient.

Silicon carbide resists most chemicals. Silicon nitride has the greatest heat and impact resistance, followed by silicon carbide and alumina.

2. PERFORMANCE OF BALL VALVES

Maximum Oprating Differential Pressure

Valves Size		Max. Differential Pressure (DP)	
A	B	MPa	psi
15	1/2	0.98	142
20	3/4	0.98	142
25	1	0.98	142
40	1 1/2	0.98	142
50	2	0.784	114
65	2 1/2	0.784	114
80	3	0.686	100
100	4	0.686	100
150	6	0.49	71

Table 2

The maximum operating differrential pressure varies with the size of the valve. Table 2 shows figures for water, but the differential pressure is subject to change depending on the media through the valve.

Maximum Operating Temperature

The Maximum operating temperature for alumina ceramic valves is 200˚C (392˚F)
The ceramics can withstand temperature of 1000˚C (1832˚F) or higher, but the actual operating temperature is limited to the thermal resistance of the O-riugs. Please consult with your local Fujikin representative if temperatures of over 125˚C (257˚F) are required.

Maximum Differential Temperature

The maximum allowable differential temperature between the valve and the media is 50˚C (122˚F) for alumina. Two and three times that much for silicon carbide and silicon nitride respectively. For more details regarding valve performance with fluids of different properties (specific heat, etc.), contact your Fujikin representative.

If the temperature is to be constantly varied and the differential temperature is more than that allowed, a step-by-step gradual increase/ decrease must be strictly adhered to. This avoids possible damage to the valve ceramics.
Please refer to the following graph for the correct raising/ lowering temperatures with time.

Temperature Raising & Lowering Procedure

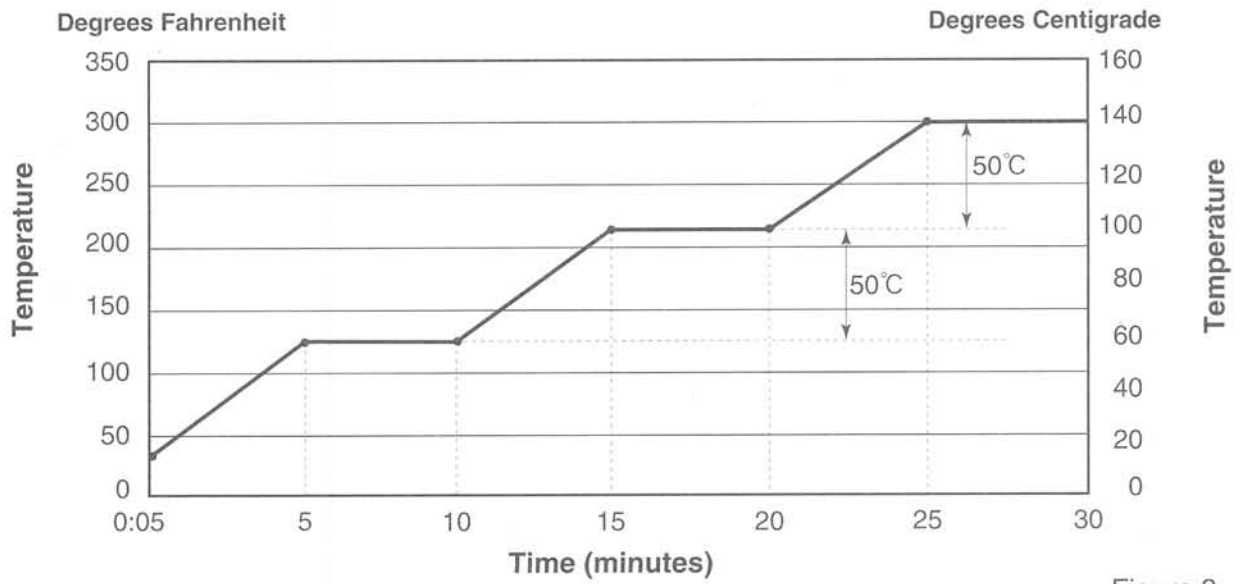


Figure 3

Seat Leakage

(cc/min)

Valves Size		Air	Water
A	B		
15	1/2	10 to 20	1 to 2
20	3/4	10 to 20	1 to 2
25	1	10 to 20	1 to 2
40	1 1/2	20 to 50	2 to 3
50	2	30 to 70	3 to 5
65	2 1/2	40 to 100	4 to 5
80	3	50 to 150	4 to 6
100	4	90 to 250	5 to 10
150	6	150 to 500	6 to 35

Table 3

Notes: Upstream pressure=0.49 MPa (72 psi)

The leakage between the ceramics that from the seal is shown in Table 3.

This value is less than 1/50,000 of the maximum Cv valve for the valve , and is practically negligible.

The hard-seated seal between the ceramics is not vulnerable to wear, as with soft-seated designs.

This leakage therefore, does not increase with the extended operation of the valve.

The values shown in the table, however, could possibly increase with pressures lower than 49.4 KPa (7.2 psi).

Cv Value and Flow Rate Characteristics

Valves Size		ON-OFF	EQ%			
A	B	(Round Port)	(Triangular Port)			
15	1/2	8	4	2.5	1.5	—
20	3/4	14	9	5	2.5	—
25	1	24	17	11	7	3
40	1 1/2	55	35	25	15	10
50	2	90	50	34	25	15
65	2 1/2	130	80	54	35	25
80	3	195	120	80	58	40
100	4	340	200	130	85	57
150	6	750	500	350	250	—

Table 4

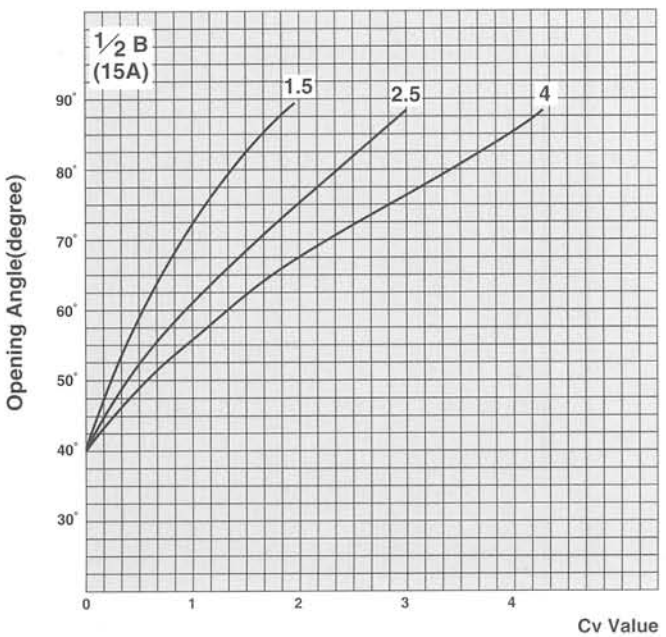
Table 4 shows the Cv values for ON-OFF (Round Port) and EQ% (Triangular Port) valves.

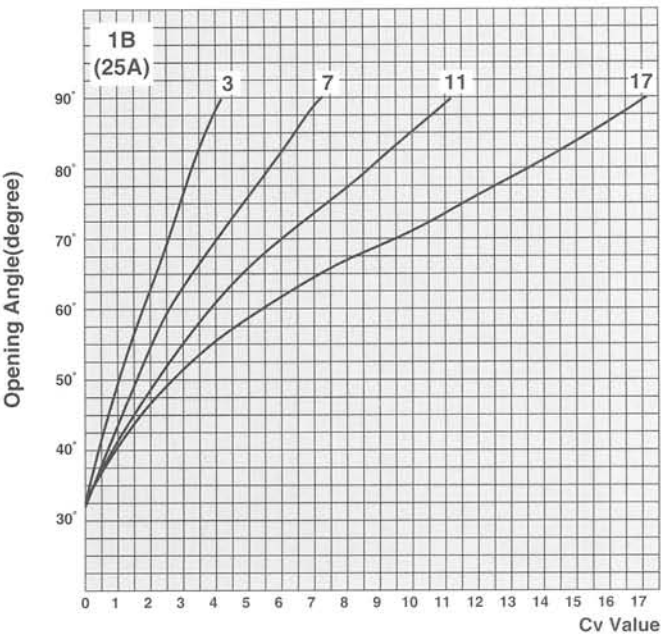
The maximum values cannot be changed.

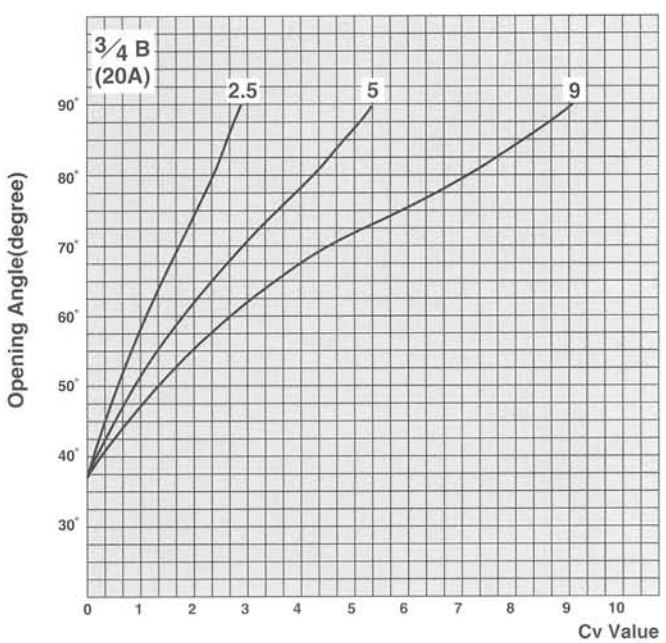
Please consult FUJIKIN representatives for the smaller Cv values.

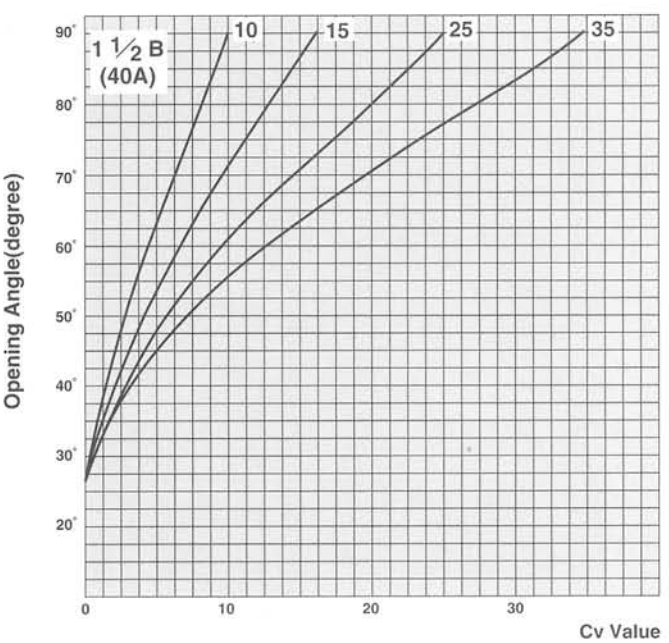
CV FLOW CHARTS FOR TRIANGULAR PORTED BALL VALVES

