

Model CP-2001 to CP-2006

Combination Valve

Instruction Manual

Please read this instruction manual thoroughly before using the combination valve, so that you may do so correctly and safely. Please carefully store this manual 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).

Contents

1.	Application of the product	1
2.	Specification and performance	1~2
3.	Available Models	2
4.	Dimensions and Weights	3~8
5.	Operation	
5. 1	Main valve operating principle	9
5. 2	Multiple control combination valve	10~12
6.	Selection of Nominal Size	
6. 1	CP—2001~2005	
6. 1. 1	Specifications selection chart	13
6. 1. 2	Safety valve setting pressure selection chart	13
6. 1. 3	Characteristics chart	14
6. 1. 4	Nominal size selection chart of pressure reducing valve	15
6. 2	CP—2006	
6. 2. 1	Nominal size selection chart of temperature regulator	16
6. 3	Nominal size selection calculation formula	17
7.	Installation procedures	
7. 1	Example of piping	18~19
7. 2	Warnings/Cautions during installation	20~24
8.	Operation procedures	
8. 1	Warnings/Cautions during operation	25
8. 2	Adjustment	25~28
9.	Maintenance procedures	
9. 1	Troubleshooting	29~31
9. 2	Warnings/Cautions during maintenance and checking	32
9. 3	Disassembly	32~33
9. 4	Cautions during re-assembling	33
9. 5	Disassembly drawing	34~37
10.	After Sales Service	

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1. Application of the product

The CP-2001 to CP-2006 combination valves are multi-function valves for steam which are equipped with a combination of special-function pilot valves which control the main valve and enable control of pressure, temperature, and ON/OFF switching, etc. As quality and productivity levels increase on today's manufacturing lines, there has been a corresponding increase in the needs for high quality, high controllable steam, and for lower cost piping systems. By offering a variety of control functions in a single unit, the CP-2001 to CP-2006 combination valves satisfy these demands.

2. Specification and performance

Model		CP-2001・2002 2003・2004	CP-2005	CP-2006
Connection		Screwed (JIS Rc) Flanged (JIS 10K FF)	Screwed (JIS Rc) Flanged (JIS 10K FF) Flanged (JIS 20K RF)	Screwed (JIS Rc) Flanged (JIS 10K FF)
Size		Screwed: 15~50A Flanged: 15~100A	Screwed: 15~50A Flanged: 15~100A	Screwed: 15~50A Flanged: 15~100A
Application		Steam		
Inlet pressure		0.1~1.0 MPa	0.1~2.0 MPa	0.1~1.0 MPa
Reduced pressure	A Spring (yellow)	0.02~0.15 MPa	0.02~0.15 MPa	
	B Spring (green)	0.1~0.85 MPa	0.1~1.4 MPa	
Min. Differential pressure		15% of Inlet pressure (gauge pressure) (Minimum value : 0.05 MPa)		0.05 MPa
Max. pressure reducing ratio		20:1		
Max. temperature		183℃	220℃	183℃
Valve seat leakage		0.01% or less of rated flow		
Solenoid valve	Solenoid valve operation	Normally closed		Normally closed
	Rated voltage	AC 100V AC 200V AC 110V AC 220V AC 240V (50/60Hz common type)		AC 100V AC 200V AC 110V AC 220V AC 240V (50/60Hz common type)
	Allowable voltage regulation	± 10% on rated voltage		± 10% on rated voltage
	Class of coil insulation	Class "H"		Class "H"
	Solenoid enclosure	Splashroof		Splashroof

Model		CP-2001・2002 2003・2004	CP-2005	CP-2006
Temperature regulator	Heated application	Water, Oil, Liquid		
	Max. pressure of sensor bulb	1.0 MPa		
	Set point range of temperature	-8～ 15℃ (Temperature endurance: 35℃) 10～ 36℃ (Temperature endurance: 56℃) 30～ 62℃ (Temperature endurance: 82℃) 55～ 94℃ (Temperature endurance: 114℃) 80～127℃ (Temperature endurance: 147℃) 115～183℃ (Temperature endurance: 203℃)		
	Capillary tube length	2m (3m or 5m length capillary tube are also available)		
Material	Main valve body	Ductile cast iron		
	Valve	Stainless steel		
	Valve seat	Stainless steel		
	Diaphragm	Stainless steel		
Body hydraulic test		2.0 MPa	4.0 MPa	2.0 MPa

*Other standard connection are available upon request.

Caution

Please confirm if the indication written in the label on Products matches with your required specifications.

*If there should be any difference on the specification, please do not put in use until contacting us for confirmation.

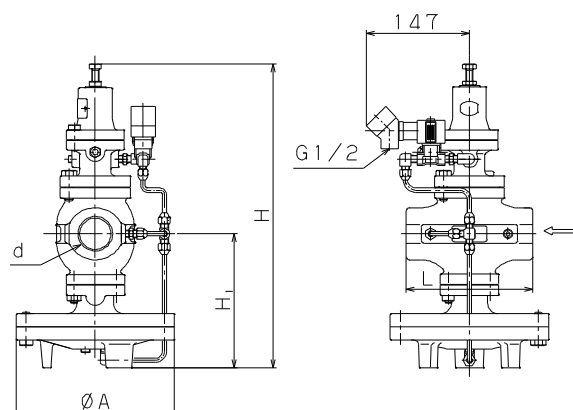
3. Available Models

Model	Purpose of control (Main Valve Operation)	Pilot Valve Types and Number(Model)	Main Valve Number (Model)
CP-2001	Pressure reduction or full close	Pressure reducing valve:1 (GP-2000BP) Solenoid valve:1 (DP-11P)	Main valve:1 (GPM-2000)
CP-2002	Pressure reduction or full open without pressure reduction	Pressure reducing valve:1 (GP-2000BP) Solenoid valve:1 (DP-11P)	
CP-2003	Switching of pressure reduction setting	Pressure reducing valve:2 (GP-2000BP) Solenoid valve:1 (DP-11P)	
CP-2004	Switching of pressure reduction setting, or full close	Pressure reducing valve:2 (GP-2000BP) Solenoid valve:2 (DP-11P)	
CP-2005	Pressure reduction and temperature control	Pressure reducing valve:1 (GP-2000BP) Temperature regulator:1 (OB-2000P)	
CP-2006	Temperature control or full close	Temperature regulator:1 (OB-2000P) Solenoid valve:1 (DP-11P)	

4. Dimensions and Weights

- CP-2001

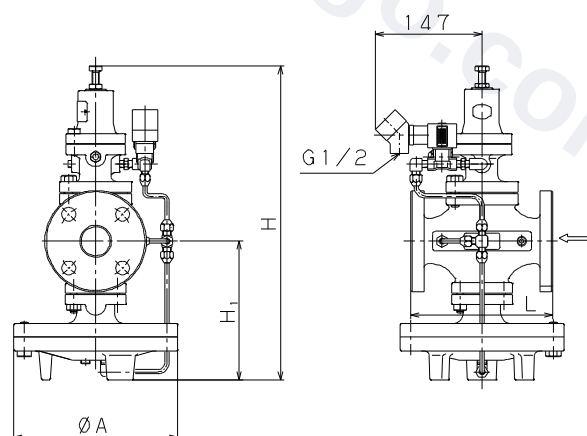
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(mm)

Size	d	L	H ₁	H	A	Weight (kg)
15A	Rc 1/2	150	170	398	200	14.7
20A	Rc 3/4	150	170	398	200	14.7
25A	Rc 1	160	175	404	226	19.0
32A	Rc 1 1/4	180	192	434	226	22.2
40A	Rc 1 1/2	180	192	434	226	22.2
50A	Rc 2	230	216	498	276	33.7

(Flanged)



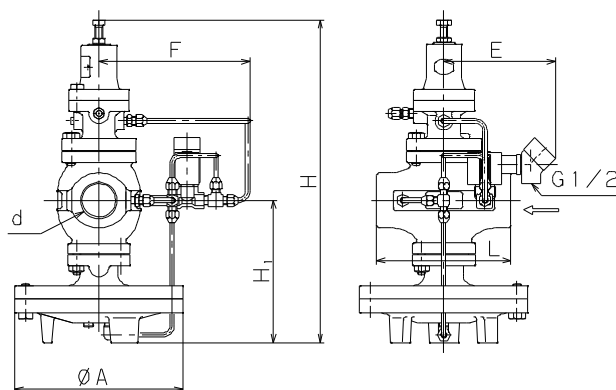
(mm)

Size	L	H ₁	H	A	Weight (kg)
15A	142	170	398	200	16.0
20A	142	170	398	200	16.5
25A	152	175	404	226	21.4
32A	172	192	434	226	24.3
40A	192	192	434	226	24.8
50A	218	216	498	276	36.2
65A	278	251	552	352	64.5
80A	294	264	575	352	69.6
100A	330	321	658	401	107.7

(JIS 10K FF)

● CP-2002

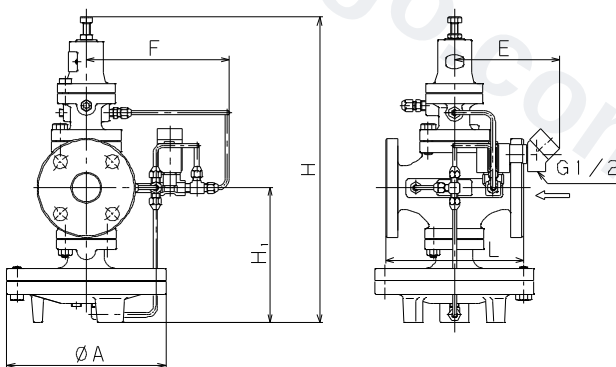
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(mm)

Size	d	L	H ₁	H	A	E	F	Weight (kg)
15A	Rc 1/2	150	170	398	200	139	191	14.9
20A	Rc 3/4	150	170	398	200	139	191	14.9
25A	Rc 1	160	175	404	226	141	195	19.2
32A	Rc 1 1/4	180	192	434	226	150	204	22.4
40A	Rc 1 1/2	180	192	434	226	150	204	22.4
50A	Rc 2	230	216	498	276	155	211	33.9

(Flanged)



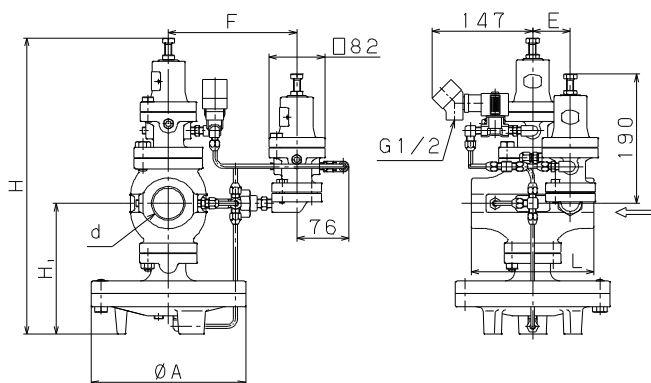
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Size	L	H ₁	H	A	E	F	Weight (kg)
15A	142	170	398	200	139	191	16.2
20A	142	170	398	200	139	191	16.7
25A	152	175	404	226	141	195	21.6
32A	172	192	434	226	150	204	24.5
40A	192	192	434	226	150	204	25.0
50A	218	216	498	276	155	211	36.4
65A	278	251	552	352	170	228	64.7
80A	294	264	575	352	175	239	69.8
100A	330	321	658	401	200	256	107.9

(JIS 10K FF)

● CP-2003

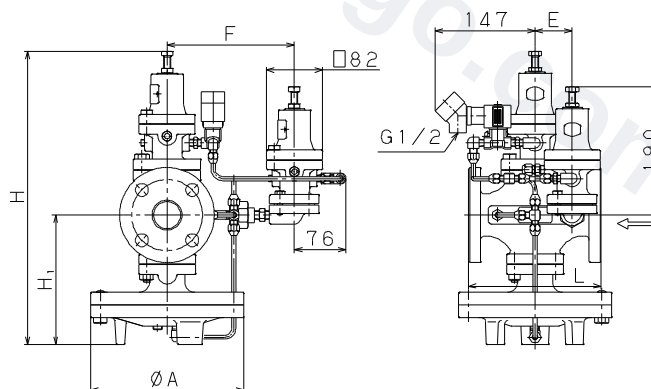
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(mm)

Size	d	L	H ₁	H	A	E	F	Weight (kg)
15A	Rc 1/2	150	170	398	200	45	175	19.9
20A	Rc 3/4	150	170	398	200	45	175	19.9
25A	Rc 1	160	175	404	226	46	180	24.2
32A	Rc 1 1/4	180	192	434	226	55	188	27.4
40A	Rc 1 1/2	180	192	434	226	55	188	27.4
50A	Rc 2	230	216	498	276	60	195	38.9

(Flanged)



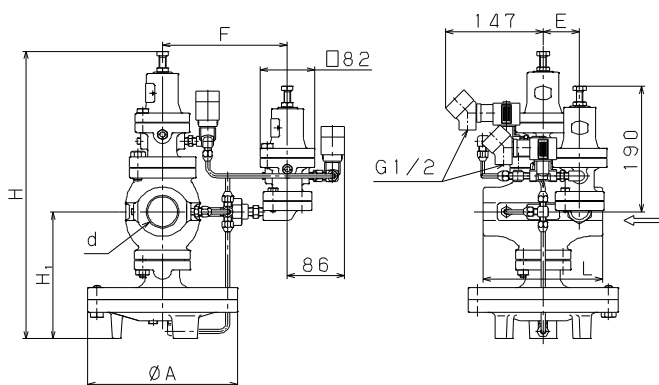
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Size	L	H ₁	H	A	E	F	Weight (kg)
15A	142	170	398	200	45	175	21.2
20A	142	170	398	200	45	175	21.7
25A	152	175	404	226	46	180	26.6
32A	172	192	434	226	55	188	29.5
40A	192	192	434	226	55	188	30.0
50A	218	216	498	276	60	195	41.4
65A	278	251	552	352	75	212	69.7
80A	294	264	575	352	80	223	74.8
100A	330	321	658	401	105	240	112.9

(JIS 10K FF)

● CP-2004

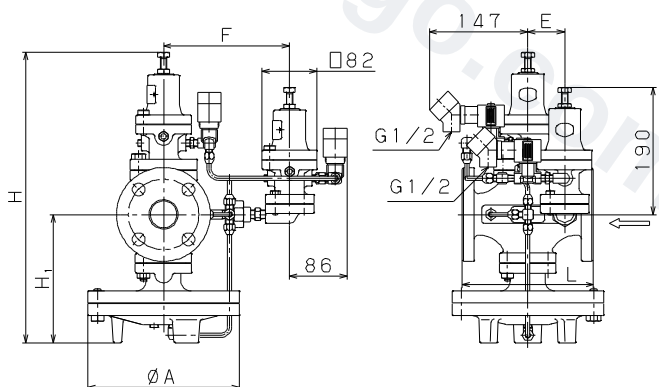
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(mm)

