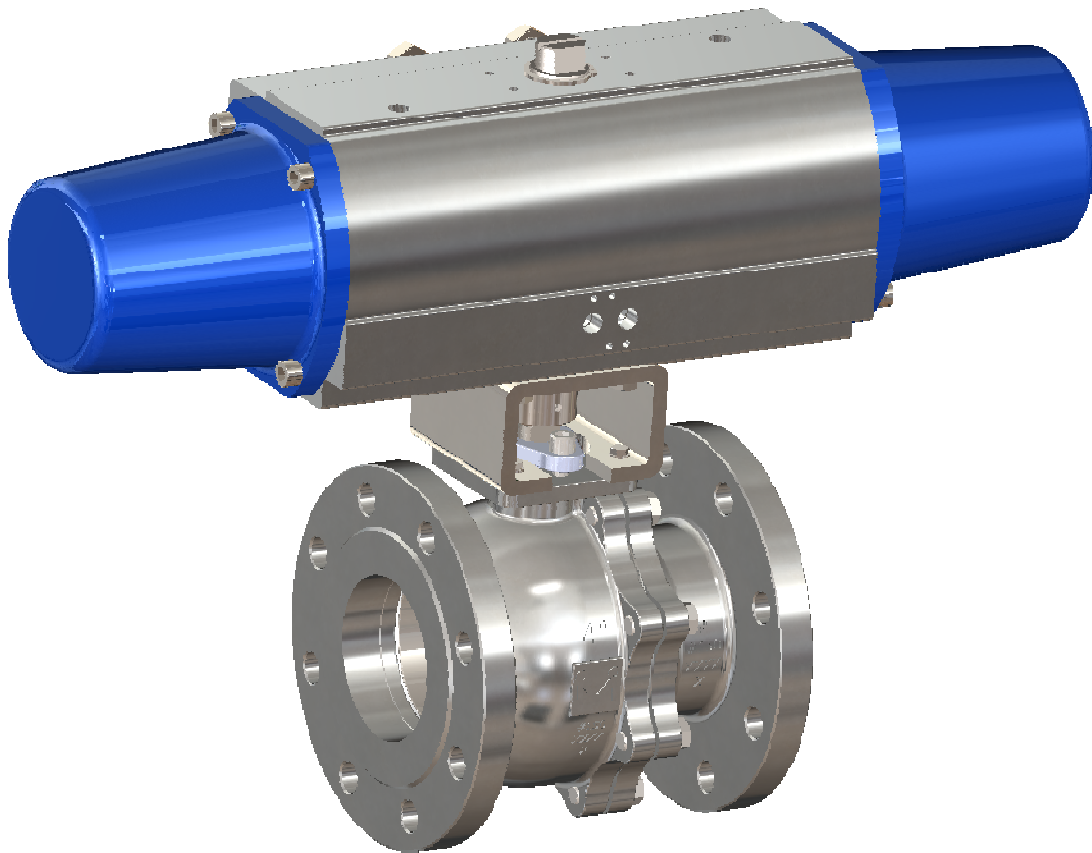


# Ball Valve



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## 1. General

### 1.1 Introduction to Valves

- A) The ball valve has been designed for the requirements and applications of piping.
- B) The most important feature of the Komoto Ball valve is its body that has been manufactured in appropriate sizes to meet the requirements of piping. It consists of a body that includes a cage to control flow speed, a seat ring, a bonnet, and an actuator.
- C) The ball Valve is designed for easy maintenance.
- D) The ball valve trim boasts a long life span and has few faults. To use the system to its full life span, you should install it correctly according to the manual and maintain it according to the prescribed procedures while using it.

#### **☀ Recommendations**

Engineer who has professional assembly capabilities are required to maintain Ball valves. Therefore, it is more economical to request repairs of the valves to Komoto. As the valves repaired by Komoto are thoroughly tested and warranted, you are recommended to entrust Komoto with repairs.

