

# Model GP-1000T Series

## PRESSURE REDUCING VALVE FOR AIR AND NON-CORROSIVE GASES

### Installation & Operation Manual

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. ("Caution" may also be used to indicate other unsafe practices or risks of property damage.)

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## 1. Features

GP-1000T Series pressure reducing valves for air and non-corrosive gases are pilot-operated valves which can be used with confidence for small to large flow rate, in a host of applications ranging from building utilities systems, air-conditioning systems, and factory systems, etc.

## 2. Specifications

| Model                        |                 | GP-1000T                                       | GP-1010T     | GP-1200T                                                                  | GP-1210T     |
|------------------------------|-----------------|------------------------------------------------|--------------|---------------------------------------------------------------------------|--------------|
| Connection                   |                 | Flanged (JIS 10K FF)                           | JIS Rc Screw | Flanged (JIS 10K FF)                                                      | JIS Rc Screw |
| Nominal size                 |                 | 15~100A                                        | 15~50A       | 15~100A                                                                   | 15~50A       |
| Application                  |                 | Air and non-corrosive gases                    |              |                                                                           |              |
| Control type                 |                 | Spring type                                    |              | Air-loaded type                                                           |              |
| Inlet pressure               |                 | 0.1~1.0 MPa                                    |              |                                                                           |              |
| Reduced pressure             |                 | 0.05~0.9 MPa                                   |              |                                                                           |              |
|                              |                 | 90% or less of inlet pressure (gauge pressure) |              |                                                                           |              |
| Loading air pressure         |                 | -----                                          |              | Refer to Standard loading pressure<br>– setting pressure reference chart. |              |
| Min. differential pressure   |                 | 0.05 MPa                                       |              |                                                                           |              |
| Max. pressure reducing ratio |                 | 20 : 1                                         |              |                                                                           |              |
| Max. temperature             |                 | 80℃                                            |              |                                                                           |              |
| Valve seat leakage           |                 | Zero                                           |              |                                                                           |              |
| Material                     | Body            | Ductile cast iron                              |              |                                                                           |              |
|                              | Valve           | Brass +Composition rubber                      |              |                                                                           |              |
|                              | Valve seat      | Stainless steel                                |              |                                                                           |              |
|                              | Piston/Cylinder | Brass or Bronze                                |              |                                                                           |              |
|                              | Gasket          | Non asbestos                                   |              |                                                                           |              |
| Body hydraulic test          |                 | 2.0 MPa                                        |              |                                                                           |              |

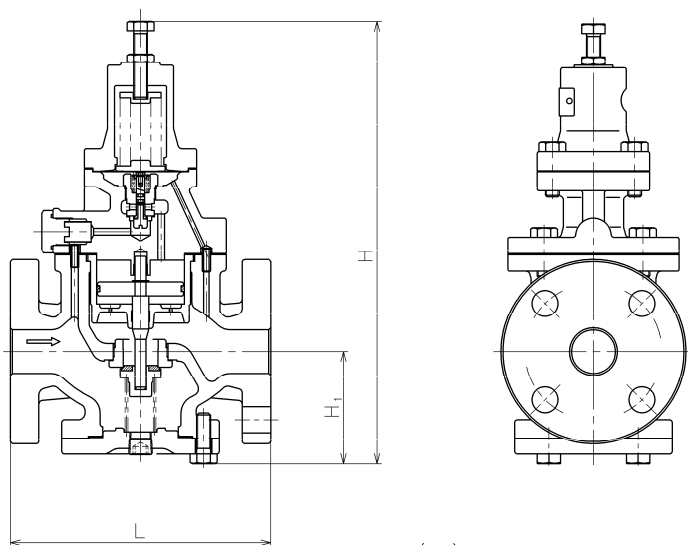
- Stainless steel main components (piston, cylinder & valve) are also available.(GP-□□□□TS)
- Stainless steel types are also available for GP-1000T and GP-1200T.(15~50A)  
(GP-1000TSS: Wetted parts stainless steel, GP-1000TAS: All stainless steel)  
(GP-1200TSS: Wetted parts stainless steel)

### ⚠ Caution

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

### 3. Dimensions and Weights

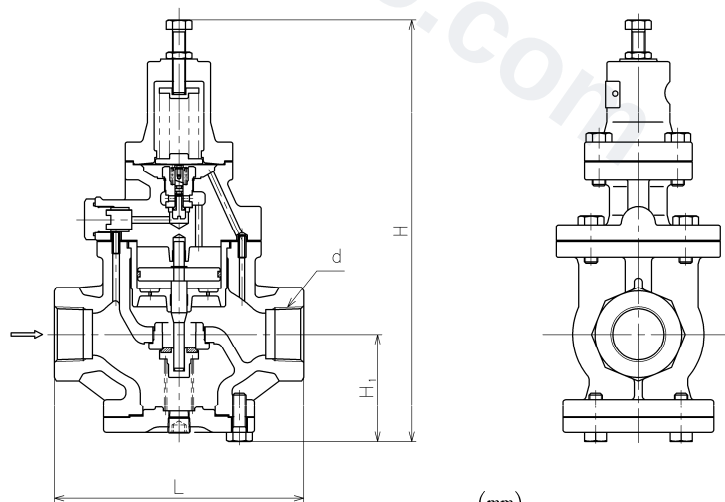
#### • GP-1000T



(mm)

| Size | L   | H   | H <sub>1</sub> | Weight (kg) |
|------|-----|-----|----------------|-------------|
| 15A  | 150 | 285 | 64             | 8.0         |
| 20A  | 155 | 285 | 64             | 8.5         |
| 25A  | 160 | 300 | 67             | 10.0        |
| 32A  | 190 | 323 | 82             | 14.0        |
| 40A  | 190 | 323 | 82             | 14.5        |
| 50A  | 220 | 347 | 93             | 20.0        |
| 65A  | 245 | 357 | 100            | 30.0        |
| 80A  | 290 | 404 | 122            | 35.0        |
| 100A | 330 | 450 | 144            | 52.5        |