Size	d	L	H ₁	H	A	E	F	Weight (kg)
15A	Rc 1/2	150	170	398	200	45	175	20.2
20A	Rc 3/4	150	170	398	200	45	175	20.2
25A	Rc 1	160	175	404	226	46	180	24.5
32A	Rc 1 1/4	180	192	434	226	55	188	27.7
40A	Rc 1 1/2	180	192	434	226	55	188	27.7
50A	Rc 2	230	216	498	276	60	195	39.2

(Flanged)

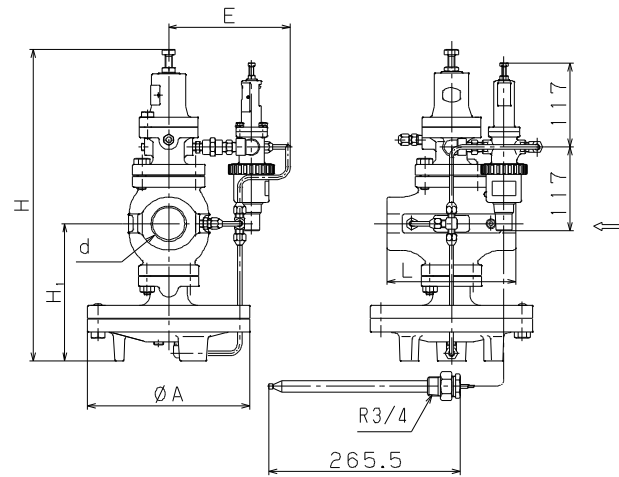


(mm)

Size	L	H ₁	H	A	E	F	Weight (kg)
15A	142	170	398	200	45	175	21.5
20A	142	170	398	200	45	175	22.0
25A	152	175	404	226	46	180	26.9
32A	172	192	434	226	55	188	29.8
40A	192	192	434	226	55	188	30.3
50A	218	216	498	276	60	195	41.7
65A	278	251	552	352	75	212	70.0
80A	294	264	575	352	80	223	75.1
100A	330	321	658	401	105	240	113.2

(JIS 10K FF)

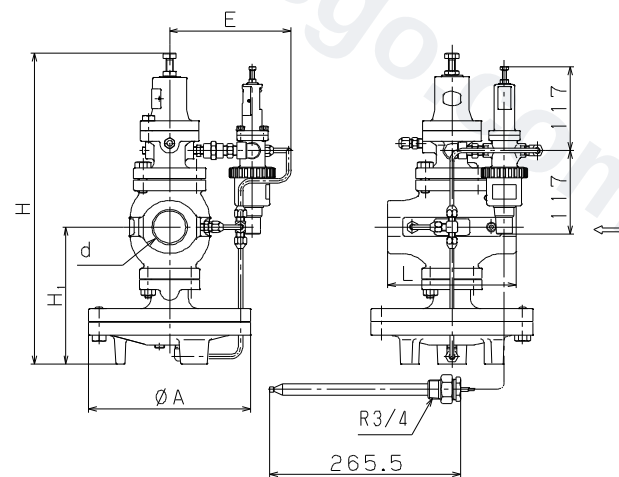
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(mm)

Size	d	L	H ₁	H	A	E	Weight (kg)
15A	Rc 1/2	150	170	398	200	169	16.3
20A	Rc 3/4	150	170	398	200	169	16.3
25A	Rc 1	160	175	404	226	169	20.6
32A	Rc 1 1/4	180	192	434	226	169	23.8
40A	Rc 1 1/2	180	192	434	226	169	23.8
50A	Rc 2	230	216	498	276	169	35.3

(Flanged)

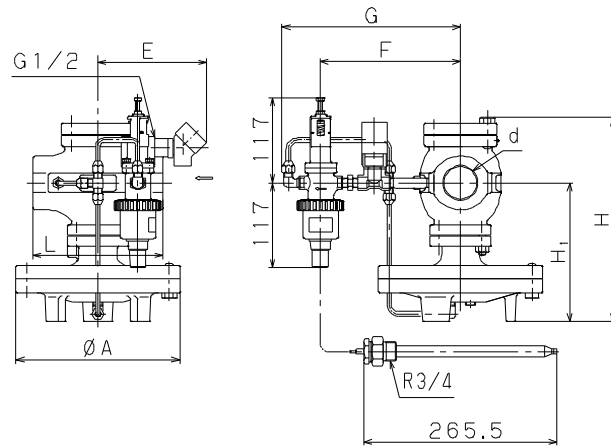


(mm)

Size	L	H ₁	H	A	E	Weight (kg)
15A	146	170	398	200	169	17.8
20A	146	170	398	200	169	18.3
25A	156	175	404	226	169	23.4
32A	176	192	434	226	169	26.3
40A	196	192	434	226	169	26.8
50A	222	216	498	276	169	38.1
65A	282	251	552	352	216	66.4
80A	302	264	575	352	216	73.4
100A	342	321	658	401	216	112.9

(JIS 20K RF)

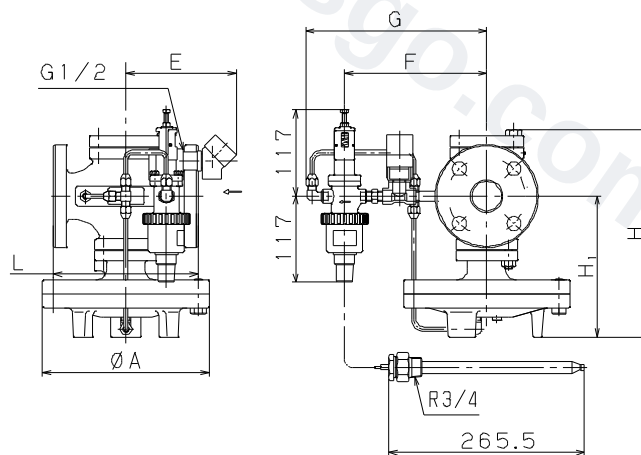
(Screwed)



(mm)

Size	d	L	H ₁	H	A	E	F	G	Weight (kg)
15A	Rc 1/2	150	170	244	200	139	179	232	14.3
20A	Rc 3/4	150	170	244	200	139	179	232	14.3
25A	Rc 1	160	175	251	226	141	184	237	18.3
32A	Rc 1 1/4	180	192	282	226	150	192	245	21.7
40A	Rc 1 1/2	180	192	282	226	150	192	245	21.7
50A	Rc 2	230	216	319	276	155	199	252	32.8

(Flanged)



(mm)

Size	L	H ₁	H	A	E	F	G	Weight (kg)
15A	142	170	244	200	139	179	232	15.6
20A	142	170	244	200	139	179	232	16.1
25A	152	175	251	226	141	184	237	21.0
32A	172	192	282	226	150	192	245	23.9
40A	192	192	282	226	150	192	245	24.4
50A	218	216	319	276	155	199	252	35.3
65A	278	251	373	352	170	216	269	62.9
80A	294	264	399	352	175	227	280	67.8
100A	330	321	488	401	200	244	297	106.1

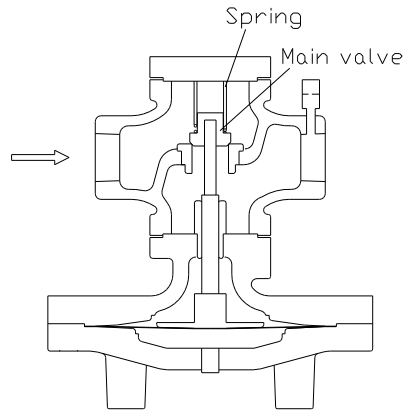
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5. Operation

5.1 Main valve operating principle

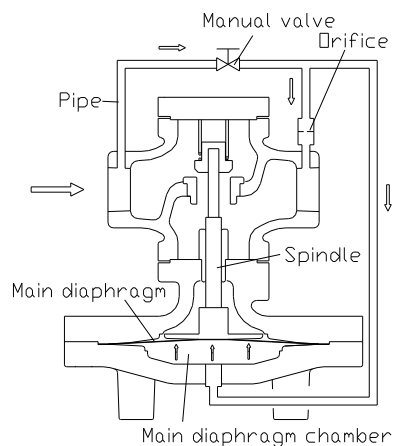
(1) Main valve alone

The main valve is closed by the spring load. When the stop valve at the inlet side is slowly opened to introduce a high pressure fluid, this pressure builds up against the back side of the main valve, but is not discharged at the outlet side.



(2) Main valve + Manual valve

A manual valve is installed in the piping at the inlet side of the main valve. The manual valve is also connected to two other orifices, one leading to the main diaphragm, and the other leading to the main valve's outlet side. When the manual valve is gradually opened, the amount of steam flowing to the outlet orifice, thereby causing the pressure to rise in the main diaphragm chamber. The main diaphragm then pushes the valve rod up, causing the main valve to open. Conversely, when the manual valve is gradually closed, the pressure in the main diaphragm chamber falls and the spring pushes the main valve closed. The main valve's open/close operation and its degree of opening can therefore be regulated by adjusting the manual valve's degree of opening. Moreover, the manual valve can be replaced by a pilot valve which serves a specific control application in order to create a pilot type pressure reducing valve or temperature regulating valve, etc.



5.2 Multiple control combination valve (Main valve + Multiple pilot valve)

Combination valves are multi-function valves for steam, featuring multiple special-function pilot valves which control the main valve and enable to control the pressure, temperature, and ON/OFF switching, etc.

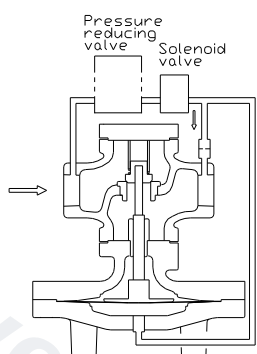
(1) Pressure reducing valve with ON/OFF control (Main valve + Pressure reducing valve + Solenoid valve)

- CP-2001 Combination valve

This valve features a format in which the pilot pressure reducing valve and solenoid valve are connected in series. In addition to functioning as a pressure reducing valve, it also offers a solenoid valve ON/OFF control function. When the solenoid valve is opened, the unit functions as a pressure reducing valve, and a constant outlet pressure is maintained. When the solenoid valve is also closed, it stops the flow of steam. Because the main valve is operated according to the pressure differential above and below the diaphragm, sudden opening and closing is prevented, eliminating water hammer conditions. Consequently this valve is not suitable in steam lines where sudden valve opening and closing is desired.

[Ex.] Solenoid valve ON : $P_1=1.0\text{MPa}$, $P_2=0.2\text{MPa}$

Solenoid valve OFF : $P_1=1.0\text{MPa}$, $P_2=0$ MPa



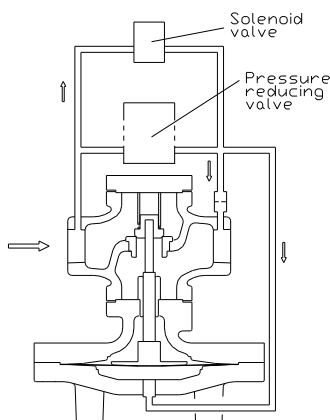
(2) Pressure reducing valve with outlet pressure control and solenoid valve open control (Main valve + Pressure reducing valve + Solenoid valve)

- CP-2002 Combination valve

The pilot of pressure reducing valve and solenoid valve are mounted in a parallel configuration. In addition to functioning as a pressure reducing valve, the main valve can be fully opened by opening the solenoid valve, letting the high pressure steam flow freely to the outlet side. When the solenoid valve is closed, the unit functions as a pressure reducing valve. This unit is suitable for situations where a large volume of high pressure steam is required for a specific length of time, followed by low pressure control of the outlet side (for initial venting operations, etc.).

[Ex.] Solenoid valve ON : $P_1=1.0\text{MPa}$, $P_2=1.0\text{MPa}$

Solenoid valve OFF : $P_1=1.0\text{MPa}$, $P_2=0.2\text{MPa}$



(3) Pressure reducing valve with two-step switching of outlet pressure (Main valve + Pressure reducing valve + Pressure reducing valve + Solenoid valve)

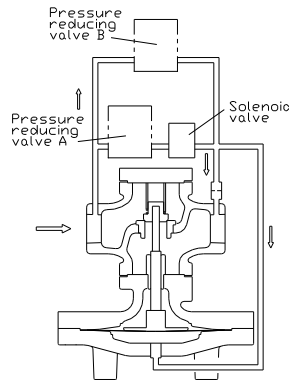
• CP-2003 Combination valve

The unit features three pilot valves: two pressure reducing valves and one solenoid valve. It functions as a pressure reducing valve with the solenoid valve enabling switching of the outlet setting pressure. Each of the two pressure reducing valves has a different pressure setting; a high pressure setting for valve A (where the solenoid valve is located), and a low pressure setting for valve B. When the solenoid valve is closed, the low pressure setting (valve B) is operative, and when the solenoid valve is opened, the high pressure setting (valve A) is operative.

[Ex.] Solenoid valve ON : $P_1=1.0\text{MPa}$, $P_2=0.5\text{MPa}$

Solenoid valve OFF : $P_1=1.0\text{MPa}$, $P_2=0.2\text{MPa}$

switching

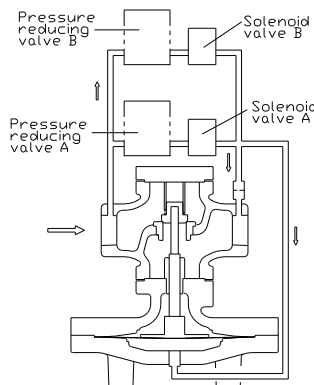


(4) Pressure reducing valve with two-step switching of outlet pressure and ON/OFF control(Main valve + Pressure reducing valve + Pressure reducing valve + Solenoid valve + Solenoid valve)

• CP-2004 Combination valve

The unit features four pilot valves: two pressure reducing valves and two solenoid valves. It is similar to the CP-2003 model shown above except that it has an additional solenoid valve. In addition to a two-step outlet pressure switching function, this unit also offers ON/OFF control of the solenoid valves. Each of the two pressure reducing valves has a different pressure setting; a high pressure setting for valve A, and a low pressure setting for valve B. The operation statuses of solenoid valves A and B, and the corresponding outlet pressures are shown in the table below.

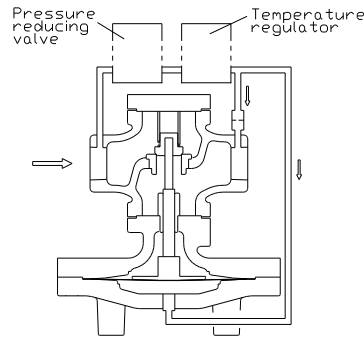
Solenoid valve A	Solenoid valve B	Outlet pressure
ON	ON	High pressure setting
ON	OFF	High pressure setting
OFF	ON	Low pressure setting
OFF	OFF	Steam flow stopped



(5) Pressure reducing valve for outlet pressure control and temperature regulator for temperature control

- CP-2005 Combination valve

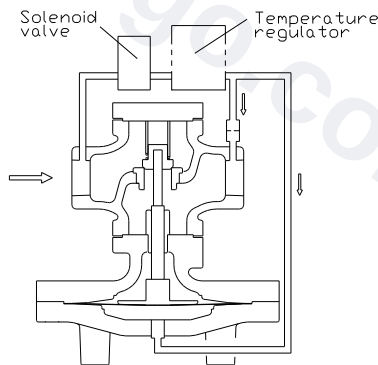
The unit features two pilot valves: a pressure reducing valve and a temperature regulator valve. The temperature is controlled as the inlet pressure is decreased. Because temperature control is hard to control when the inlet pressure is fluctuating, temperature control can be obtained by a constant outlet pressure.



