

# GD-200 Series

Model:GD-200,200C,200H


## Pressure Reducing Valve

Please read this bulletin thoroughly before using the pressure reducing valve, so that you may do so correctly and safely. Please carefully store this bulletin in a handy place.

-----The following safety symbols are used in this manual. -----

 **Warning**

This symbol indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

 **Caution**

This symbol indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.

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1. Specifications & Performance  
1.1 Specifications

Table 1

Model	GD-200	GD-200C	GD-200H
Application (Fluid)	Hot and cold water, Air, Oil (+) (kerosene, heavy oil A·B) and Other non-dangerous fluids		
Nominal Size	15A ~ 150A		
Inlet Pressure (MPa)	1.0 or less		2.0 or less
Reduced Pressure (MPa)	15A~80A : (A)0.05~0.25 (B)0.26~0.7 100A~150A : (A)0.05~0.25 (B)0.26~0.5		15A~50A : (A)0.05~0.25 (B)0.26~0.7 (C)0.5~1.0 65A、80A : (A)0.05~0.25 (B)0.26~0.7 (C)0.5~0.9 100A~150A : (A)0.05~0.25 (B)0.26~0.5 (C)0.5~0.75
Min. Differential Pressure (MPa)	0.05		
Max. Pressure Reduction Ratio	10:1		
Min. adjustable flow Capacity	Water: 5L/min Air: 10m <sup>3</sup> /h (normal state)		
Application Temperature(°C)	5~80	5~60	5~80
Coefficient of viscosity(cSt)	600 or less		
Material	Body	Ductile Cast Iron	
	Valve Seat	Stainless Steel	
	Valve Disc	NBR	
	Diaphragm	NBR	
Connection	JIS 10K FF Flanged		JIS 20K RF Flanged
Surface treatment	15~100A: Electrodeposition Paint 125~150A: Tar paint (Black) or Electrodeposition Paint	Nylon11 Coating (Both sides)	15~100A: Electrodeposition Paint 125~150A: Tar paint (Black) or Electrodeposition Paint

\* The wetted parts made of stainless steel type and all stainless steel type are also available.

\* The rubber material FKM type is also available (excluding GD-200H (C) 65~150A).

\* We also manufacture products with a pressure gauge (Connection size: R1/4, R3/8).

(+) Deterioration of rubbers may be accelerated depending on the additives contained in the oil used.

 **Caution**

Please collate with attached nameplate and specification of ordered model.

\*Please consult factory in case they do not match each other.

## 1.2 Flow Rate Characteristics Chart

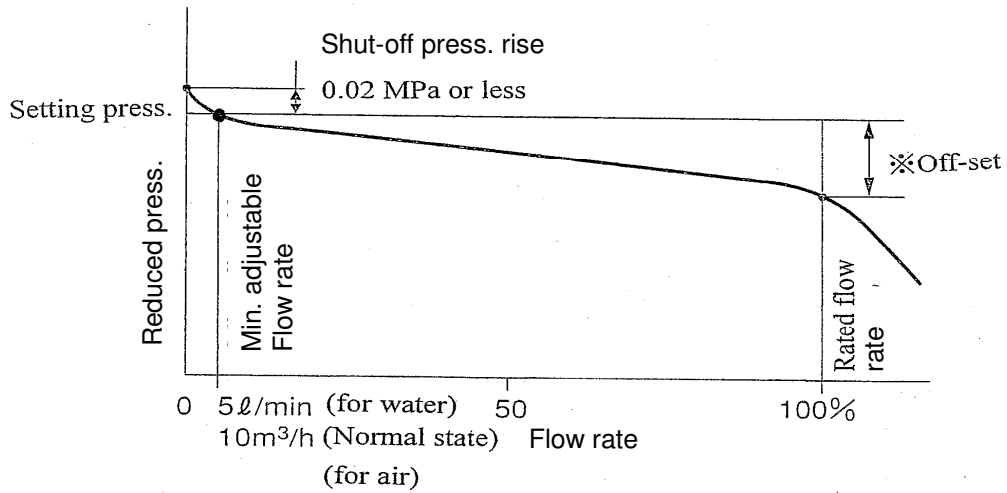


Fig.1 Flow Rate Characteristics Chart

\*Off-set

Table 2

Nominal size	Spring division	Off-set	
		Setting range	Within
15A~50A	(A), (B)	Setting range 0.05~0.7MPa	Within 0.05MPa
	(C)	Setting range 0.5~1.0MPa	Within 0.11MPa
65A, 80A	(A), (B)	Setting range 0.05~0.7MPa	Within 0.05MPa
	(C)	Setting range 0.5~0.9MPa	Within 0.11MPa
100A	(A), (B)	Setting range 0.05~0.5MPa	Within 0.05MPa
	(C)	Setting range 0.5~0.75MPa	Within 0.11MPa
125A~150A	(A)	Setting range 0.05~0.25MPa	Within 0.05MPa
	(B)	Setting range 0.26~0.5MPa	Within 0.07MPa
	(C)	Setting range 0.5~0.75MPa	Within 0.11MPa

## 1.3 Pressure Characteristics Chart

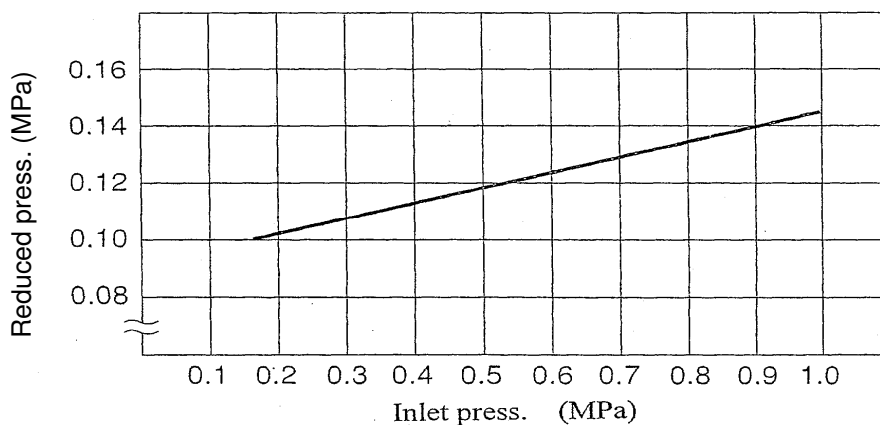


Fig.2 Pressure Characteristics Chart

The above chart shows the change in the reduced pressure when the inlet pressure is changed in the range of 0.15~1.0~0.15 MPa whereas the reduced pressure is set at 0.1 MPa at inlet pressure of 0.15 MPa.