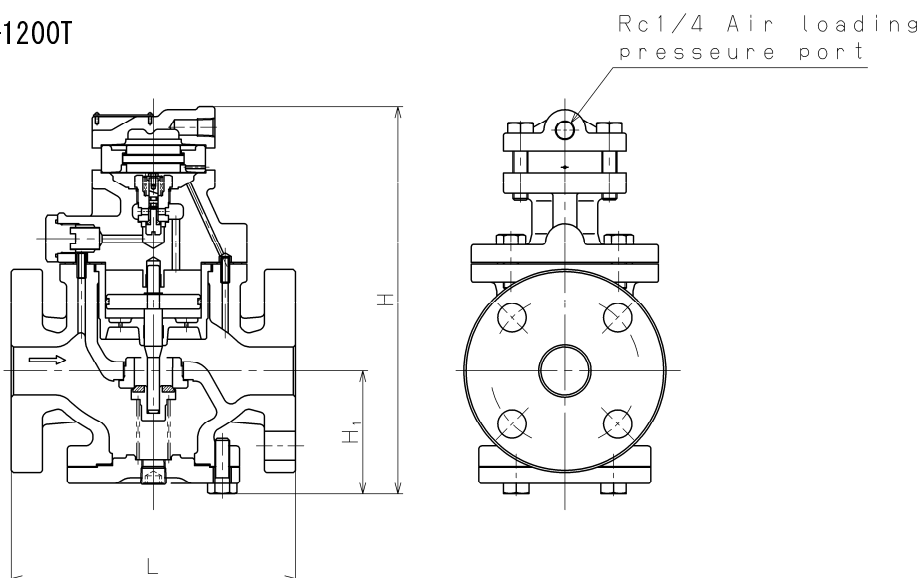
#### • GP-1010T



(mm)

| Size | d        | L   | H   | H <sub>1</sub> | Weight (kg) |
|------|----------|-----|-----|----------------|-------------|
| 15A  | Rc 1/2   | 150 | 285 | 64             | 7.0         |
| 20A  | Rc 3/4   | 155 | 285 | 64             | 7.0         |
| 25A  | Rc 1     | 160 | 300 | 67             | 8.5         |
| 32A  | Rc 1-1/4 | 190 | 323 | 82             | 12.0        |
| 40A  | Rc 1-1/2 | 190 | 323 | 82             | 12.5        |
| 50A  | Rc 2     | 220 | 347 | 93             | 18.0        |

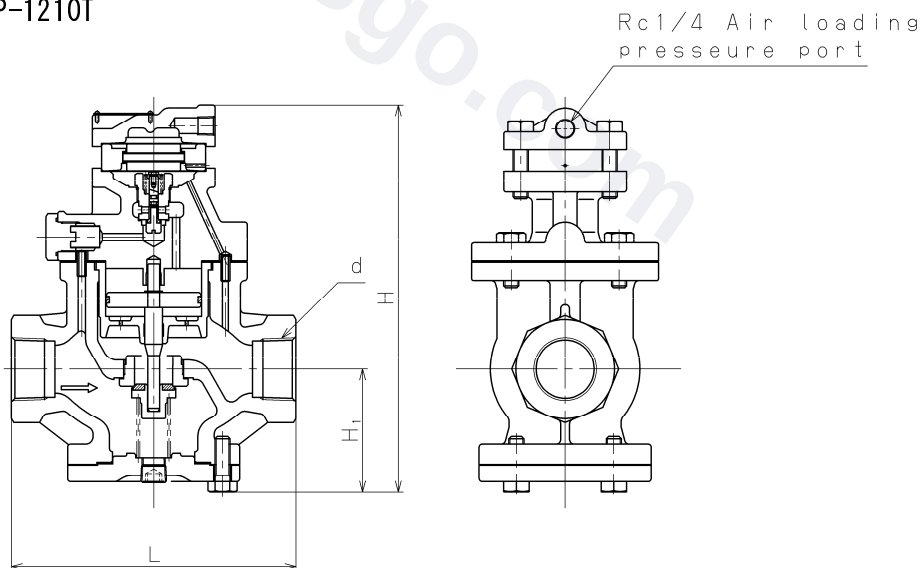
• GP-1200T



(mm)

| Size | L   | H   | H <sub>1</sub> | Weight (kg) |
|------|-----|-----|----------------|-------------|
| 15A  | 150 | 220 | 64             | 8.0         |
| 20A  | 155 | 220 | 64             | 8.5         |
| 25A  | 160 | 235 | 67             | 10.0        |
| 32A  | 190 | 258 | 82             | 14.0        |
| 40A  | 190 | 258 | 82             | 14.5        |
| 50A  | 220 | 282 | 93             | 20.0        |
| 65A  | 245 | 292 | 100            | 30.0        |
| 80A  | 290 | 339 | 122            | 35.0        |
| 100A | 330 | 385 | 144            | 52.5        |