(6) Temperature regulator with ON/OFF control

- CP-2006 Combination valve

The unit features two pilot valves: a temperature regulator valve, and a solenoid valve. In addition to the temperature regulator valve which provides a heating function, this unit also offers a solenoid valve ON/OFF control function. When the solenoid valve is open, the temperature regulator valve is operative, and when the solenoid valve is closed, the main valve also closes, stopping the flow of steam.

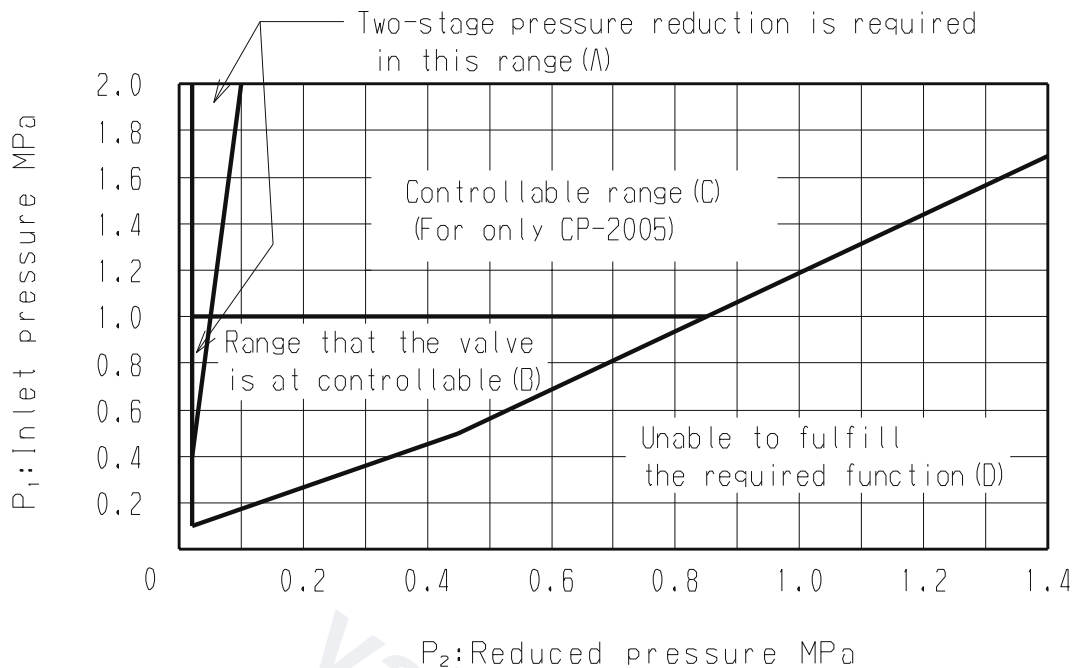


In addition to the units shown above, other pilot valve combination are possible for almost any control application. Contact your Yoshitake representative for details.

6. Selection of Nominal Size

6.1 CP-2001•2002•2003•2004•2005

6.1.1 Specifications selection chart

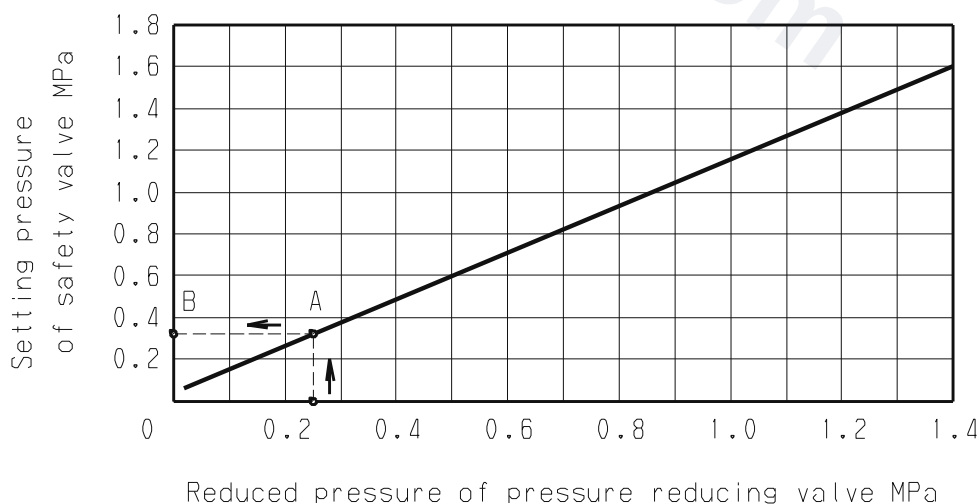


[How to read chart]

Find the cross intersection of the inlet pressure (P_1) and the reduced pressure (P_2). In case the cross point located within the range of (A), it is possible to apply with two-stage pressure reduction. In case of (B) {(C) for only Model CP-2005}, it is possible to apply with one reducing valve and in case of (D), the valve is not possible to fulfill the designed specifications.

When reducing pressure in two stages, maximize the distance between the valves (at least 3 m).

6.1.2 Safety valve setting pressure selection chart



[How to read chart]

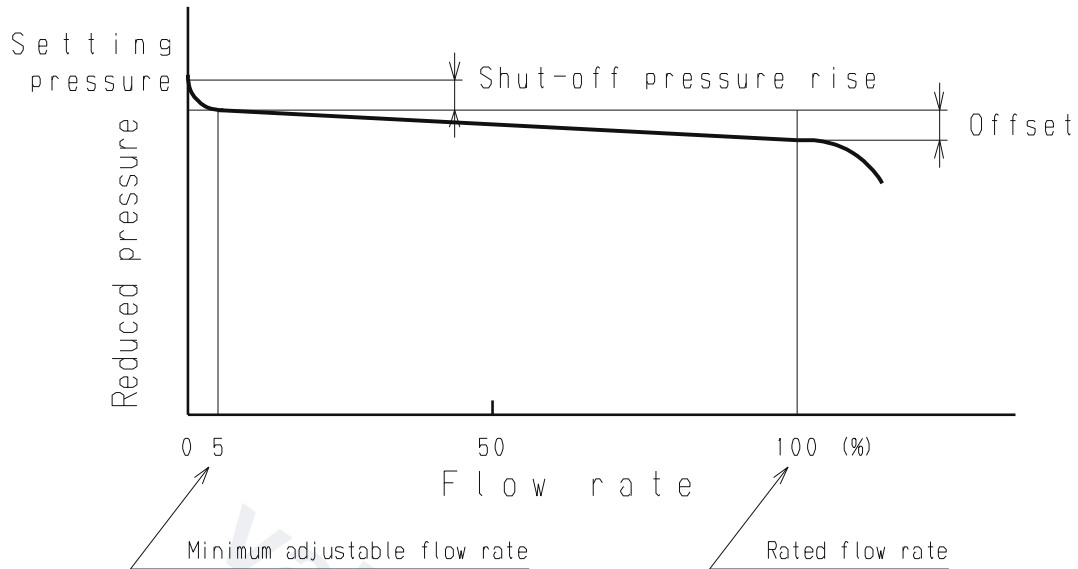
Determine the reduced pressure of the pressure reducing valve on the outlet side. Find the intersection with the chart curve (point "A"). Horizontally proceed from point "A" to the left until the Y axis. Regard this point as "B". "A" value higher than point "B" will be the required setting pressure of the safety valve.

e.g. When the reduced pressure of the pressure reducing valve is 0.25 MPa, the setting pressure of the safety valve must be 0.32 MPa or more.

6. 1. 3 Characteristics chart

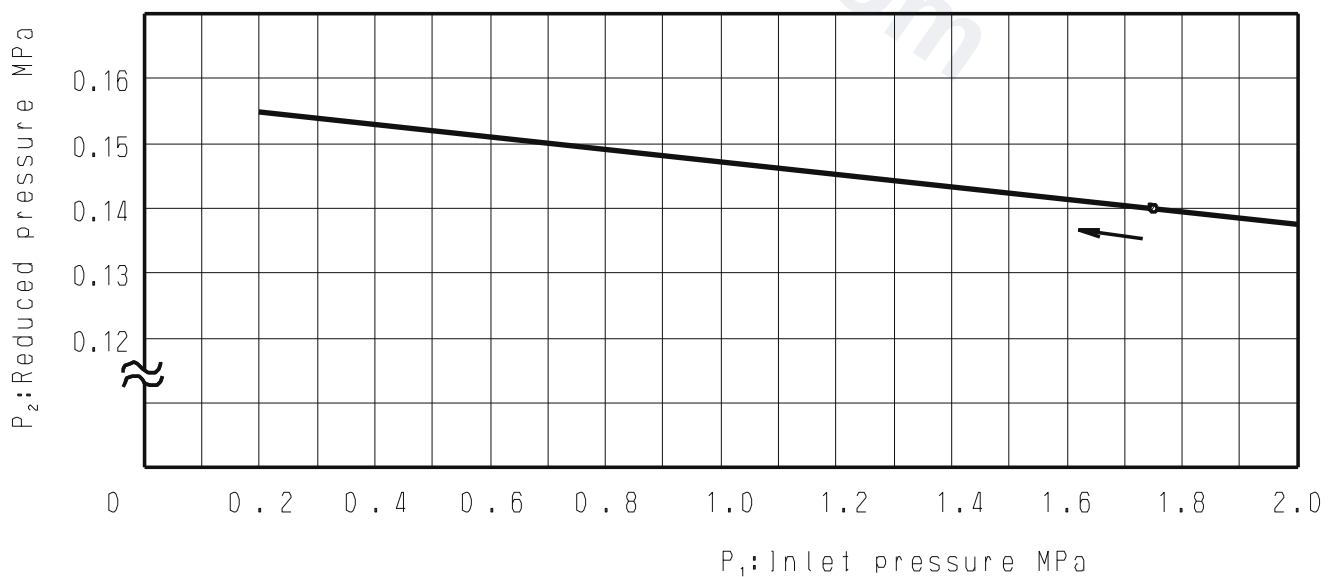
(1) Flow rate characteristics chart

- Shut-off pressure rise : 0.02 MPa or less
- Offset : 10% or less of setting pressure
(Minimum value : 0.02 MPa)



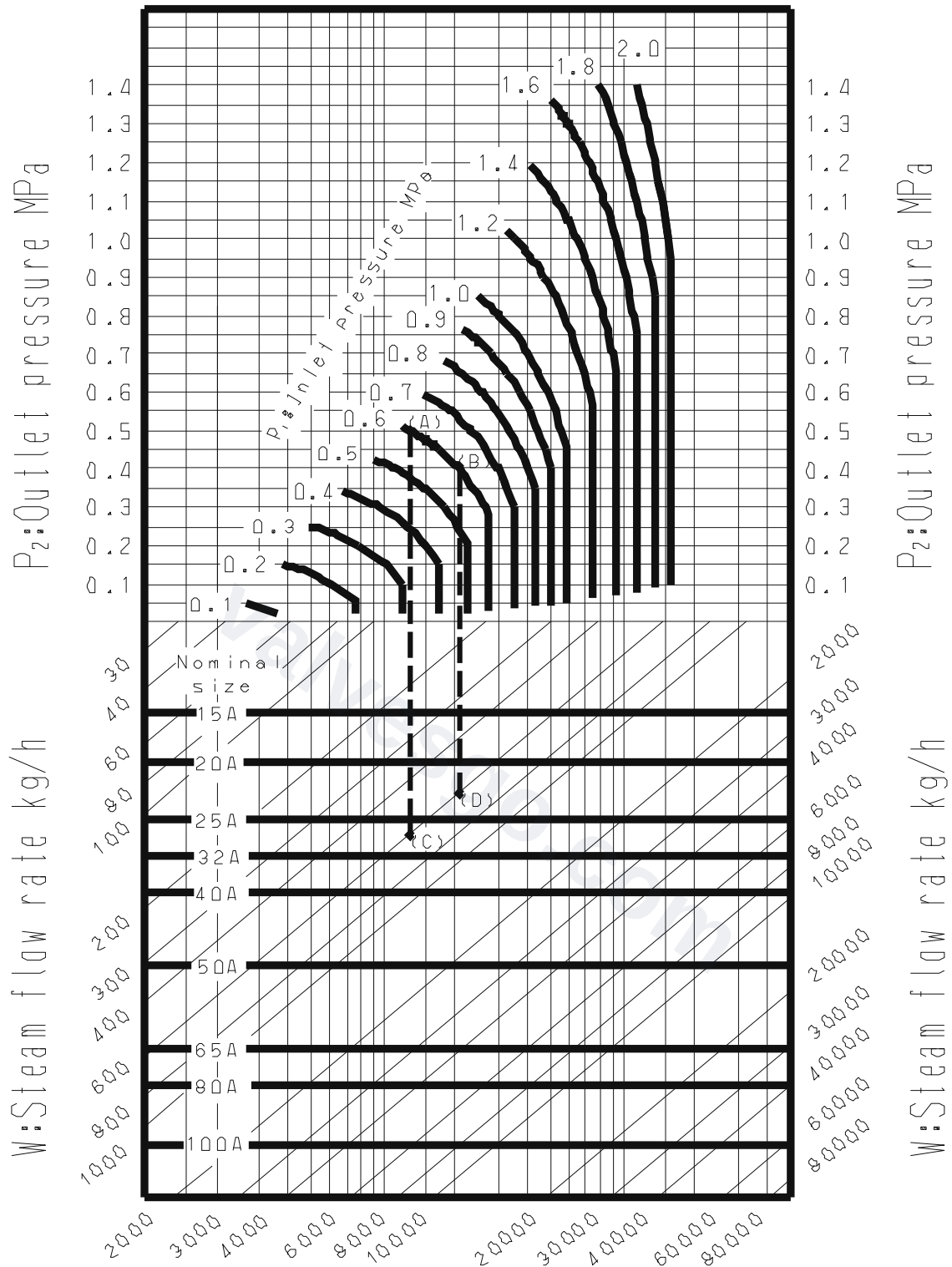
Using the nominal size selection chart, select the nominal size of 80 ~ 90% of the flow rate, considering pressure loss and heat loss of the gate valve and the strainer before and after the pressure reducing valve. To fully utilize the flow characteristics of the valve, do not select a small pipe size, considering the effects due to pipe resistance.

