

Model GD-6 Pressure Reducing Valve Product manual

Thank you very much for choosing the Yoshitake's product.
To ensure the correct and safe use of the product, please read this manual before use.
This manual shall be kept with care for future references.

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



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



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

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YOSHITAKE

1. Specifications & Performance

Model	GD-6
Nominal Size	10A ~ 25A
Application (Fluid)	Hot and cold water, Air, Oil and Other non-dangerous fluids
Inlet Pressure	0.1 ~ 1.0 MPa
Reduced Pressure	(A) 0.02 ~ 0.1 MPa (Name plate color: Yellow) (B) 0.1 ~ 0.4 MPa (Name plate color: Blue)
Min. Differential Pressure	0.05 MPa
Max. Pressure Reduction Ratio	10:1
Application Temperature	5~80 °C
Valve leakage	Non-leakage
Coefficient of viscosity	300 cSt or less
Connection	JIS Rc screwed

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

* The valve and valve seat made of stainless steel type is also available.

* The rubber material PTFE type is also available. (Valve leakage: 0.1% or less of rated flow)

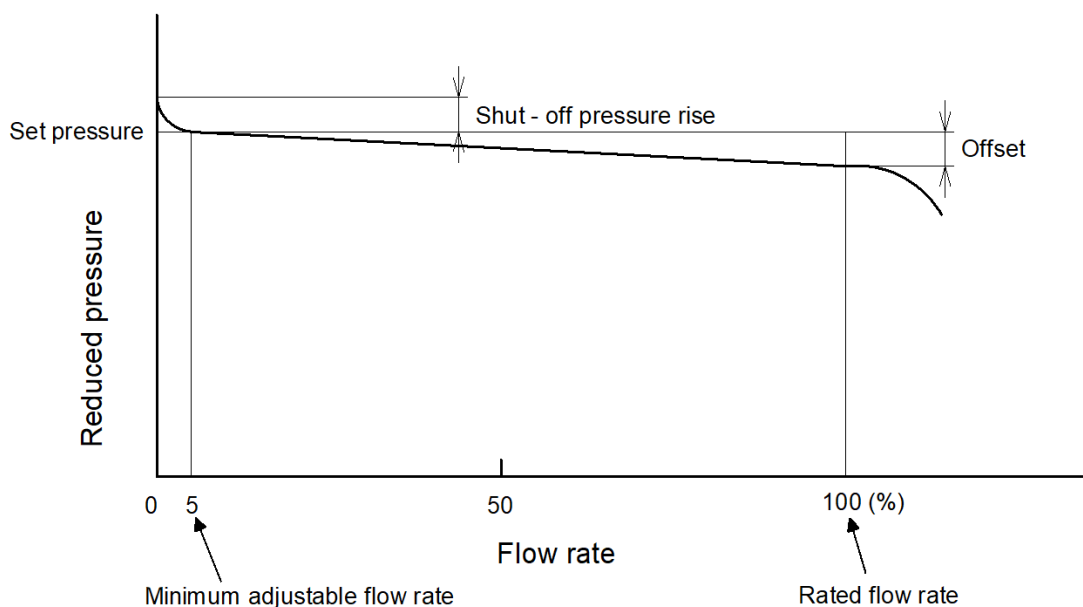
* We also manufacture products with anti-corrosion treatment (fluorine resin coating).

Caution

Please collate with attached nameplate and specification of ordered model.

