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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After Sales Service

Yoshitake INC.

GD-200 Series pressure reducing valves are widely used for construction equipment, air conditioning, plant equipment, industrial plant facilities and other application.
This product can provide stable outlet pressure and big capacity.

1. Features

1) As pressure balanced structure is introduced, outlet pressure can be kept at a constant level without influence of inlet pressure.
2) Valve seat is made of stainless steel to ensure superior preventing abrasion and durability.
3) Rubber disc is used at the valve body to effectively eliminate leaks.
4) Maintenance is easy.

2. Specifications & Performance

2. 1 Specifications

Table 1

Model		GD-200	GD-200C	GD-200H
Application(Fluid)		water、air、oil (kerosene、heavy oil A·B)		
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 : 10m³/h(normal state)		
Application Temperature(℃)		5～80	5～60	5～80
Coefficient of viscosity(cSt)		600 or less		
Materials	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

⚠ Caution

Please collate with attached nameplate and specification of ordered model.
※Please consult factory in case they do not match each other.

2．2 Flow Rate Characteristics Chart

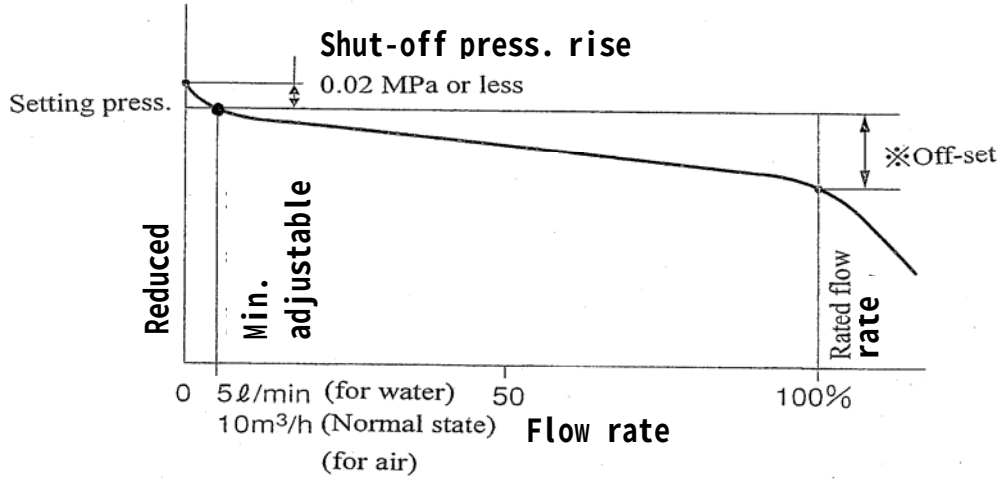


Fig.1 Flow Rate Characteristics Chart

※Off-set Table 2

Nominal size	Spring division	Off-set	
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

2．3 Pressure Characteristics Chart

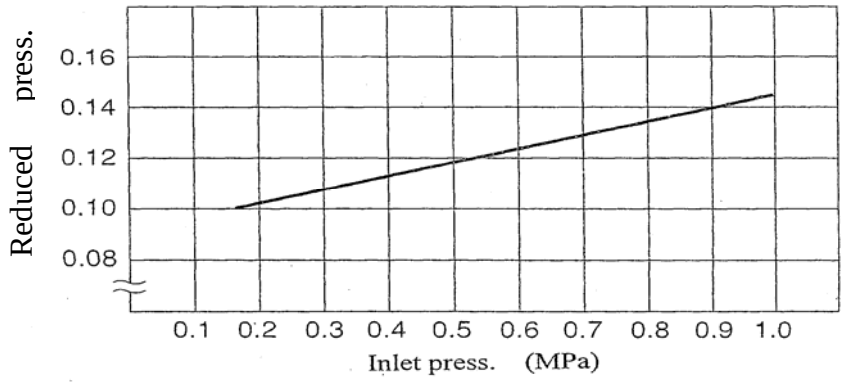


Fig.2 Pressure Characteristics Chart

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.