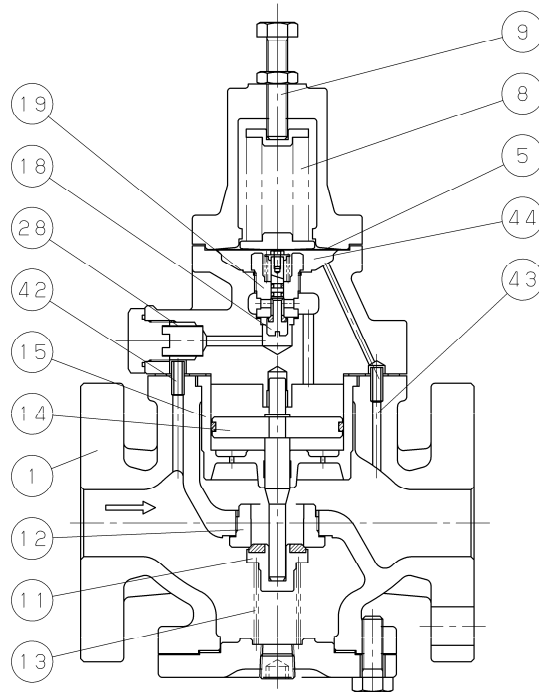
• GP-1210T



(mm)

| Size | d        | L   | H   | H <sub>1</sub> | Weight (kg) |
|------|----------|-----|-----|----------------|-------------|
| 15A  | Rc 1/2   | 150 | 220 | 64             | 7.0         |
| 20A  | Rc 3/4   | 155 | 220 | 64             | 7.0         |
| 25A  | Rc 1     | 160 | 235 | 67             | 8.5         |
| 32A  | Rc 1-1/4 | 190 | 258 | 82             | 12.0        |
| 40A  | Rc 1-1/2 | 190 | 258 | 82             | 12.5        |
| 50A  | Rc 2     | 220 | 282 | 93             | 18.0        |

## 4. Operation



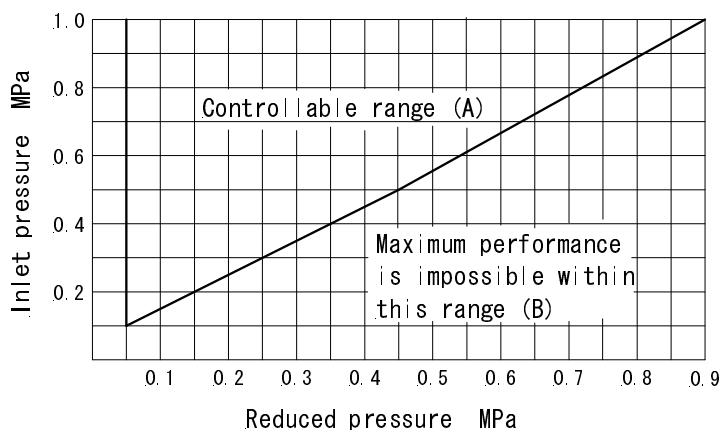
| No. | Parts name                  |
|-----|-----------------------------|
| 1   | Body                        |
| 5   | Diaphragm                   |
| 8   | Adjusting spring            |
| 9   | Adjusting screw             |
| 11  | Main valve                  |
| 12  | Main valve seat             |
| 14  | Piston                      |
| 15  | Cylinder                    |
| 18  | Pilot valve                 |
| 19  | Pilot valve seat            |
| 28  | Strainer                    |
| 42  | Inlet press. passage        |
| 43  | Reduced press. Sensing port |
| 44  | Diaphragm chamber           |

The pressure reducing valve reduces pressure by the throttling the valve. The valve is composed of the main valve and main valve seat for throttling, and adjusting spring (air-loaded pressure when the remote control type is used), diaphragm, pilot valve, and piston for pressure sensing and activation.

- (1) When the pressure reducing valve is mounted correctly, releasing the compression of adjusting spring [8] (When the remote control type is used, the loading air pressure must be set to zero.) allows the spring to close main valve [11] and pilot valve [18]. Slowly open the gate valve and allow the high pressure fluid to flow in. Inlet pressure is applied to the downside of the main valve. High pressure fluid passes through strainer [28] via inlet pressure passage [42] to also apply inlet pressure to the downside of the pilot valve.
- (2) Turning adjusting screw [9] clockwise compresses the spring (When the remote control type is used, increase air-loaded pressure.), which flexes diaphragm [5] to open the pilot valve.
- (3) Inlet pressure via inlet pressure passage and pilot valve enters the upside of the piston. The pressure overrides the pressure on the downside of the main valve and the load of main valve spring, to open the main valve. The fluid then begins to flow from the inlet side.
- (4) Reduced pressure is led to diaphragm chamber [44] via reduced pressure sensing port [43]. The diaphragm receives the reduced pressure to be balanced with the adjusting spring load (When the remote control type is used, to be balanced with air-loaded pressure.), and control the pilot valve travel.
- (5) The change of pilot valve travel changes the flow rate of fluid to the upside of the piston, and controls the main valve travel to obtain appropriate reduced pressure.

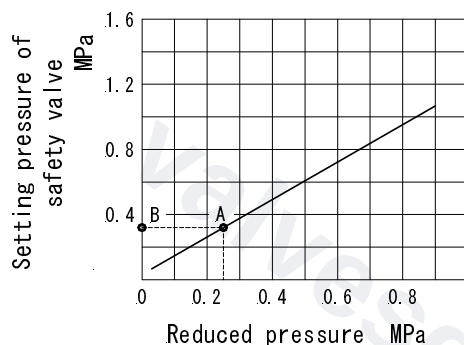
## 5. Nominal Size Selection Method

### 5.1 Pressure reducing valve specification selection chart



Find the intersection point of the inlet and reduced pressures. The GP-1000T series valves are suitable within range (A). When within range (B), maximum performance cannot be obtained.