## 2. Dimension & Weight

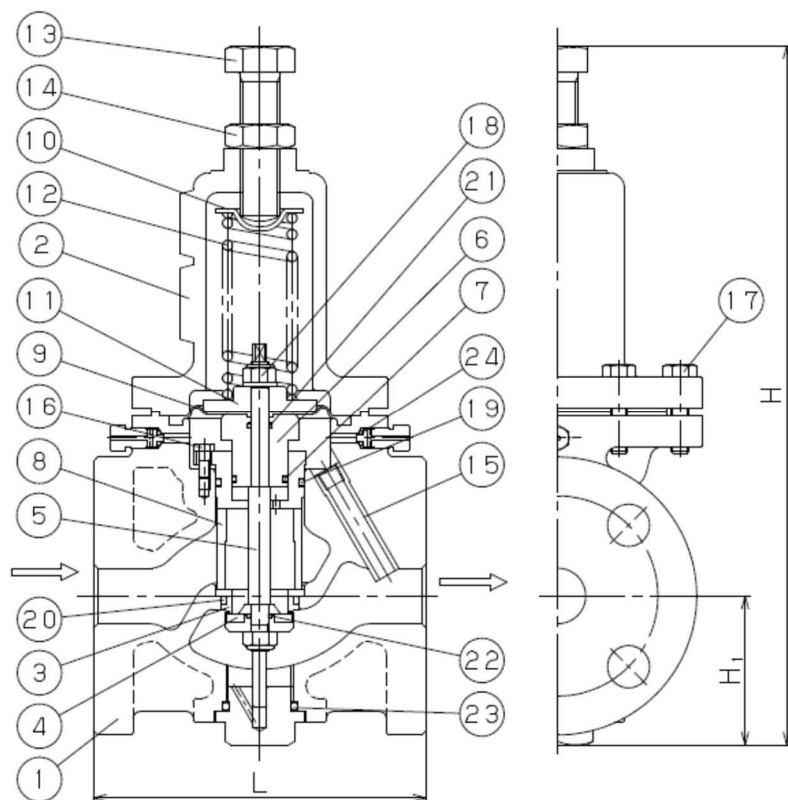


Fig.3

Table 3

No.	Parts Name
1	Body
2	Spring Chamber
3	Valve Seat
4	Valve
5	Spindle
6	Retainer
7	O Ring
8	Retainer Guide
9	Diaphragm
10	Spring Plate
11	Spring Plate
12	Adjusting Spring
13	Adjusting Screw
14	Lock Nut
15	Conductor Pipe
16	Bolt
17	Bolt
18	U Nut
19	O Ring
20	O Ring
21	O Ring
22	O Ring
23	O Ring
24	O Ring

\*The parts shape differs according to the nominal size.

Table 4 Dimension & Weight (mm)

Size	L	H		H <sub>1</sub>		Weight(kg)	
		GD-200·200H	GD-200C	GD-200·200H	GD-200C	GD-200·200H	GD-200C
15A	145	310	296	57		8.2	8.3
20A	150	310	296	57		8.2	8.3
25A	150	333	318	67		10.0	10.1
32A	195	397	398	76		17.3	17.4
40A	195	397	398	76		17.3	17.4
50A	195	415	412	81		19.2	19.3
65A	270	555	573	110	113	40.0	40.1
80A	270	582	598	125	128	43.7	43.8
100A	308	645	666	143	146	70.0	70.8
125A	380(384)	849	875	179	182	144.0(145.0)	144.1
150A	400(404)	918	930	204	207	173.0(175.0)	173.1

\*Measurements shown in parenthesis are for GD-200H.

### 3. Operation

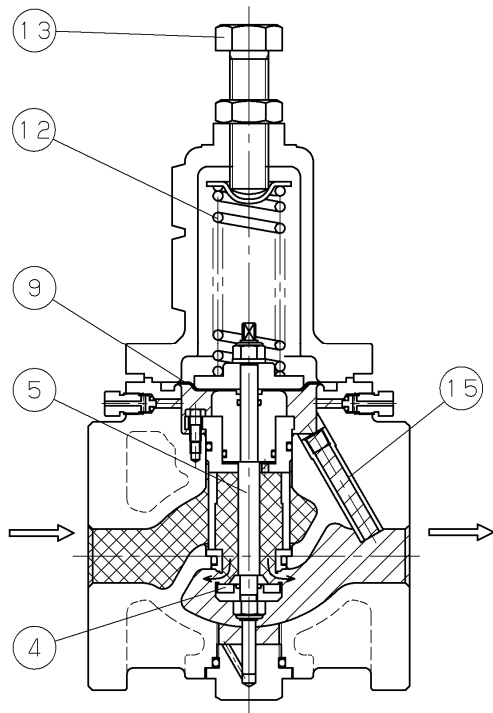


Fig.4

If the adjusting screw [13] is turned right, the diaphragm [9] will be depressed with the adjusting spring [12] and valve disc [4] connected with spindle [5] will open.

The fluid which flowed in from the inlet side carries out the action which pushes up diaphragm through a sensing pipe at the same time it flows into the outlet side through the valve disc upper part.

Load to diaphragm balances with load of adjusting spring, and it adjust the opening of main valve to regulate the reducing pressure.