(2) Pressure characteristics chart



Reduced pressure is set to 0.14 MPa when inlet pressure is 1.75 MPa. The chart indicates a variation in reduced pressure when the inlet pressure is changed within the range of 0.2 to 2.0 MPa.

6. 1. 4 Nominal size selection chart of pressure reducing valve



[For example]

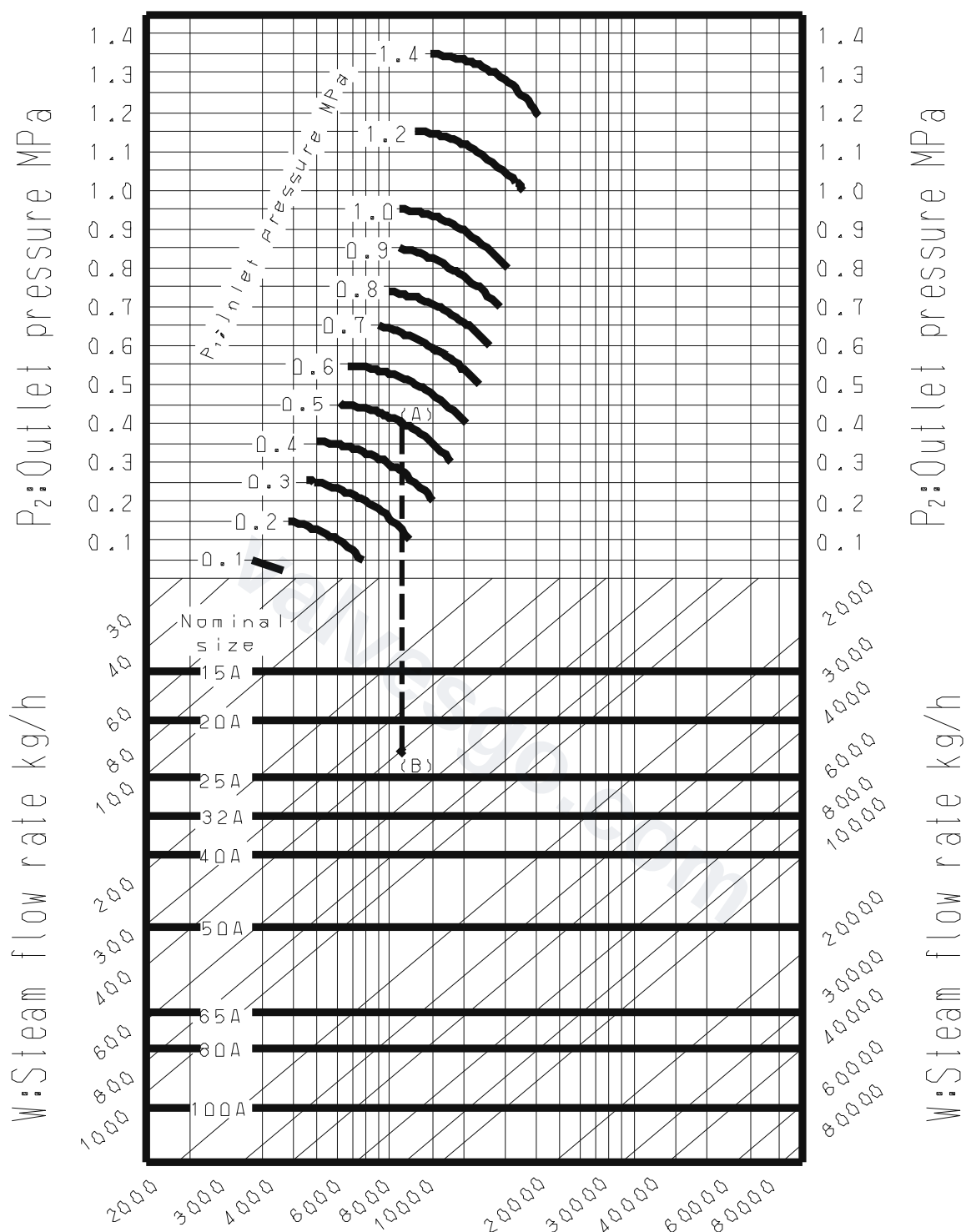
How to select the suitable valve size of the combination valve, Model CP-2003, which has steam flow rate 600kg/h, the inlet pressure (P_1) 0.6 MPa, the reduced pressure (P_2) which can be switchover 0.5 MPa and 0.4 MPa, is to find points of intersection of the inlet pressure 0.6 MPa and the reduced pressure 0.5MPa (A), and the reduced pressure 0.4 MPa (B) respectively.

Descending from the point (A) and (B) perpendicularly, find the points of intersection with the flow rate 600kg/h (C) and (D) respectively.

The point (C) is in between valve size 25A and 32A, and the point (D) is in between 20A and 25A; the largest size, 32A is the suitable valve size to fulfill these two criteria.

6. 2 CP—2006

6. 2. 1 Nominal size selection chart of temperature regulator (Also applicable to CP-2005, for temperature regulator)



For example, take a temperature regulator whose inlet pressure(P_1) is 0.5 MPa, outlet pressure(P_2) 0.4 MPa, flow rate 400 kg/h. When determining the nominal size, find the point of intersection(A) of inlet pressure 0.5 MPa and outlet pressure 0.4 MPa. Vertically proceed from point(A) to come across the flow rate 400 kg/h, and regard this point as (B). Point(B) is between nominal sizes 20A and 25A. Select the larger nominal size (in this example, nominal size 25A).

6. 3 Nominal size selection calculation formula

In case selecting the suitable valve size from calculation, find the Cv value with formula, which value will be defined by applying criteria, and select the valve size that fulfills the said Cv value.

- Cv value calculation

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

$$C_v = \frac{Wk}{138\sqrt{\Delta P(P_1 + P_2)}}$$

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

$$C_v = \frac{Wk}{120P_1}$$

W : Max. steam flow rate [kg/h]

P_1 : Inlet pressure [MPa·A]

P_2 : Outlet pressure [MPa·A]

ΔP : $P_1 - P_2$ [MPa]

k : $1 + 0.0013 \times \{\text{super-heated steam temp} [^\circ\text{C}] - \text{saturated steam temp} [^\circ\text{C}]\}$

C_v : Cv value of the nominal size

- Flow rate calculation example of CP-2001 combination valve

The flow rate of the combination valve is calculated under the following conditions :
Nominal size 15A, saturated steam, Inlet pressure of 0.6 MPa, Outlet pressure of 0.4 MPa.

$P_1 = 0.7$ [MPa·A], $P_2 = 0.5$ [MPa·A], you can find that Cv value of 15A is 5.0 from the chart. The following formula is established.

$$0.5(P_2) > \frac{0.7(P_1)}{2} \quad C_v = \frac{Wk}{138\sqrt{\Delta P(P_1 + P_2)}}$$

$$W = \frac{138C_v\sqrt{\Delta P(P_1 + P_2)}}{k}$$

$$= \frac{138 \times 5 \times \sqrt{0.2 \times (0.7 + 0.5)}}{1}$$

$$= 338 \quad \text{kg/h}$$

■ Secure a safety rate of 80 to 90%

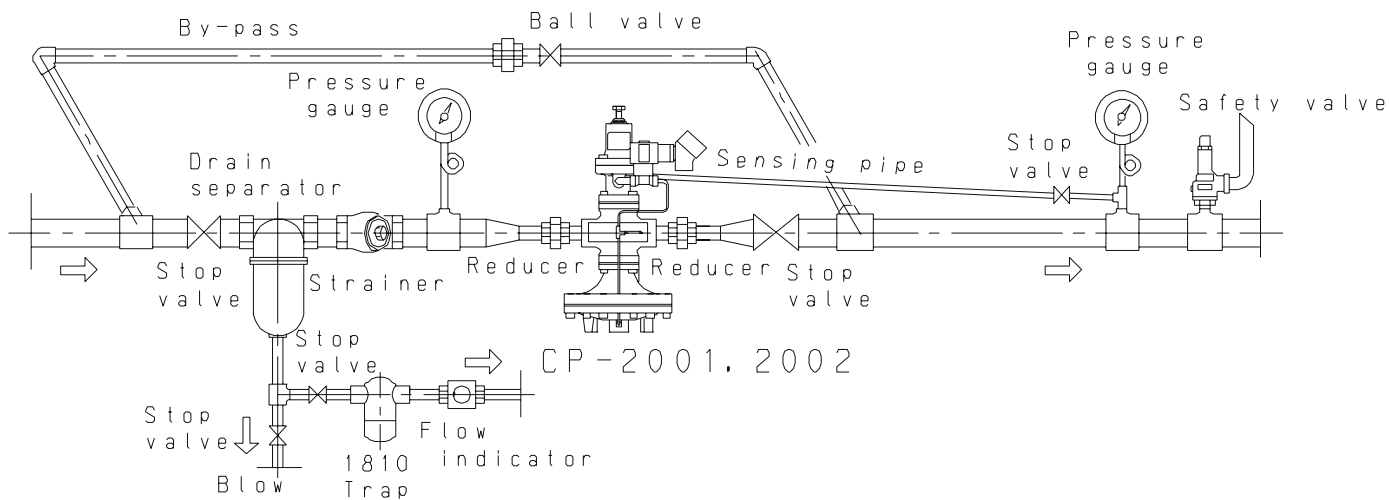
- Cv value chart (External sensing)

Type	15A	20A	25A	32A	40A	50A	65A	80A	100A
CP-2001	5.0	7.2	10.9	14.3	18.8	32.0	60.0	78.0	120.0
CP-2002 (Pressure reducing valve operating)	5.0	7.2	10.9	14.3	18.8	32.0	60.0	78.0	120.0
CP-2002 (Solenoid valve operating)	4.5	7.0	8.5	13.0	15.0	27.0	54.0	65.0	116.0
CP-2003	5.0	7.2	10.9	14.3	18.8	32.0	60.0	78.0	120.0
CP-2004	5.0	7.2	10.9	14.3	18.8	32.0	60.0	78.0	120.0
CP-2005	5.0	7.2	10.9	14.3	18.8	32.0	60.0	78.0	120.0
CP-2006	5.0	7.2	10.9	14.3	18.8	32.0	60.0	78.0	120.0