3. Dimension & Weight

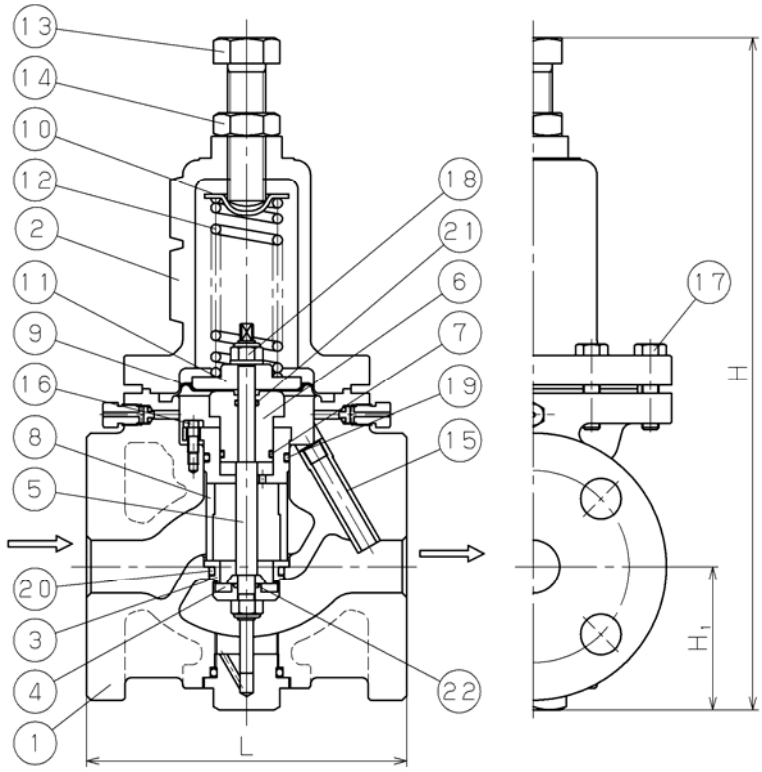


Fig.3

※The parts shape differs according to the nominal size.

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

Table 4 Dimension & Weight (mm)

Size	L	H		H_1		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.

4. Operation

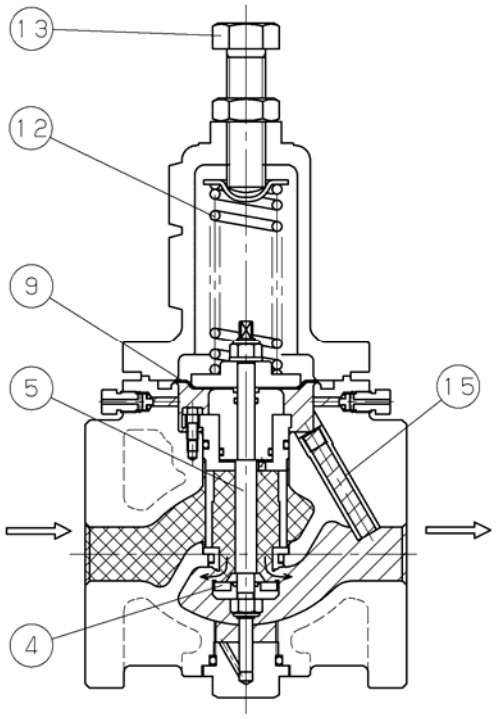


Fig.4

If the adjusting screw⑬ is turned right, the diaphragm⑨ will be depressed with a adjusting spring⑫ and valve disc④ connected with spindle⑤ will open.
The fluid which flowed in from the inlet side carries out the action which pushes up diaphragm⑨ through a sensing pipe at the same time it flows into a outlet side through the valve disc④ upper part.
Load to diaphragm⑨ balances with load of adjusting spring⑫, and it adjust the opening of main valve to regulate the reducing pressure.

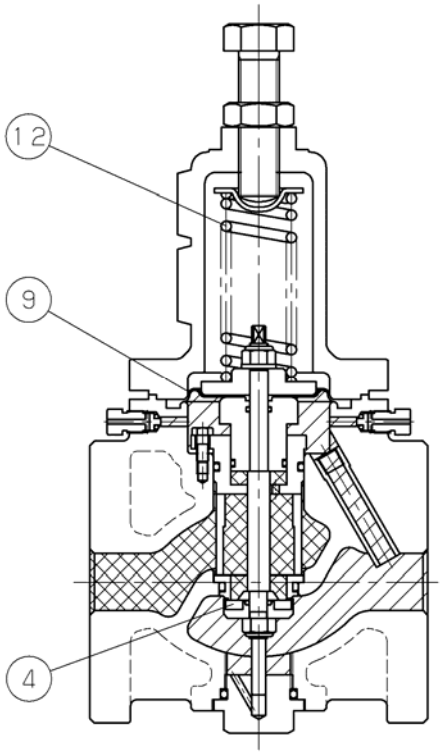


Fig.5

With closing stop valve at the outlet side by little by little, the load to diaphragm⑨ will be increased because of increasing in reduced pressure. Increasing load to diaphragm⑨ overcomes the load of adjusting spring⑫, and then closes the main valve.