Triangular port



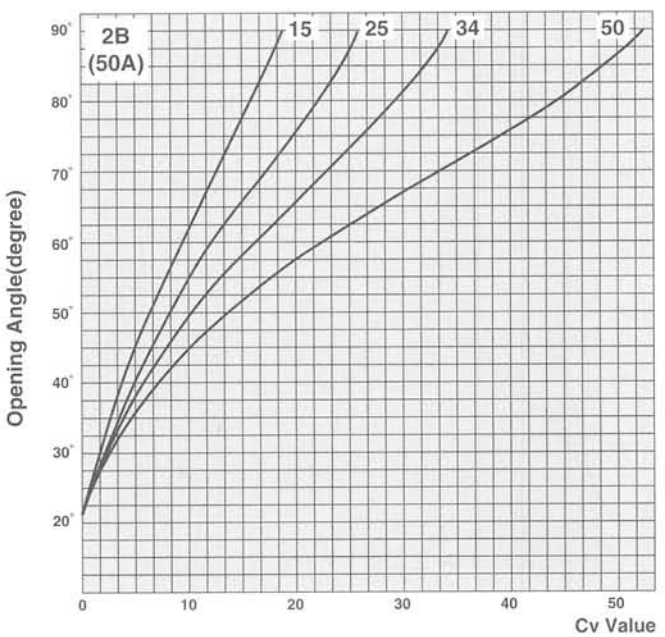


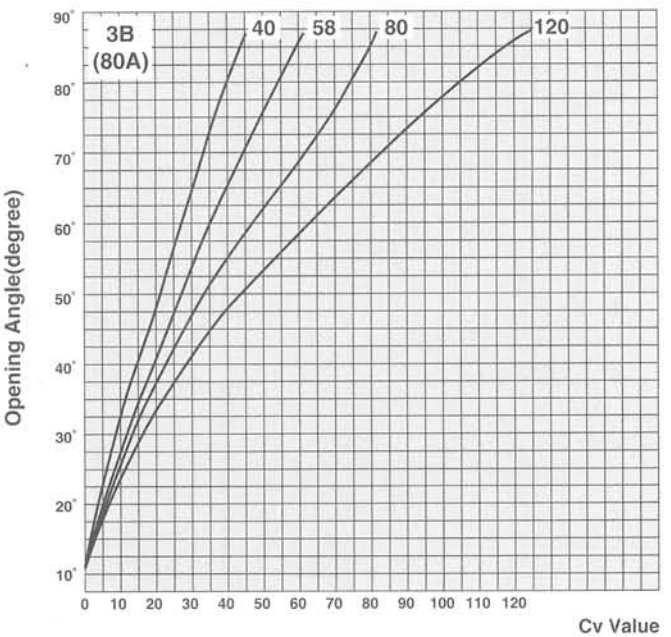


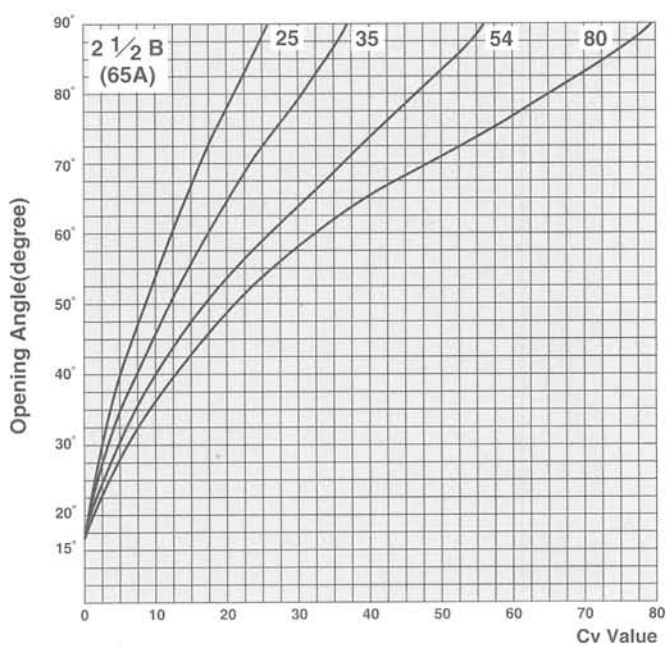


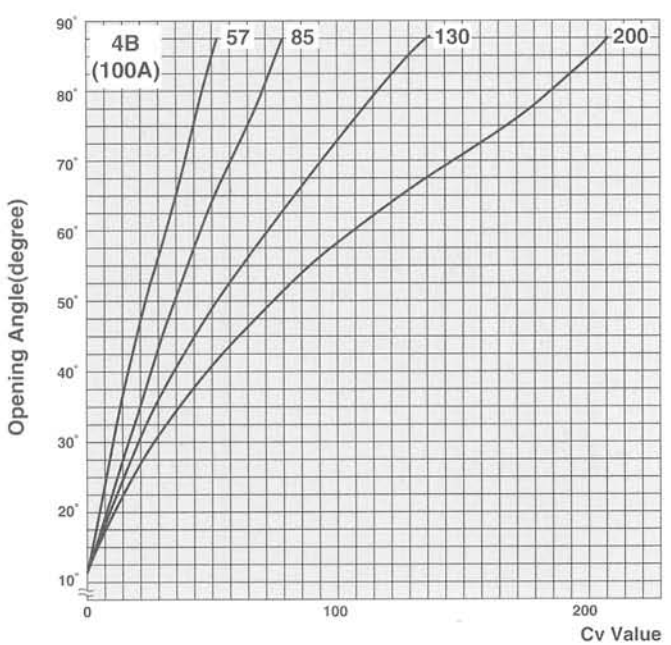
CV FLOW CHARTS FOR TRIANGULAR PORTED BALL VALVES

Triangular port



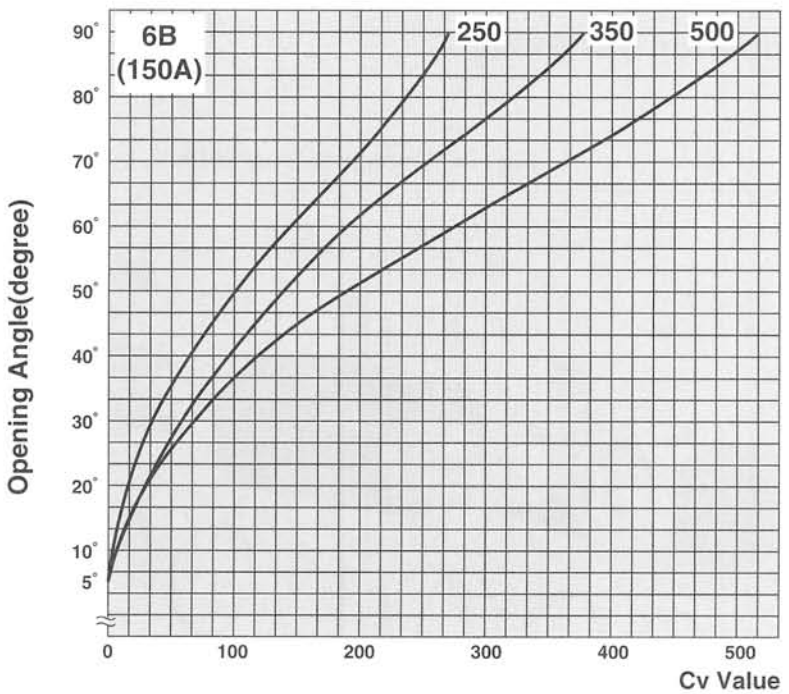






CV FLOW CHARTS FOR TRIANGULAR PORTED BALL VALVES

Triangular port

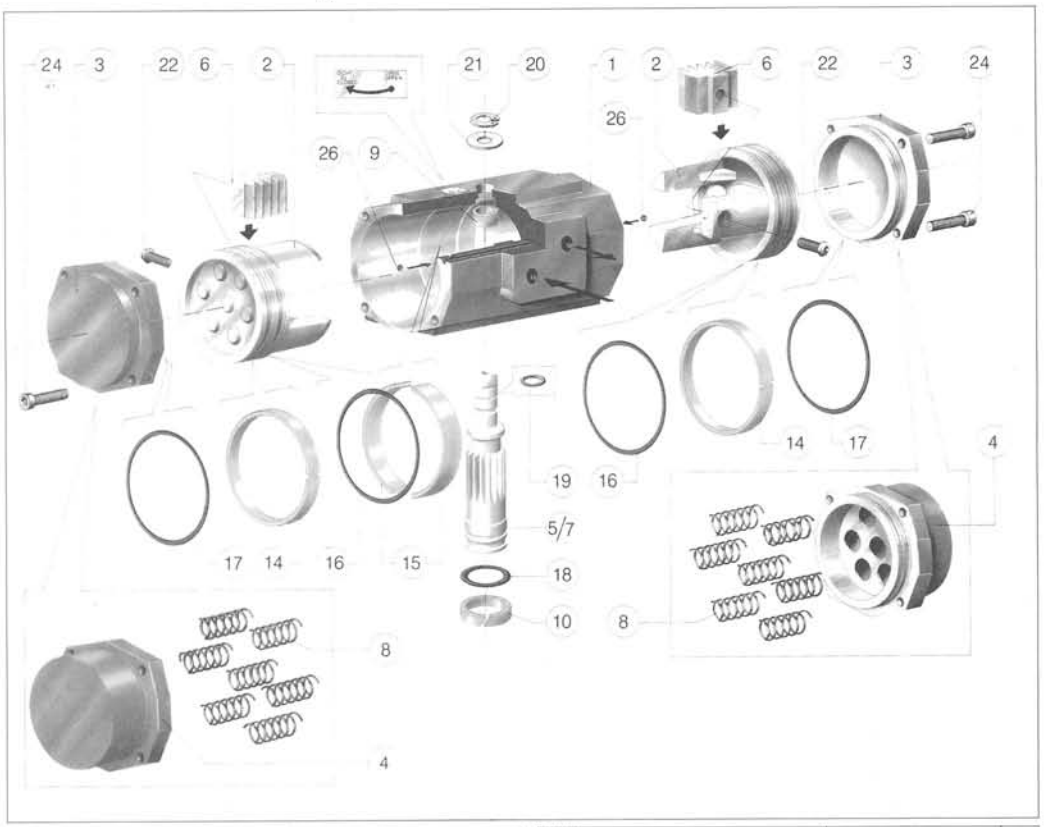


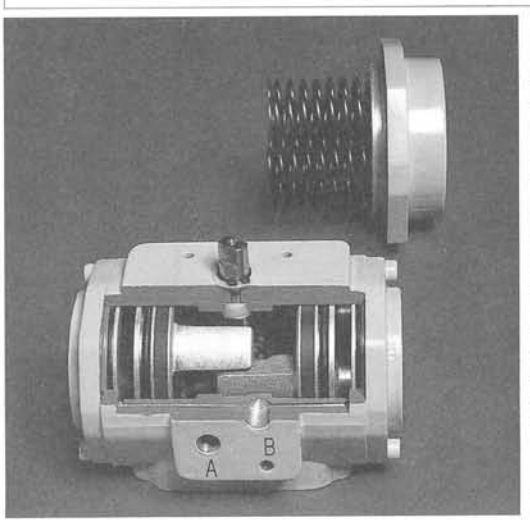
3. ACTUATORS

< Feature >

- **Compact Design**
  Horizontal moving type for modes, Double Acting and Single Acting
- **Superior Durability**

Fig. 14 Construction and Materials





Part No.	Descriqtion	Material	Cty
1	Body	Aluminium Alloy	1
2	Piston	Aluminium Alloy	2
3	End cover (Double Acting)	Aluminium Alloy	2
4	End cover (Single Acting)	Aluminium Alloy	2
5	Central Drive Shaft	Steel	1
6	Gear Rock	Steel	2
7	Drive Shaft Bush	Steel	1
8	Spring	Carbon Spring Steel	14Max.
9	Bearing Bush	Delrin	1
10	Bearing Bush	Nylatron	1
14	Beering Strip	PTFE. (C-PTFE)	2
15	Beering Strip	PTFE. (C-PTFE)	2
16	O-ring for Piston	Nitrile Rubber	2
17	O-ring for Cover	Nitrile Rubber	2
18	O-ring for Shaft	Nitrile Rubber	1
19	O-ring for Shaft	Nitrile Rubber	1
20	Spring Clip	Spring Steel	1
21	Washer	Delrin	1
22	Bolt	Allay Steel	2
24	End cover bolt	Steel	8/20
26	Bolt	Stainless Steel	2

Table 5 Recommendable Model No. of Actuator for the size of the Valves

Valve Size	Double Acting		Single Acting	
	Actuator Model No.	Supply Pressure (KPa)	Actuator Model No.	Supply Pressure (KPa)
1/2"	PD 35	140	PE 35 (10)	400
3/4"		280	PE 60 (10)	
1"			PE 60 (8)	
1 1/2"		400	PE 150 (10)	
2"	PD 60			
2 1/2"			PE 280 (8)	
3"	PD 150	280		
4"		400	PE 500 (8)	
6"	PD 500		PE 1100 (10)	

4. POSITIONERS

Positioner for Revolution Torque Type Actuators only, made by SSS Co., Ltd.