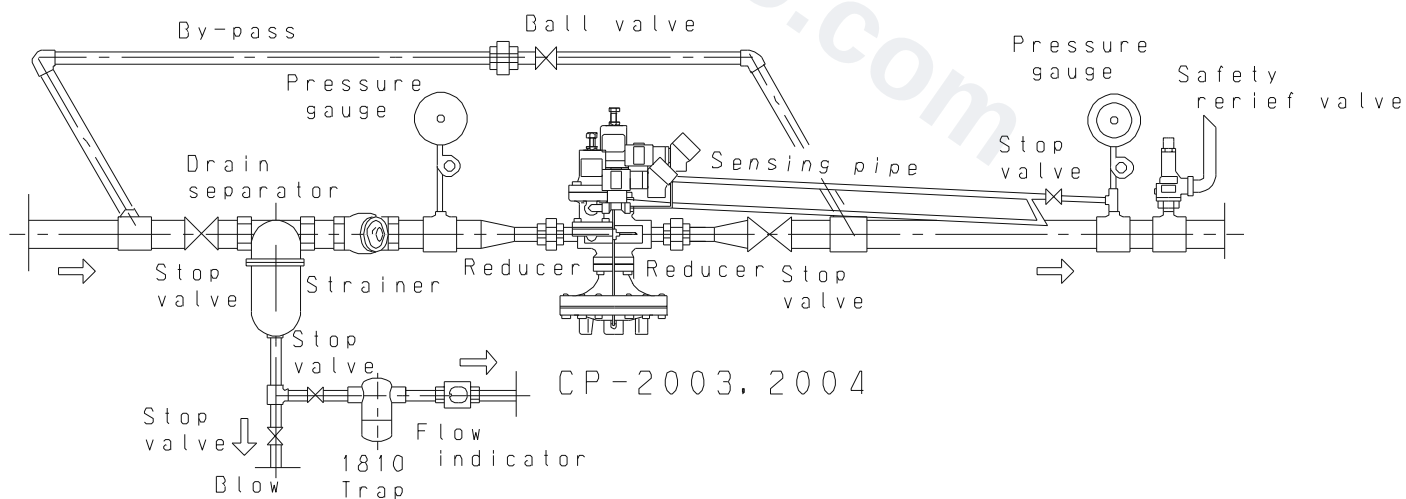
7. Installation procedures

7.1 Example of piping

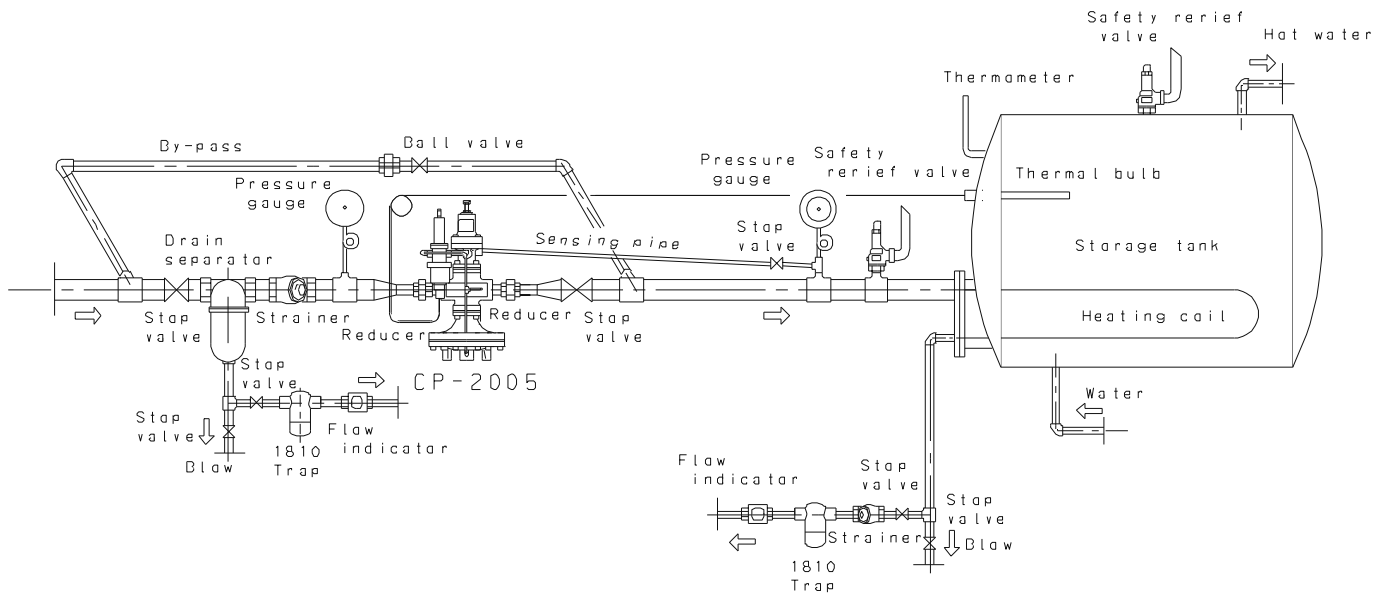
(1) CP-2001•2002



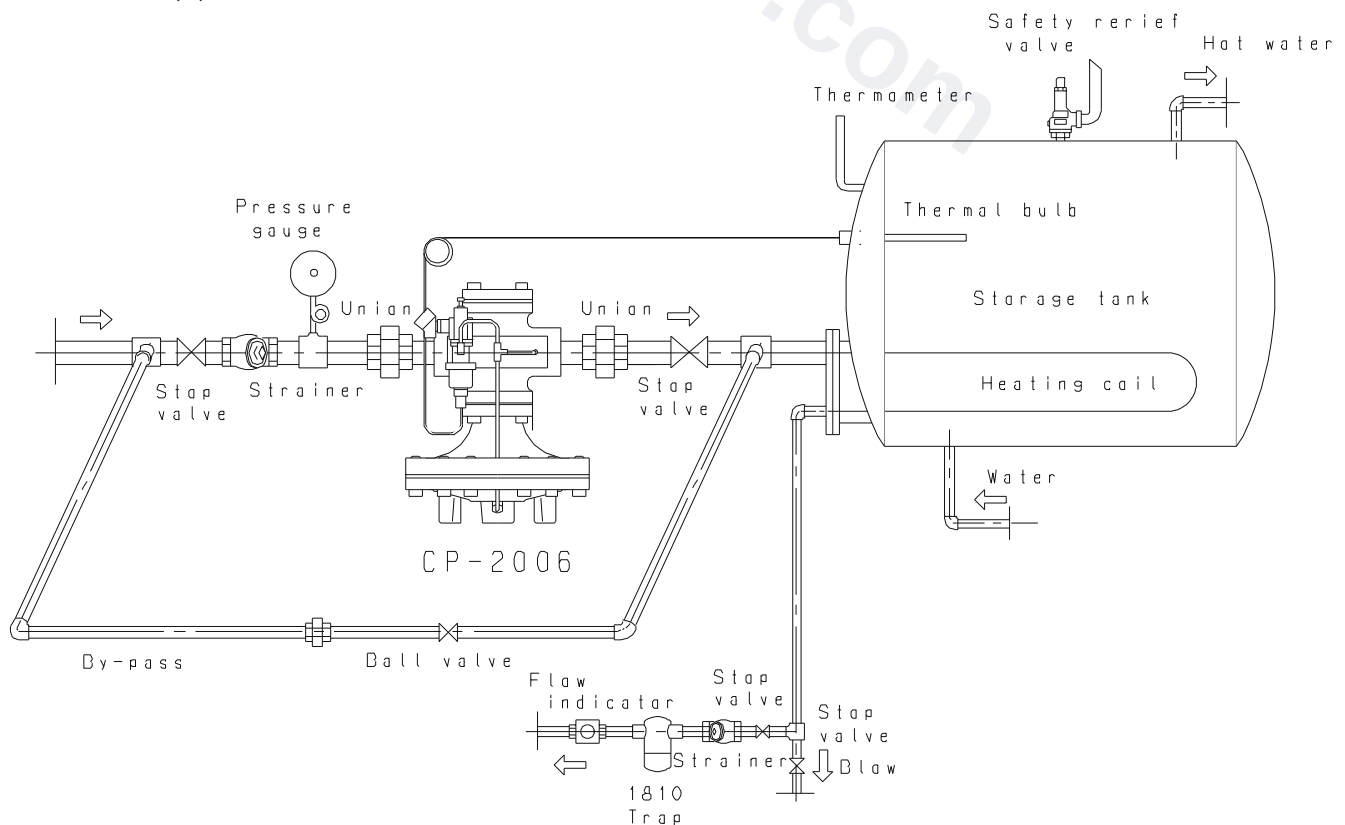
(2) CP-2003•2004



(3) CP-2005



(4) CP-2006



7. 2 Warnings/Cautions during installation

Warning

[(2) ~ (6) are not applied to CP-2005, and (7) and (8) are not applied to CP-2006.]

- (1) **As this product is considerably heavy in weight, please secure it with lifting devices for installation on piping. As to the weight of product, please refer to "4. Dimension and weight."**
 - * Falling the product may cause the injury of personnel.
- (2) **The solenoid valve (DP-11P) is not explosion-proof construction. The valve may not be put in use in the location of corrosive gas or volatile gas may exist or stick to the valve, or of explosive ambience.**
- (3) **Make sure to perform the sufficient insulation on the cable connection.**
 - * Improper insulation may cause electric shock or fire.
- (4) **Carry out the electric cable connection only by expert electricians.**
- (5) **Carry out the cable connection only after confirming that no power is supplied.**
 - * May cause an electric shock.
- (6) **Carry out the cable connection after confirming the rated voltage and follow to the instruction.**
 - * Erroneous cable connection may cause an electric shock or fire.
- (7) **At the outlet side of safety valve which to be fitted on the outlet side of the product, connect the blow-off pipe. The pipe end of blow-off pipe should be led to the safe place in case the steam blows.**
 - * In case the steam blows, the personnel may be scalded.
- (8) **When installing the combination valve, be sure to connect the provided sensing pipe and joint.**
 - * Unless the sensing pipe is connected, the valve will not operate. Further, steam may blow off, resulting burns.

< Sensing pipe connection method >

Connect the provided sensing pipe (ϕ 8-2m) and joint (ϕ 8-R1/4) as shown in the illustration in Fig.1.

1. Wind sealing tape around the joint and insert the joint into the pressure sensing side.
2. Fully insert the sensing pipe into the valve and the pressure sensing side joint. Tighten the cap nut until it can no longer be rotated manually, and then turn the cap nut about one and quarter times with a tool.
3. Note that the sensing pipe must be connected so that the valve side is higher than the pressure sensing side.

Model	Sensing pipe	Joint
CP-2001、2002 CP-2005	1	2
CP-2003、2004	2	4

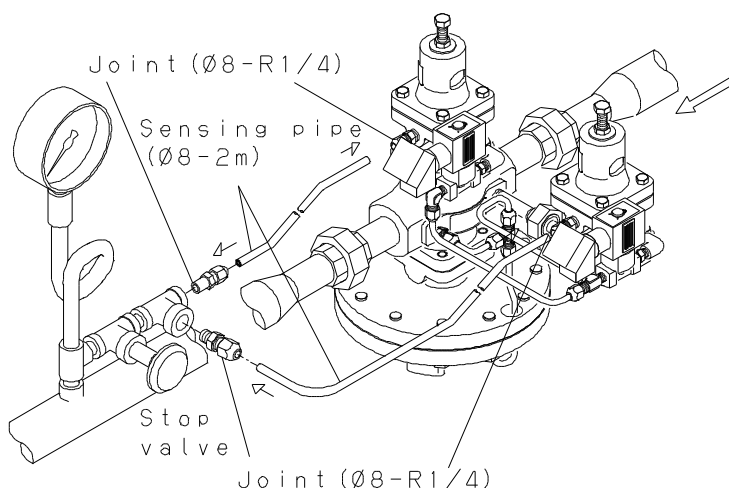
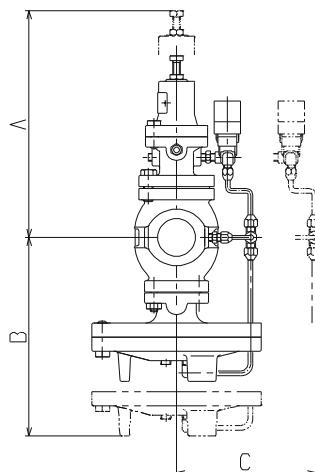


Fig.1

- (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 (80 mesh) at the valve inlet side.**
* Failure to do so may hamper correct pressure control, which affects the original performance.
- (4) **In order to prevent the condensation trouble, make sure to install a steam trap at the inlet port of the product.**
* May cause the condensation trouble.
- (5) **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.
- (6) **Install the valve perpendicularly to horizontal lines with the diaphragm chamber located at the bottom.**
* Failure to do so may affect the original performance.
- (7) **Do not apply excessive load, torque or vibration to the valve.**
* Doing so may result in drastically shortened service life or operational failure.
- (8) **Be extremely careful not to damage the copper pipe.**
* Damage to the copper pipe may prevent the valve from functioning correctly.
- (9) **Use the gate valve as a stop valve at the inlet and outlet sides of the combination valve.**
* Using a valve with large resistance, such as a globe valve, may affect the original performance.
- (10) **When installing, reserve the space shown below (10-1 to 10-6) in both upper and lower side of the pipe center of the product for the maintenance and checking.**
- (11) **Use the sensing pipe (ϕ 8-2m) and joint (ϕ 8-R1/4) provided.**
* Using other sensing pipes may affect the original performance.
- (12) **Do not connect the sensing pipe close to valves and elbows. Choose the position with the least vibration. (Recommended straight length: 10 times the line pipe diameter)**
* Failure to do so may cause inconsistent reduced pressure, which hampers correct pressure control.
- (13) **For protection of the equipment, install the safety valve at outlet side of the product.**
* It is impossible to detect the trouble on the product and may cause damage of the equipment.
- (14) **Install a pressure gauge at both the inlet and outlet sides of the valve. Further, install the gauge at the outlet side as close to the sensing pipe (pressure sensing side) as possible.**
* Failure to do so may hamper correct pressure control, which affects the original performance.

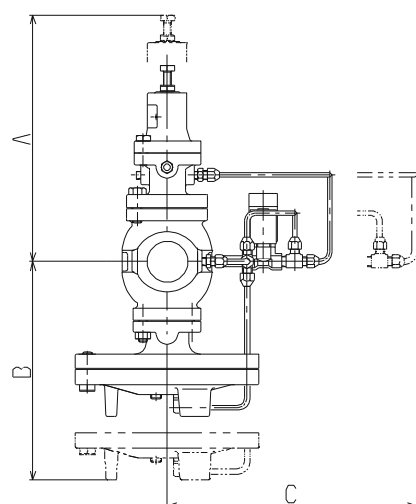
- (1) Install by-pass pipes around the product. (Refer to 7.1 Example of piping)
- (2) In case the pressure reduction ratio is large, install a expander to prevent the excess flow velocity. (In case that the fluid is steam, the recommendable flow velocity in pipe is below 30m/s.)

(10-1) CP-2001



(mm)			
Size	A	B	C
15•20A	340	340	250
25A	340	350	250
32•40A	360	380	250
50A	400	430	250
65A	420	370	260
80A	430	390	260
100A	450	470	280

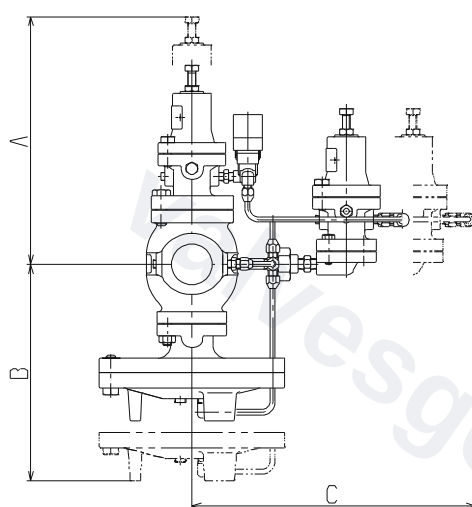
(10-2) CP-2002



(mm)

Size	A	B	C
15•20A	340	340	340
25A	340	350	340
32•40A	360	380	350
50A	400	430	360
65A	420	370	380
80A	430	390	390
100A	450	470	410

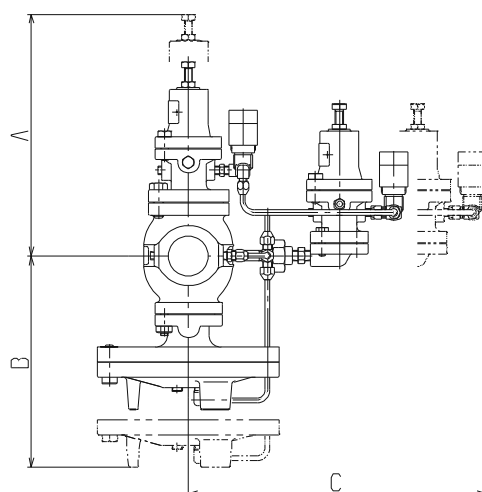
(10-3) CP-2003



(mm)

Size	A	B	C
15•20A	340	340	380
25A	340	350	390
32•40A	360	380	400
50A	400	430	400
65A	420	370	410
80A	430	390	430
100A	450	470	450

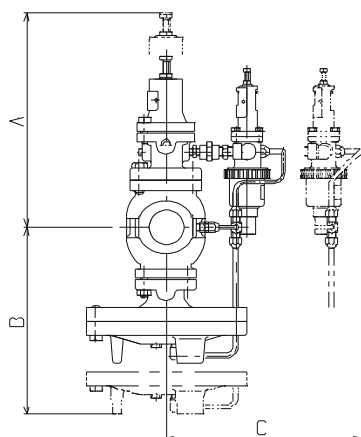
(10-4) CP-2004



(mm)

Size	A	B	C
15•20A	340	340	390
25A	340	350	400
32•40A	360	380	410
50A	400	430	410
65A	420	370	420
80A	430	390	440
100A	450	470	460

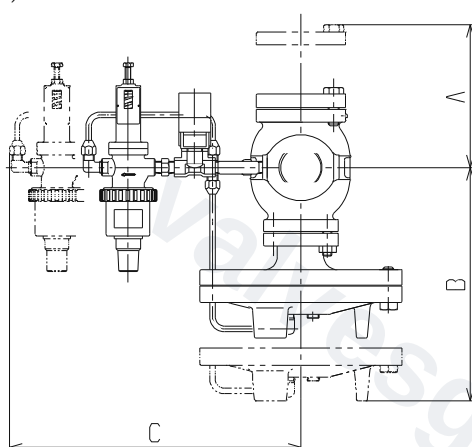
(10-5) CP-2005



(mm)

Size	A	B	C
15•20A	340	340	300
25A	340	350	300
32•40A	360	380	300
50A	400	430	300
65A	420	370	380
80A	430	390	380
100A	450	470	380

(10-6) CP-2006



(mm)

Size	A	B	C
15•20A	180	340	330
25A	180	350	330
32•40A	190	380	340
50A	200	430	350
65A	330	370	420
80A	360	390	430
100A	440	470	450

⚠ Caution on the solenoid valve (except the model CP-2005)

- (1) **Do not apply insulation around the solenoid coil.**
*May cause an abnormal function.
- (2) **The size of all electrical wiring should be 0.5 mm² or greater. Moreover, the wires should not be subjected to excessive force.**
- (3) **Use electrical circuits which do not chatter at contact.**
- (4) **If using electrical circuits which are adversely affected by solenoid surges, install surge absorbers (in parallel) at the solenoid, or request a surge killer (optional).**
- (5) **The voltage should always be kept within -10% to +10% of the rated voltage. A voltage drop is the value at the lead wire which connects the coil.**
- (6) **The voltage at both ends of the coil when OFF should never exceed 20% of the rated voltage.**

⚠ Caution on the temperature regulator (except the model CP-2001 to 2004)

- (1) **Although the thermal bulb can be mounted in any posture, be sure that the mount position allows at least 3/4 of its total length to be immersed in the fluid to be monitored.**
 - * Failure to do so may affect the original performance.
- (2) **The bend radius of the capillary tube should never be less than 40mm. Avoid abrupt bend in the tube, and never twist or pull it with force. Furthermore, it should be secured in a manner which prevents it from touching the steam piping, etc.**
 - * Damage to the capillary tube may prevent the valve from functioning correctly.
- (3) **Install the thermometer in a position close to the thermal bulb.**
 - * Failure to do so may affect correct adjusting and the original performance.
- (4) **Handle the product not to apply the excess temperature to the sensor part.**
- (5) **Install the product in the place of ambient temperature below the setting temperature.**
 - * In case the ambient temperature exceed the setting temperature, the product is unable to regulate the fluid temperature properly.
- (6) **Screw on bushing first, then use washer of packing to secure thermal bulb. (Fig. 2)**
 - * Failure to do so may prevent the valve from functioning.
- (7) **If temperature detection is to be executed with the thermal bulb inserted into the piping, it should be installed at a point where the circulation is best.**
 - * Failure to do so may prevent the setting temperature.
- (8) **Install bellows follower into the thermal bellows with its flat surface facing downward, then use the fastener ring to screw the thermal bellows assembly to the body. (Fig. 3)**
 - * Be sure the bellows follower is not lost when unpacking the unit.