5. Nominal Size Selection Method

5. 1 Nominal Size Selection Chart

< For Water >

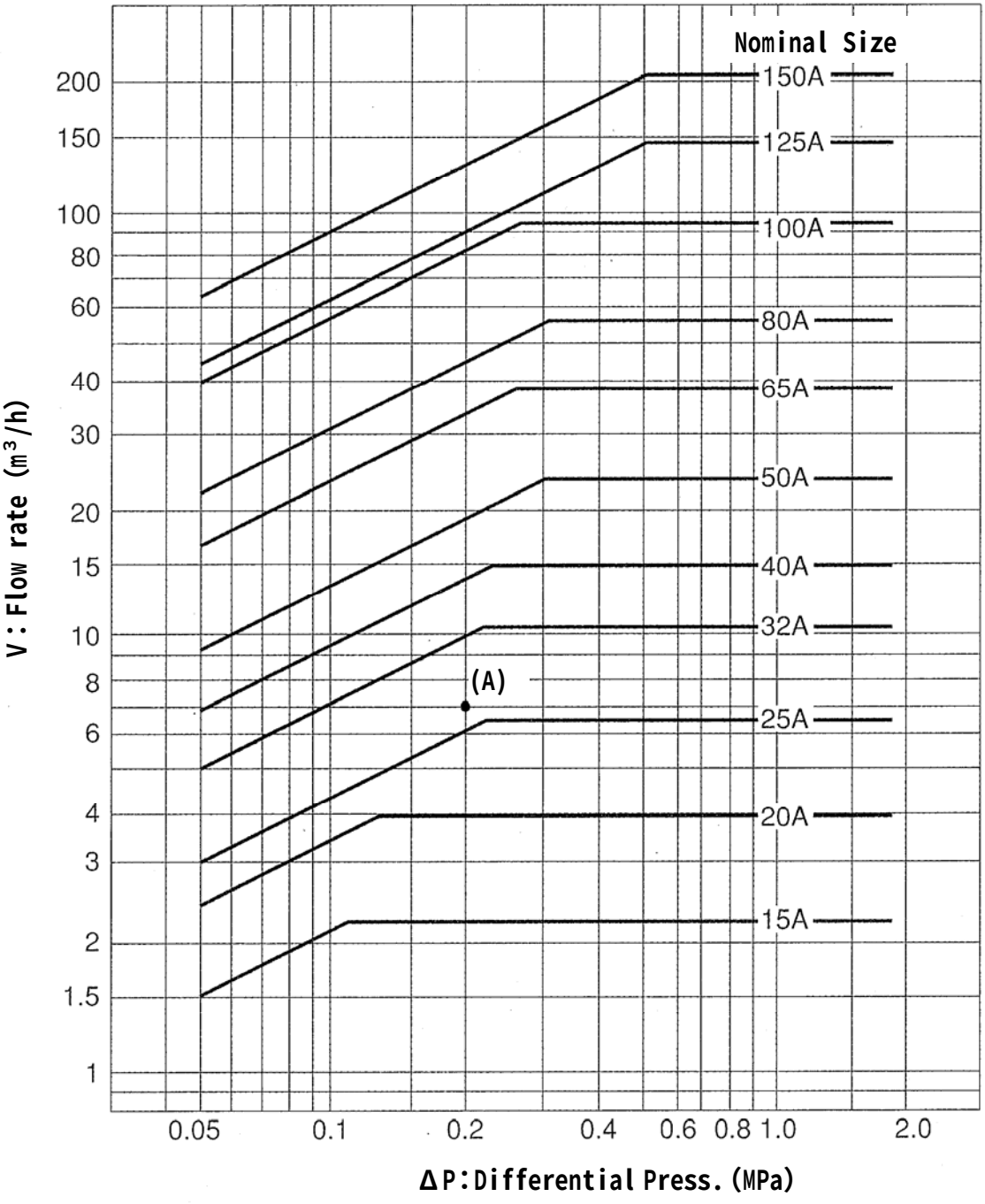


Fig.6

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 7m³/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 m³/h, the point(A) is between line of size 25A and 32A.

Choose larger size 32A for application.