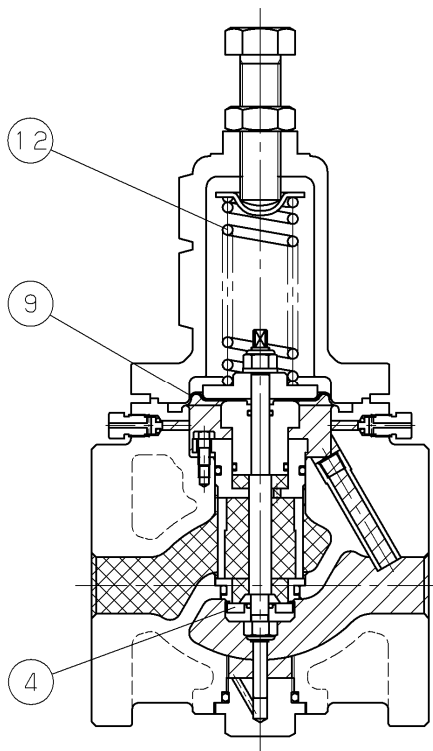


Fig.5

With closing stop valve at the outlet side by little by little, the load to diaphragm [9] will be increased because of increasing in reduced pressure. Increasing load to diaphragm overcomes the load of adjusting spring [12], and then closes the main valve [4].

#### 4. Nominal Size Selection Method

Please select the product in consideration of the usage conditions (frequency of use and durability).

##### 4.1 Nominal Size Selection Chart

When selecting pipe size, please take piping condition and application into consideration and secure a safety rate of 20% or more for the performance value.

< For Water >

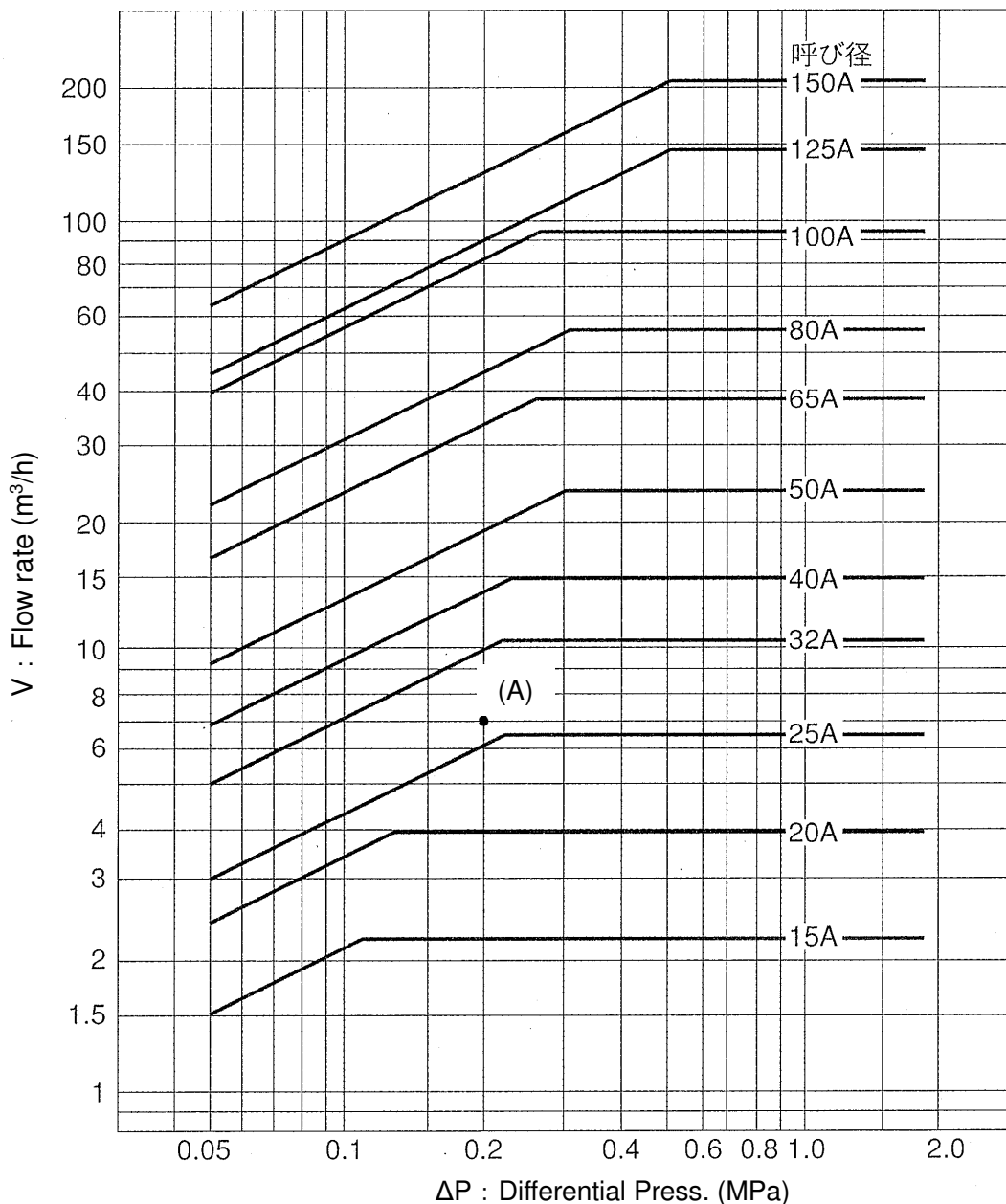


Fig.6

##### [Example of Selection]

When the inlet pressure ( $P_1$ ) is 0.5 MPa, the reduced pressure ( $P_2$ ) is 0.3 MPa and the flow rate is  $7\text{m}^3/\text{h}$ , for instance, the size of the pressure reducing valve is selected as follows. Find the intersection point (A) of the differential pressure of 0.2 MPa with the flow rate of  $7\text{m}^3/\text{h}$ , the point (A) is between line of size 25A and 32A. Choose larger size 32A for application.