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

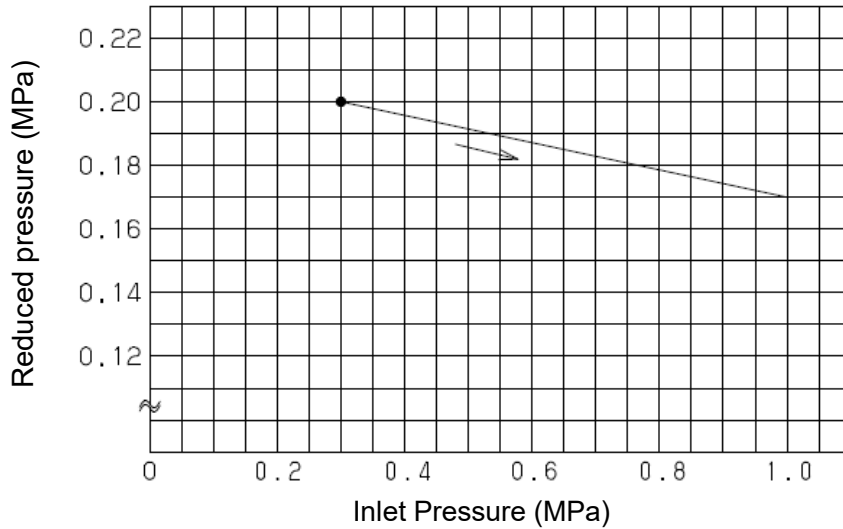
[Flow Rate Characteristics Chart]



* Shut-off pressure rise: 0.02 MPa or less

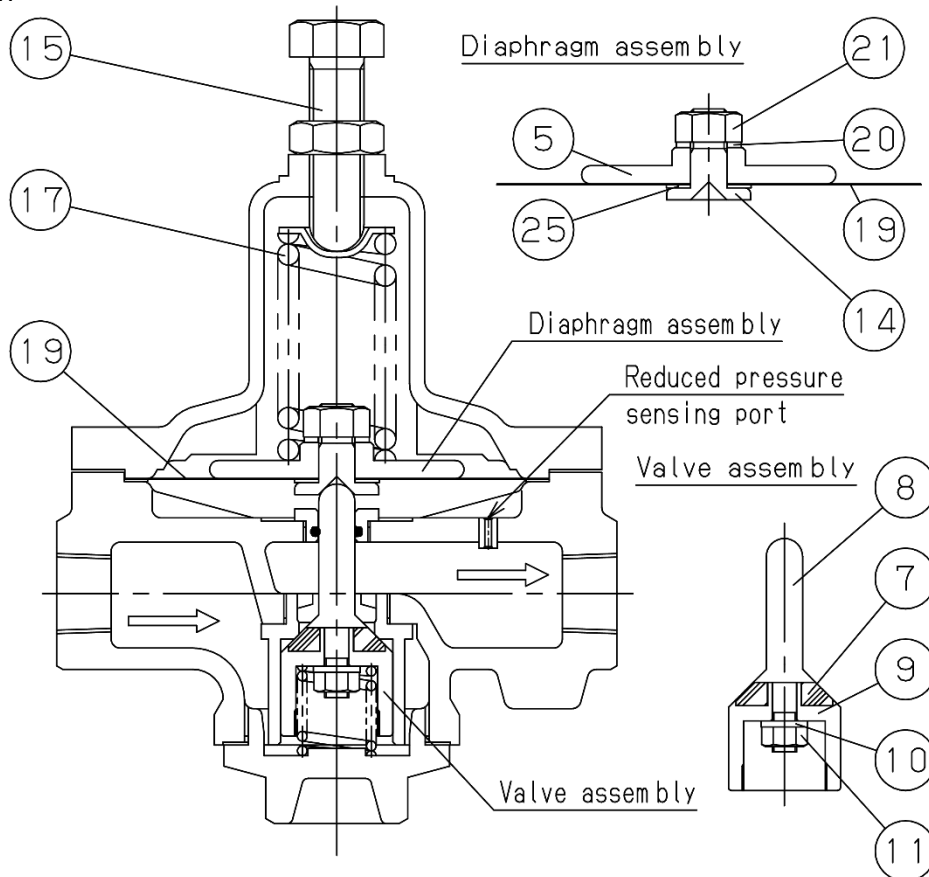
* Offset: 0.03 MPa or less

[Pressure Characteristics Chart]



The above chart shows the change in the reduced pressure when the inlet pressure is changed in the range of 0.3~1.0 MPa whereas the reduced pressure is set at 0.2 MPa at inlet pressure of 0.3 MPa.