< For Air >

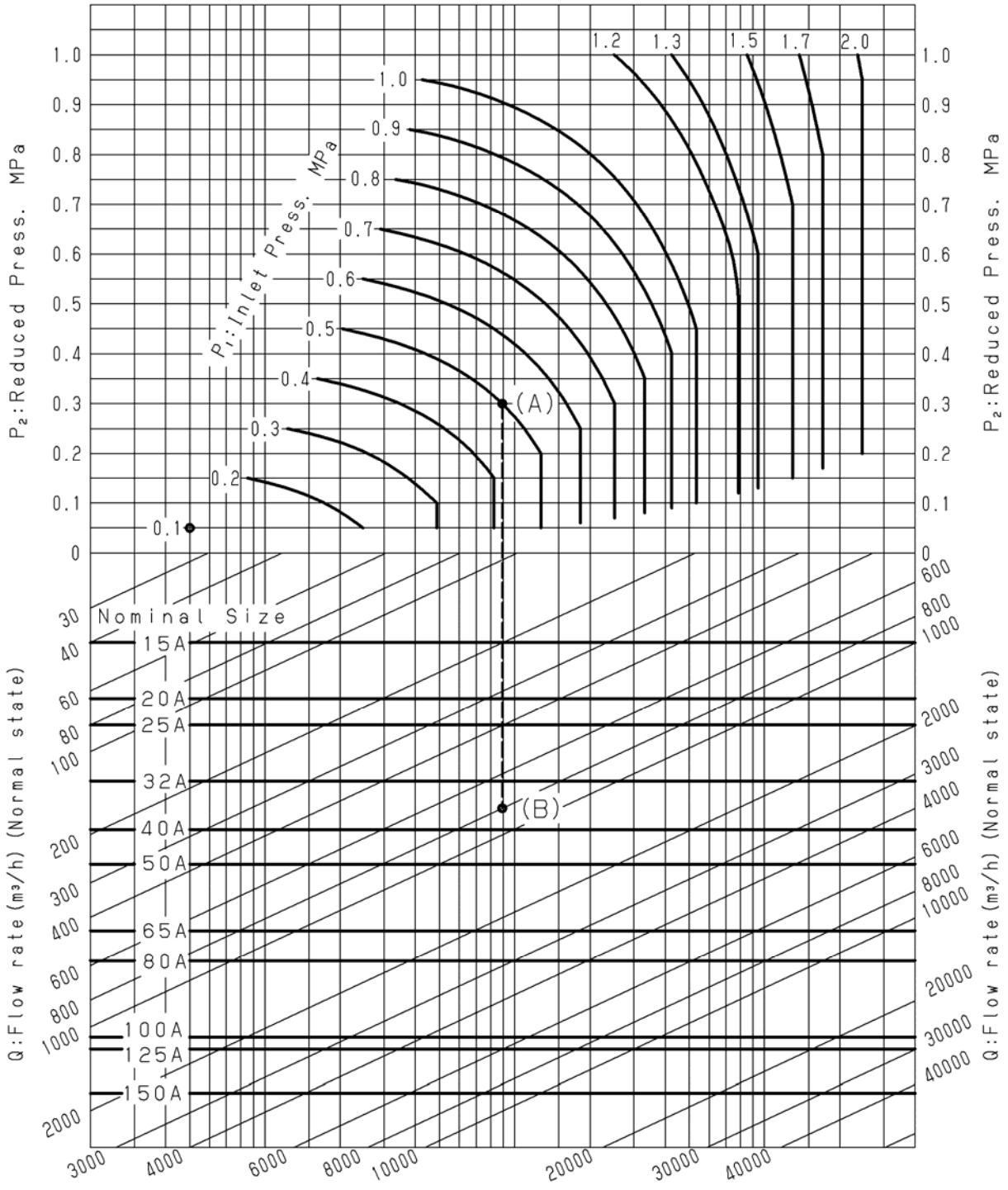


Fig.7

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 800Nm³/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.

5．2 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 $p_2 \le \frac{p_1}{2}$

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

< 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.

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

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 (m³/h)

Viscosity Correction Curve

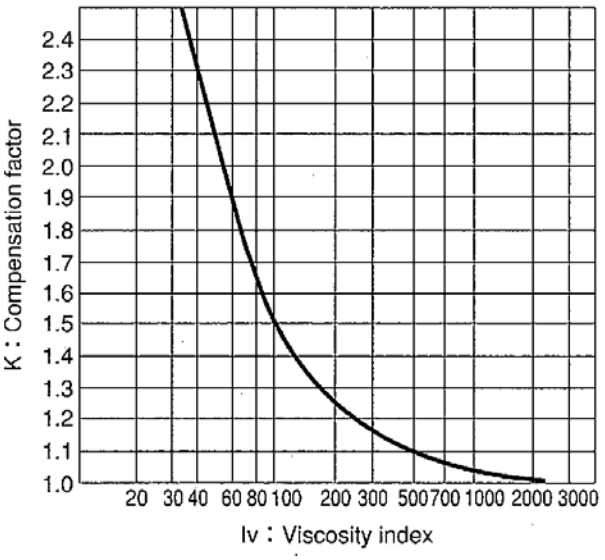


Fig.8

P_1: Inlet pressure [MPa·A]
P_2: Reduced pressure [MPa·A]
ΔP: $P_1 - P_2$ [MPa]
G : Specific gravity
(Gas : Specific gravity relative to air
Liquid : Specific gravity relative to water)
V : Max. liquid flow rate [m³/h]
Q : Max. gas flow rate [m³/h(Normal state)]
t : Temperature [℃]
Cv : Cv value of the nominal size
Iv: Viscosity index
Mcst: Viscosity {cSt}