4—1.

P/P POSITIONERS (XP100)

SPECIFICATION

Specifications	Single Acting	Double Acting
Input Signal	3~15 psi, 6~30 psi (Optional) (1/2 split range adjustment is also available)	
Supply Pressure	20~100 psiG (1.4~7kg/cm²G)	
Stroke	Linear Motion: 10~100mm Rotary Motion	
Connections	NPT 1/4 (Gauge NPT 1/8)	
※1 Pressure Gauge (Output)	30 psi/2 kg/cm² 200kpa/30psi 60 psi/4 kg/cm² 400kpa/60psi 150 psi/10 kg/cm² 1,000kpa/150psi	
Grade	Dust & Weather Proof , IP65	
Kinds of Cams	Linear & Equl Percent (Common use). Nonlinear (Optional)	
Ambient Temp.	Standard(S):-4~158 °F Low Temp. Service (L):-58~140 °F Middle Low Temp. High Temp. Service (H):-32~212 °F Service (M):-31~140 °F	
Mass	2.9 pounds(1.3kg) (Approx)	3.1 pounds(1.4kg) (Approx)
Material	Base Alminum Diecastings (Special Anodization)	Cover: PBT resin (Mixed Glass Fiber)

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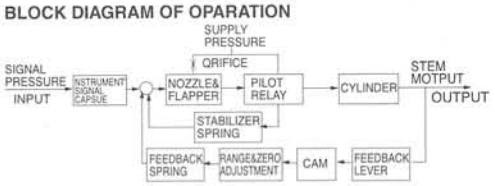
Performance	Single Acting	Double Acting
Linearrty (±%)	1.0	1.5
Hysteresis (%)	1.0	1.0
Repeatability (%)	0.3	0.5
Sensitvirty (%)	0.2	0.5
Sup. Press Effect(%/kgf/cm²)	0.2/0.1	0.3/0.1
Orientation Effect (%)	Max.0.2/10' Max4.0/90' 3 Axis positions	
Vibration Effect	1%/1G	
Air. Consumption (scfm)	0.09~0.11 (at 20 psi)	0.24~0.30 (at 60 psi)
	At high gain, output 50%	
Max. Flow Capacity (scfm)	5.7 & 2.1 (at 20 pis)	5.7 & 2.1 (at 20 pis)
	At output open	

※The above technical data vary in accordance with specification of actuator.

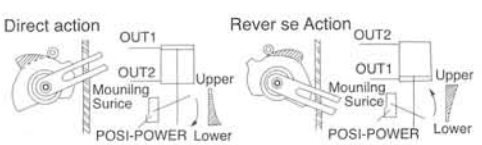
OPERATION

When an input signal is applied to the instrument signal capsule (1P) the spring holder (6P) moves in the direction of arrow A centering around the flexure (3) . This movement separates the fiapper (5) from the nozzle (4) to reduce pressure in the nozzle backpressure chamder (12). As a result, the balance between the above pressure and that in the pressure chamber (11) in lost, and eventually if the relay spool (13) opens port A (15a) and port B (15b) simultaneosly separates from the end of the relay spool (13) . In response to this movement, the output of OUT 1 flows into the lower cylinder chamber (18b) and the upper cylinder chamber (18a) connects to the went to reise the stem (19) . This movement is transmitted to the feedback levers (20) and (21) , cam (22) and adjustments, (24) and (27) . to expand the feedback spring (7) untill the tension of this spring and the output of the instrument signal capsule (1P) balance. Therefore, a change in the stem (19) proportional to input signal is obtained.

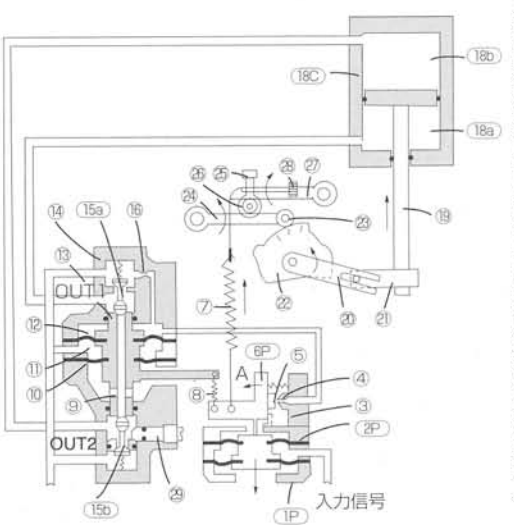
BLOCK DIAGRAM OF OPARATION



Change from direct action to reverse action and vice versa. Direction can be changed by selecting the reer and front of the cam and by reversing the piping connection of OUT 1 and OUT 2.



SINGLE ACTING

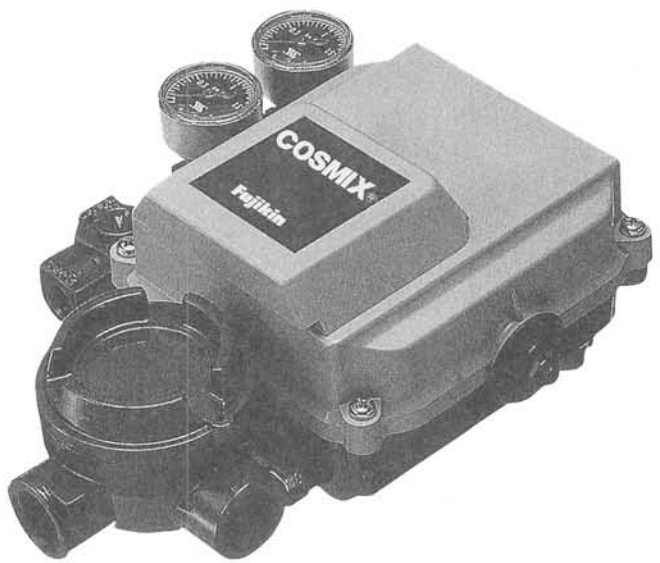


1P Instrument Signal Capsule
2P Diaphragm
3 Flexure
4 Nozzle
5 Flapper
6P Spring Holder
7 Feedback Spring
8 Stabilizer Spring
9 Exhaust
10 Diaphragm
11 Pressure Chamber
12 Nozzle Back Pressure Chamber
13 Relay Spool
14 Pilot Relay Body
15a Port A
15b Port B
16 Orifice
18C Cylinder
18a Upper Cylinder Chember
18b Lower Cylinder Chemder
19 Stem
20 Feedback Lever A
21 Feedback Lever B
22 Cam
23 Bearing
24 Range Adjustment
25 Range Adjuster
26 Roller Shaft
27 Zoro Adjustment
28 Zoro Adjustment Knob
29 Seat Adjuster

※For the single acting type, pilot relay construction differs. Refer to figure XE 100.

4—2.

E/P POSITIONERS (XE100)



SPECIFICATION

Specifications	Single Acting	Double Acting
Input Signal/ Impedance	4~20 mADC/250Ω. 10~50 mADC/100Ω (Optional) (1/2 spilit range adjustment is also available)	
Supply Pressure	20~100 psiG (1.4~7kgf/cm²G)	
Stroke	Linear Motion: 10~100mm Rotary Motion: 60' .90'	
Connections	NPT1/4 (Gauge NPT 1/8)	
Condult	NPT1/2 (JIS Exd Ⅱ BT6X: PF 1/2)	
※1 Pressure Gauge (Output)	30 psi/2 kgf/cm² 200kpa/30psi 60 psi/4 kgf/cm² 400kpa/60psi 150 psi/10 kgf/cm² 1,000kpa/150psi	
Grade	Dust & Weather Proof Explosion Proof (JIS Exd Ⅱ BT6X Flame Proof) ,IP65	
Kinds of Cams	Linear & Equl Percent (Common use) . Nonlinear (Optional)	
Amblent Temp.	Standard(S):-4~158°F Low Temp. Service (L):-58~140°F Middle Low Temp. High Temp. Service (H)- 32~212°F Service (M):-31~140°F	
Mass	4.7 pounds (2.2kg) (Approx)	4.9 pounds (2.3kg)(Approx)
Material	Base Alminum Diecastings Cover: PBT resin (Special Anodization) (Mixed Glass Fider)	

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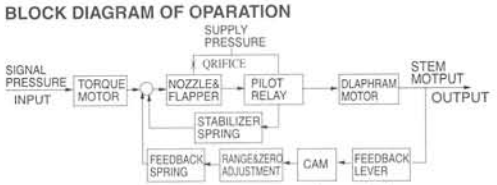
Performance	Single Acting	Double Acting
Lineartty (±%)	1.0	2.0
Hysteresis (%)	1.0	1.0
Repeatability (%)	0.3	0.5
Sensitvirty (%)	0.2	0.5
Sup. Press Effect (%/kgf/cm²)	0.2/0.1	0.3/0.1
Orientation Effect (%)	Max.0.2/10' Max4.0/90' 3 Axis positions	
Vibration Effect	1%/1G	
Air. Consumption (scfm)	0.09~0.11 (at 20 psi)	0.24~0.30 (at 60 psi)
	At high gain, output 50%	
Max. Flow Capacity (scfm)	5.7 & 2.1 (at 20 pis)	5.7 & 2.1 (at 20 pis)
	At output open	

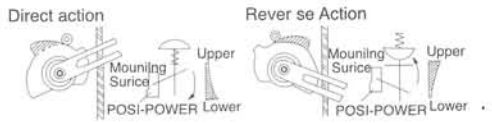
OPERATION

When input current is appoiled to the torque motor (1E) . the armature (2E) moves in the direction of arrow A centering around the flexure (3). This movement separates the fiapper (5) from the nozzle (4) to reduce pressure in the nozzle back pressure chamder (12). As a result, the balance between this pressure and that in the pressure chamber (11) is lost, and eventually the relay spool (13) opens port (15) to introduce the output of OUT 1 to the diaplragm motor, thereby lowering the stem (19) . This movement is transmitted to the feedback levers (21) and (20), cam (22) and adjustments, (24) and (27) to expand the feedback reverse (21) and (20) the cam (22) and adjustments (24) and (27) to expand the feedback spring (7) untill the the tension of this spring and the attraction of the torque motor (1E) balance. Therefore, a change in the stem (19) propotional to input current is obtained.