2. Operation



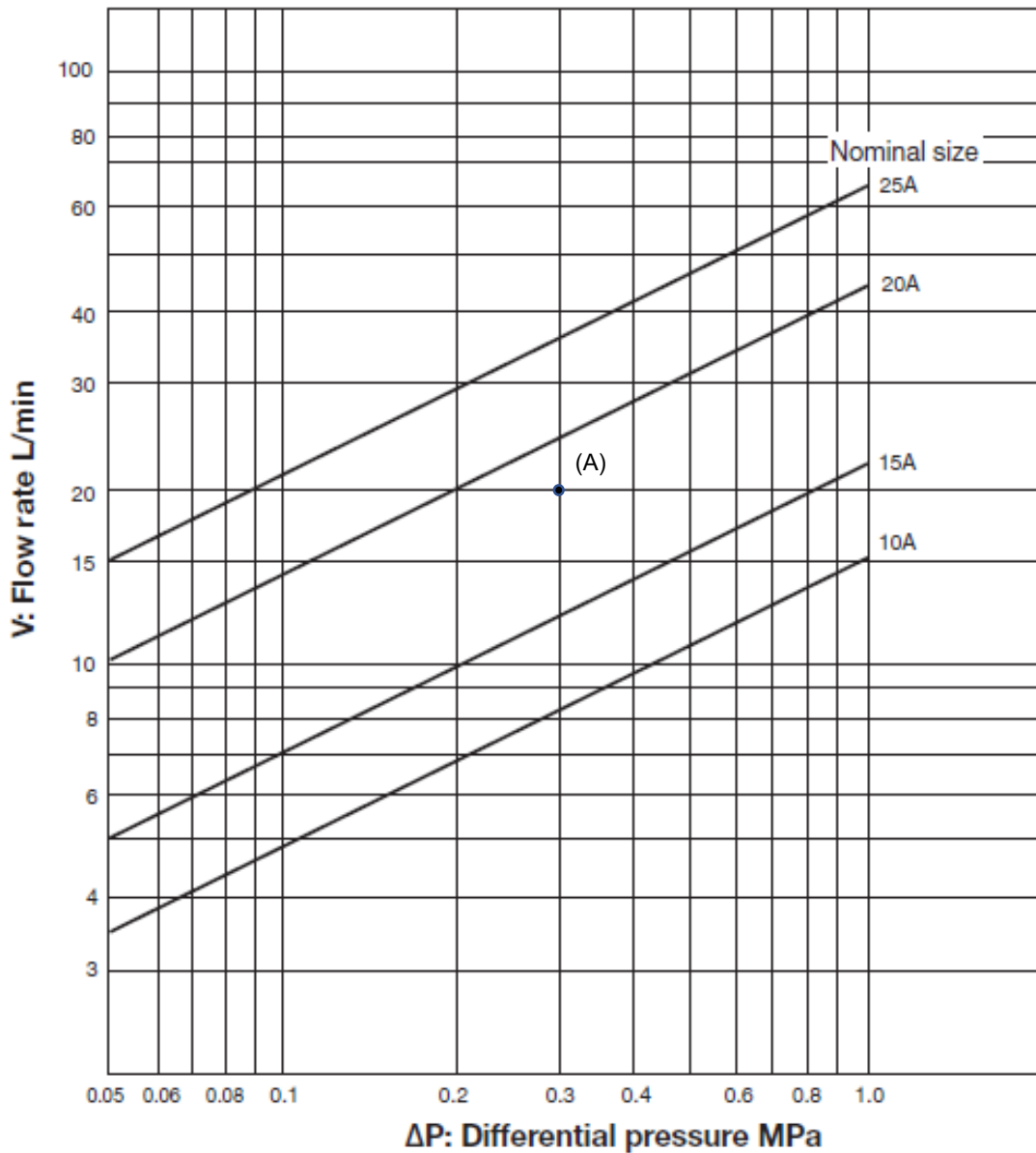
When the adjusting screw [15] is screwed in, the adjusting spring [17] is compressed, which lowers the diaphragm [19] and opens the valve assembly to allow the fluid to flow to the secondary side. When the secondary side pressure increases or decreases, the diaphragm [19] and adjustment spring [17] balance, adjust the valve opening, and maintain the secondary side pressure constant.