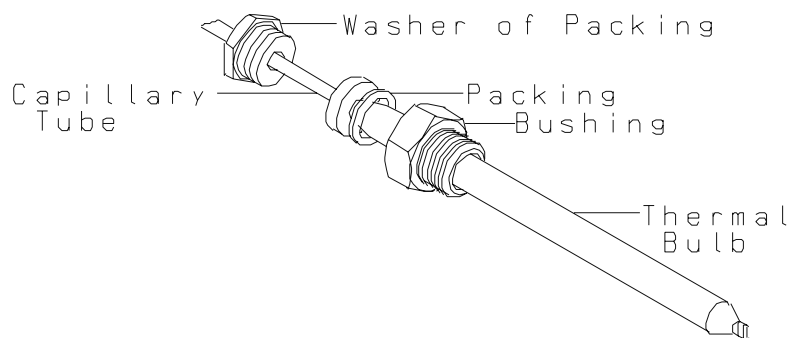


Fig. 2

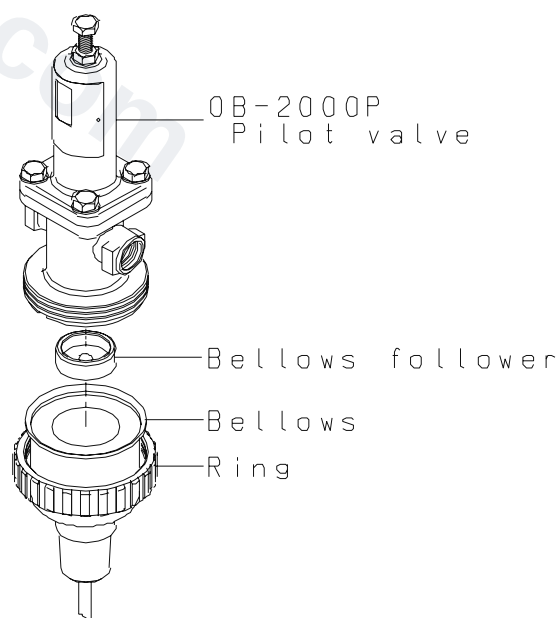


Fig. 3

8. Operation procedures

8. 1 Warnings/Cautions during operation

Warning

- (1) **Do not touch the valve directly with bare hands.**
 - * Doing so may result in burns.
- (2) **Prior to letting the steam run in the system, make sure that all connecting part are properly connected and there is no danger when the steam flows out of pipe end.**
 - *In case the steam flows out of connecting part or pipe end, there will be a danger of personnel being scalded.

Caution

- (1) **Before carrying out steam blow, close the stop valves at both inlet and outlet side of the product, and make sure to flush the foreign matter or scales out of piping system using the by-pass line. During this operation, pay an attention to the outlet pressure at by-pass stop valve not to exceed the setting pressure (for CP-2001 to CP-2005) and designed maximum temperature (for CP-2005 & CP-2006).**
 - Also open the relative stop valves in the piping system gradually.**
 - *Once the foreign matter or scales come into the product, it may not function as designed. Sudden opening the stop valve may cause the hunting or water hammer and result in damage the product or relative equipment.
 - *When the outlet pressure of by-pass stop valve exceeds the set value, the safety valve may be blown out.
 - *If the temperature exceeds the designed maximum value, the sensor part may be damaged.
- (2) **In order to adjust the pressure, turn the adjusting screw slowly.**
 - *The hunting or water hammer may damage the product or equipment.
- (3) **Remove condensation completely from the line, and close the stop valves located at front and rear of the valve when not using it for long periods of times.**
 - * By the rust gathered in the product or inside of pipes, the product may malfunction.

8. 2 Adjustment

Follow the steps in 8.2.1 Adjustment, and slowly turn the adjusting screw to control pressure.

* Incorrect adjustment may cause hunting, water hammer, etc., resulting in damage to the valve and other equipment.

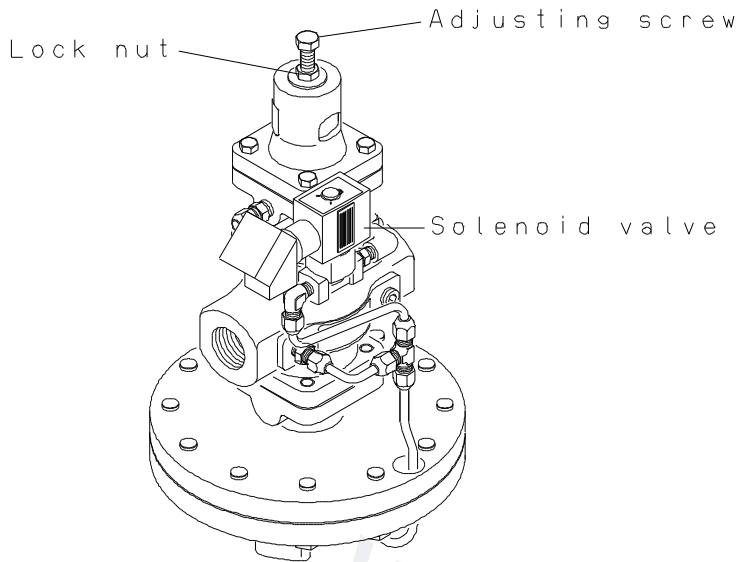
8. 2. 1 Adjustment

- (1) Close the stop valves located at front and rear of the combination valve, and below fluid through the by-pass for a sufficient period of time. When completed, be sure to close the ball valve. To avoid activating the safety valve during the blowing operation, make sure that the fluid temperature does not rise above the sensor's maximum permissible temperature.
- (2) Loosen the lock nut, and then loosen the adjustment screw until the adjustment spring is free (no load).
- (3) Open the stop valves at the outlet side and at the outlet pressure sensing pipe.
- (4) Slowly open the inlet stop valve.

The subsequent adjustment for each model are shown below. (8.2.2)

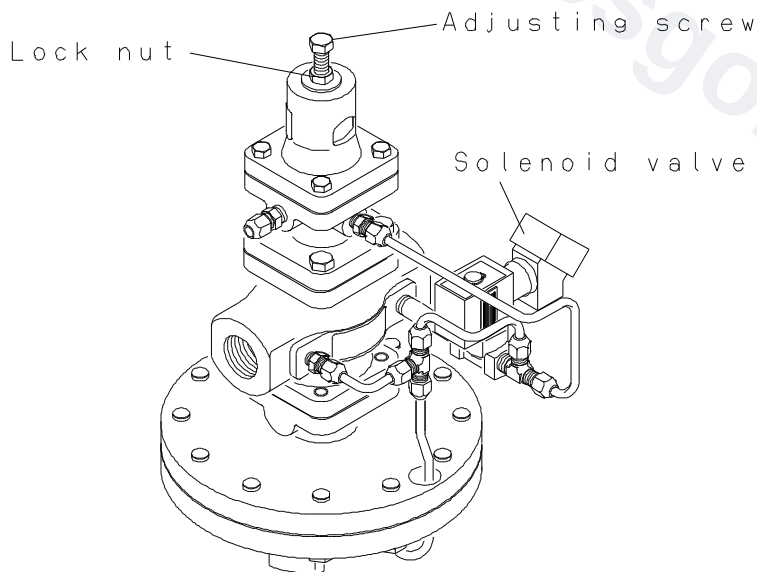
8. 2. 2 The subsequent adjustment for each model

(1) CP-2001



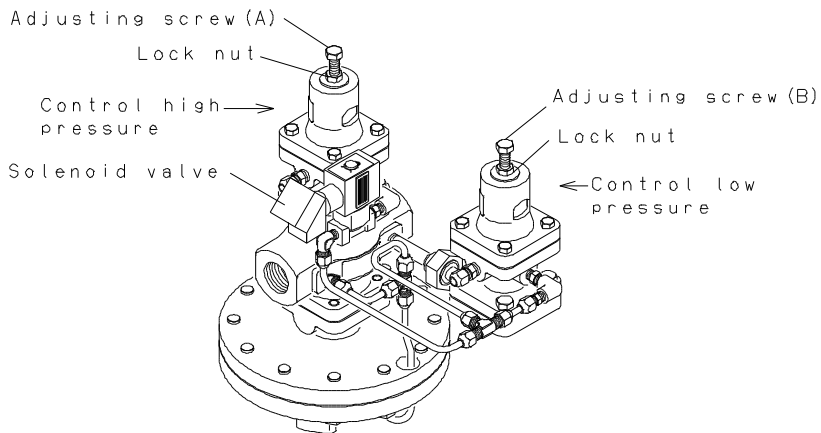
Open the solenoid valve and slowly turn the adjusting screw of the pressure reducing valve in the clockwise direction until the desired pressure is obtained. Make any required fine adjustments after the system stabilizes. After adjusting the outlet pressure, re-tighten the lock nut and close the solenoid valve. At this time, verify that the flow of steam has stopped.

(2) CP-2002



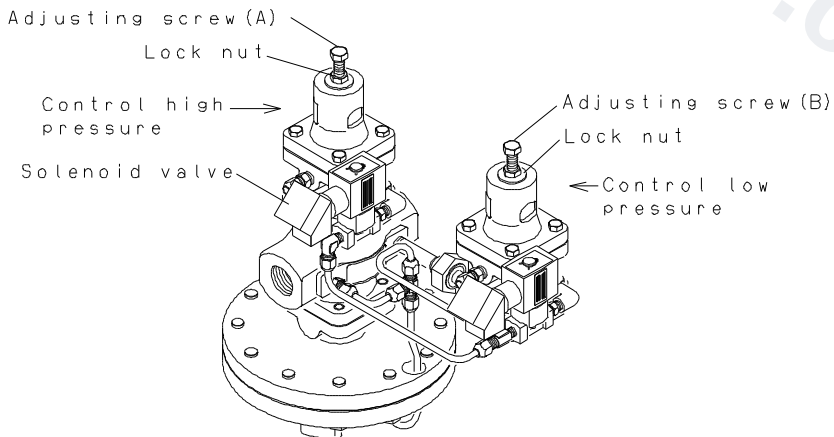
Close the solenoid valve and adjust the outlet pressure in the same manner as that described for the CP-2001. When completed, open the solenoid valve and verify that high pressure steam (about the same pressure as at the inlet side) flows to the outlet side.

(3) CP-2003



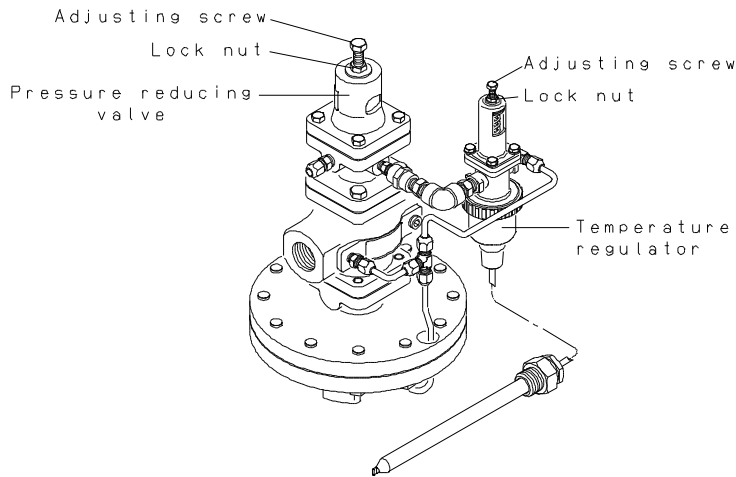
Close the solenoid valve, then turn adjusting screw [B] to adjust the low pressure setting in the same manner as that described for the CP-2001. After adjusting the low pressure setting, open the solenoid valve and turn adjusting screw [A] in the clockwise direction to adjust the high pressure setting. When both the low pressure and high pressure settings have been adjusted, open and close the solenoid valve to verify that pressure switching is occurring at the outlet side.

(4) CP-2004



Open solenoid valve [B] and close solenoid valve [A], then turn adjusting screw [B] to adjust the low pressure setting in the same manner as that described for the CP-2001. When completed, open solenoid valve [A], close solenoid valve [B], then adjust the high pressure setting. After adjusting outlet pressure, refer to the operation table shown at page 9 and verify that the unit is operating correctly.

(5) CP-2005



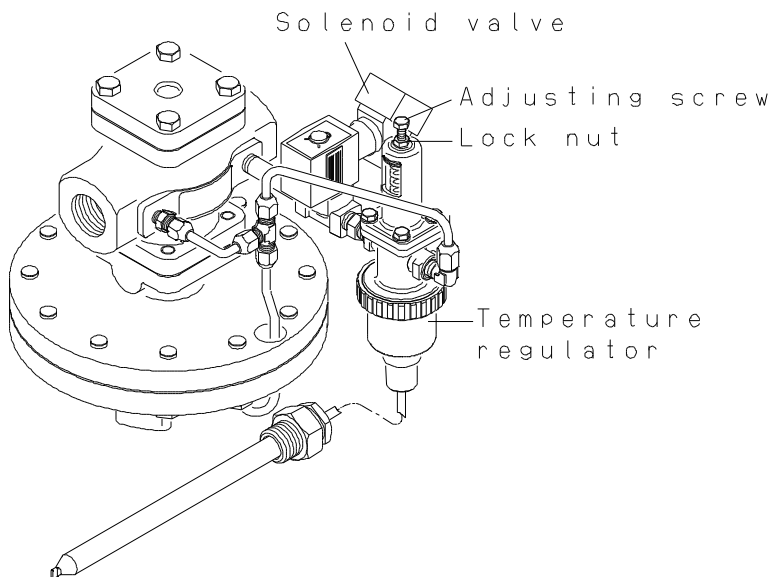
Turn the temperature regulator's adjusting screw until the needle is pointing to the desired temperature. At this point, there is still no flow of steam. Next, turn the pressure reducing valve's adjusting screw in the clockwise direction to adjust the outlet pressure so that it is slightly higher than the steam pressure required under maximum load conditions. (as a general guideline, adjust the pressure to a level where the steam temperature is about 3°C higher than the set temperature.)

setting pressure at the pressure reducing valve, and fine adjust. Optimal temperature control is possible when the outlet setting pressure is such that it provides the minimum steam pressure required for maintaining the set temperature under maximum load conditions. When adjustment is completed, re-tighten the lock nut. General adjustment guidelines are shown in the table below, though the actual values may vary somewhat depending on the operating conditions. In any event, the key is to adjust the pressure so that the required temperature is obtained.