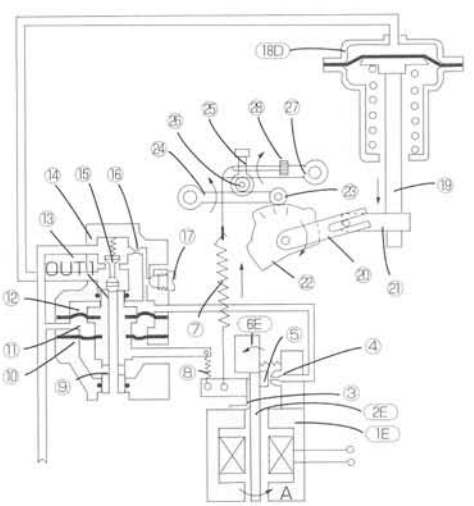
BLOCK DIAGRAM OF OPARATION



Change from direct action to reverse action and vice versa. These chances can be achieved selecting the can rear and front.



SINGLE ACTING



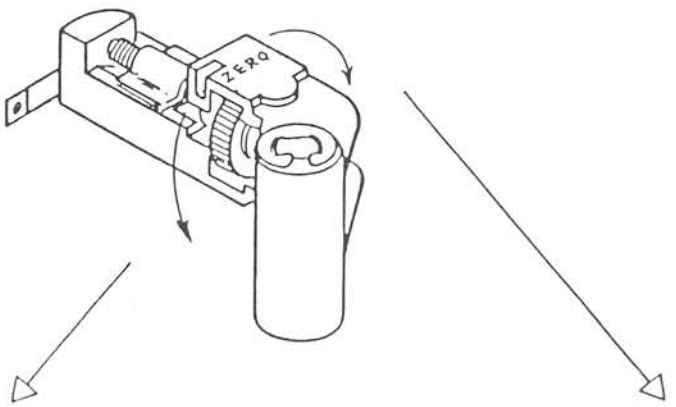
1E Torque Motor
2E Armature
3 Flexure
4 Nozzle
5 Flapper
6E Counter Weight Block
7 Feedback Spring
8 Stabilizer Spring
9 Exhaust
10 Diaphragm
11 Pressure Chamber
12 Nozzle Back Pressure Chamber
13 Relay Spool
14 Pilot Relay Body
15 Port
16 Orifice
17 A/M Selector
18D Diagphragm Motor
19 Stem
20 Feedback Lever A
21 Feedback Lever B
22 Cam
23 Bearing
24 Range Adjustment
25 Range Adjuster
26 Roller Shaft
27 Zoro Adjustment
28 Zoro Adjustment Knob

※For the single acting type, pilot relay construction differs. Refer to figure XE 100.

4—3. Adjustment

〔1〕 Zero Point Adjustment

(1) Sel an input signal to the stroke starting signal (For XE 4mA, and for XP; 3psi) then turn the zero adjustment knob (28) clockwise or counterclockwise.(When Stopper or Valve Seat is staying at the point of 100% or 0% position of the actuator, it is easy to adjust at the 10% or 50% position.)

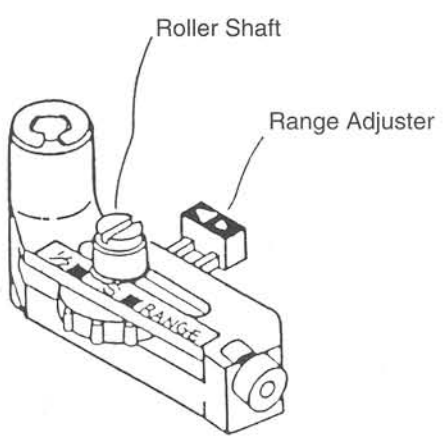


(2—a) Turn counterclockwise, if a starting input signal to move the actuator stem is lower than 0%

(2—b) Turn clockwise, if a starting input signal to move the actuator stem is higher than 0%.

〔2〕 Range Adjustment.

(1) Adjust Range Adjustment so that an actuator stops at 0% position of the stroke by the 0% applied input signal and 100% position for 100% input signal respectively.(When Stppper or Valve Seat keeps staying at the 100% or 0% position of the acutuator, the adjustment is made at the 10%-90% position or, otherwise, 25%-75% position.)



(2) When Input Signal is 0%, Zero Adjustment has to be done by same procedures discribed in the last paragraph.

(3) Check the actuator stroke to be positioned at 100% position with the 100% applied Input Signal. Checking for the input signal and stroke has to be done carefully because over-

ranged adjustment makes the actuator stroke over travelled, before the input signal is reached to 100% level.

(4) Range Adjuster has a mark ◀▶ indicates to increase a range, and ▶ indicates to decrease a range.

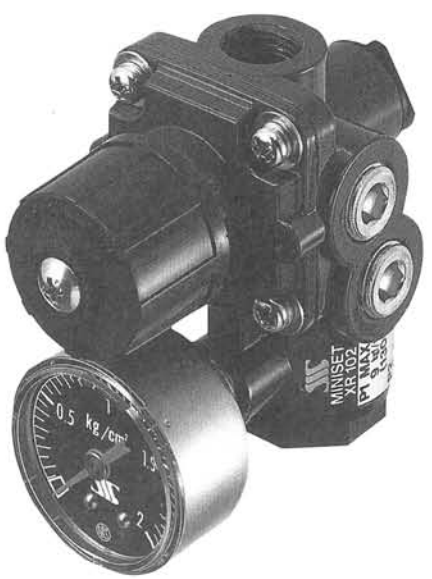
(5) Range Adjuster can be free to move by loosen Roller Shaft slightly by the screw driver. Keeping the screw driver to hold Rollor Shaft loosened, move and adjust Range Adjuster and lock it again. Do not loosen too much! because Roller Shaft will be slantd and its adjustment will become unreliable due to the zero-shifted stroke.

(6) Range adjustment and Zero adjustment had to be done alternartely.

(7) If Range adjustment can not be achieved by full range movement of Adjuster, check a position of the transmission pin on the feedback lever.

5. REDUCING VALVES WITH FILTER

Compact Reducing Valves with Filter, made by SSS Co. Ltd.



Feature

- Super-compact Design
- LIght Weight: 1/3~1/5 on standard weight of conventional Valves so no need of mounting by bracket.
- Easier Connecting Works
- Wide Range Application
- Large Exhaust Capacity with Small Variation inSupplying Pressure.
- High Efficiency Filter used element of non-weave cloth mad of Polypropylene Fiber.
- Panel Mounting also is available.

SPECIFICATION

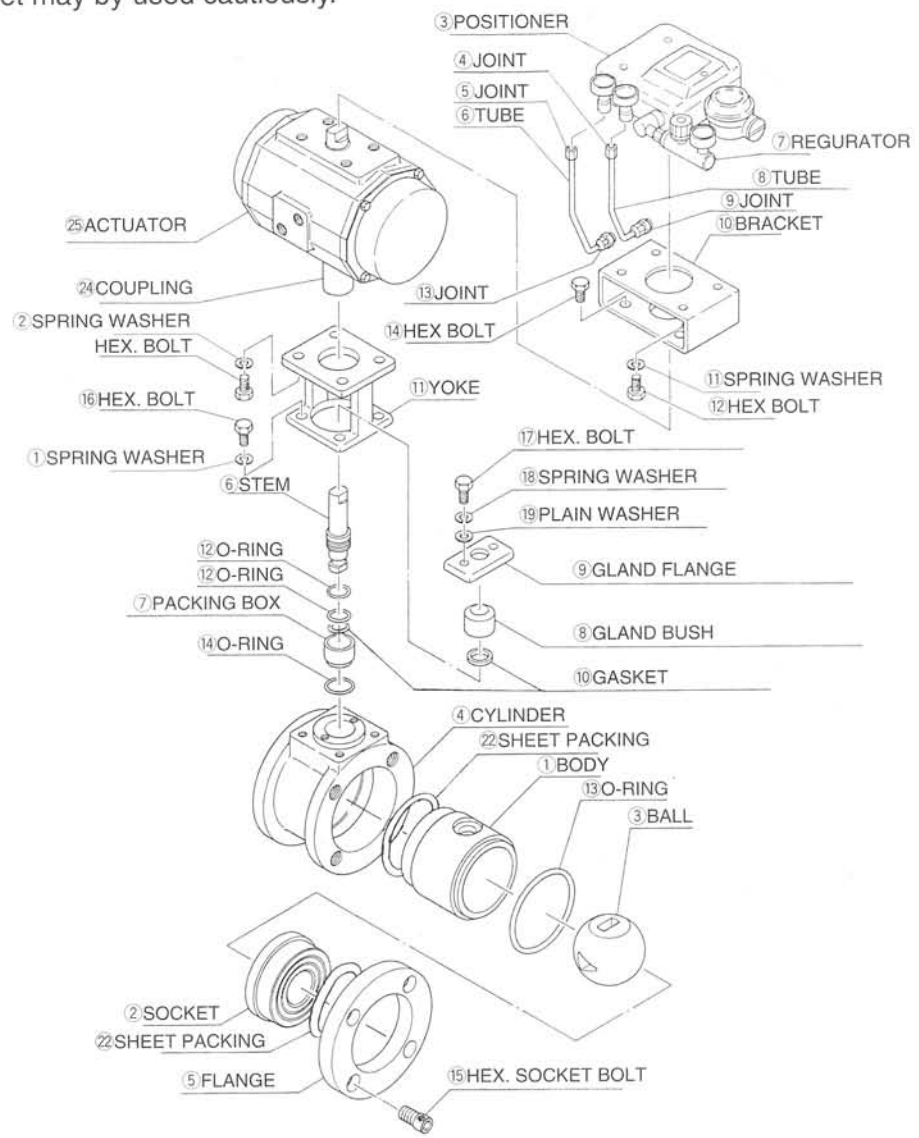
Spec. Item \ Type		Standard
Ambient Temp. Range		-4~158°F(-20~70°C)
Press.Range		0~30psi, 0~60psi, 0~120psi (0.2MPa, 0.4MPa, 1.0MPa)
Output Press Gauge		30psi, 60psi, 150psi (2kgf/cm², 4kgf/cm², 10kgf/cm²)
Air Conn. Body (Press Gauge)		NPT1/4, RC1/4 (NPT1/8), (RC1/8)
Filter Element	Kind	Polypropylene cloth-free fillter 5μElement D__20mm, H__30mm
	Air Resistance	1000 Nℓat 1.5 KPa 300 Nℓat 4.5 KPa 500 Nℓat 9 KPa
Air Consumption (Max)//Set Press		0.5Nl/min//0.14MPa 0.6Nl/min//0.24MPa 0.7Nl/min//0.4MPa
Max. Air Supply Press.		130 psi (0.9MPa)
Mass		0.53 pounds (Approx.) 0.26kg (Approx.)

6. ASSEMBLY AND DISASSEMBLY PROCEDURE

Ceramics are strong in compression, but weak against stress, tension and shock. Therefore, when handing any ceramic valve parts, they should not be treated roughly.

Start with a clean work bench. Alumina ceramics have a white color, and stains are very difficult to remove. To Protect the ceramic parts from chipping and to avoid scarring the painted surfaces, please cover the working area with a clean, soft cloth. Any weak alkaline detergents may be used to clean parts that have become dirty.