**To avoid possible injury to personnel or damage to valve parts, WARNING and CAUTION notes must be strictly followed. Modifying this product, substituting non-factory parts or using maintenance procedures other than outlined could drastically affect performance, be hazardous to personnel and equipment and may void existing warranties.**

## 2. Storage

- A) Do not throw, drop, trip or drag ball valves when transporting them.
- B) Keep all parts of the ball valve in a well-ventilated place protected from fire, rain and wind.  
Store the valve at a temperature between - 29°C (-20°F) and 48°C (120°F).  
The storage area must be protected from flooding.
- C) Operate the elastomer (O-ring type) of pneumatic actuator at least once every six months to prevent their functional degeneration. Operate it to the full stroke even under general operation conditions at least three times a month.

- D) Do not remove the flange cap attached to the flange surface to prevent foreign substances from penetrating into the system until ball valves are installed on the line.

### 3. Installation

Like any other valves, the Komoto control valve must be installed carefully at first according to the following cautions to use it for many years without malfunction.

- A) Remove the flange cap and check whether there are any foreign substances in the body. If you find foreign substances, remove them before starting installation.
- B) As cast steel products are processed with rust preventive oil before shipping to prevent corrosion, remove the rust preventive oil from the pipes before installing them on the line.
- C) Blow off all foreign substances including welding chips in the pipes before starting installation.

**- Warning -**

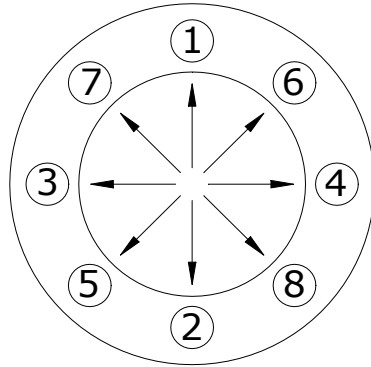
To prevent damages to plugs and seats, you must blow out (flashing) foreign substances such as weld beads, scales and chips from the pipeline according to the prescriptions before installing the ball valve.

- D) Install valves in the direction of arrow marked on the body.

### **☀ Cautions**

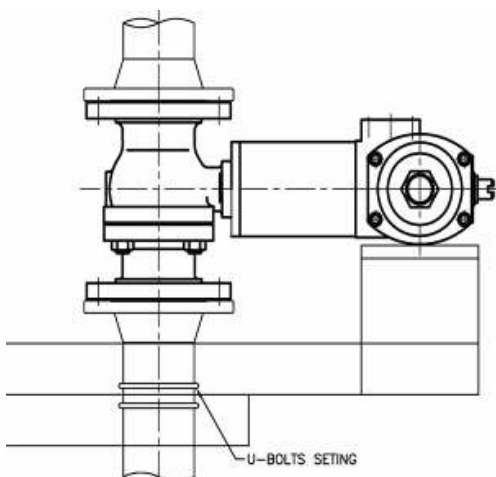
- ① When moving control valves, you should handle them carefully so that the components and air piping will not be damaged. Otherwise, the electronic and electric parts such as solenoid valve, positioner, and limit switch may get damaged or the valve travel may change.
- ② Be careful not to damage the sealing surface of valve flange.
- ③ Apply thermal insulation as needed, but do not apply thermal insulation to the cooling fin and extensions.

E) When assembling the valve, you should use a specified gasket, and install it in parallel with the other flange. Also, you are recommended to fasten the bolts in several parts in a balanced manner sequentially in diagonal direction. <See FIG. 3-1>