< For Air >

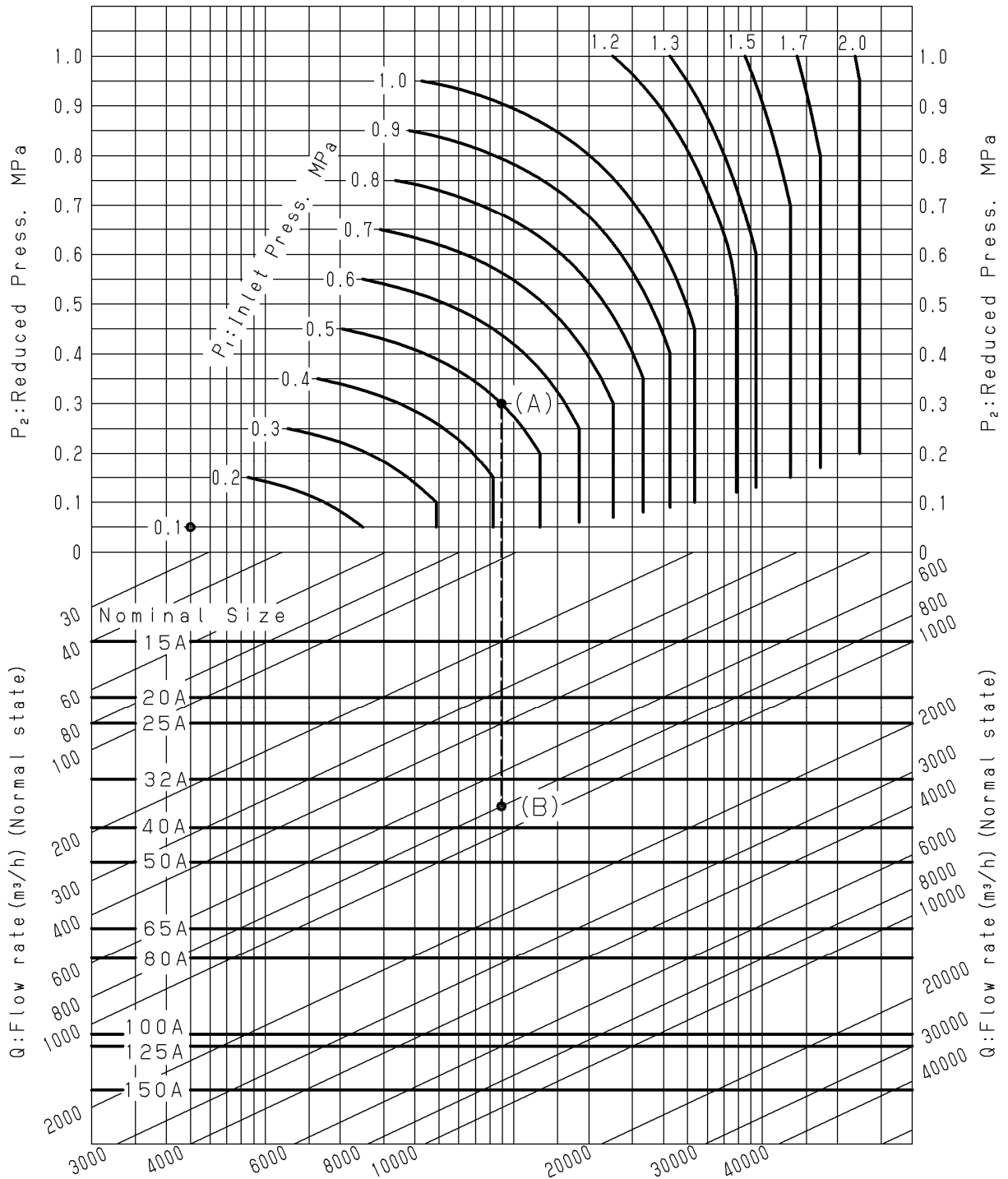


Fig.7

[Example of Selection]

When the inlet pressure ( $P_1$ ) is 0.5 MPa, the reduced pressure ( $P_2$ ) is 0.3 MPa and the flow rate is 800  $Nm^3/h$ , for instance, the size of the pressure reducing valve is selected as follows. Find the intersection point (A) of the inlet pressure ( $P_1$ ) 0.5 MPa and reduced pressure ( $P_2$ ) 0.3 MPa and go straight down from the point (A) to find the intersection (B) crossing the flow rate line. The point (B) is between line of 32A and 40A, and choose larger size 40A for application.

## 4.2 Selection Formula for Nominal Size

\*Cv value

Table 5

Nominal Size	15A	20A	25A	32A	40A	50A	65A	80A	100A	125A	150A
Cv value	2.5	4	5	8	12	16	28	36	68	75	108

[Cv Value Calculation Formula]

< For Gas >

In case of  $p_2 > \frac{p_1}{2}$

$$C_v = \frac{Q}{2940} \sqrt{\frac{(273+t)G}{\Delta P(P_1 + P_2)}}$$

In case of  $p_2 \leq \frac{p_1}{2}$

$$C_v = \frac{Q\sqrt{(273+t)G}}{2550P_1}$$

< For Liquid >

$$C_v = \frac{0.365V\sqrt{G}}{\sqrt{\Delta P}}$$

[Viscosity correction Formula]

Find the Max. Flow rate (V) when the viscosity is ignored.

$$V = \frac{C_v \cdot \sqrt{\Delta P}}{0.365 \cdot \sqrt{G}}$$

And find the viscosity index of Iv.

$$I_v = \frac{72780}{M_{cst}} \left( \frac{\Delta P}{G} \right)^{\frac{1}{4}} V^{\frac{1}{2}}$$

Find the value of K from the value of Iv, found through the above formula, with the viscosity correction curve. The calculated Max. flow rate divided by the value of K is the corrected value.

Compensated Max. flow rate  $V' = V/K$  (m<sup>3</sup>/h)

Viscosity Correction Curve

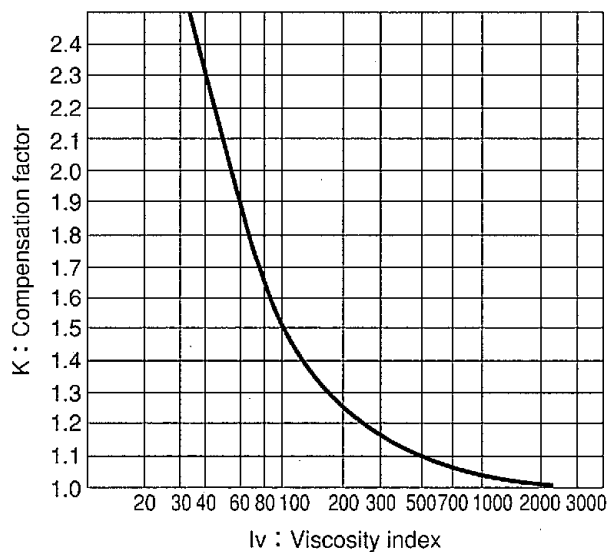


Fig.8

- $P_1$ : Inlet pressure [MPa·A]
- $P_2$ : Reduced pressure [MPa·A]
- $\Delta P$ :  $P_1 - P_2$  [MPa]
- G: Specific gravity  
(Gas: Specific gravity relative to air  
Liquid: Specific gravity relative to water)
- V: Max. liquid flow rate [m<sup>3</sup>/h]
- Q: Max. gas flow rate [m<sup>3</sup>/h (Normal state)]
- t: Temperature [°C]
- Cv: Cv value of the nominal size
- Iv: Viscosity index
- Most: Viscosity [cSt]