3. Nominal Size Selection Method

3.1 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.

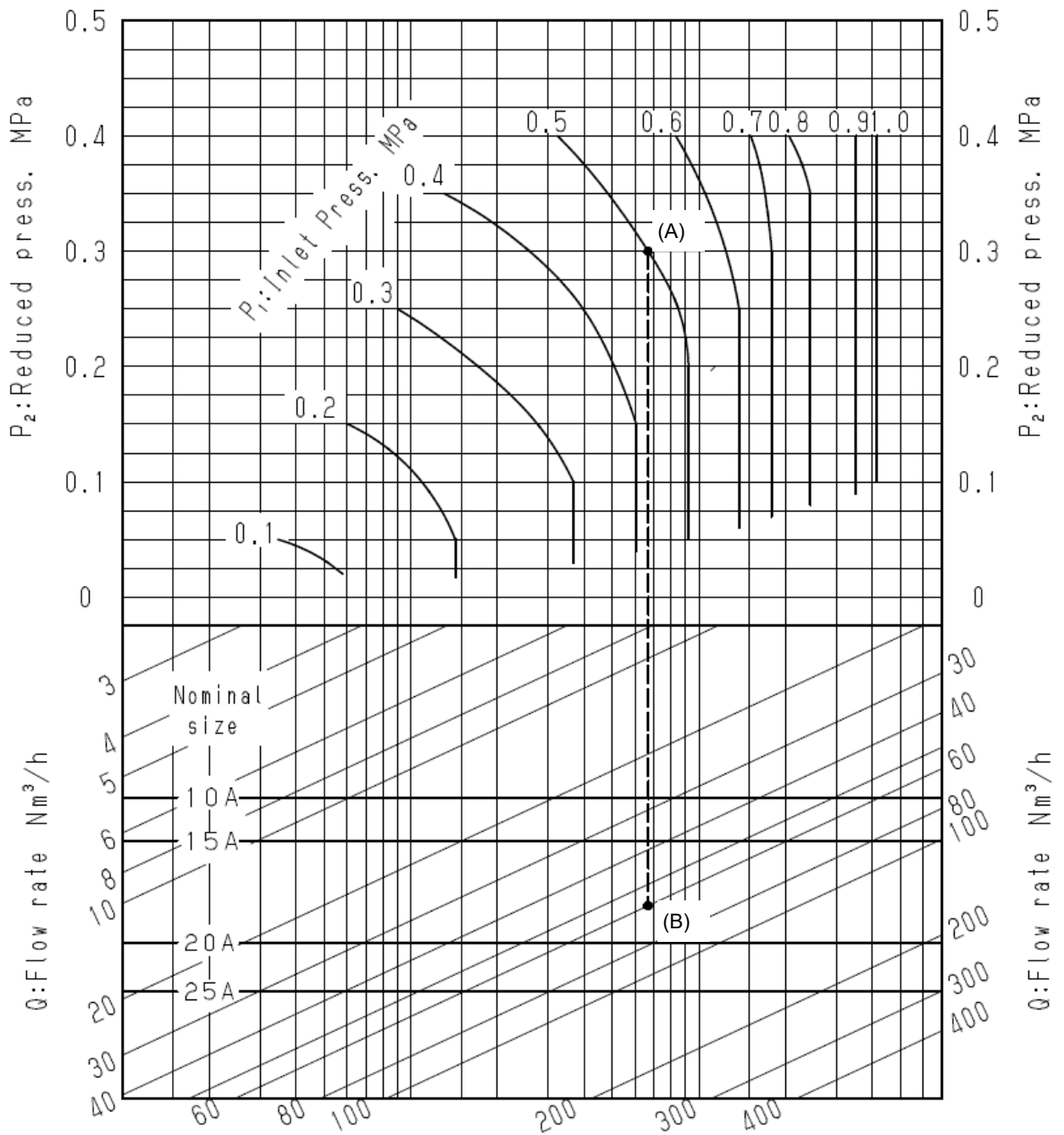
< For Water >



[Example of Selection]

When the inlet pressure (P_1) is 0.5 MPa, the reduced pressure (P_2) is 0.2 MPa and the flow rate is 20 m³/h, for instance, the size of the pressure reducing valve is selected as follows. Find the intersection point(A) of the differential pressure of 0.3 MPa with the flow rate of 20 m³/h, the point(A) is between line of size 15A and 20A. Choose larger size 20A for application.