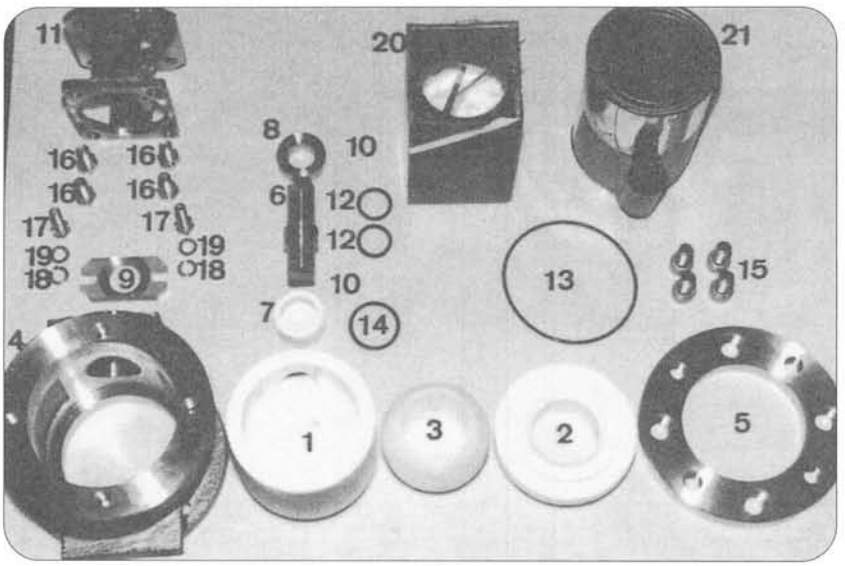
Never use metal hammers for the repair of valves. A wooden, rubber, or plastic mallet may by used cautiously.



(NOTE)

The materials of BUSH⑧ & PACKING BOX⑦ were changed to teflon CF on Feb. 2, 1990. It is unnecessary to place these GASKETS⑩ when BUSH⑧ & PACKING BOX⑦ made of teflon CF are used.

Preparing a set of parts

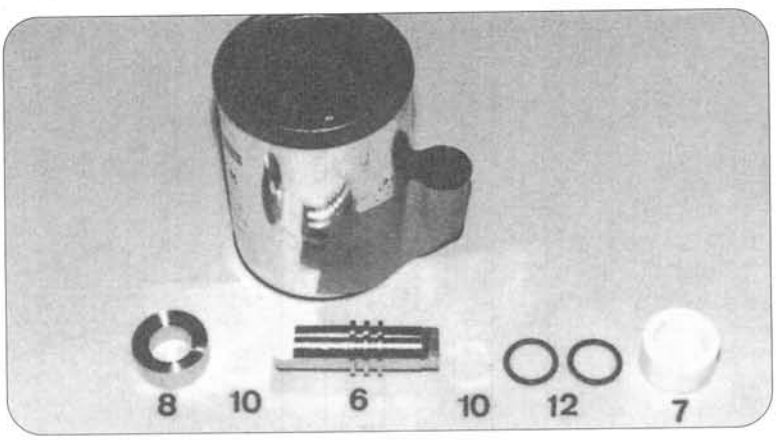


① BODY
② SOCKET
③ BALL
④ CYLINDER
⑤ FLANGE
⑥ STEM
⑦ PACKING BOX (=STUFFING BOX)
⑧ GLAND BUSH
⑨ GLAND FLANGE
⑩ GASKET
⑪ YOKE
⑫ O-RING
⑬ O-RING
⑭ O-RING
⑮ HEX. SOCKET BOLT
⑯ HEX. BOLT
⑰ HEX. BOLT
⑱ SPRING WASHER
⑲ PLAIN WASHER
⑳ DIFLON GREASE
㉑ SILICON GREASE
㉒ SHEET PACKING

(NOTE)
The materials of GLAND BUSH⑧ & PACKING BOX⑦ were changed to teflon CF on Feb.2, 1990. It is unnecessary to replace these GASCKETS⑩ when GLAND BUSH⑧ & PACKING BOX⑦ made of teflon CF are used.

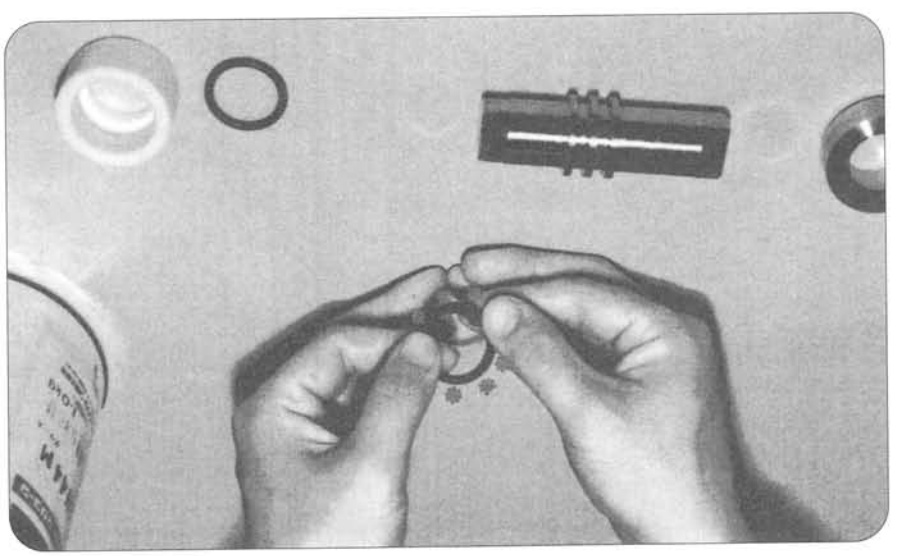
ASSEMBLY PROCEDURE

(1) Preparing a set of STEM parts



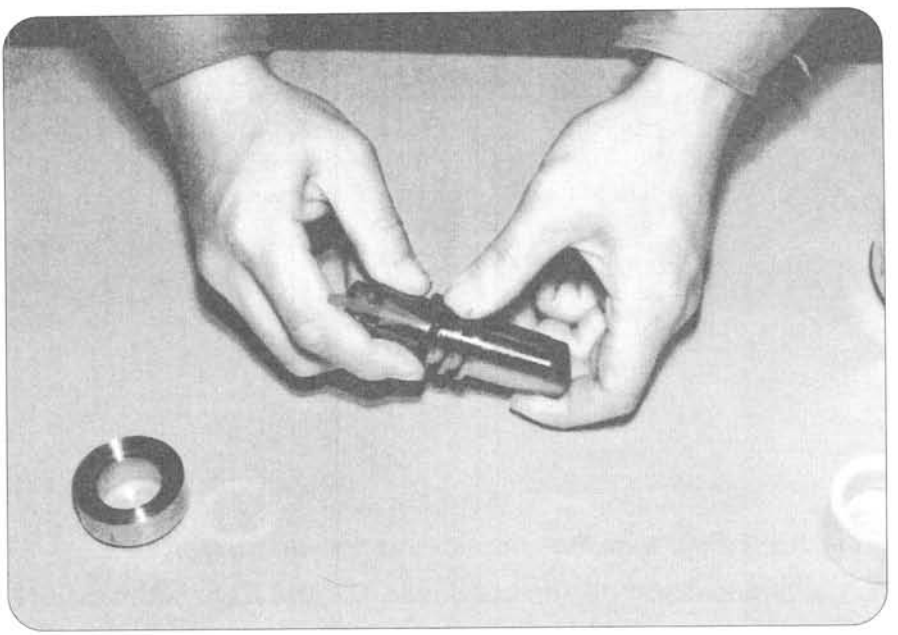
⑧ GLAND BUSH
⑩ GASKET
⑥ STEM
⑩ GASKET
⑫ O-RING
⑦ PACKING BOX

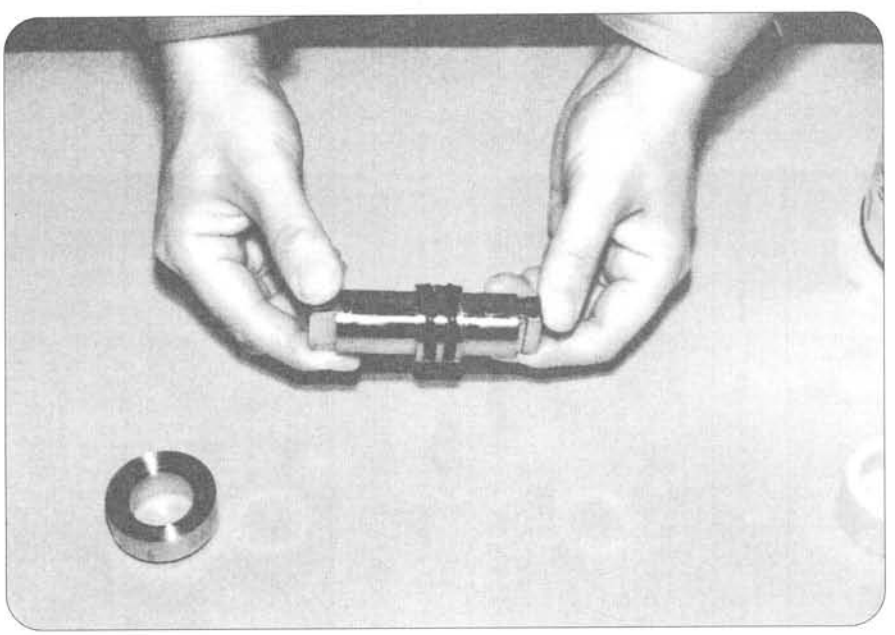
(2) Greasing O-RING⑫



Use silicon grease.
Grease both O-RINGs⑫.

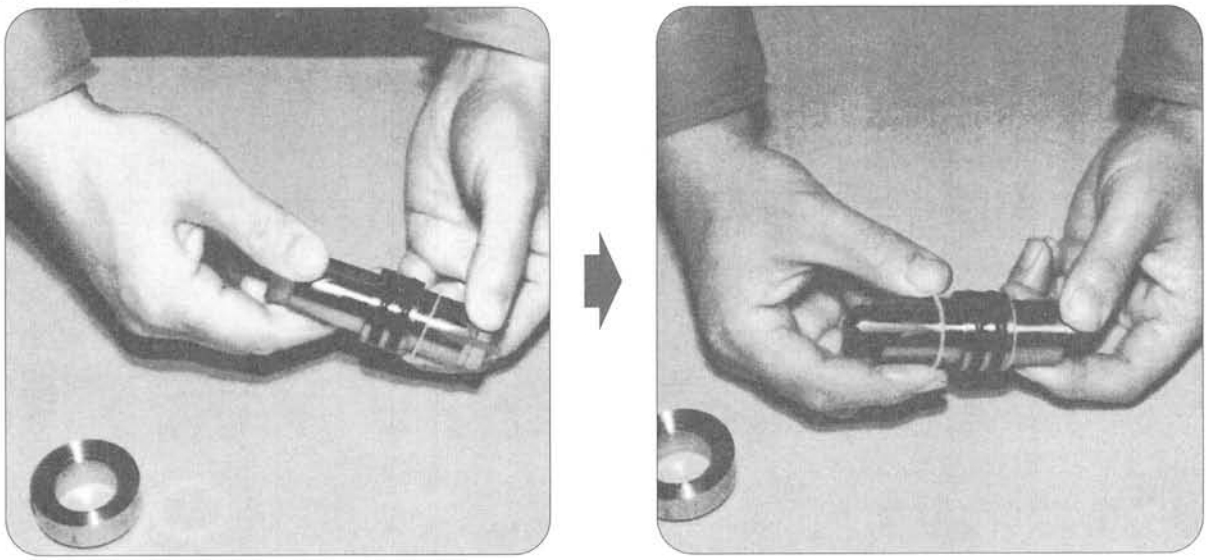
(3) Installing O-RINGs⑫





Install O-RINGs⑫ in grooves.
Be carefull not to damage them.
(Clean STEM⑥ before installing)