6. Installation

6.1 Example of Piping

●For Water

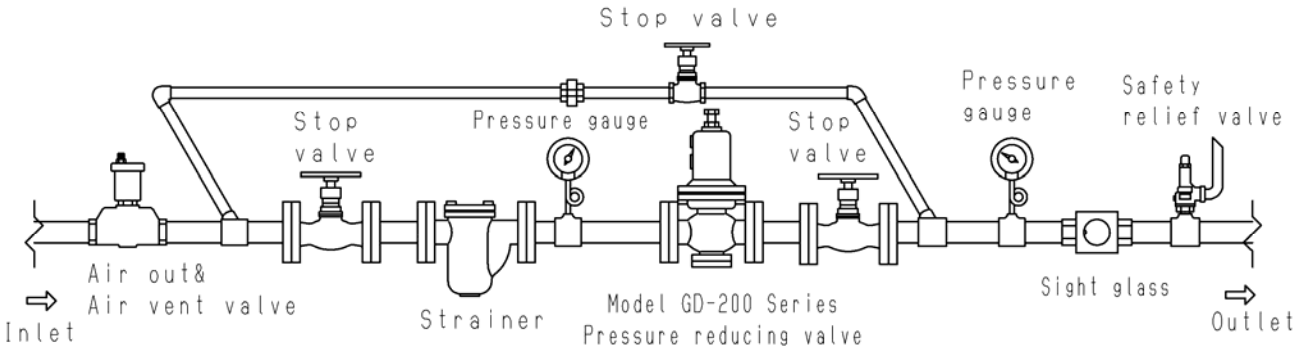


Fig.9

●For Air

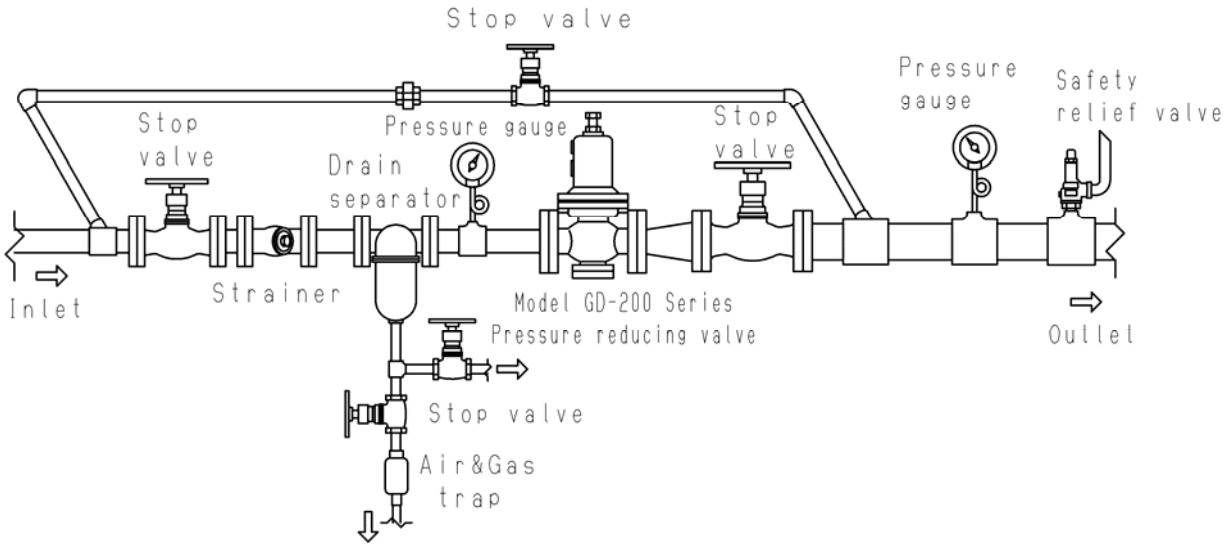


Fig.10

6．2 Precautions before operation

⚠ Caution

(1) 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.

(2) Do not disassemble the valve unreasonably.
※Disassembling the valve at your discretion may affect the original performance.

(3) Remove foreign matter and scales from the lines before connecting the valve.
※Failure to do so may prevent the valve from functioning correctly.

(4) 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.