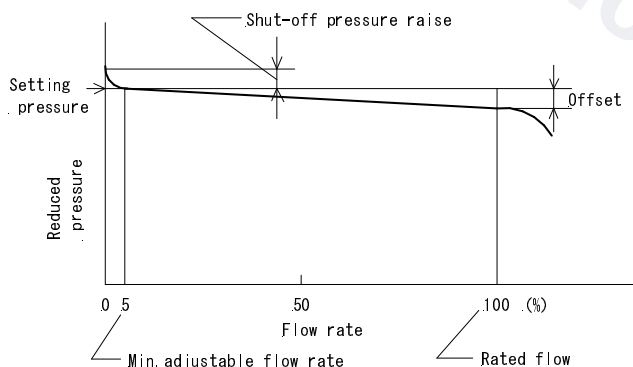
### 5.2 Safety valve setting pressure chart



Determine the reduced pressure of pressure reducing valve. Find the intersection point (A) with the chart curve. Next, find point (B) by proceeds horizontally from point (A) to the left until the 'Setting pressure of safety valve' axis. The setting pressure of the safety valve should be higher than the pressure of the point (B).

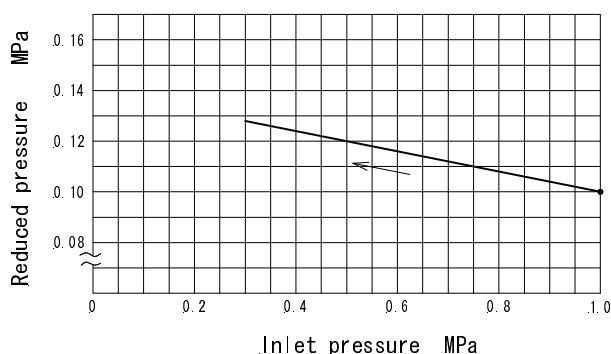
### 5.3 Characteristics chart

#### (1) Flow rate characteristics chart



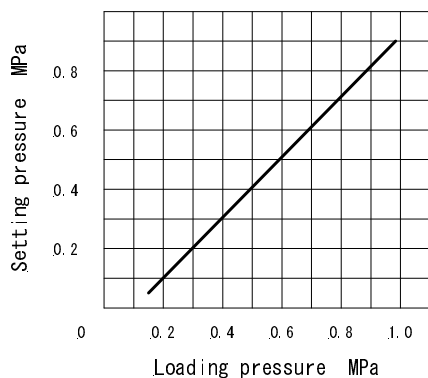
- Shut-off pressure raise : 0.02 MPa or less
- Offset : 0.03 MPa or less  
(Setting pressure: 0.05~0.1 MPa)  
: 0.05 MPa or less  
(Setting pressure: 0.1~0.9 MPa)

#### (2) Pressure characteristics chart



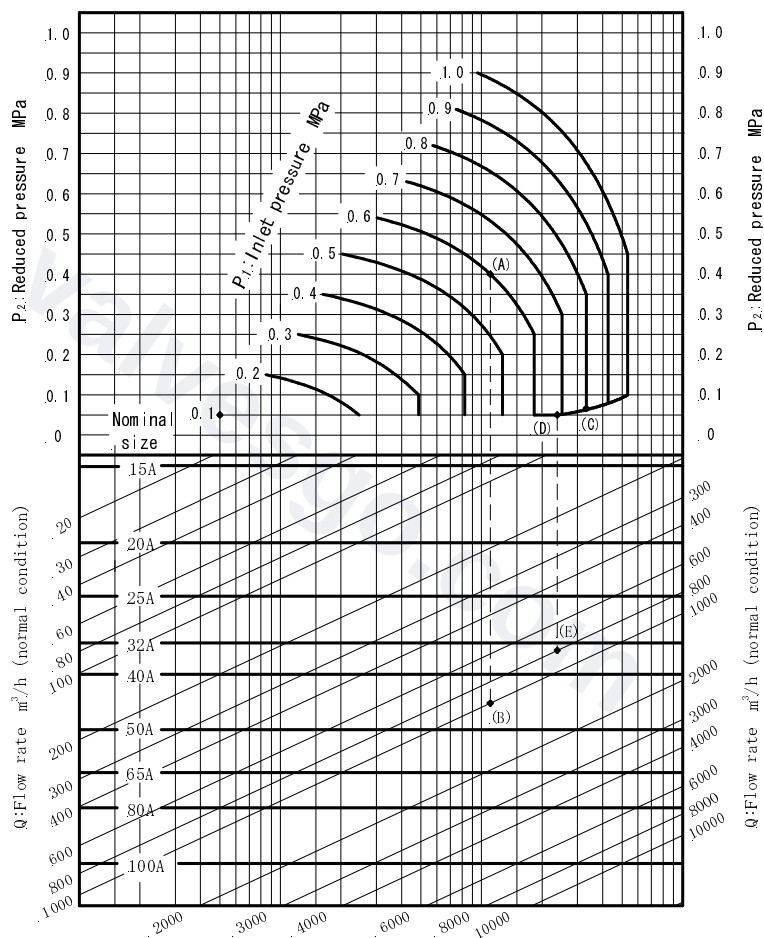
Reduced pressure is set to 0.1 MPa when inlet pressure is 1.0 MPa. The chart indicates a variation in reduced pressure when the inlet pressure is changed from 1.0 to 0.3 MPa.