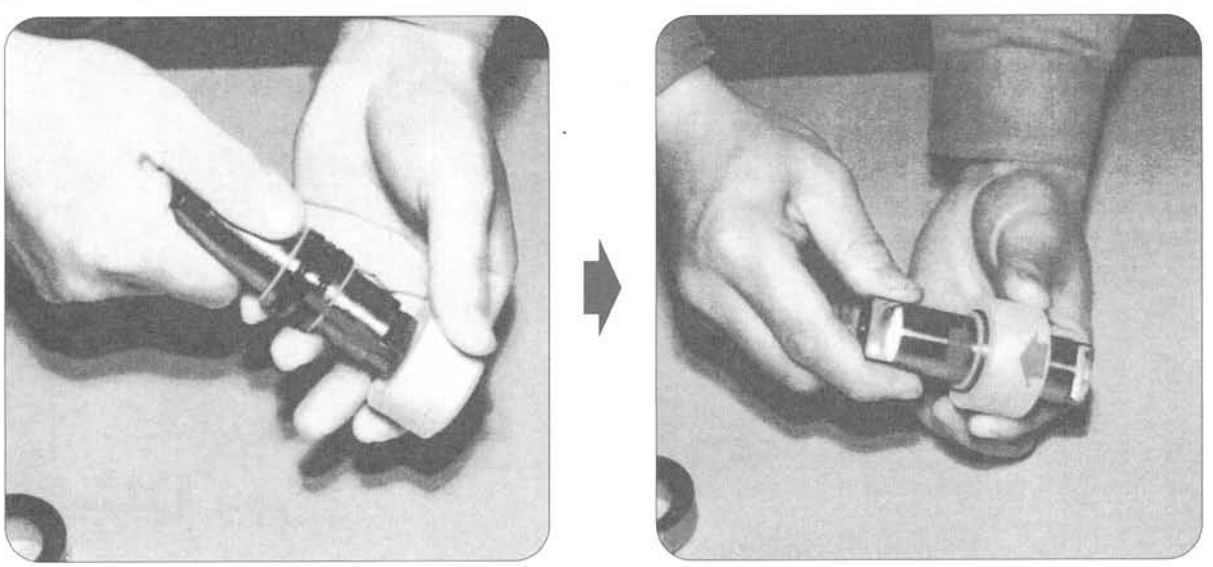
(4) Placing GASKET's⑩



Insert both GASKET's⑩ from the both sides as shown in the picture.

(NOTE) It is unnecessary to replace these GASKET's⑩ when GLAND BUSH⑧ & PACKING BOX⑦ made of teflon CF are used.

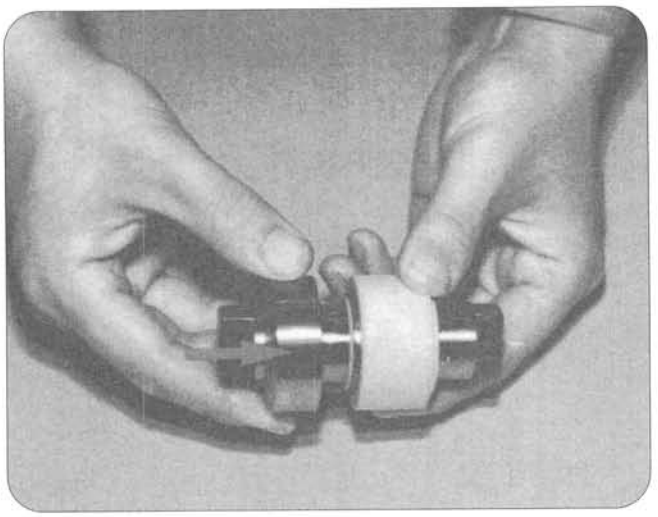
(5) Installing STEM⑥ into PACKING BOX⑦



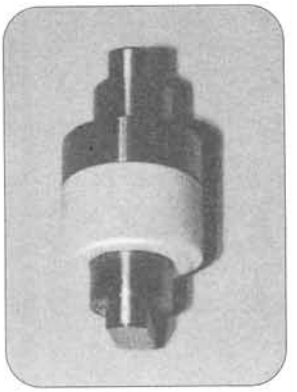
Install the STEM⑥ into the PACKING BOX⑦ until it covers the gaskets and cannnot go any further.

(Clean PACKING BOX⑦ beforehand.)

(6) Install BUSH⑧

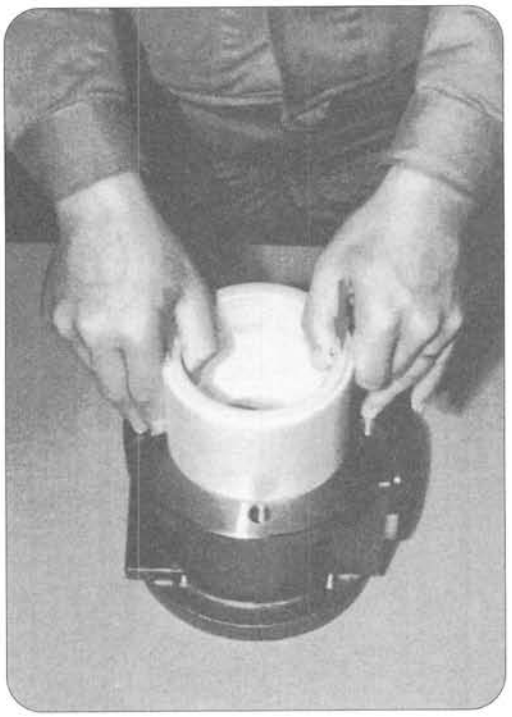


Installing the GLAND BUSH⑧ onto the opposide side of STEM⑥

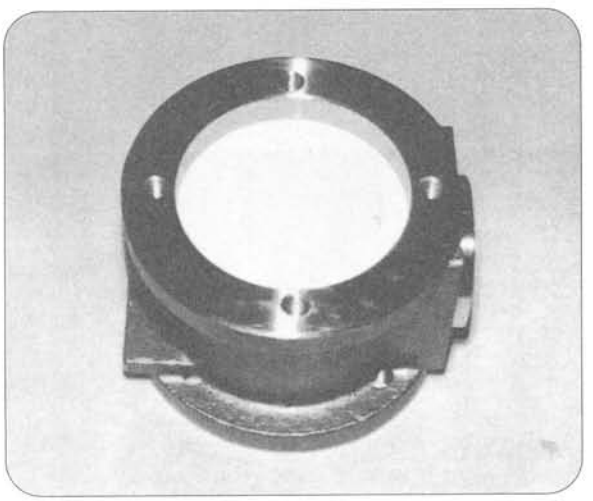


STEM is complete.

(7) Installing BODY① into CYLINDER④

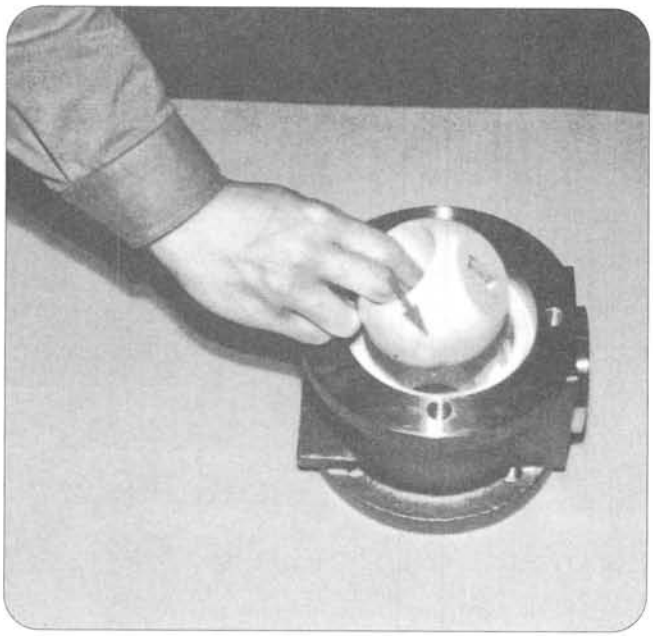


After set SHEET PACKING㉒,
Install BODY① slowly and carefully.
Clean BODY① beforehand.



Align stem holes of both BODY① and CYLINDER④.

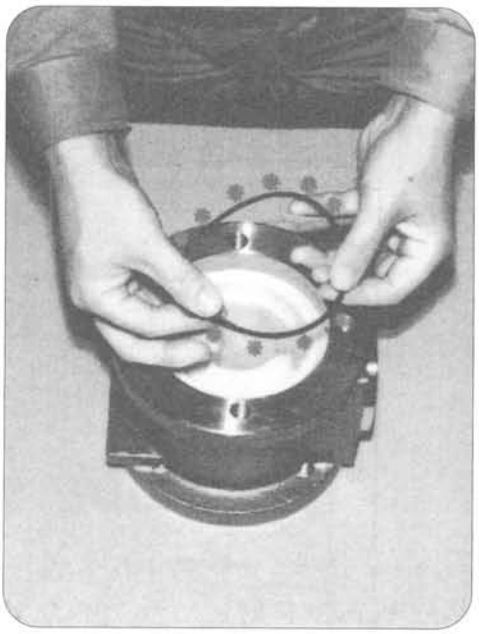
(8) Installing BALL③



Install BALL③ slowly and carefully.

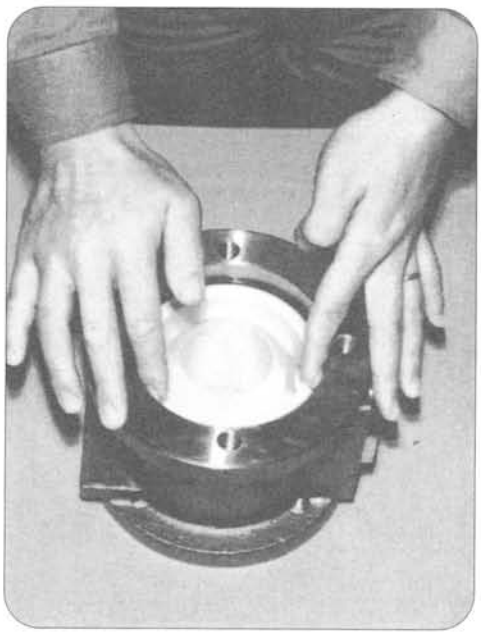
Make sure that the stem-slot is in-line with the stem makes on the body and cylinder.

(9) Installing O-RING ⑬



Use sillicon grease.

Grease O-RING ⑬.



Install O-RING ⑬ in groove.

(10)

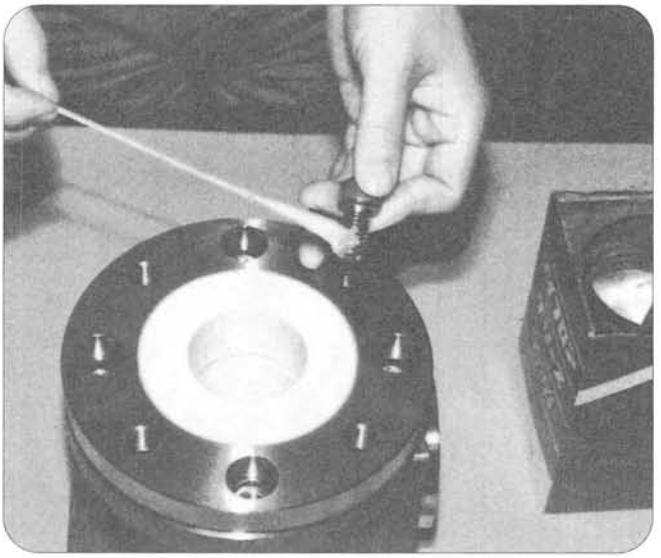
Install SOCKET② slowly and carefully.
(Clean SOCKET② beforehand.)