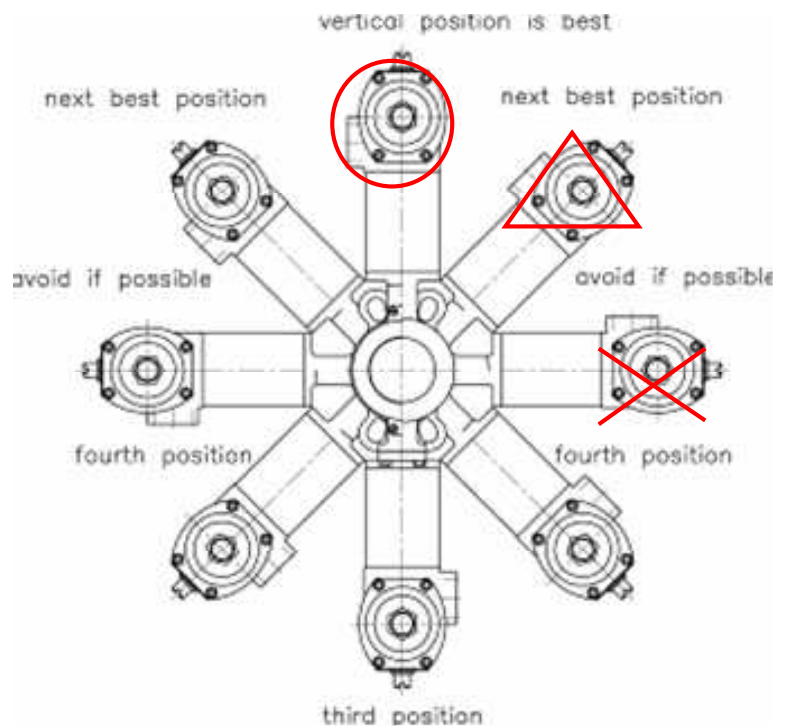


<FIG. 3-1> Procedure for Fastening Flange Bolts

F) Install the valve at right angle to the ground as much as possible. If this is impossible, attach a support to the valve before installing it. <See FIG. 3-2, 3-3>