< For Air >



[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 60 Nm³/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 15A and 20A, and choose larger size 20A for application.

3.2 Selection Formula for Nominal Size

*Cv value

Nominal Size	10A	15A	20A	25A
Cv value	0.35	0.5	1.0	1.5

[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]

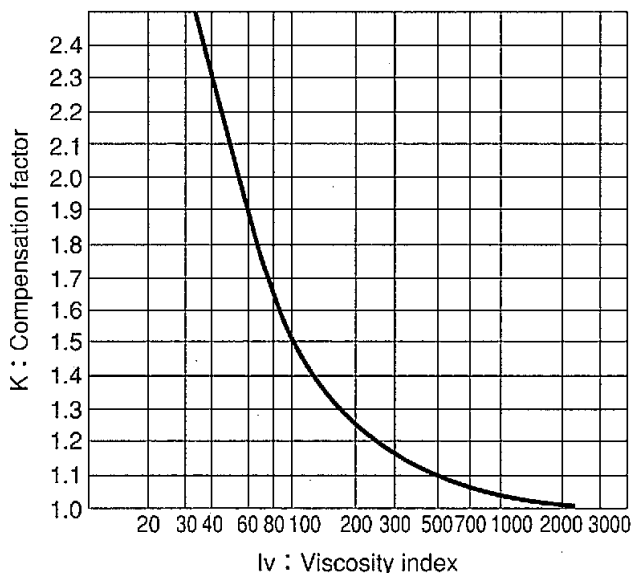
And find the viscosity index of Iv.

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

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

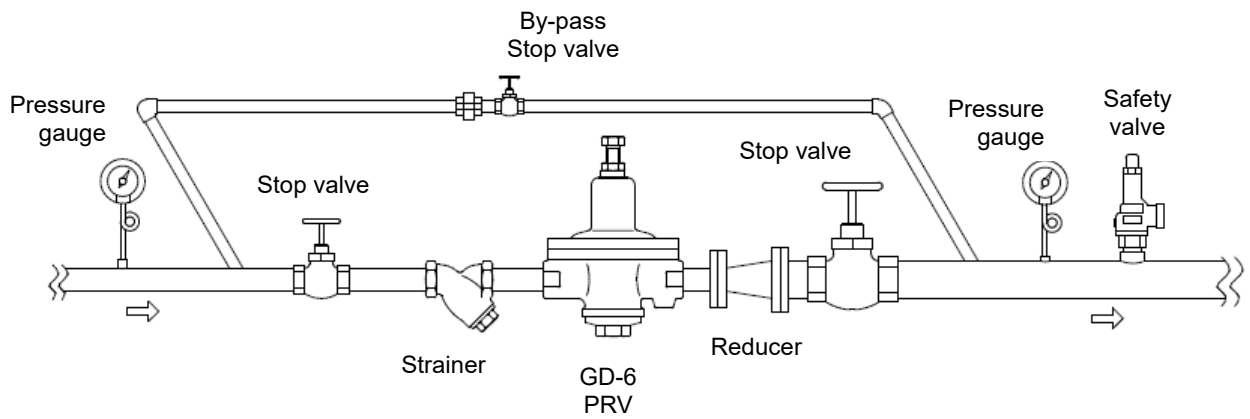


- P_1 : Inlet pressure [MPa·A]
- P_2 : Reduced pressure [MPa·A]
- ΔP : $P_1 - P_2$ [MPa]
- Q: Max. gas flow rate [m³/h (Normal state)]
- G: Specific gravity
(Gas: Specific gravity relative to air
Liquid: Specific gravity relative to water)
- t: Temperature [°C]
- V: Max. liquid flow rate [m³/h]
- Cv: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