## 5. Installation

### 5.1 Example of Piping

[For Water]

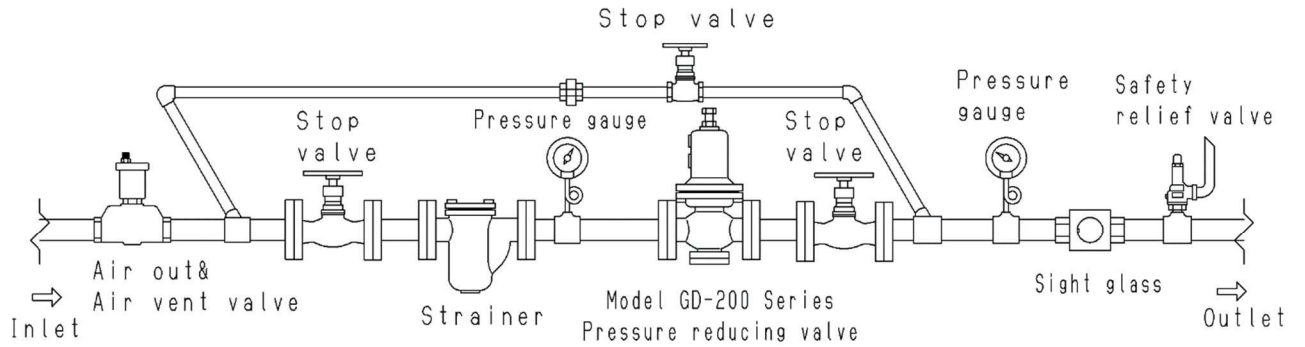


Fig.9

[For Air]