Unit:°C

Scale Value	Temperature regulating range					
	-8~15°C	10~36°C	30~62°C	55~94°C	80~127°C	115~183°C
0.5	-11	4	22	45	68	101
1.0	-2	15	37	61	89	130
1.5	6	25	49	76	107	153
2.0	14	34	58	91	125	178
2.5	21	43	67	106	147	210

(6) CP-2006



With the solenoid valve open, turn the adjusting screw in the clockwise direction until the desired temperature is obtained (procedure is identical to that described for the CP-2005). Refer to the "scale value and setting temperature" table for assistance. After adjusting is completed, Re-tighten the lock nut and close the solenoid valve. At this time, verify that the flow of steam has stopped.

9. Maintenance procedures

9.1 Troubleshooting

Problem	Type	Cause	Solution
Pressure does not reach the desired value.	CP-2001 CP-2002 CP-2003 CP-2004 CP-2005	1. Incorrect pressure is being used. 2. Screen is clogged. 3. Main diaphragm is damaged. 4. Orifice of tee (to elbow) is clogged. 5. Nominal size is too small for the specifications. 6. Pressure is not adjusted correctly. 7. Strainer placed in front of pressure reducing valve is clogged. 8. Pressure gauge is faulty. 9. Sensing pipe is clogged.	1. Correct the pressure. 2. Disassemble the valve and clean the screen. 3. Remove pipe C at elbow and open the by-pass valve. If the fluid runs out from elbow, replace the main diaphragm. 4. Remove the orifice and clean it. 5. Change the nominal size appropriately. 6. Observe the adjustment steps and readjust pressure. 7. Disassemble and clean it. 8. Replace it. 9. Disassemble and clean it.
	CP-2001 CP-2002 CP-2003 CP-2004	10. Solenoid valve (DP-11P) doesn't operate.	10. Check the power supply and the voltage. If the problem is caused by some other factor, disassemble and repair, or replace. 11.
	CP-2005	12. Temperature regulator (OB-2000P) doesn't operate.	11. Check the adjustment and verify the sensor's temperature range. If the problem is caused by some other factors, disassemble and repair, or replace.
Outlet pressure raises above than the specified value.	CP-2001 CP-2002 CP-2003 CP-2004 CP-2005	1. Check for foreign matter stuck to main valve and main valve seat, or for scratches on these. 2. Check for foreign matter stuck to pilot valve and pilot valve seat of the pressure reducing valve (GP-2000BP), or for scratches on these. 3. Trap is not provided for dead end pipe. 4. Fluid leaks from by-pass valve. 5. Pilot diaphragm is damaged. 6. Seal bellows of the pressure reducing valve (GP-2000BP) is damaged. 7. Orifice of tee (to pipe B) is clogged. 8. Pressure is not adjusted correctly. 9. Foreign matters stuck to clearance between spindle and guide.	1. Clean the main valve and main valve seat. When any scratches are identified, lap the main valve and main valve seat. 2. Remove the pilot valve assembly, and clean the pilot valve and pilot valve seat. 3. Install a trap. 4. Repair or replace it. 5. Remove, and replace it. 6. Replace the seal bellows. 7. Remove, and clean it. 8. Observe the adjustment steps and readjust pressure. 9. Remove them for inspection and cleaning.
	CP-2002 CP-2003 CP-2004	10. Solenoid valve (DP-11P) doesn't close.	10. Inspect and repair, or replace.

Problem	Type	Cause	Solution
Temperature fails to rise.	CP-2005 CP-2006	1. Adjustment is incorrect. 2. The nominal size is too small for these specifications. 3. The sensor being used is improper for the temperature which is desired. 4. The ambient temperature is higher than the setting temperature. 5. The traps of the heat exchanger, etc., cannot be drained of sediment. 6. Main diaphragm is damaged. 7. Orifice of tee (to elbow) is clogged.	1. Re-adjusting according to the adjustment procedure. 2. Replace with the correct nominal size item. 3. Check the ravel, and replace the sensor if necessary. 4. Install a ventilation fan and/or windows to lower the ambient temperature. 5. Open the trap's by-pass valve and check its condition. 6. Remove pipe C and open the by-pass valve. If fluid is discharged from elbow C, replace the main diaphragm. 7. Remove the orifice and clean it.
		8. Setting pressure of pressure reducing valve (GP-2000BP) is low. 9. Screen is clogged. 10. Sensing pipe is clogged.	8. Raise the setting pressure. 9. Disassemble the valve and clean the screen. 10. Disassemble and clean it.
	CP-2006	10. Solenoid valve (DP-11P) doesn't operate.	10. Check the power supply and the voltage. If the problem is caused by some other factor, disassemble and repair, or replace.
Temperature rises excessively.	CP-2005 CP-2006	1. Adjustment is incorrect. 2. Either foreign matter is embedded in the main valve or main valve seat, or else scratches exist. 3. Either foreign matter is embedded in the pilot valve or pilot valve seat of temperature regulator (OB-2000P), or else scratches exist. 4. Orifice of tee (to pipe B) is clogged. 5. The thermal bulb and/or thermal bellows is damaged. 6. The by-pass pipe is leaking.	1. Re-adjust according to the adjustment procedure. 2. Disassemble the unit and clean them out the foreign matter. If scratches exist, lap them. 3. Disassemble the unit and clean them out the foreign matter. If scratches exist, lap them. 4. Remove, and clean it. 5. Replace the sensor. 6. Repair, or replace it.
	CP-2005	7. Seal bellows of pressure reducing valve (GP-2000BP) is damaged.	7. Replace the seal bellows.
Valve operation is not stable. Temperature error is large.	CP-2001 CP-2002 CP-2003 CP-2004 CP-2005 CP-2006	1. Movement of spindle or pilot valve (OB-2000P) is not smooth. 2. Orifice of tee (to pipe B) is partially clogged. 3. Malfunction caused by drain. 4. The nominal size is too large for these specifications.	1. Remove and clean it, or replace it. 2. Remove, and clean it. 3. Install a trap. 4. Replace with the correct nominal size item.
	CP-2001 CP-2002 CP-2003 CP-2004 CP-2005	5. Drain is present in the sensing pipe. 6. Pressure reducing ratio is too large.	5. Connect the sensing pipe in upward slope to the combination valve. 6. Replace reducing pressure in two stage.

Problem	Type	Cause	Solution
Valve operation is not stable. Temperature error is large.	CP-2005 CP-2006	7. Either the thermal bulb is mounted incorrectly, or the thermometer position is unsuitable.	7. Install the thermal bulb and thermometer where circulation is good.
	CP-2005	8. Setting pressure of pressure reducing valve (GP-2000BP) is too high, or outlet pressure raises above than the specified value.	8. Reduce the setting pressure. If the outlet pressure is rising, refer to the "Outlet pressure raises above than the specified value".
	CP-2006	9. Inlet pressure is too high.	9. Reduce the inlet pressure, or replace the unit with a CP-2005.
Abnormal noise is detected.	CP-2001 CP-2002 CP-2003 CP-2004 CP-2005 CP-2006	1. The nominal size is too large for these specifications. 2. Condensation trouble is happening. 3. Any valves adjacent to the product are opening or closing rapidly. 4. The pipe diameter for outlet side is too small.	1. Replace with the correct nominal size item. 2. Install a steam trap. 3. Make the distance as far as possible. 4. Make the selection of pipe diameter in order to let the flow velocity less than 30m/s.
	CP-2001 CP-2002 CP-2003 CP-2004 CP-2005	5. The reduction ratio is too large.	5. Make the reduction system in two stages.

※Most combination valve problems are the result if scaling caused by foreign particles such as sand and dust, etc., inside the piping. Therefore, be sure that the piping has been thoroughly cleaned out.

※Problems caused by faulty pressure gauges, failure to close the by-pass valve, clogged strainers, etc., are often mistakenly thought to be temperature regulator malfunctions. To avoid such a mistake, verify that all equipment is functioning properly before resorting to the troubleshooting instructions given below.

※In case it is unsure to define the parts is still in usable condition or in need to renew, please contact us.

9. 2 Warnings/Cautions during maintenance and checking

Warning

- (1) **On disassembling or checking, relief the pressure out of the product, piping and equipment thoroughly, and let cool them down till you can touch them by hand. Do not touch them until cooled down with bare hand.**

*The remaining pressure may injure or be scalded. Or may soil the surrounding with the drainage.

Caution

[(5) and (6) are not applied to CP-2005.]

- (1) **In order to maintain the product's function and performance, carry out the daily checking and periodical inspection. Also carry out the self-imposed inspection in accordance with the relative regulations.**

* For the general user, it is recommendable to entrust specialists the inspection.

- (2) **Carry out the disassembling or checking by the skilled specialist or specialized dealer.**

* When the product is in abnormal condition or malfunctioned, contact the specialized dealer for troubleshooting.

- (3) **When disassembling the product, prepare a container or pan to receive the drain as it remains inside and may flow out. Also, let all steam (condensation) out of the product prior to disassembling.**

* The overflowed condensation may soil the surrounding.

- (4) **After stopping the system for long period of time, carry out the function checking prior to re-starting.**

* When any abnormal condition detected, contact the specialized dealer for troubleshooting.

- (5) **Be sure to turn the solenoid valve (DP-11P) OFF before disassembly and inspection operations.**

* May cause the electric shock.

- (6) **Do not supply electric power while the solenoid coil is detached from the product.**

*The overcurrent may cause the fire.

9. 3 Disassembly

Anytime prior to disassembling, confirm if both stop valves at inlet and outlet side of the product are at closed position. Also, make sure that no pressure and condensation remains inside of the product.

Disassembly should be made using the procedure described below, with reference to Fig.4 to Fig.8, and observe the step below.

- (1) **Main valve (9. 5 Disassembly drawing Fig.4、Fig.5)**

1. Remove pipe A. (That is not necessary for CP-2006.)
2. Remove bolt [1] of the pilot valve or the cover. Dismount the pilot valve or the cover from the main valve. And remove spring plate , screen , main valve spring , and main valve . (Spring plate and screen are not existed for CP-2006.)

- (2) **Main diaphragm (9. 5 Disassembly drawing Fig.4、Fig.5)**

1. Remove pipe C.
2. Remove bolt [2] of bottom diaphragm case. Dismount the bottom diaphragm case, main diaphragm , retainer , and spindle.

(3) **Pilot valve of pressure reducing valve (GP-2000BP)**

(9. 5 Disassembly drawing Fig.7)

1. Slightly loosen lock nut and turn adjusting screw counterclockwise to release spring (no compression).
2. Remove bolt [3] of spring chamber, and remove spring chamber, and remove spring, top spring plate, bottom spring plate, spring plate follower, and pilot diaphragm.
3. Remove seal bellows using a ring spanner or socket wrench (nominal size 30), and remove pilot valve seat using a ring spanner or socket wrench (nominal size 17), and remove pilot valve assembly.

(4) **Temperature regulator (OB-2000P) (9. 5 Disassembly drawing Fig.8)**

1. Be sure that the thermal bulb is not exposed to a temperature which exceeds the prescribed temperature endurance.
2. Slightly loosen lock nut and turn adjusting screw counterclockwise to release spring (no compression).
3. Remove bolt of spring chamber and remove the spring chamber and remove spring, and etc.
4. Remove bellows plate and seal bellows.
5. Loosen ring, and remove the thermal bellows. Be sure not to lose the bellows follower at this time.
6. Remove guide and pilot valve.

9. 4 Cautions during re-assembling

 Caution

(1) Check that there is no damage on the main valve, main valve seat, pilot valve, and pilot valve seat.

*If any scratches exist on the seating surface of valve seat, they may cause increasing the outlet pressure and excess temperature. When any scratches exist on the main valve and valve seat, carry out lapping to remove them. If it is not possible to remove them, replace with new parts. When any scratches exist on the pilot valve and valve seat, replace with new parts.

(2) Move the sliding section (pilot valve, main spindle, etc.) two to three times and confirm they move smoothly.

* If they do not move smoothly, original performance may be affected.

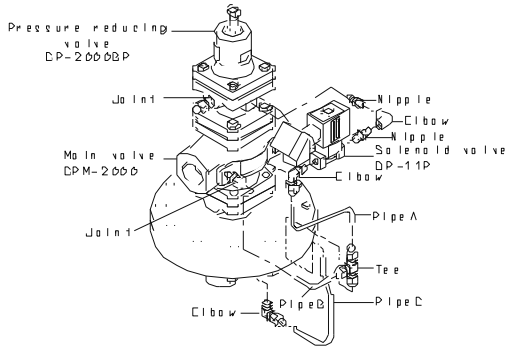
(3) Replace gaskets with new ones when disassembling.

* Reusing the gasket as it is, the steam may leak outside.

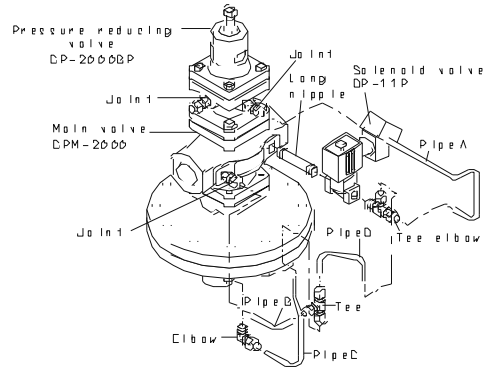
(4) Carry out re-assembling in reverse order of disassembling. Tighten all hexagon bolts evenly on each bolt in turn of diagonal position.

* When re-assembling the product in wrong order, the proper function may not be available. Uneven tightening of bolts may cause the leakage of steam.