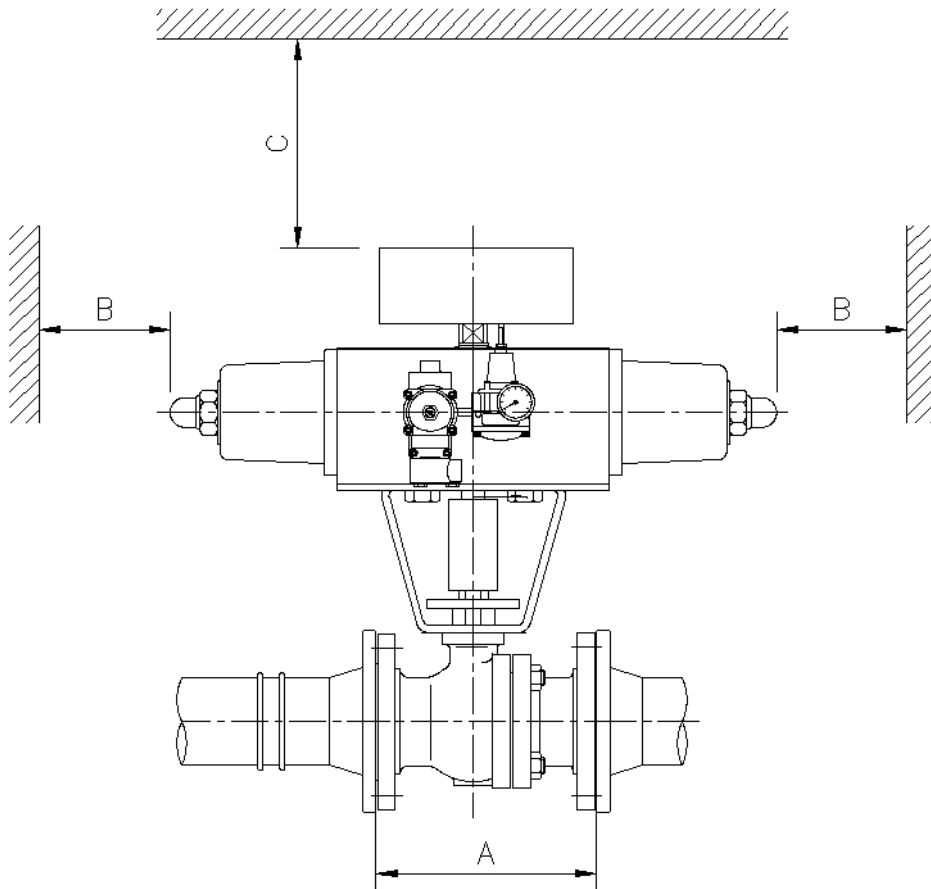


<FIG. 3-2> Installing Support



<FIG. 3-3> Installation Location of Actuator

G) A minimum space is required for maintenance of the valve installation area. <See FIG. 3-4> In addition, a space for manual operation is required if a manual hand wheel has been installed.



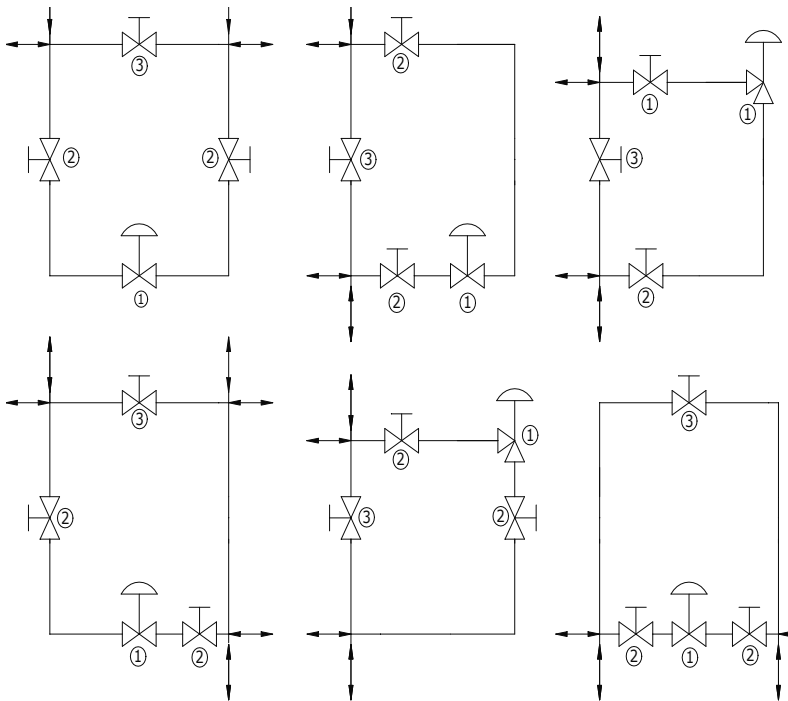
<FIG. 3-4> Space required for automatic valve installation

- ☞ A: Face-to-Face Dimension
- B: Minimum distance from obstacles (Approx. 30 cm)
- C: Space for removing the actuator (Approx. 40 cm)

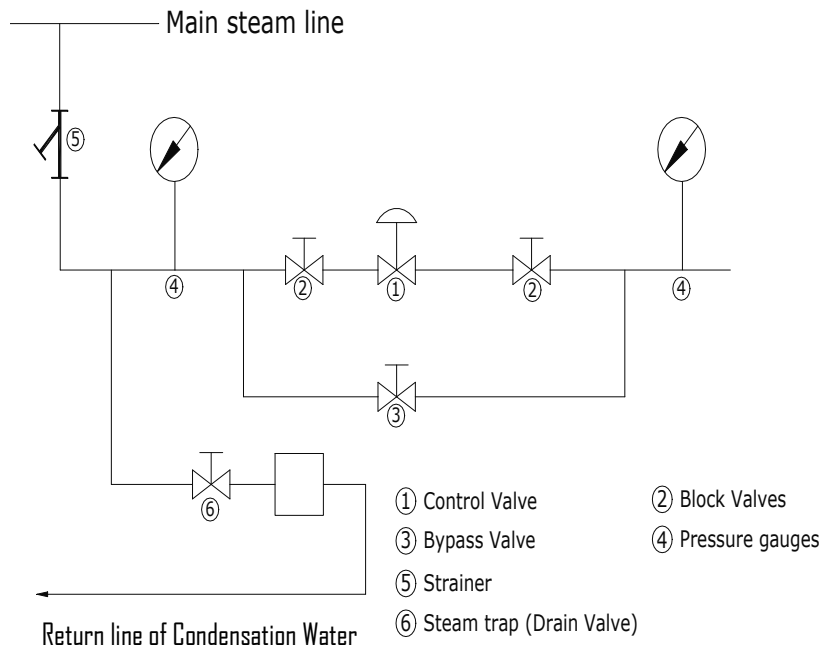
H) Install a bypass line for valve maintenance. <See FIG. 3-5>