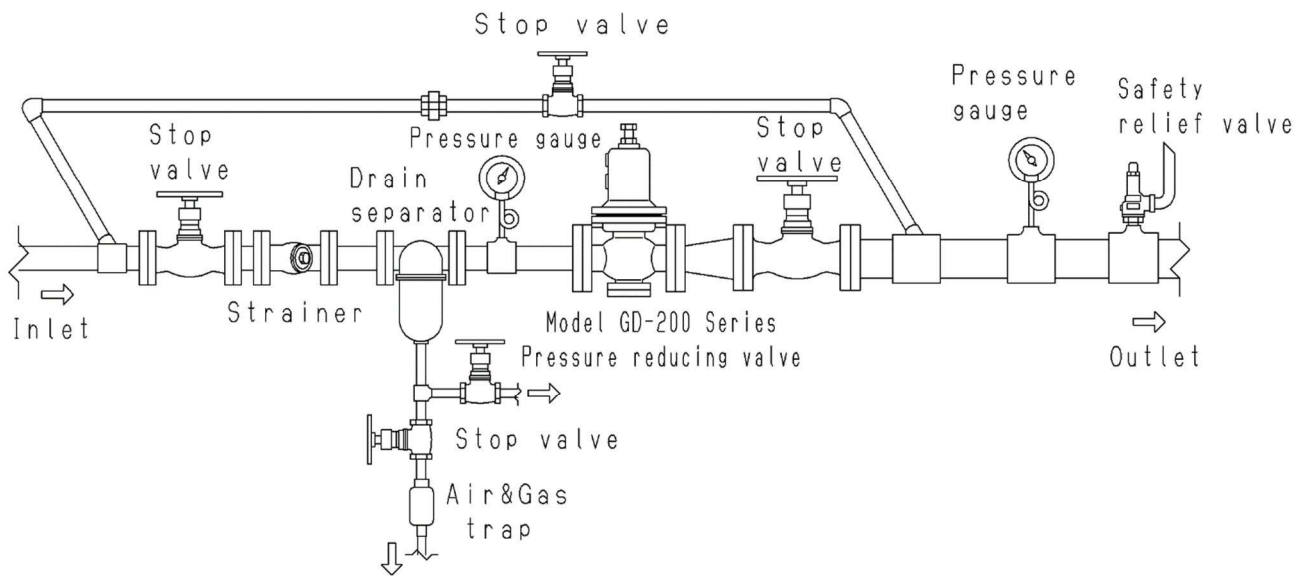


Fig.10

## 5.2 Precautions before operation

### Caution

- (1) Depending on the water quality, brass parts may corrode or be promoted, causing product malfunction. In an environment where corrosion may occur, select a product made of a compatible material such as stainless steel.
  - (2) If components having negative influence on internal parts are included in fluid or surroundings, deterioration of rubber parts is accelerated and then outside leakage or functional disorder is caused.
  - (3) The product or parts will be damaged if an impact due to sudden pressure fluctuations such as water hammer is applied.
  - (4) If the product is in a closed pipe state, the fluid in the pipe will expand in volume due to the rise in fluid temperature, and the product will be damaged.
  - (5) Sticky fluids can cause parts to stick together and cause malfunctions.
  - (6) Since it is weight thing, this product should use lifting equipment etc., and please support a product certainly and install it in piping.
    - \*There is a possibility that it may be injured, by fall of product.
  - (7) Do not disassemble the valve unreasonably.
    - \*Disassembling the valve at your discretion may affect the original performance.
  - (8) Remove foreign matter and scales from the lines before connecting the valve.
    - \*Failure to do so may prevent the valve from functioning correctly.
  - (9) Install a strainer at the valve inlet side.
    - \*Failure to do so may hamper correct pressure control, which affects the original performance.
    - \*By sunshine or atmosphere temperature rise, the fluid in piping carries out volume expansion, failure of the valve and the external leak of fluid occur, and there is danger of circumference contamination.
  - (10) Install a safety valve at the valve outlet sides for alarms.
    - \*Failure to do so prevents problem identification, resulting in equipment damage.
  - (11) Install a pressure gauge at both the inlet and outlet sides of the valve.
    - \*Failure to do so may hamper correct pressure adjustment.
  - (12) For gas application, install a trap to the inlet sides of the valve to prevent drainage problem.
    - \*Failure to do so may result in drainage problem, affecting the original performance.
  - (13) When installing quick open and close valves, such as a solenoid valve, secure at least 3 m from the valve.
    - \*Failure to do so may result in malfunction or drastically shortened service life.
  - (14) When reducing pressure in two stages, secure at least 3 m between the valves.
    - \*Failure to do so may result in malfunction, affecting the original performance.
  - (15) Do not apply excessive load, torque or vibration to the valve.
    - \*Doing so may result in malfunction or drastically shortened service life.
  - (16) Install the valve in proper direction of the fluid flow.
    - \*Failure to do so may affect the original performance.
  - (17) Do not use dissimilar metal piping that causes a potential difference.
    - \* Products and parts will corrode.
- (1) Pipes can be installed either horizontally or vertically except over the size of 100A.
  - (2) If the large valve is used for gas, install a reducer to prevent excessive flow speed. (The flow speed made in piping is appropriate, if it is 15m/s or less.)
  - (3) Above the center of the pipe line, be sure to reserve enough space larger than H<sub>2</sub>(Fig.3). Please see the Table 6.

Nominal Size	15A	20A	25A	32A	40A	50A	65A	80A	100A	125A	150A
H <sub>2</sub>	500	500	500	650	650	650	800	800	1000	1200	1400

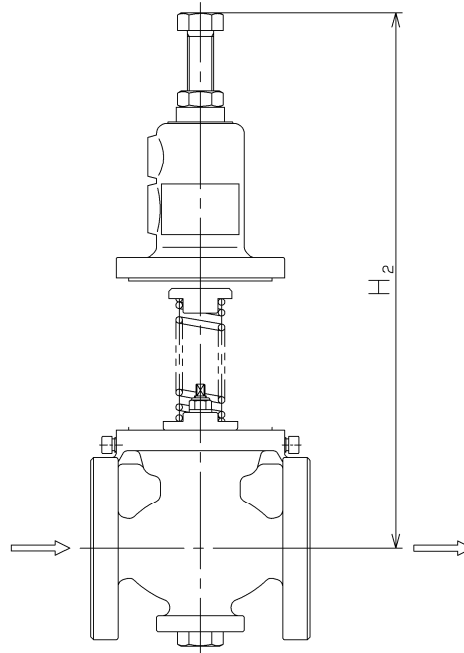


Fig.11

## 6. Operating Procedure

### 6.1 Precautions for pressure reducing valve operation

#### ⚠ Warning

Do not touch the valve directly with bare hands.  
\*Doing so may result in burns.

#### ⚠ Caution

- (1) Close the stop valves before and after the pressure reducing valve, and remove all foreign matter and scales via the by-pass line before operation.  
\*Failure to do so may prevent the valve from functioning correctly.
- (2) When the adjust pressure, slowly turn the adjusting screw  
\*Incorrect adjustment may cause hunting, water hammer, etc., resulting in damage to the valve and other equipment.
- (3) Remove condensate completely from the line, and close the stop valves before and after the valve when not using it for long periods of times.  
\*Rust generated in the valves and lines may cause malfunction.

## 6.2 Adjustment Procedure

### Caution

- (1) Follow the steps below, and slowly turn the adjusting screw to set pressure. Incorrect adjustment may cause hunting, water hammer, etc., resulting in damage to the valve and other equipment.
- (1) Close the stop valves at both sides of the pressure reducing valve, and thoroughly purge the system through the by-pass line, with the by-pass valve opening adjusted so that the safety relief valve is not activated. When completed, be sure to close the by-pass valve.
  - (2) Slowly open the inlet stop valve, then open the outlet stop valve slightly, allowing a trickle to be discharged.
  - (3) Loosen the lock nut [14], and slowly turn the adjusting screw [13] (clockwise to increase, counterclockwise to reduce) while observing the pressure gauge on the outlet side.
  - (4) Slowly open the outlet stop valve to its full-open position.
  - (5) After the adjustment, tighten the lock nut.
  - (6) In case of secondary pressure for size 65A to 150A is unstable because of an air obstruction or etc. adjust opening of needle valve at detecting pipe.