## 5.4 Standard loading pressure-setting pressure chart line



The setting pressures corresponding to the loading pressure are shown left. As slight deviations from the loading pressure-setting pressure chart line shown left may occur depending on conditions, such as the length of the air line, etc., a setting pressure which is high enough to cover such deviations should be selected.

## 5.5 Nominal size selection chart (Fluid : Air, Temperature : 20°C)



[Ex.1]

For example, take a pressure reducing valve whose inlet pressure ( $P_1$ ) is 0.6 MPa, reduced pressure ( $P_2$ ) is 0.4 MPa, flow rate 1000  $\text{m}^3/\text{h}$  (normal condition). First, find the point of intersection (A) of inlet pressure 0.6 MPa and reduced pressure 0.4 MPa. Vertically proceed from point (A) to come across the flow rate 1000  $\text{m}^3/\text{h}$  (normal condition), and regard this point as (B). Point (B) is between nominal sizes 40A and 50A. Select the larger nominal size 50A.

[Ex.2]

For example, take a pressure reducing valve whose inlet pressure ( $P_1$ ) is 0.8 MPa, reduced pressure ( $P_2$ ) is 0.05 MPa, flow rate 800  $\text{m}^3/\text{h}$  (normal condition). First, find the point of intersection (C) of inlet pressure 0.8 MPa and the diagonal line. Move leftward down the diagonal line to intersection point (D) where the diagonals line intersect with the reduced pressure 0.05 MPa. Vertically proceed from point (D) to come across the flow rate 800  $\text{m}^3/\text{h}$  (normal condition), and regard this point as (E). Point (E) is between nominal sizes 32A and 40A. Select the larger nominal size 40A.

## 5.6 Nominal size selection calculation formula

The appropriate nominal size can be calculated by obtaining the Cv value for the operating conditions in question, as shown below.

• Cv value calculation formula

$$P_2 > \frac{P_1}{2}$$

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

$$P_2 \leq \frac{P_1}{2}$$

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

Q: Max. Fluid flow rate [m<sup>3</sup>/h (normal condition)]

P<sub>1</sub>: Inlet pressure [MPa · A]

P<sub>2</sub>: Reduced pressure [MPa · A]

ΔP: P<sub>1</sub> - P<sub>2</sub> [MPa]

G: Specific gravity

(Specific gravity per air)

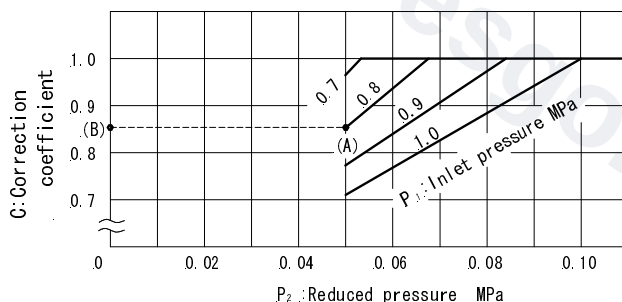
t: Fluid temperature [°C]

• Rated Cv value table (When Cv correction coefficient is C=1)

| Nominal size   | 15A | 20A | 25A | 32A | 40A | 50A | 65A | 80A | 100A |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Rated Cv value | 1   | 2.3 | 4   | 6.5 | 9   | 16  | 25  | 36  | 64   |

※Correction of rated Cv value

If the inlet pressure exceeds 0.7 MPa, and the pressure reducing ratio exceeds 10:1, find the appropriate correction coefficient C using chart below, and multiply the rated Cv value, and obtain the corrected Cv value.



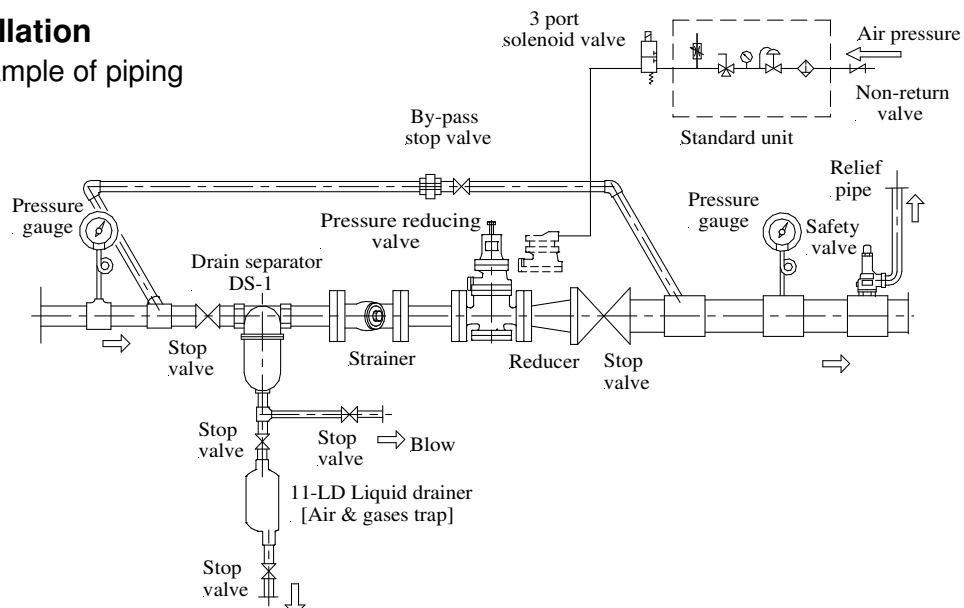
[Ex.]