**☀ Note**

When the automatic valve has a problem, you may have to close the block valve and open the bypass valve to adjust flow. Therefore, use a control valve that has the feature to adjust flow by opening the bypass valve. Moreover, it is ideal to choose the same flow characteristics and size as those of automatic control valve. FIG. 3-6 shows an example of ideal automatic valve installation recommended by Komoto.



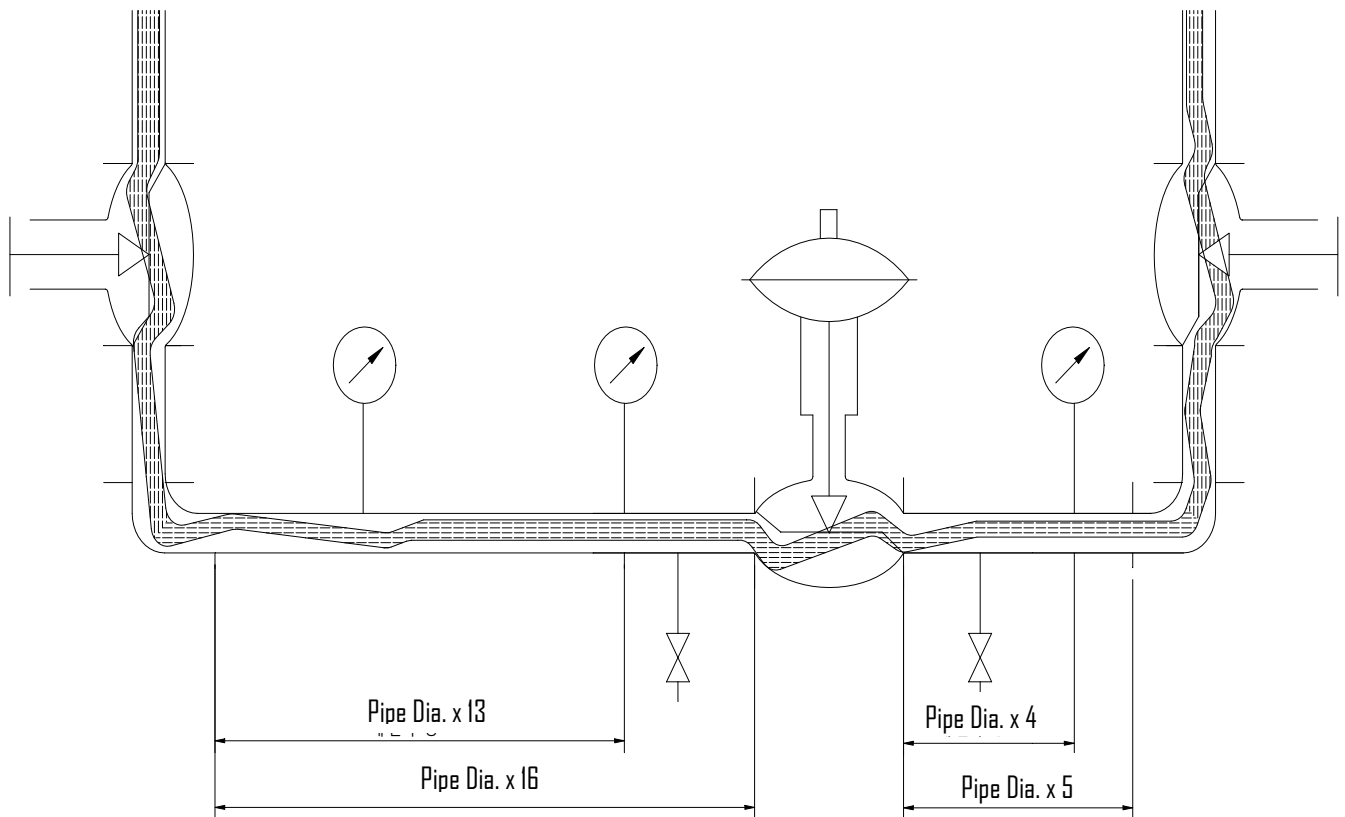
<FIG. 3-5> Example of Automatic Control Valve Installation