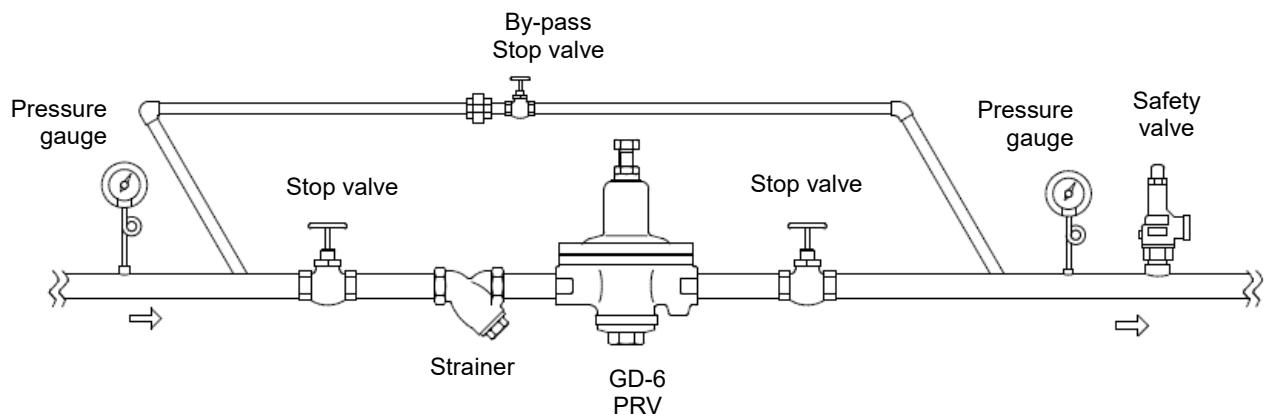
4. Installation

4.1 Example of Piping

[For Air]



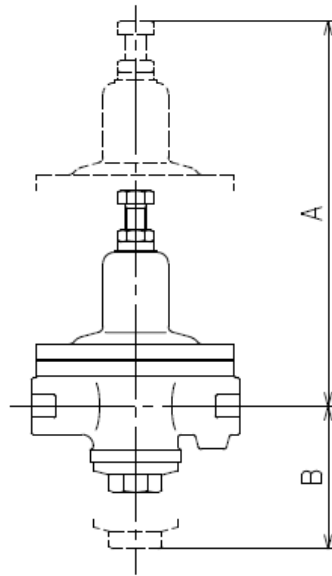
[For Water]



4.2 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) Do not disassemble the valve unreasonably.
 - * Disassembling the valve at your discretion may affect the original performance.
- (7) Remove foreign matter and scales from the lines before connecting the valve.
 - * Failure to do so may prevent the valve from functioning correctly.
- (8) 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.
- (9) Install a safety valve at the valve outlet sides for alarms.
 - * Failure to do so prevents problem identification, resulting in equipment damage.
- (10) Install a pressure gauge at both the inlet and outlet sides of the valve.
 - * Failure to do so may hamper correct pressure adjustment.
- (11) 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.
- (12) 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.
- (13) 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.
- (14) Do not apply excessive load, torque or vibration to the valve.
 - * Doing so may result in malfunction or drastically shortened service life.
- (15) Install the valve in proper direction of the fluid flow. Also, install the product so that it faces vertically upward with respect to horizontal piping.
 - * Failure to do so may affect the original performance.
- (16) Do not use dissimilar metal piping that causes a potential difference.
 - * Products and parts will corrode.
- (17) 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.)
- (18) In order to have easy maintenance, be sure to have enough space for inspection. Please see the Fig. 1.



Nominal size	(mm)	
	A	B
10A	120	100
15A		
20A		130
25A		

Fig. 1

5. Operating Procedure

5.1 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 [15].
* Incorrect adjustment may cause hunting, water hammer, etc., resulting in damage to the valve and other equipment.
- (3) When the product is not used for an extended period, completely discharge fluid from the product and pipes, and close the stop valves at the inlet and outlet sides of the product.
- (4) If the secondary side of the pressure reducing valve is closed and the fluid is retained in the product for a long period of time, the sliding parts will stick and cause malfunction.
- (5) After a long period of non-use, conduct an operation check before resuming operation.
* If there is any abnormality, please ask a professional dealer to fix it.
- (6) Following a wrong adjusting procedure may cause hunting, scale problems or other problem, and can heavily damage the main parts of the valve. To avoid these problems, follow the procedure in "6.2 Adjustment Procedure".