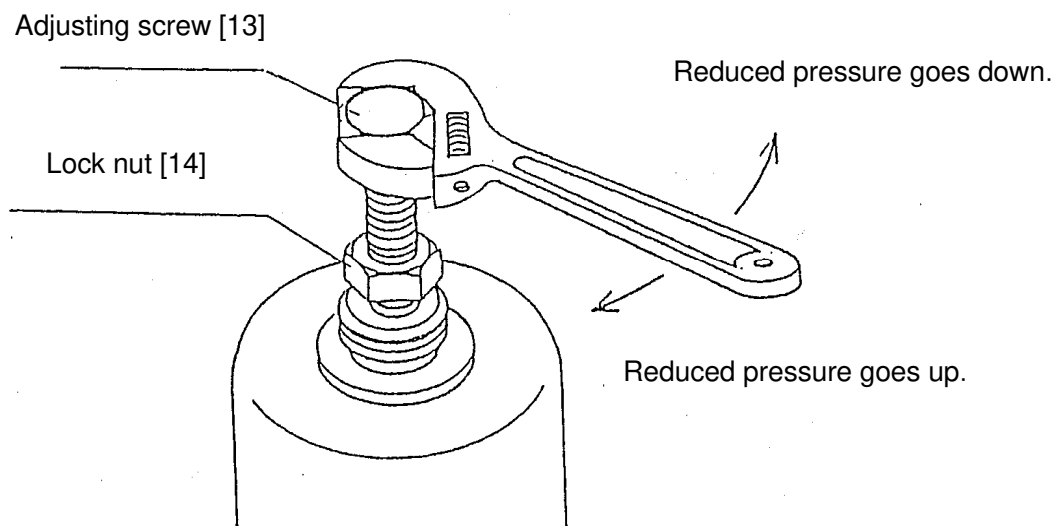


Fig.12

7. Maintenance Procedure  
7.1 Troubleshooting

Problem	Causes	Solutions
Pressure does not rise to desired level.	<ol style="list-style-type: none"> <li>1. Incorrect pressure is being used.</li> <li>2. The conductor pipe [15] is clogged with foreign matter.</li> <li>3. Nominal size is too small for these specifications.</li> <li>4. Incorrect adjustment.</li> <li>5. Strainer is clogged.</li> <li>6. Pressure gauge malfunction.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct the pressure being used. (Refer to the "Specifications".)</li> <li>2. Disassemble and clean the conductor pipe.</li> <li>3. Replace with the correct nominal sized item.</li> <li>4. Re-adjust according to the adjustment procedure. (Refer to the "Adjustment Procedure".)</li> <li>5. Disassemble and clean.</li> <li>6. Replace the pressure gauge.</li> </ol>
Reduced pressure exceeds prescribed level.	<ol style="list-style-type: none"> <li>1. Foreign matter is embedded in the valve [4] and/or valve seat [3], or else scratches exist.</li> <li>2. By-pass valve is leaking.</li> </ol>	<ol style="list-style-type: none"> <li>1. Disassemble and clean. If scratches exist, replace them.</li> <li>2. Repair or replace the valve.</li> </ol>
External leakage	<ol style="list-style-type: none"> <li>1. Diaphragm [9] is broken.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace Diaphragm</li> </ol>
Abnormal noise is heard.	<ol style="list-style-type: none"> <li>1. Nominal size is too large for these specifications.</li> <li>2. Pressure reduction ratio is too large.</li> <li>3. Air problem is caused. (Liquid use)</li> <li>4. An abrupt OPEN/CLOSE valve is located too close to the pressure reducing valve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace with the correct nominal sized item.</li> <li>2. Use a two-stage reduction. (Refer to the "Specifications".)</li> <li>3. Install a trap.</li> <li>4. Allow as much distance as possible between the valves.</li> </ol>

\*Foreign matter and scales in pipe may cause most of problems of pressure reducing valve. Be careful sufficiently to foreign matter in pipe.

\*Phenomenon alike valve trouble may happen by fault of pressure gauge, fluid leakage from by-pass valve, forgetting to close the by-pass valve, clogging strainer, etc. First, check the said before above troubleshooting.

## 7.2 Precautions during disassembly and inspection

### Warning

Completely discharge internal pressure from the valves, lines, and equipment, and cool the valve down to a level where you can touch it with bare hands before disassembly and inspection.

\*Failure to do so may result in injury or burns due to residual pressure or spillage around the valve.

### Caution

- (1) Perform periodical inspection to maintain product functions and performance.  
\*General users shall request countermeasures to installers or maintenance companies.
- (2) The pressure reducing valve shall be disassembled and inspected by qualified persons.
- (3) Rubber parts and components shown below are consumables. Note that the life expectancy depends on the conditions under which they are used.

Table 7

Serviceable life	Parts name/number
3 years	Valve [4]、 O ring [7]、 Diaphragm [9]
5 years	O ring [19] [20] [21] [22] [23] [24]

\*For circled numbers, refer to “3. Dimension & Weight”.

## 7.3 Disassembly

- (1) Release the internal pressure completely, and make sure of zero pressure.
- (2) Slightly loosen the lock nut [14] and turn the adjusting screw [13] counter clockwise to relieve the adjusting spring [12] (Unload the spring).
- (3) Remove the hexagon bolt [17] from the spring chamber [2], then remove the spring chamber, and take out the adjusting spring and the spring plate [10].
- (4) To remove the diaphragm [9], fix the spindle [5] and remove the U nut [18].
- (5) To remove the retainer [6], loosen and remove the retainer guide clamping bolt [16] and pull the retainer guide [8]. Remove it by the bellow method (Fig.13, Fig.14) when it is difficult to remove the retainer guide.
- (6) To remove the valve seat [3], pull the spindle.
- (7) Fix two planar sections at spindle and loosen U nut for spindle to remove it, then the valve can be dismantled.

[Nominal Size: 15A~50A]

To remove the retainer guide [8] easily, install the spring plate [11] and U nut [18] to spindle [5] again and pull the spring plate. (Fig.13)

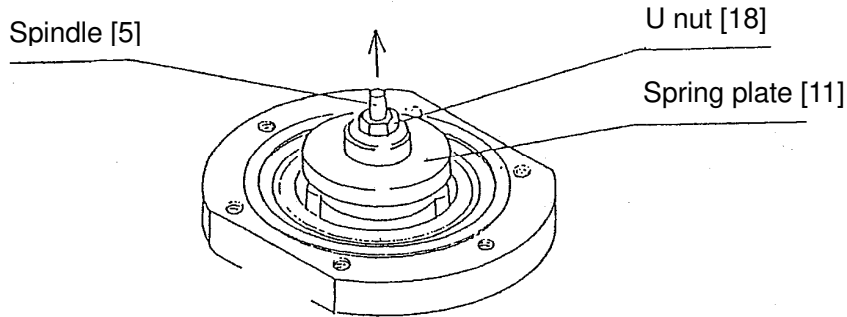


Fig.13

[Nominal Size: 65A~150A]

To remove the retainer guide [8] easily, screw the retainer guide clamping bolt [16] to retainer guide and pull it. (Fig.14)