Take a pressure reducing valve whose inlet pressure is 0.8 MPa, reduced pressure is 0.05 MPa. Find the inlet and reduced pressure intersection point (A) at the left chart, then draw a horizontal line in the leftward direction to point (B) which indicates a correction coefficient of 0.85. For a nominal size of 25A, the corrected Cv value would be calculated as follows:

$$4(\text{rated Cv value}) \times 0.85(\text{correction coefficient}) = 3.4$$

## 6. Installation

### 6.1 Example of piping





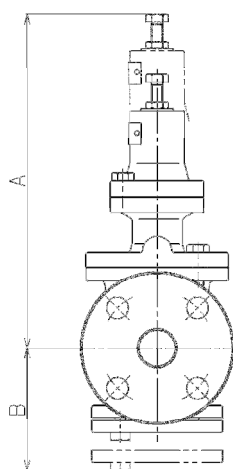
## 6.2 Precautions during installation

### ⚠ Warning

- (1) Because of heavy weight, hold the valve with lifting equipment while piping. Refer to “**3. Dimensions and weights**” table for the valve weight.  
※Failure to do so may result in injury due to dropping the valve.
- (2) In case installing safety valve as safety device at outlet side, joint relief pipe at outlet of safety valve and guide it to safety place where the fluid can relief out.  
※When the fluid temperature is high, failure to do so may result in burns.

### ⚠ Caution

- (1) Do not disassemble the valve unreasonably.  
※Disassembling the valve at your discretion may affect the original performance.
  - (2) Remove foreign matter and scales from the lines before connecting the valve.  
※Failure to do so may prevent the valve from functioning correctly.
  - (3) Install a strainer (Recommendation:80-100mesh or equivalent) at the valve inlet side.  
※Failure to do so may hamper correct pressure control, which affects the original performance.
  - (4) Install a safety valve at the valve outlet sides as safety device for equipment.  
※Failure to do so prevents problem identification, resulting in equipment damage.
  - (5) Install a pressure gauge at both the inlet and outlet sides of the valve.  
※Failure to do so may hamper correct pressure adjustment.
  - (6) Install a steam trap to the inlet sides of the valve to prevent drainage problems.  
※Failure to do so may result in drainage problem, affecting the original performance.
  - (7) When installing quick open and close valves, such as a solenoid valve, install it at inlet side as much as possible, and secure at least 3 m from the valve.  
※Failure to do so may result in malfunction or drastically shortened service life.
  - (8) When pressure reducing in two stages, secure at least 3 m between the valves.  
※Failure to do so may result in malfunction, affecting the original performance.
  - (9) Install the valve in proper direction of the fluid flow.  
※Failure to do so may affect the original performance.
  - (10) Do not apply excessive load, torque or vibration to the valve.  
※Doing so may result in malfunction or drastically shortened service life.
- (1) Install the valve perpendicularly to horizontal lines.
  - (2) Provide the by-pass line. (See 6.1 Example of piping)
  - (3) When the pressure reducing ratio is large, install a reducer to keep the flow velocity in the pipe below 15 m/s or less.
  - (4) Provide space on the top and bottom of the valve so that the valve can be easily disassembled and inspected. (See Fig.1)



| Nominal size | A (mm)      |                 | B   |
|--------------|-------------|-----------------|-----|
|              | Spring type | Air-loaded type |     |
| 15A          | 310         | 240             | 125 |
| 20A          |             |                 |     |
| 25A          |             |                 | 135 |
| 32A          | 330         | 260             | 155 |
| 40A          |             |                 |     |
| 50A          | 340         | 270             | 175 |
| 65A          | 350         | 280             | 190 |
| 80A          | 370         | 300             | 225 |
| 100A         | 390         | 320             | 265 |

Fig.1

## 7. Operating Procedure

### 7.1 Precautions during operation

#### Warning

- (1) Do not touch the valve directly with bare hands.  
※When the fluid temperature is high, doing so may result in burns.
- (2) Before flow the steam in pipe line, make sure the fluid can flow without any dangerous at the end of pipe line and pipe line is connected tightly.  
※In case the fluid blow off, it may result in burns when the fluid temperature is high.

#### 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. And, open each stop valve slowly.  
※Failure to do so may prevent the valve from functioning correctly. And, It may cause hunting, water hammer, etc., resulting in damage to the valve and other equipment when the stop valve is opened quickly.
- (2) Secondary pressure at by-pass line must be lower than set pressure.  
※Safety valve blows in case secondary pressure at by-pass line becomes higher than set pressure.
- (3) When adjusting pressure, slowly turn the adjusting screw. (When air-loaded type is used, slowly increase loading air pressure.)  
※Incorrect adjustment may cause hunting, water hammer, etc., resulting in damage to the valve and other equipment.
- (4) 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 procedures

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 valve at inlet and outlet side of the pressure reducing valve, and taking sufficient time not to blow the safety valve, blow off the fluid to remove foreign matter via the by-pass line. After blowing, close the by-pass line stop valve.
- (2) Slowly open the stop valve at the inlet side of the pressure reducing valve, and adjust the travel of the stop valve at the outlet side of the pressure reducing valve so that a little fluid flows.
- (3) Loosen the lock nut, and slowly turn the adjusting screw to achieve the desired pressure (clockwise to increase, counterclockwise to reduce) while observing the pressure gauge on the outlet side. When the air-loaded type is used, the loading air pressure must be set to zero and slowly increase air-loaded pressure.
- (4) Slowly open the stop valve at the outlet of the pressure reducing valve, and readjust the desired pressure.
- (5) After adjustment, tighten the lock nut. When the air-loaded type is used, lock the pressure reducing valve for the loading air pressure.