5.2 Adjustment Procedure

(Refer to "3. Operation" and "5.1 Example of Piping")

- (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 [16], and slowly turn the adjusting screw [15] (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 [16].


6. Maintenance Procedure
6.1 Troubleshooting

Problem	Causes	Solutions
Pressure does not rise to desired level.	<ol style="list-style-type: none"> 1. Incorrect pressure is being used. 2. Nominal size is too small for these specifications. 3. Incorrect adjustment. 4. Strainer is clogged. 5. Pressure gauge malfunction. 6. Reduced pressure sensing port is clogged with foreign matter. 	<ol style="list-style-type: none"> 1. Correct the pressure being used. 2. Replace with the correct nominal sized item. 3. Re-adjust according to the adjustment procedure. (Refer to the "Adjustment Procedure".) 4. Disassemble and clean. 5. Replace the pressure gauge. 6. Disassemble and clean
Reduced pressure exceeds prescribed level.	<ol style="list-style-type: none"> 1. Foreign matter is embedded in the valve assembly and/or valve seat [12], or else scratches exist. 2. By-pass valve is leaking. 	<ol style="list-style-type: none"> 1. Disassemble and clean. If scratches exist, replace them. 2. Repair or replace the valve.
External leakage	<ol style="list-style-type: none"> 1. Diaphragm [19] is broken. 2. Gasket [23], [24], [25] is broken. 	<ol style="list-style-type: none"> 1. Replace the diaphragm [19]. 2. Replace the gasket [23], [24], [25].
Abnormal noise is heard.	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Replace with the correct nominal sized item. 2. Use a two-stage reduction. 3. Install an air trap. 4. Keep the distance between valves at least 3m.

*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.

6.2 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) Rubber parts and components shown below are consumables. Note that the life expectancy depends on the conditions under which they are used.

Recommended replacement period	Parts name/number
3 years	*Disc [9]
5 years	O ring [27]

*Disc [9] is replaced as a valve assembly.

6.3 Disassembly

- (1) Release the internal pressure completely, and make sure of zero pressure.
- (2) Slightly loosen the lock nut [16] and turn the adjusting screw [15] counter clockwise to relieve the adjusting spring [17] (Unload the spring).
- (3) Remove the hexagon bolt [22] from the spring chamber [3], then remove the spring chamber, and take out the top spring plate [6], the adjusting spring, and the diaphragm assembly.
- (4) The diaphragm assembly can be disassembled by fixing the diaphragm stopper [14] and removing the nut [21].
- (5) Rotate the bottom cap [2] counterclockwise to remove it, and take out the valve spring [18] and the valve assembly from the body [1].

Table: Width Across Flats of Each Part

	(mm)	
	10-15A	20-25A
Lock Nut [16]	27	27
Adjusting Screw [15]	27	27
Hexagon Bolt [22]	17	17
Diaphragm [14]	24	24
Nut [21]	19	19
Bottom Cap [2]	32	41

6.4 Precautions during reassembly

Caution

- (1) Check to see that there is no foreign substance inside the body and on each part.
 - * Foreign substances prevent the product from functioning properly. To avoid the problem, remove foreign substances.
- (2) Check that there is no scratch on valve assembly or O-ring [27].
 - * A scratch on the relevant part prevents the product from functioning properly. Replace the damaged part.
- (3) Apply silicone grease to the O-ring [27].
 - * Failure to follow this notice may damage O-ring [27].
- (4) Replace gaskets [23], [24], [25] with new ones when reassembling.
 - * If the old gasket is used again, it may cause steam leakage problem.
- (5) Assemble the parts in reverse order from disassembly. Tighten the bolts [22] uniformly.
 - * Wrong order keeps the product from being assembled correctly. If the hexagon bolts [22] are not tightened uniformly, it may cause steam leakage problem.

Warranty Information

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.