<FIG. 3-6> Example of Automatic Valve Installation Recommended by Komoto

**☀ Note**

To maintain a constant pressure at the entrance for all tracks of the valve, the straight pipe length at the valve entrance must be at least 10 to 20 times the pipe diameter. For the fluid to maintain the specified pressure after passing the valve and to prevent noise or vibration by turbulent flow, the straight pipe length at the valve exit must be at least 3 to 5 times the pipe diameter. Straight piping at the entrance and exit allows the preservation of accurate operation status by enabling accurate measurement of the pressure at the entrance and exit. <See FIG 3-7>



<FIG. 3-7> Minimum straight pipe length for valve performance and pressure measurement



## 4. Operation

### 4.1 Inspections before Operation

- ① Check whether there is any leak from all connections including the air pipe connections.
- ② To check whether there is any leak from gland packing and gaskets, apply a pressure to the pipeline. If any leak is detected, remove pressure from the pipeline and fasten the gland flange nut.
- ③ Check the bolts and nuts of the actuator and the yoke for any looseness.
- ④ Check whether there is any short circuit in the electric signal system.
- ⑤ Check whether the attached manual hand wheel is at the Neutral position.
- ⑥ Check whether the system operates accurately and flexibly according to the signals from the controller.
- ⑦ When raising the temperature or pressure, do it slowly. Never raise the temperature or pressure quickly.
- ⑧ Check whether the air pressure required for valve operation is accurately set. (Cylinder Actuator: 5.0kgf/cm<sup>2</sup> -> Specified in the name plate)
- ⑨ Electrical devices such as limit S/W, solenoid V/V are attached to an automatic valve. Even if the manufacturer has adjusted them, the tubing may be bent or the valve stem's position becomes incorrect due to a shock during transportation or careless handling during assembly. Therefore, it is recommended to readjust the valve during the test run.

#### - Warning -

- ❶ Remove air pressure from the actuator before using the manual hand wheel. If you use the hand wheel without removing air pressure, it may not work normally and its weak part may get damaged by overstrain.
- ❷ If the manual hand wheel is not at the Neutral position during automatic operation, it may not work normally and its weak part may get damaged.
- ❸ If you use a pressure higher than the specified pressure on the name plate, the rubber and O-rings of the actuator may be damaged and cause operation problems.

## 5. Maintenance and Repair

### \* Regular Inspection

Repair and inspect as described below. If any malfunction occurs, take appropriate measures according to the preventive maintenance procedures and troubleshooting in Chapter 6. Also, disassemble and inspect the valve body and actuator during the regular overhaul period, and replace parts if necessary.

### \* Recommendations

- ① The life span of the valve can increase if you replace parts according to their replacement cycles. Refer to the Part Replacement Cycle Sheet shown below.