(5) Install a safety valve at the valve outlet sides for alarms.
※Failure to do so prevents problem identification, resulting in equipment damage.

(6) Install a pressure gauge at both the inlet and outlet sides of the valve.
※Failure to do so may hamper correct pressure adjustment.

(7) 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.

(8) 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.

(9) 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.

(10) Install the valve in proper direction of the fluid flow.
※Failure to do so may affect the original performance.

(11) Do not apply excessive load, torque or vibration to the valve.
※Doing so may result in malfunction or drastically shortened service life.

(12) Pipes can be installed either horizontally or vertically except over the size of 100A.

(13) The safety valve should be set as described below.

Table 6 Safety valve setting pressure table

Setting pressure of a reducing valve (MPa)	Setting pressure of a safety valve (MPa)
0.1 or less	Setting pressure of a reducing valve +0.05 or more
0.11-0.4	Setting pressure of a reducing valve +0.08 or more
0.41-0.6	Setting pressure of a reducing valve +0.1 or more
0.61-0.8	Setting pressure of a reducing valve +0.12 or more
0.8 and above	Setting pressure of a reducing valve +15%

(14) If the large valve is used for gas, install a reducer to prevent excessive flow speed. (The flow speed made in pipings is appropriate, if it is 15m/s or less.)

(15) Above the center of the pipe line, be sure to reserve enough space larger than H_2(Fig.3). Please see the following table.

Table 7 (mm)

Nominal Size	15A	20A	25A	32A	40A	50A	65A	80A	100A	125A	150A
H_2	500	500	500	650	650	650	800	800	1000	1200	1400

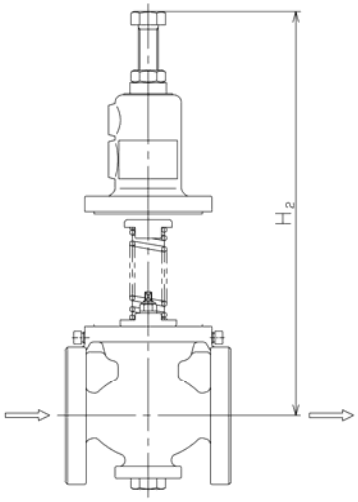


Fig.11

7. Operating Procedure

7. 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.

7．2 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 nut⑭, and slowly turn the adjusting screw⑬ (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 nut⑭.
(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.