## 8. Maintenance Procedure

### 8.1 Troubleshooting

| Problem                                                 | Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pressure does not reach the desired value.              | <ol style="list-style-type: none"> <li>1. Incorrect pressure is being used.</li> <li>2. Strainer [28] is clogged.</li> <li>3. Foreign matter exists between piston [14] and cylinder [15].</li> <li>4. O ring [16] is damaged.</li> <li>5. Nominal size is too small for the specifications.</li> <li>6. Pressure is not adjusted correctly.</li> <li>7. Strainer installed before pressure reducing valve is clogged.</li> <li>8. Pressure gauge is faulty.</li> <li>9. Loading air pressure is insufficient. (Air-loaded type)</li> </ol> | <ol style="list-style-type: none"> <li>1. Correct the pressure.</li> <li>2. Disassemble and clean the strainer.</li> <li>3. Disassemble and remove the foreign matter. When any scratches are identified, polish them away using a paper. Change the parts if scratches still exist after polishing.</li> <li>4. Replace the O ring.</li> <li>5. Change the nominal size appropriately.</li> <li>6. Observe the adjustment procedures and readjust pressure.</li> <li>7. Disassemble and clean it.</li> <li>8. Replace it.</li> <li>9. Increase loading air pressure.</li> </ol> |
| Reduced pressure raises above than the specified value. | <ol style="list-style-type: none"> <li>1. Foreign matter exists between main valve [11] and main valve seat [12], or scratches exist.</li> <li>2. Foreign matter exists between pilot valve [18] and pilot valve seat [19], or scratches exist.</li> <li>3. Foreign matter exists between piston [14] and cylinder [15].</li> <li>4. Trap is not provided for dead-end line.</li> <li>5. By-pass valve is leaking.</li> <li>6. Diaphragm [5] is damaged.</li> </ol>                                                                         | <ol style="list-style-type: none"> <li>1. Disassemble and remove the foreign matter. When any scratches are identified, change the parts.</li> <li>2. Disassemble the pilot valve assembly, and clean or replace it.</li> <li>3. Disassemble and remove the foreign matter. When any scratches are identified, polish them away using a paper. Change the parts if scratches still exist after polishing.</li> <li>4. Install a trap.</li> <li>5. Repair or replace it.</li> <li>6. Replace the diaphragm.</li> </ol>                                                            |
| Abnormal noise is heard.                                | <ol style="list-style-type: none"> <li>1. Nominal size is too large for the specifications.</li> <li>2. Pressure reducing ratio is too large.</li> <li>3. An abrupt OPEN/CLOSE valve is located too close to the pressure reducing valve.</li> <li>4. Outlet pipe is too small.</li> </ol>                                                                                                                                                                                                                                                  | <ol style="list-style-type: none"> <li>1. Change the nominal size appropriately.</li> <li>2. Reduce pressure in two stages.</li> <li>3. Allow as much as possible between the valves.</li> <li>4. Select a pipe size that will produce a flow velocity of 30m/s or less.</li> </ol>                                                                                                                                                                                                                                                                                              |
| Other                                                   | <ol style="list-style-type: none"> <li>1. Springs and diaphragm are worn.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ol style="list-style-type: none"> <li>1. Replace the springs and diaphragm.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

- Foreign matter and scales in a pipe may cause most of problems of pressure reducing valve. Be careful sufficiently to foreign matter in a 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.
- Consult factory when cannot make a judgement whether parts need replacement or not.

## 8.2 Precautions during maintenance and inspection

### Warning

- (1) 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. When the remote control type is used, confirm the loading air pressure is set to zero.
  - ※When the fluid temperature is high, failure to do so may result in injury or burns due to residual pressure or spillage around the valve.

### Caution

- (1) In order to maintain original performance and function, examine daily and personal inspection. And, periodical inspection must be examined according to the regulations of every kind.
  - ※For general users, request to specialized dealer or manufacture.
- (2) Pressure reducing valve shall be disassembled and inspected by qualified person or manufacture.
  - ※Request the treatment to specialized dealer or manufacture in case of any problems.
- (3) While disassembly, drain flow out from the valve, so catch it by container. And release steam completely before disassembling.
  - ※In case of no container for drain, it makes dirty surrounding the valve.
- (4) 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.
- (5) When adjusting pressure, slowly increase loading air pressure. (When air-loaded type is used, slowly increase loading air pressure.)
  - ※Incorrect adjustment may cause hunting, water hammer, etc., resulting in damage to the valve and other equipment.
- (6) 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) In case of no operation for a long period of time, perform operating exam before start operation again.
  - ※Request the treatment to specialized dealer or manufacture in case of any problems.

## 8.3 Disassembly

Be sure that the stop valves at inlet and outlet side of pressure reducing valve is closed and all internal pressure and condensate have discharged before disassembling the valve.

### (1) Pilot valve

- 1. Loosen the lock nut [10] and turn the adjusting screw [9] to release the spring [8] (no compression). When the air-loaded type is used, loading air pressure must be set to zero.
- 2. Remove the bolt [33] of the spring chamber [4]. Remove the spring chamber, spring, top spring plate [6], bottom spring plate [7], and diaphragm [5]. When the air-loaded type is used, remove the bolt [46] of the cover [42] and remove the cover, pilot diaphragm [43], diaphragm case [44], diaphragm plate [45], and diaphragm [5].
- 3. Remove the pilot valve assembly [18], [19] using a ring spanner or socket wrench (nominal size 22)

### (2) Piston

- 1. Remove the bolt [34] of the top cover [2] and the top cover. Pick up the spindle [17], and remove the O ring [16].

### (3) Main valve

- 1. Remove the bolt [35] of the bottom cover [3]. Remove the bottom cover, main valve spring [13], and main valve [11].