Part Replacement Cycle Sheet		
Item Name	Replacement Cycle	Others
Packing	2 years	
Gasket	2 years	
Ball	2 years	Replace after inspection according to the fluid conditions and used environment.
Seat	2 years	Replace after inspection according to the fluid conditions and used environment.

### \* Irregular Inspections

- A) Are there abnormal noise, vibration or hunting?
- B) Is there any leak from the seat?
- C) Are there any loose bolts and nuts?

## 5.1 General

### - Warning -

To prevent human injuries and damages to control system, close the block valve, remove instrument air and signals from the valve and open the bypass valve to switch over the pressure from the line to the bypass. Then slowly unfasten the bolts from the pipe until the internal pressure of the body is completely released and remove the valve before disassembling the actuator.

- ♣ Prepare gland packing and gaskets as required. (Do not reuse parts that have been used.)

## 5.2 Body Disassembly and Assembly <See FIG. 5-1>

### - Warning -

To prevent injuries or damages to the system, remove the line pressure and remove the valve from the line before starting disassembly.

### 5.2.1 Disassembly

- ① Pull out the valve from the component while taking care not to damage the accessories and pipes.
- ② Remove the valve from the actuator.
- ③ Unfasten the gland bolt (41) from the valve and remove the gland flange (11).
- ④ Unfasten the body nut (22) and remove the body (1) and body cap (2).
- ⑤ Remove the ball (3), and push the stem (4) to the inside of the body (1) to remove it.
- ⑥ Remove the seat (5) and gasket (31) from the body (1) and the body cap (2).

- Clean each part and check them for any damage. Prepare available parts for future repair.

### - Warning -

Take special care not to damage the surface of ball and seat during assembly.

\* Inspection after Disassembly

A> Are there any damages to the seat ring and ball?

B> Are there any damages to the gasket and gland packing?

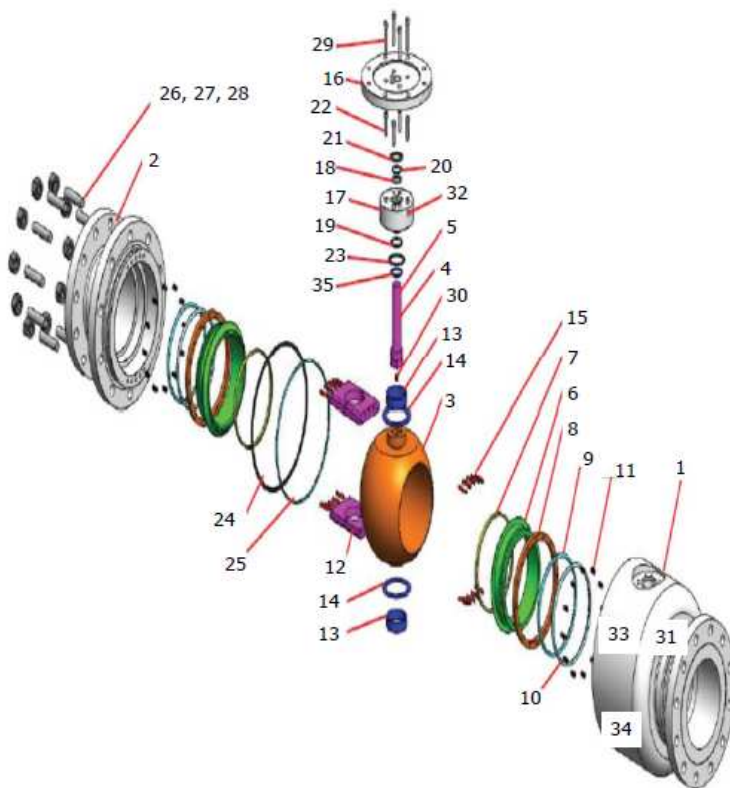
## ※ Recommendations

A> Be sure to inspect and replace worn out parts before reassembling them.