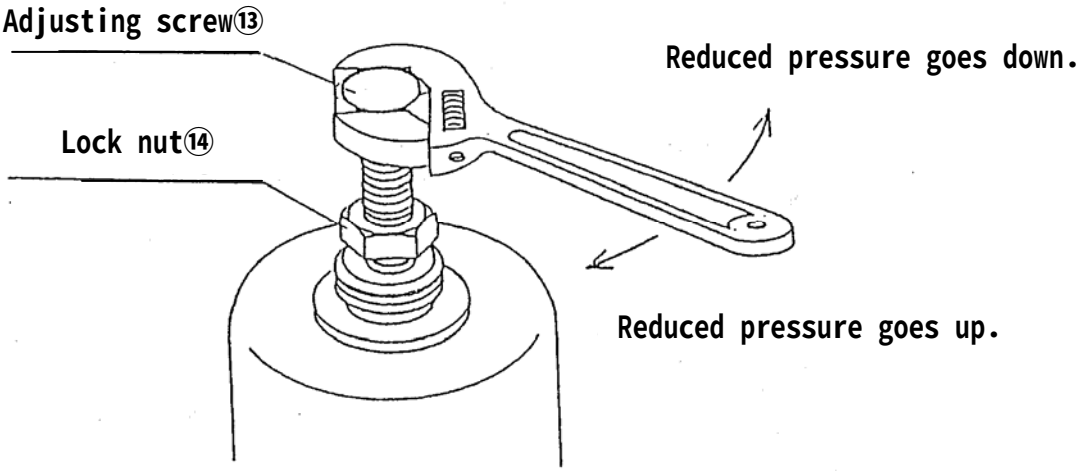


Fig.12

8. Maintenance Procedure

8.1 Troubleshooting

Problem	Causes	Solutions
Pressure does not rise to desired level.	1. Incorrect pressure is being used. 2. The conductor pipe⑮ is clogged with foreign matter. 3. Nominal size is too small for these specifications. 4. Incorrect adjustment. 5. Strainer is clogged. 6. Pressure gauge malfunction.	1. Correct the pressure being used. (Refer to the "Specifications".) 2. Disassemble and clean the conductor pipe. 3. Replace with the correct nominal sized item. 4. Re-adjust according to the adjustment procedure. (Refer to the "Adjustment Procedure".) 5. Disassemble and clean. 6. Replace the pressure gauge.
Reduced pressure exceeds prescribed level.	1. Foreign matter is embedded in the valve ④ and/or valve seat ③, or else scratches exist. 3. By-pass valve is leaking.	1. Disassemble and clean. If scratches exist, replace them. 3. Repair or replace the valve.
External leakage	Diaphragm⑨ is broken.	Replace Diaphragm⑨
Abnormal noise is heard.	1. Nominal size is too large for these specifications. 2. Pressure reduction ratio is too large. 3. Air problem is caused.(Liquid use) 4. An abrupt OPEN/CLOSE valve is located too close to the pressure reducing valve.	1. Replace with the correct nominal sized item. 2. Use a two-stage reduction. (Refer to the "Specifications".) 3. Install a trap. 4. Allow as much distance as possible between the valves.

※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, and etc. First, check the said particulars before above troubleshooting.

8．2 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 8

Serviceable life	Parts name/number
3 years	Valve④、O ring⑦、Diaphragm⑨
5 years	O ring⑲⑳㉑㉒

※For circled numbers, refer to ３. Dimension & Weight.

8．3 Disassembly

(１) Releave the internal pressure completely, and make sure of zero pressure.
(２) Slightly loosen the lock nut⑭ and turn the adjusting screw⑬ counter clockwise to relieve the adjusting spring⑫ (Unload the spring).
(３) Remove the hexagon bolt⑰ from the spring chamber②,then remove the spring chamber②, and take out the adjusting spring⑫ and the spring plate⑩ .
(４) To remove the diaphragm⑨ , fix the spindle⑤ and remove the U nut⑱.
(５) To remove the retainer⑥, loosen and remove the retainer guide clamping bolt ⑯ and pull the retainer guide⑧.
Remove it by the bellow method (Fig.13,Fig.14) when it is difficult to remove the retainer guide⑧.
(６) To remove the valve seat③, pull the spindle⑤.
(７) Fix two planar sections at spindle⑤ and loosen U nut for spindle to remove it, then the valve can be dismounted.

Nominal Size 15A~50A

To remove the retainer guide⑧ easily, install the spring plate⑪ and U nut ⑱ to spindle⑤ again and pull the spring plate⑪. (Fig.4)

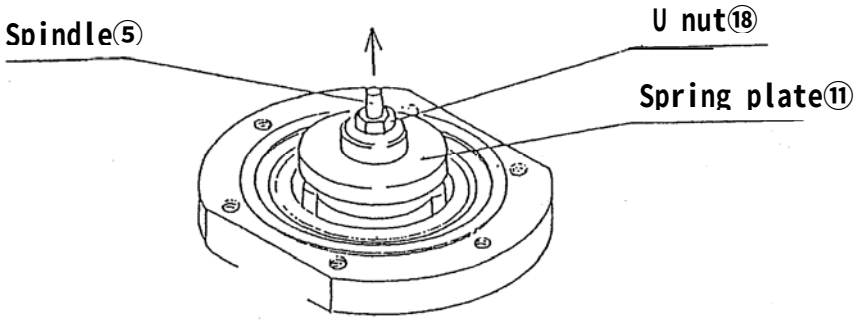


Fig.13

Nominal Size 65A~100A

To remove the retainer guide⑧ easily, screw the retainer guide clamping bolt ⑯ to retainer guide⑧ and pull it.(Fig.5)

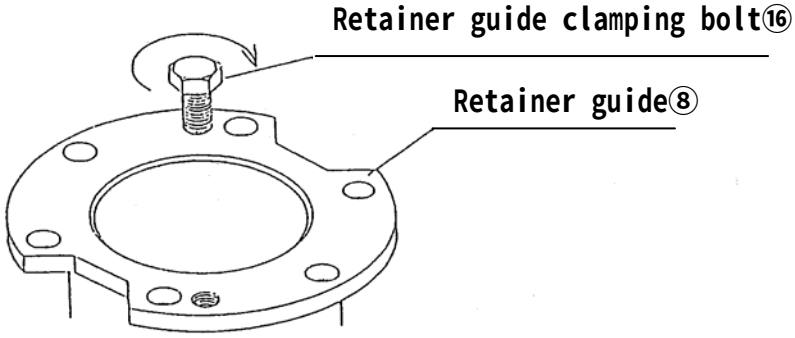


Fig.14

8．4 Precautions during disassembly

(1) Make sure that the diaphragm⑨, the valve seat③, and the valve④ have no scratches.

(2) Apply the silicon grease to the O-Ring⑦ after confirm whether there are any flaw on the O-Ring⑦.