Turn SOCKET② to check if it is installed properly. Rotation should be smooth.

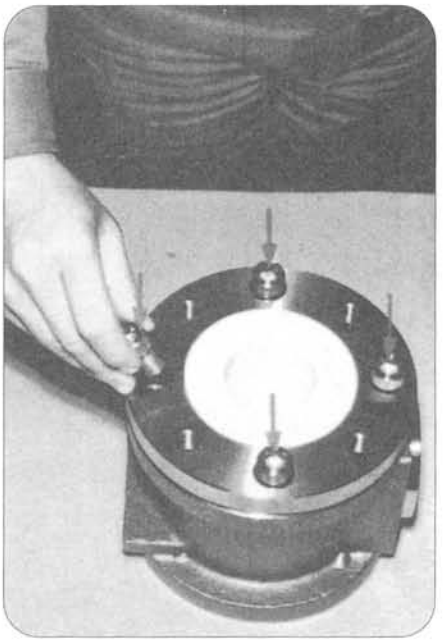
(11) Placing FLANGE ⑤

After set SHEET PACKING ㉒,
Place FLANGE ⑤.
Be careful not to chip the socket by dropping the flange onto it.

(12) Screwing HEX. SOCKET BOLTs ⑮

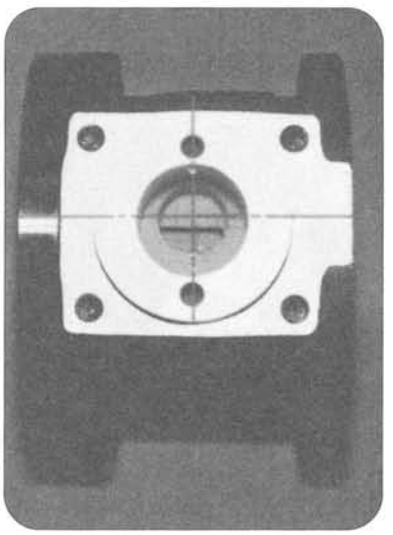


Use diflon grease.
Grease thread of each SOCKET BOLT ⑮.



Screw each SOCKET BOLT ⑮ evenly.
Hand-tighten at this stage.

(13) Alignment of stem-holes **(Most important point!!)**



Align the centers of the stem-holes
as shown in the picture.

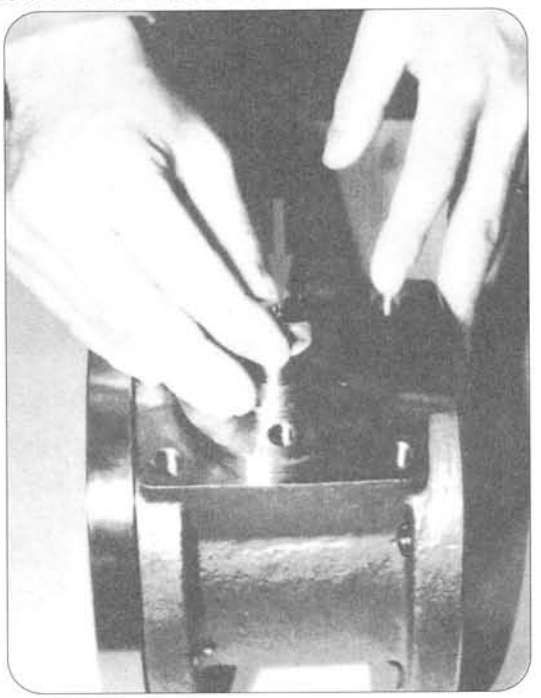
(14) Placing O-RING ⑭

Inserting the O-RING ⑭

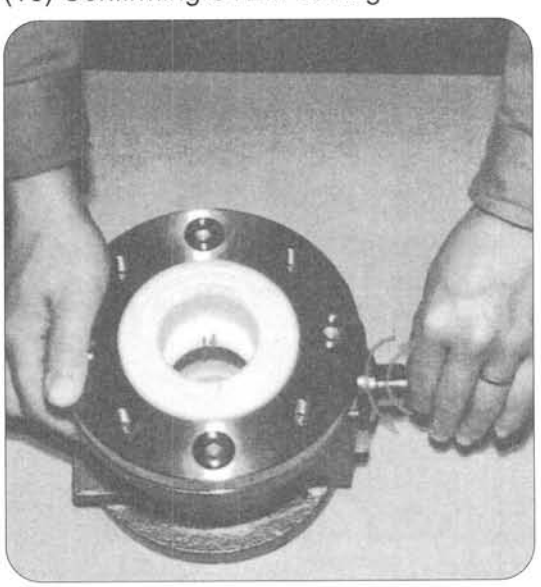
Ludricate the O-ring with silicon grease, and insert the O-RING ⑭ in to the groove of the packing box.

(15) Installing STEM.

Side the stem in slowly and carefully, paying attension not to move the O-RING from its position in the PACKING BOX ⑦

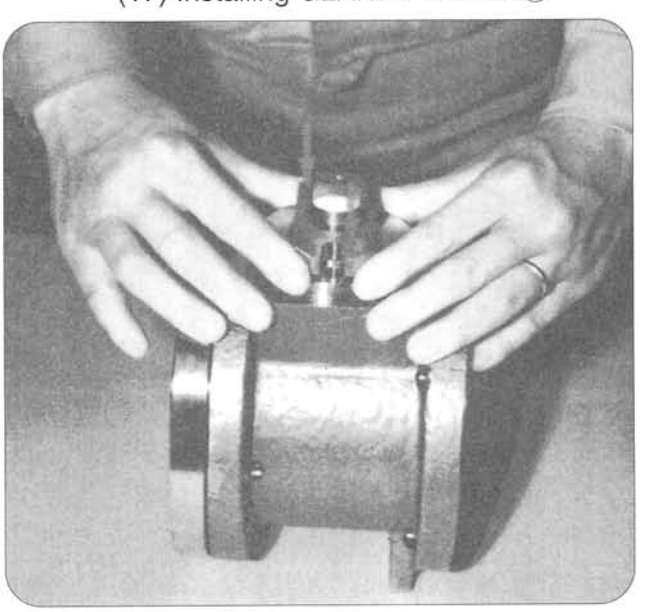


(16) Confirming STEM setting

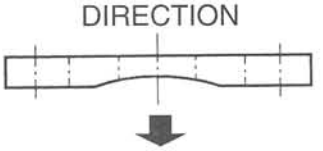


Turn STEM and check if STEM is installed properly and BALL turns freely.

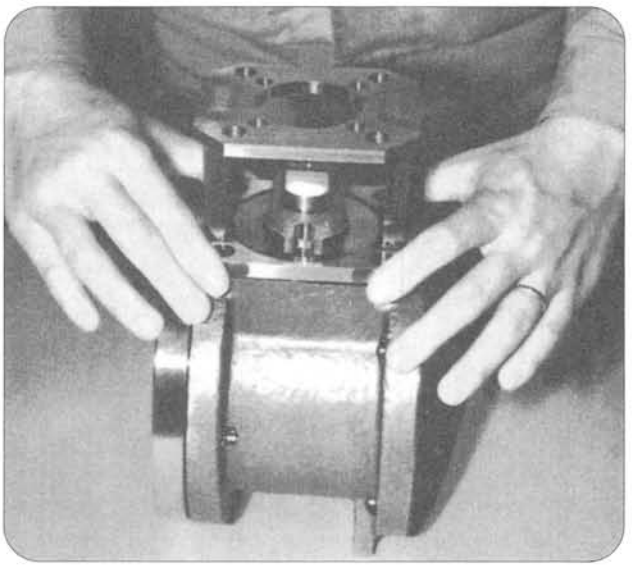
(17) Installing GLAND FLANGE⑨



DIRECTION



(18) Setting YOKE ⑪

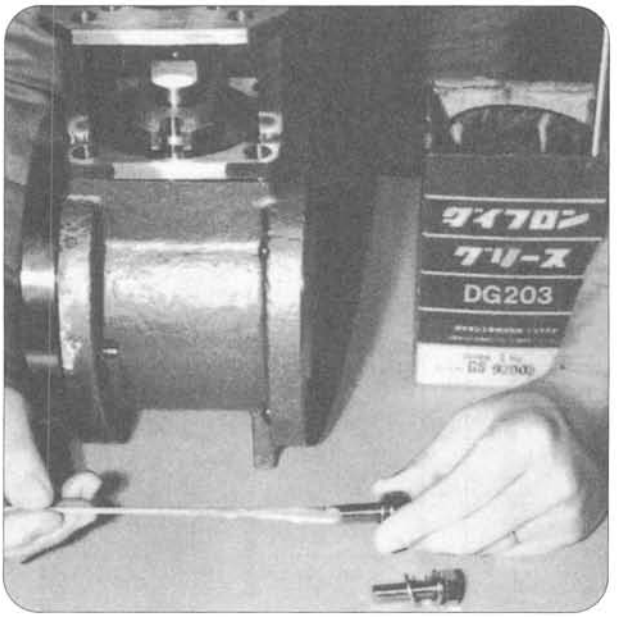


(19) Screwing HEX. BOLTs ⑰⑱⑲(for GLAND FLANGE)

Prepare each BOLT ⑰ with SPRING WASHER ⑱ & PLAIN WASHER ⑲.

Use diflon grease.

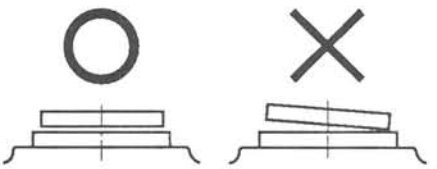
Grease each BOLT ⑰.



Tighten each BOLT ⑰ evenly.