B> You are recommended to replace soft products such as packing, gasket and seat always before reassembling.

## 5.2.2 Assembly

Assemble in the reverse sequence of the disassembly.



No.	Name	No.	Name
1	BODY	19	O-RING
2	CLOSURE	20	O-RING
3	BALL	21	GLAND FLANGE GAS-KET
4	SPINDLE	22	WRENCH BOLT
5	KEY	23	SPINDLE COVER GASKET
6	SOFT SEAT	24	BODY GASKET
7	SOFT SEAT INNER RING	25	O-RING
8	SPRING RETAINER	26	BOLT
9	O-RING	27	SPRING WASHER
10	GRAPHITE SEAL	28	WASHER
11	SPRING	29	WRENCH BOLT
12	BALL GUIDE	30	ANTISTATIC SPRING
13	BALL THRUST BUSH	31	SEAT SEALLANT PLUG
14	BALL THRUST WASH-ER	32	SPINDLE SEALLANT PLUG
15	PIN	33	VENT TAP
16	GLAND FLANGE	34	DRAIN TAP
17	SPINDLE COVER	35	SPINDLE THRUST WASHER
18	O-RING		

<FIG. 5-1> Body Assembly Diagram

## 6. Preventive Maintenance and Troubleshooting

### \* Note

Replace parts after inspection by referring to the Part Replacement Cycle Sheet in Section 5. For other parts, replace them to prevent damages to other devices when they show a wearing sign.

### 6.1 Troubleshooting

Table 6-1 shows some remedies to general problems that may occur at the site while using ball valves. For more serious problems, transport the system to the factory.

Table 6-1

Problem	Solution
Leak from Stem Packing	<ol style="list-style-type: none"> <li>1. Fasten the packing flange. Check for leaking.</li> <li>2. If you suspect any damage to the stem, go to item no.3 Otherwise, replace packing after taking all safety precautions at the site.</li> <li>3. Disassemble the valve. Visually inspect the stem. Check whether the plug components are damaged, and replace them if necessary. Also, replace the gland packing.</li> </ol>
Excessive internal leak when the valve is blocked (Seat)	<ol style="list-style-type: none"> <li>1. Check the air pressure supplied to the valve.</li> <li>2. If you suspect any damage to ball or seat, go to item no.3</li> <li>3. Disassemble the valve. Visually check ball and seat for damages. Replace them if any damage is found.</li> </ol>
The stroke time is delayed.	<ol style="list-style-type: none"> <li>1. Check the air pressure supplied to the valve.</li> <li>2. Check the pressure of the filter regulator.</li> <li>3. Check the adjustment of accessories such as booster solenoid.</li> </ol>
Leak from the connection between body and body cap	<ol style="list-style-type: none"> <li>1. Remove pressure from the line and fasten the bolts connecting the body and body cap.</li> <li>2. Disassemble the valve and check the gasket.</li> </ol>

Problem	Solution
Ball does not move.	<ol style="list-style-type: none"> <li>1. Check the air pressure supplied to the valve and then check the condition of the filter regulator.</li> <li>2. Check the operations of parts such as solenoid valve and air operated valve.</li> <li>3. Disassemble the valve and check whether there are any foreign substances in the ball and seat.</li> <li>4. Check the design temperature and actual line temperature.</li> <li>5. Remove the actuator and try to operate the actuator only.</li> </ol>
The valve does not respond to input signals.	<ol style="list-style-type: none"> <li>1. Check the air pressure supplied to the valve.</li> <li>2. Check the voltage of the solenoid valve.</li> <li>3. Apply a proper air pressure to the actuator to see whether it works properly or leaks. (If it leaks, fasten the cylinder cover bolts.)</li> </ol>
The valve flow is low.	<ol style="list-style-type: none"> <li>1. Check pressure at the entrance and exit of the valve.</li> <li>2. Visually check whether the valve responds to signals.</li> <li>3. Check whether the valve operates with the maximum stroke.</li> </ol>