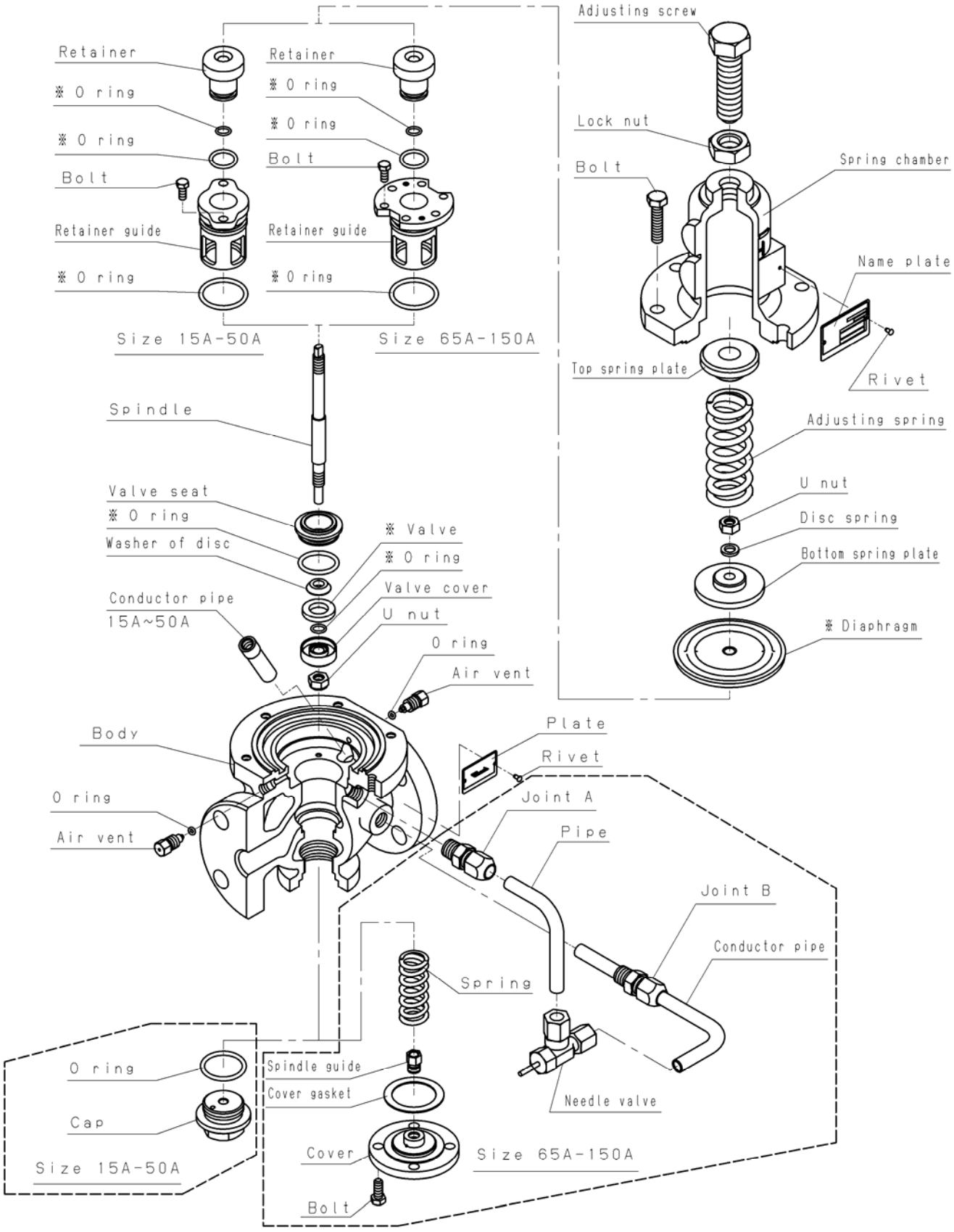
(3) Install the spring chamber② after the confirm whether the border of diaphragm ⑨ is fitted with the groove of body①.

(4) For size 15A to 50A, assemble spring chamber② after confirming the outer circumference of diaphragm⑨ interlaces with groove at the body①.
For size 65A to 150A of GD-200H, confirm the bolt hole of diaphragm⑨ fit to bolt hole at body①.
Tightening torque of U nut⑱ for diaphragm and hexagon bolt⑰ for spring chamber are described below.

Table 9

Nominal size	65A、80A	100A	125A、150A
Tightening torque of U nut⑱ (N-m)	60	60	280
Tightening torque of hexagon bolt⑰ (N-m)	20	40	50

8．5 Exploded drawing



- **Parts with the ※ are consumable.**
  Please contact us for purchase of these consumable parts.