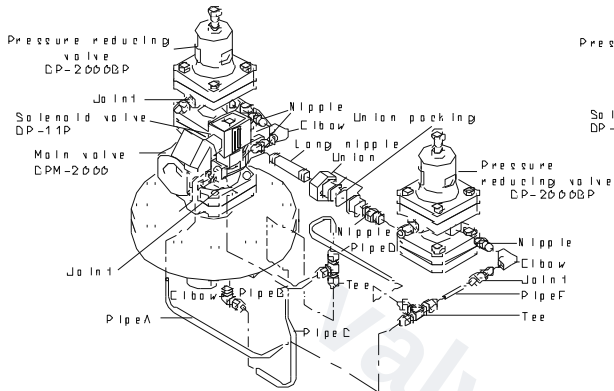
9. 5 Disassembly drawing



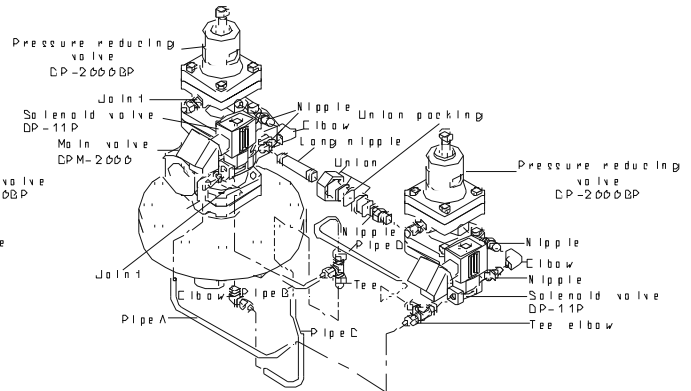
CP-2001



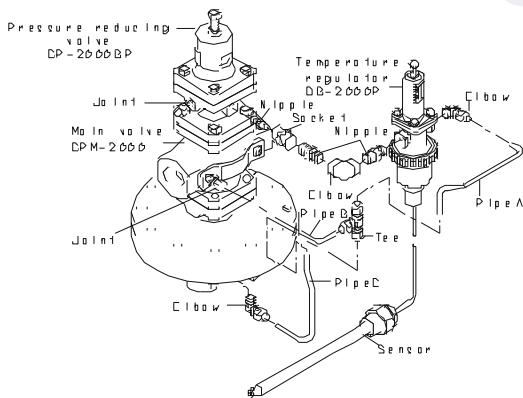
CP-2002



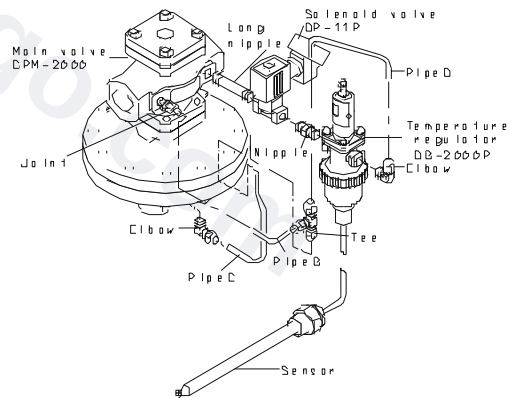
CP-2003



CP-2004



CP-2005



CP-2006

Fig.4

GPM-2000 Main valve

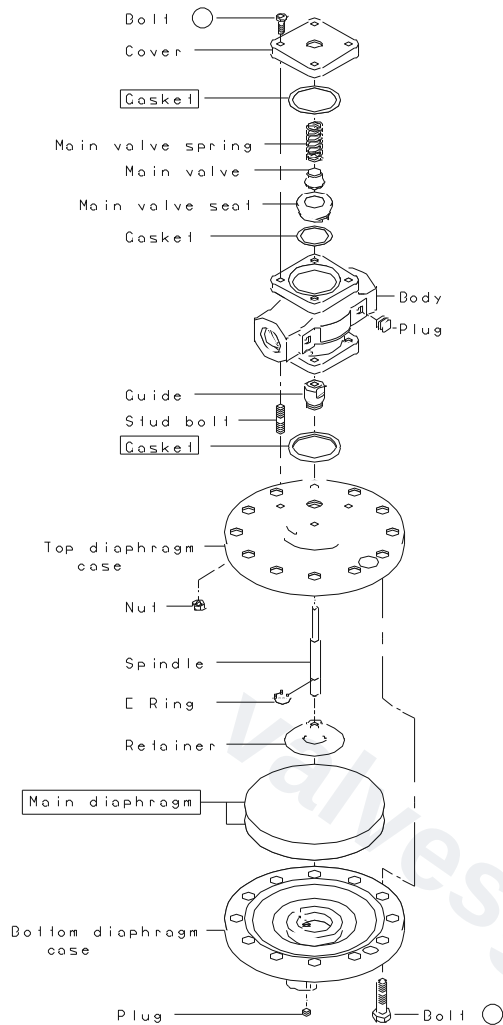


Fig.5

- ※ Parts within the frame are consumable. Please contact us for purchase of these consumable parts.
- ※ In cases where the GP-2000BP pilot valve is mounted on the top of the main valve, some additional parts are required, and some of the parts shown here are not used.
- ※ Apply the liquid gasket, heat-resisting and steam resisting type (recommendable product: NEVER SEEZ Standard Grade made by BOSTIK), on sealing surface between the pilot diaphragm and upper cover, also between upper and lower sealing surface of the main diaphragm.
- ※ Install the tee onto the pilot body with its slit part. (Refer to the above drawing.)

**DP-11P Solenoid valve
(Pilot valve)**

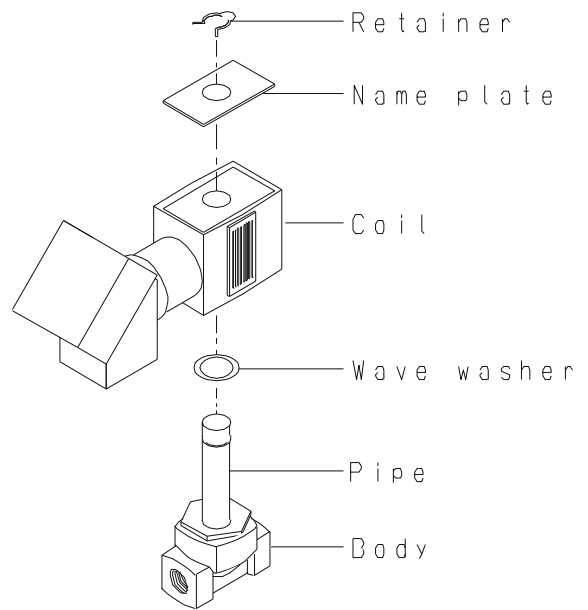
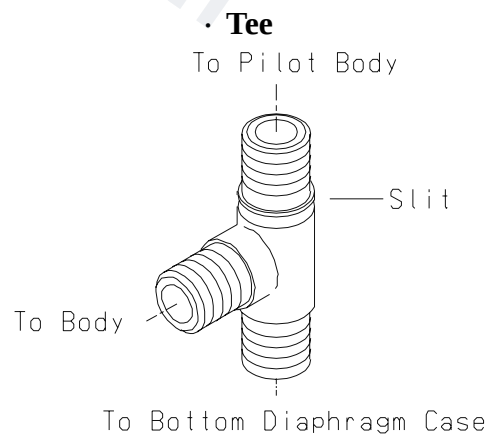


Fig.6



GP-2000BP Pressure reducing valve (Pilot valve)

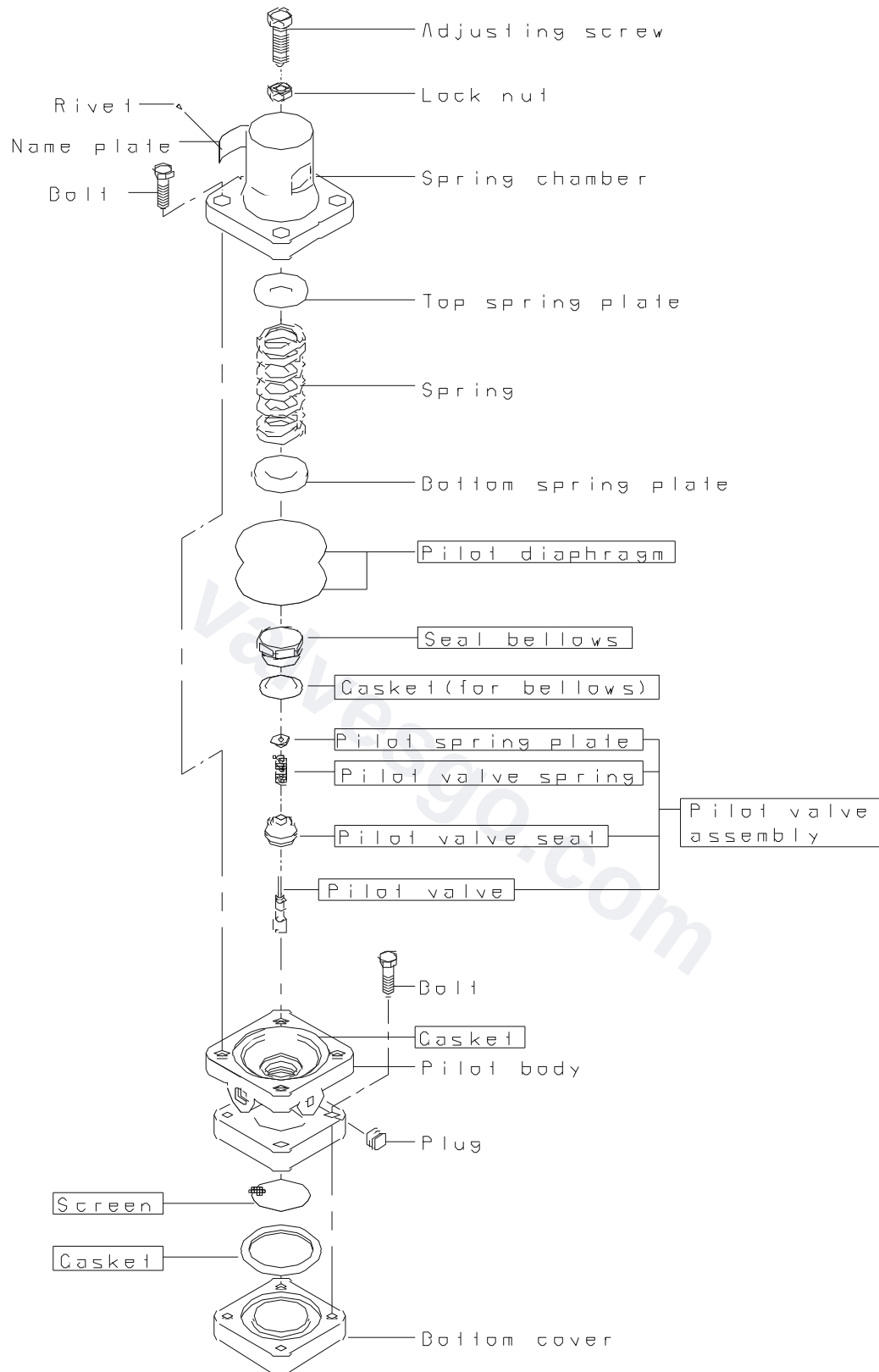


Fig.7

※ Parts within the frame are consumable. Please contact us for purchase of these consumable parts.

OB-2000P Temperature regulator

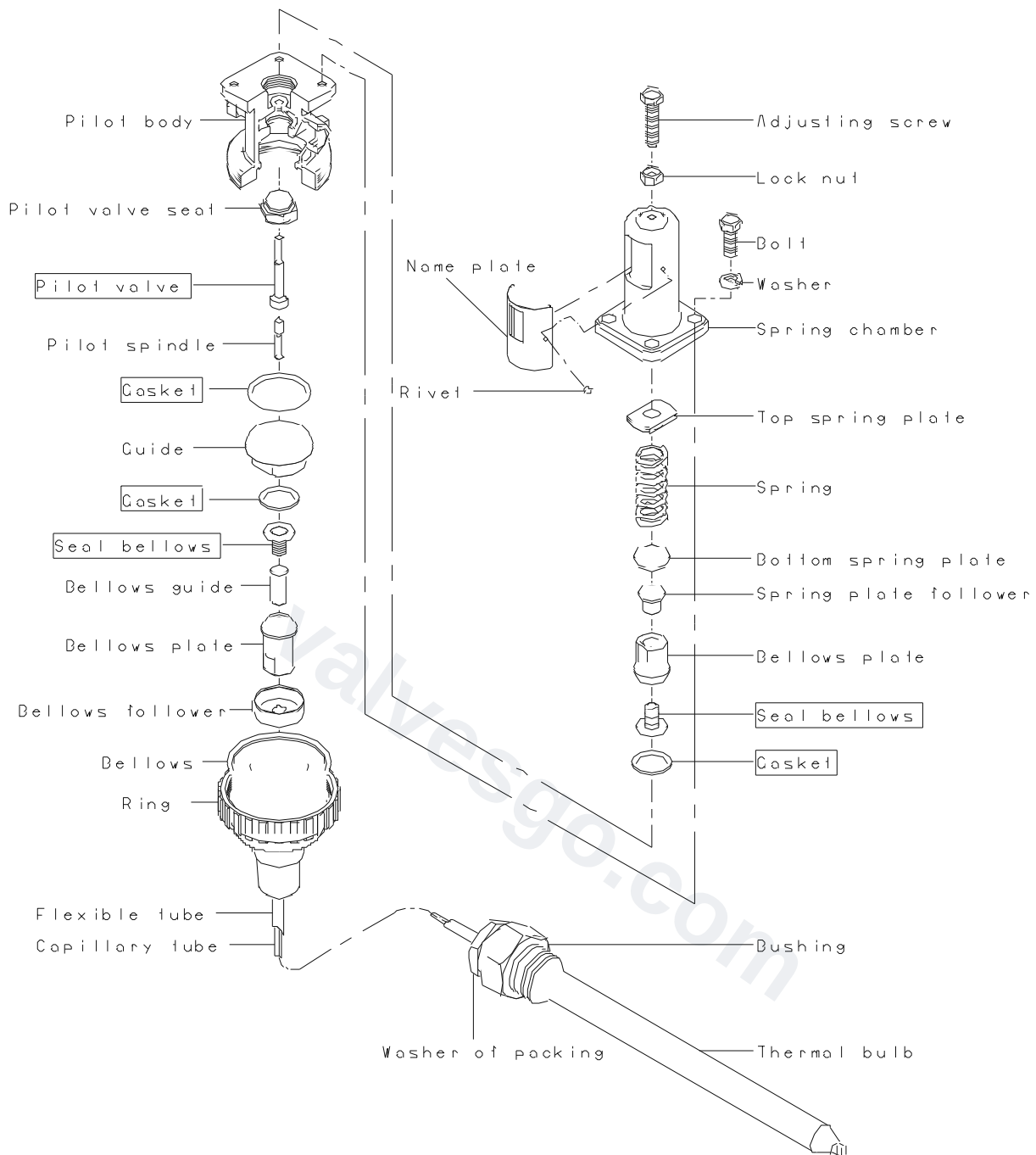


Fig.8

※ Parts within the frame are consumable. Please contact us for purchase of these consumable parts.

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.

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