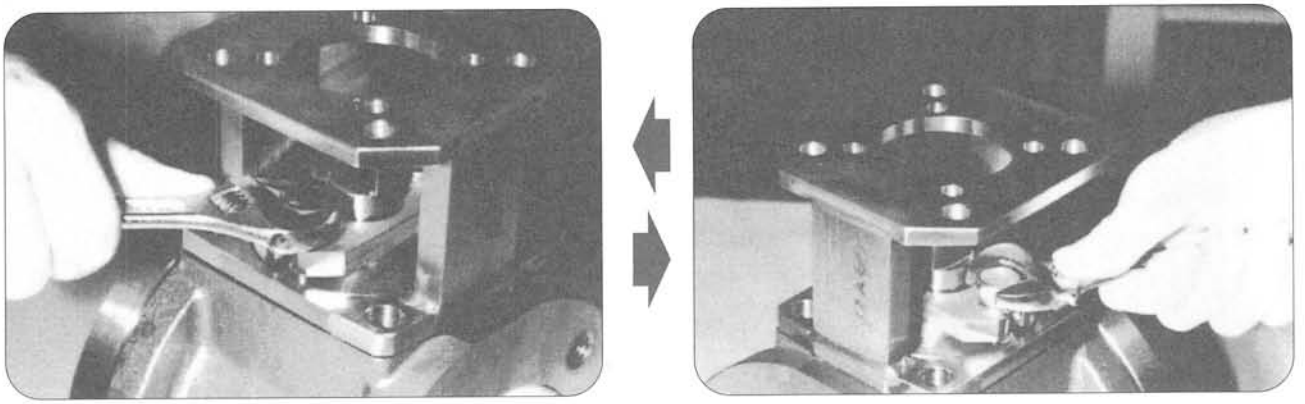
Right bolt, left bolt, right bolt, left bolt ..... little by little

stop by step

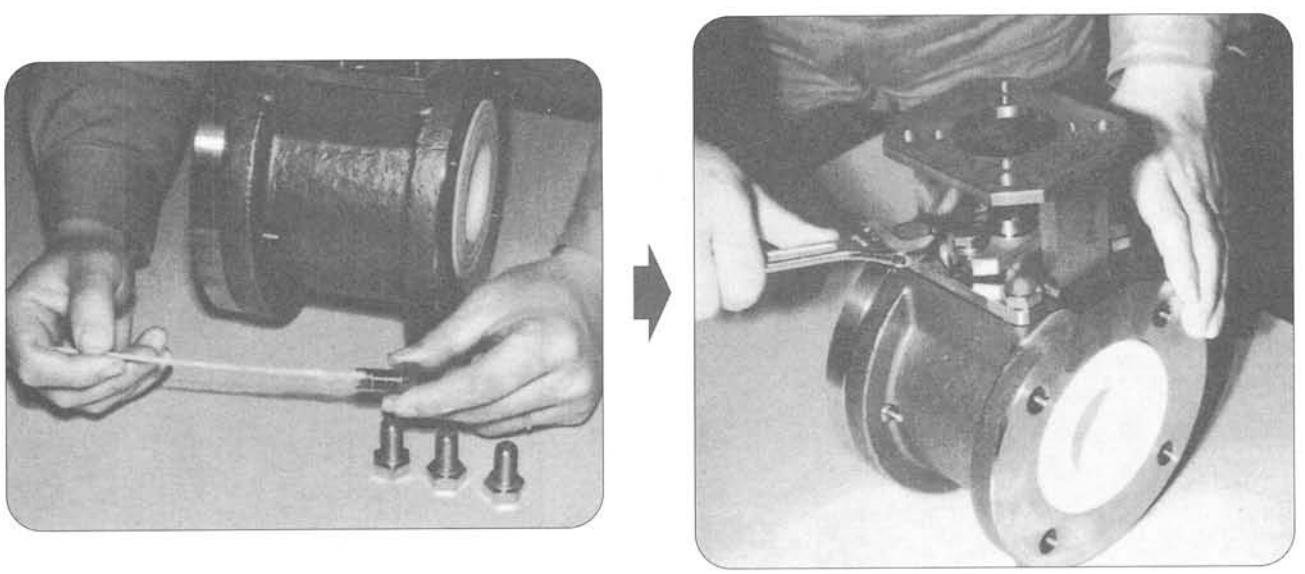


Do not overtighten them.

Stop tightening when the lock washer has been compressed flat.



(20) Tighten HEX. BOLT's ⑯ (for YOKE)



Use difilon grease.

Grease each BOLT ⑯.

Tighten them.

(21) Final tightening of HEX. SOCKET BOLTs ⑮

Tighten each SOCKET BOLT ⑮ evenly and firmly.
Do not use a hammer, or other hard objects that may damage the ceramics.

COMPLETE!!

When installing the actuator, move the torque fitting up and down to assure that it is aligned concentrically with the hole on the mounting pad.

DISASSEMBLY PROCEDURE

Disasembling the valve is the opposite procedure of assembling.

MEMO

7. VALVE STORAGE

(1) Fujikin valve should be stored indoors away from any sourecs of vibration and/or mechanical shock.
(2) When in storage, keep the valves in their original packaging.
(3) Do not stack more than two valves on top of each other. Always store the boxes upright.
(4) During transit, always handle the valves with care.
(5) Do not subject the valves to vibrations and/or shock, and never drop the boxes from a height of more than three inches.
(6) Remove the valves from their original packaging only before installation.

8. IMPORTANT POINTS FOR VALVE HANDLING

(1) During transit do not handle the valve roughly.
Sudden impact, shock, or dropping the valve will result in breakage.
Do not drop the valves from a height of more than three inches.

(2) Always handle the valve with care.
Avoid vibrations, mechanical shock, or dropping the valve.

(3) Never strike any ceramic component with a metallic object.

(4) Always supply clean, dirt - free air to the positioner or actuator.
Installing an air filter, or other air cleaning device will prolong the life of the actuation equipment.

(5) If you are not sure about handling the valve, or need further information, consult the operation manual.
If you require more specific information, contact your local Fujikin representative.

(6) Do not handle the valve with the supply air still attached.
Since the actuator produces a high amount of torque, there is possible danger of injury if the valve accidentally opens or closes.
Special attention should be paid to spring-return actuators, since they may operate unexpectedly if the valve is stuck in an open or closed position.

9. IMPORTANT POINTS IN OPERATION

(1) Select the proper length of flange bolts so as not to reach the end of the threading when pipe flange is installed. However, the flange bolts should be of sufficient length. and strength so as to securely hold the valve in the piping assembly.

(2) If short pipes are provided in the vicinity of the valve, first, connect the short pipes with the valve, and then connect them with the piping in order to minimize the influence of any misalignment of piping upon the valve.
For gasket, use rubber materials such as NBR or FPM (fluorine rubber) as far as possible.

(3) Never remove the packing gland flange when the valve is in service.
Before servicing the valve in any way, relieve any pressure from within the valve and connecting piping.
If the valve is under pressure and the packing gland flange is removed, serious injury can occur from the stem shooting out of the valve.

(4) During installation tighten the flange bolts the same amount, alternating between all bolts on each side (use the star-method, much like tightening a wheel on an automobile). Tighten both flange bolts on either side of the valve simultaneously.
Do not use a hammer or other metallic objects that might damage the ceramic components.

(5) Important points during installation:
Maximum operating pressure= 0.98Mpa (142 psi)
Maximum operating temperature= 125°C (257°F)
The maximam operating differential pressure varies with the size of the valve.
Please refer to page 3 of this manual for more information on maximum conditions.

(6) **Special caution should be paid to the first run of liquid through the valve. Avoid thermal shock by heat-tracing the valve.**
Gradually increase the temperature within the valve as described on Pages 3 and 4 of this manual.

(7) **For fluids that coagulate at low temperatures, a special arrangement should be equipped on the outside of the valve to prevent the fluid from solidifying within the valve.**
If there is a possibility of remaining water - or other fluids - within the valve freezing due to extremely low temperatures, drain any remaining fluid from within the valve.

(8) **For media or slurries that can bewater or accumulate within the valve, provision should be made to flush and throttle the valve a few times each day.**

(9) In the case that fluid is leaking from the gland and anywhere else, replace the old O-rings with new one. Tightening the gland bolts is in no way a proper repairing procedure.

(10) In the event that the valve does not operate, or has become stuck, **DO NOT FORCE THE VALVE TO TURN.** Attempt to flush the line. If that is not effective, take the valve out of line, and disassemble the valve. Remove anything from within the valve that has caused it to seize. Clean all the parts, and install the valve again.

10. Problems and solutions for the ceramic valves

Problems	Causes	Solutions
(1) The valve does not operate.	(1) The pressure of the actuator (or the supply pressure for the valve with the positioner) is too low. (2) A foreign substance is obstructing the valve. (3) Scales adhere to the valve. (4) Slurries are caught between the valve box and the valve rod. (5) The valve rod axis and the actuator axis of the valve are not aligned properly. (6) The fluid pressure is too high. (The differential pressure is too high.)	(1) Confirm whether the actuator pressure (or the positioner supply pressure) reaches the specified pressure range. Increase the pressure if it is too low. (2) Remove the valve to disassemble and clean. (3) Same as (2) above. (4) Same as (2) above. (5) Loosen the nut for installing the actuator, and move the actuator slightly to pull out the padding. (Confirm that the joint moves up and down smoothly.) (6) Reduce the fluid pressure. (The differential pressure)
(1) Movement of the valve is not smooth. (Catches in the middle.)	(1) It seems to be associated with the above-mentioned causes. (2) Malfunctions of the actuator. (A lubricator is not required.)	(1) Perform the above solutions. (2) In the event of actuator malfunction, please return it to us for repair and adjustment.
(3) The valve is hatched. (With the positioner)	(1) The output of the actuator and the required torque for the valve are too close together. (2) The signaling system is malfunctioning.	(1) Since the valve torque has increased due to causes indicated in (2) to (4) above, disassemble the valve for cleaning. If the differential pressure is too high, reduce the differential pressure. For the maximum available differential pressure, please refer to P. 2. (2) Check the signal transmission system with the flow meter, etc.
(4) The signal pressure and the opening range of the positioner are incorrect.	(1) The span is incorrect.	(1) Perform the span adjustment and the fixed adjustment by moving the zero-setting knob, as referred to in "Adjustment of the positioner" (P. 13 - 14).
(4) The ball and the valve body are unusually worn. (Wear of 2 to 3mm after using for 2 to 3 months is normal.)	(1) They are worn quickly if the differential pressure before and after the valve is too high and the speed of the moving fluid is too high.	(1) Reduce the differential pressure before and after the valve by increasing the Cv value and the size of the valve. (Reduce the entrance pressure) For the slurry line, a value of 300 - 400 Kpa is appropriate.

If you use the same product repeatedly, please inform us when you change the operating conditions or methods of use in order to prevent any problems.

11. Consumable spares list, Spare parts list

11-1. Consumable spares list (The main body parts of the valve)

No.	Part names	Materials	Quantity	The number of pieces	Remarks
1	Packing Box	C-PTFE	1	7	Made by Fujikin To be replaced at the time of disassembling or the annual inspection, if necessary.
2	Gland Bush	C-PTFE	1	8	
3	Sheet Packing	PTFE	2	10	
4	O-ring	Fluorine rubber	1	13	Commercially available To be replaced at the time of disassembling or the annual inspection.
5	O-ring	Fluorine rubber	1	14	
6	O-ring	Fluorine rubber	2	15	

11-2. Spare parts list

No.	Part names	Materials	Quantity	The number of pieces	Remarks
1	Packing Box	C-PTFE	1	7	Made by Fujikin To be replaced at the time of disassembling or the annual inspection, if necessary.
2	Gland Bush	C-PTFE	1	8	
3	Sheet Packing	PTFE	2	10	
4	O-ring	Fluorine rubber	1	13	Commercially available To be replaced at the time of disassembling or the annual inspection.
4	O-ring	Fluorine rubber	1	14	
4	O-ring	Fluorine rubber	2	15	
7	Socket	Ceramics	1	2	Made by Fujikin To be replaced at the time of disassembling or the annual inspection, if necessary.
8	Ball	Ceramics	1	3	
9	Stem	Hastelloy C-22	1	6	

12. Inspection checklist during normal operation

No.	Inspection items	Remarks
1	Is there any external leakage from the main body of the valve?	
2	Does the valve operate smoothly? Are there any unusual noises?	
3	Is there any abnormal air leakage from the positioner or the actuator?	

13. Notes for storing products that have been used once.

Please comply with the following the instructions regardless of the storage duration.

13-1. Before storing, use packing materials to avoid shock to the valve main body and the driving parts. Prevent dust and dirt from entering the air connection openings and the valve main body.

13-2. Regardless of the storage duration, wash the valve main body sufficiently and take proper precautions to keep slurry from remaining within the valve.

13-3. If the storage duration will be 3 months or more, we recommend replacing the consumable parts, such as the O-ring for the valve main body, etc.

13-4. When you use the valve again, confirm proper operation and adjustment 4 - 5 times at the time piping work is performed before starting operation.

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