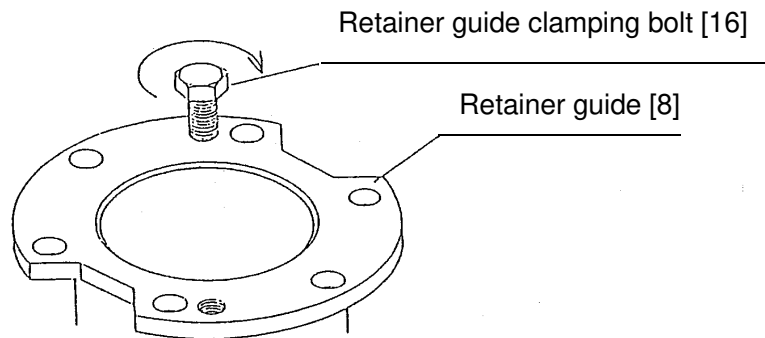


Fig.14

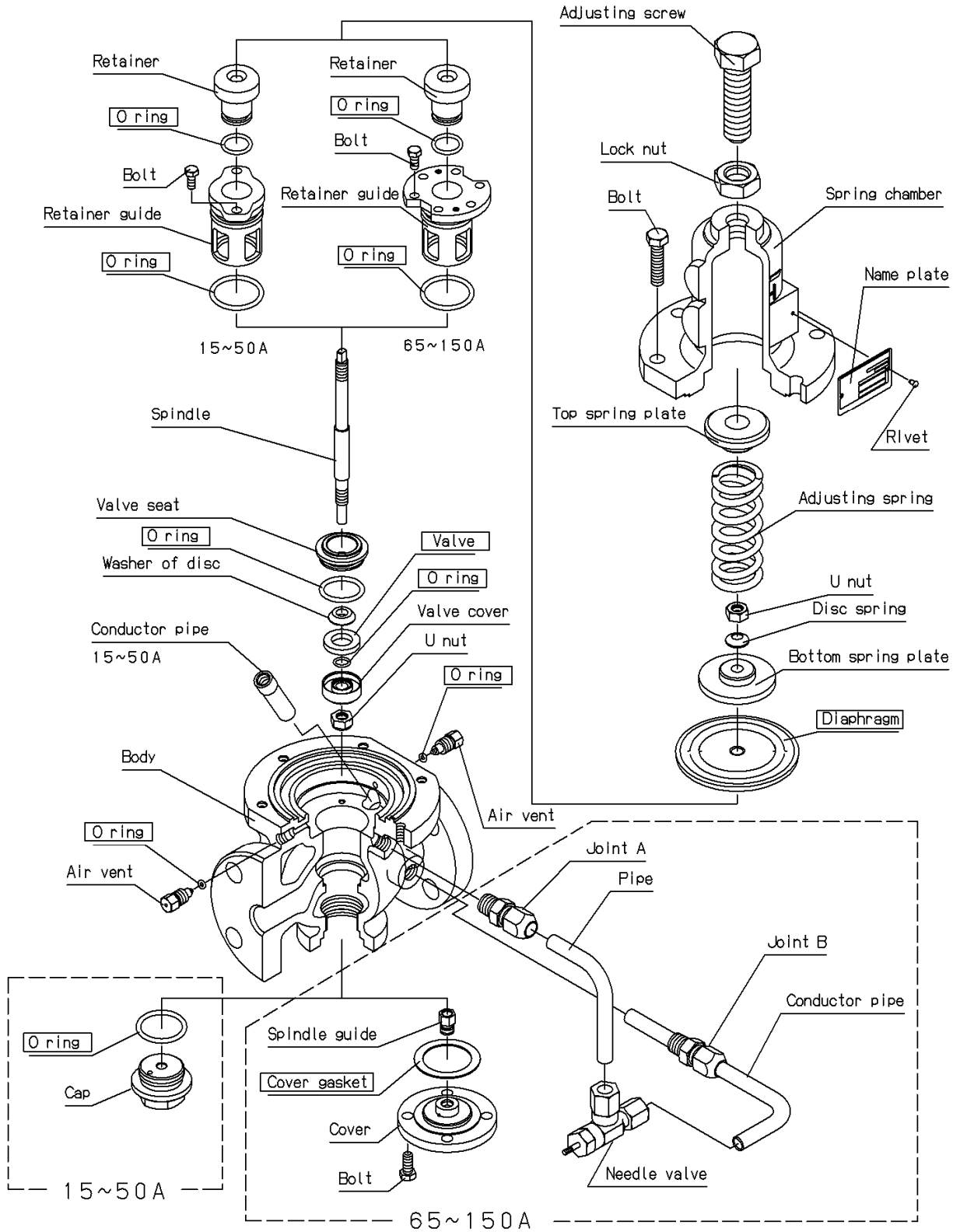
#### 8.4 Precautions during disassembly

- (1) Make sure that the diaphragm [9], the valve seat [3], and the valve [4] have no scratches.
- (2) Apply the silicon grease to the O-Ring [7] after confirm whether there is any flaw on the O-Ring.
- (3) Install the spring chamber [2] after the confirm whether the border of diaphragm is fitted with the groove of body [1].
- (4) For size 15A to 50A, assemble spring chamber after confirming the outer circumference of diaphragm interlaces with groove at the body.  
For size 65A to 150A of GD-200H, confirm the bolt hole of diaphragm fit to bolt hole at body.  
Tightening torque of U nut for diaphragm and hexagon bolt for spring chamber are described below.

Table 8

Nominal size	65A, 80A	100A	125A, 150A
Tightening torque of U nut [18] (N-m)	60	60	280
Tightening torque of hexagon bolt [17] (N-m)	20	40	50

# 8 Exploded drawing



\* Enclosed parts are offered as consumable.



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## Warranty Information

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1. Limited warranty

This product has been manufactured using highly-advanced techniques and subjected to strict quality control. Please be sure to use the product in accordance with instructions on the manual and the label attached to it.

Yoshitake warrants the product to be free from any defects in material and workmanship under normal usage for a period of one year from the date of receipt by the original user, but no longer than 24 months from the date of shipment from Yoshitake's factory.

2. Parts supply after product discontinuation

This product may be subject to discontinuation or change for improvement without any prior notice. After the discontinuation of the product, Yoshitake supplies the repair parts for 5 years otherwise individually agreed.

3. This warranty does not cover the damage due to any of below:

- (1) Valve seat leakage or malfunction caused by foreign substances inside piping.
- (2) Improper handling or misuse.
- (3) Improper supply conditions such as abnormal water pressure/quality.
- (4) Water scale or freezing.
- (5) Trouble with power/air supply.
- (6) Any alteration made by other than Yoshitake.
- (7) Use under severe conditions deviating from the design specifications (e.g. in case of corrosion due to outdoor use).
- (8) Fire, flood, earthquake, thunder and other natural disasters.
- (9) Consumable parts such as O-ring, gasket, diaphragm and etc.

Yoshitake is not liable for any damage or loss caused by malfunction or defect of the product.

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