#### 8.4 Precautions during disassembly

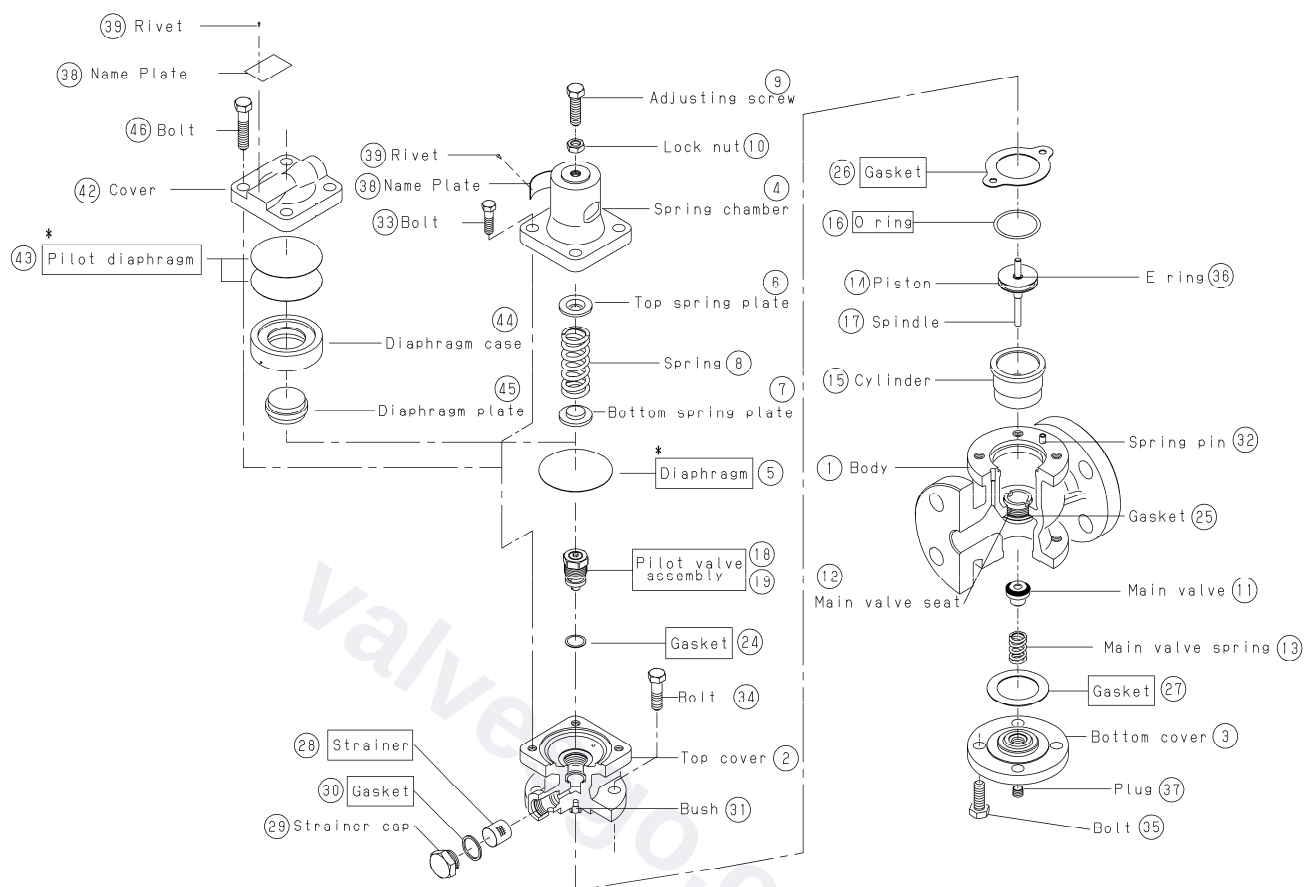
##### Caution

- (1) Check that there is no damage and scratches on the main valve, main valve seat, pilot valve, and pilot valve seat.
  - ※Any scratches at sealing surface lead to increase in secondary pressure. When any scratches are identified at main valve and seat, change the parts. Also, in case any scratches are identified at pilot valve and pilot valve seat, change into pilot valve assembly.
- (2) Move the sliding section (pilot valve, piston, etc.) two to three times and confirm they move smoothly.
  - ※If the sliding parts do not move correctly, it may cause failure problems. (Working not correctly).
- (3) Replace gaskets with new ones when reassembling.
  - ※If the gasket is used for a long time, it may cause the fluid leakage problem.
- (4) Assemble in the reverse order of Disassembly. And tighten the bolts evenly.
  - ※Assemble the valve due to the order. Failure to do so may lead to not assemble correctly. And if the hexagon bolts are not screwed correctly, it may cause steam leakage problem.

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## 8.5 Exploded drawing

The parts shown below are used for the air-loaded type.



Parts with \* in the flame are consumable. Please contact us for purchase of these consumable parts.

| No.   | Name of parts        | Replace period |
|-------|----------------------|----------------|
| 5     | Diaphragm            | 2 years        |
| 16    | O ring               | 3 years        |
| 18·19 | Pilot valve assembly | 5 years        |
| 24    | Gasket               | 5 years        |
| 26·27 | Gasket               | 2 years        |
| 28    | Strainer             | 5 years        |
| 30    | Gasket               | 2 years        |
| 43    | Pilot diaphragm      | 2 years        |

Note (\*): Apply a liquid sealant for heat and steam resistant (Recommendation: SOLVEST 110) to the sealing surface of the diaphragm bottom and the top cover.