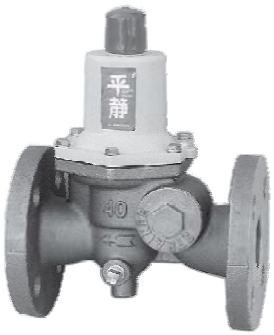
RD-31N, 31FN, 33FN Type Pressure Reducing Valve (for Water, Hot Water or Air)

for Building and Factory Equipments etc. Direct operation, general-purpose valves

(bronze body, medium capacity)

Bronze valves meeting the demand of the time.
Designed based on our technology for making quality pressure reducing valves, which are highly evaluated by our customers, these valves are more reliable, easier to control and use, and particularly, they do not allow rust in the entire piping line, including pipe joints. Using these pipes, you do not need to worry about the occurrence of the red water (rusty water). Ideal for applications in building, house, factory, and boiler and water supply equipments.

Screw Type



Flange Type

■ FEATURES

- Bronze body prevents occurrence of rusty water.
- Low noise design.
- 50% smaller, lighter than traditional cast iron products.
- No water leakage even if the diaphragm is broken.
- Flexible installation (except that the strainer cap face upwardly).
- Strainer embedded (40 meshes for nominal diameter less than size 50mm).

■ SPECIFICATIONS

Model name	RD-31N L/H	RD-31FN L/H	RD-33FN L/H
Code name	RD31N-F□	RD31FN-F□	RD33FN-F□
	※L (low press.) or H (high press.) for adjustable secondary pressure is required in □.		
Size	15~50(½″~2″)	25~50(1″~2″)	65~150(2½″~6″)
End connection	Screwed JIS Rc	Flanged JIS 10KFF	
Applicable primary pressure	Max. 1.0MPa		
Applicable fluid	Water, hot water, air*2 & non-corrosive gases*2		
Applicable temperature	5~90℃		
Adjustable secondary pressure	Size 15~100mm L:0.05~0.35MPa, H:0.3~0.7MPa Size 125~150mm L:0.05~0.35MPa, H:0.3~0.5MPa		
Maximum reducing rate	10:1		
Minimum pressure differential across the disc	0.05MPa		
Leakage allowance	Nil(Confirm at pressure Gauge)		
Valve body pressure test	Hydraulic 1.75MPa		
Materials	Body(Cast bronze), Trim(Cast bronze), Diaphragm & disc(Synthetic rubber) Spring case(Size 25~50mm:Cast zinc, Size 65~150mm:Cast iron)		

*1. Valves with pressure gauge is also available upon your request.(Secondary side)
*2. Size 100mm or smaller can be used in non-corrosive gases line.

■ DIMENSIONS (RD-31N Type)

(mm)

Size	d	L	G	H	A	Mass (kg)
15(½″)	½″	125	41	140	100	2.2
20(¾″)	¾″	130	41	140	100	2.3
25(1″)	1″	145	41	141	100	2.6
32(1¼″)	1¼″	175	50	187	116	4.9
40(1½″)	1½″	180	50	187	116	5.1
50(2″)	2″	205	50	206	142	7.5

■ DIMENSIONS (RD-31FN, 33FN Type)

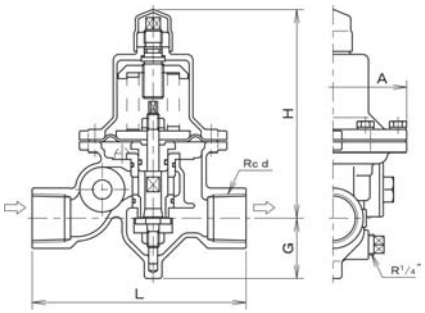
(mm)

Size	L	G	H	A	Mass(kg)
25(1″)	170	41	141	100	5.3
32(1¼″)	190	50	187	116	8.3
40(1½″)	190	50	187	116	8.6
50(2″)	215	50	206	142	12
65(2½″)	215	70	280	162	22
80(3″)	230	70	285	162	22
100(4″)	260	78	345	201	35
125(5″)	330	105	490	250	63.5
150(6″)	400	130	660	340	126

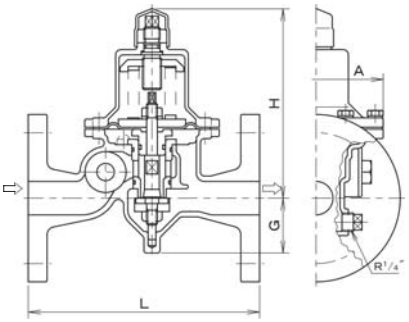
Flange code JIS 10KFF

■ CONSTRUCTION

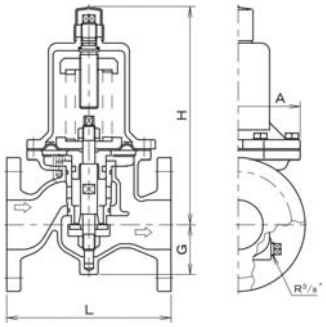
RD-31N Type



RD-31FN Type



RD-33FN Type



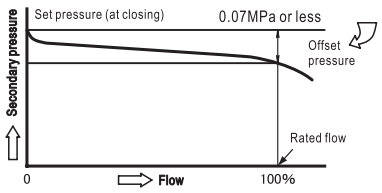
DATA/RD-31N ~ 38F Type Pressure Reducing Valve (for Water, Hot Water, Air or Liquids)

■ OFFSET PRESSURE CHARACTERISTIC

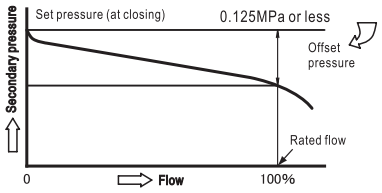
Offset pressure: The difference between secondary pressure and set pressure when flow increases from zero to rated flow but the primary pressure maintains the same.

(For details, see Flow Characteristics)

Spring range L : 0.05~0.35MPa



Spring range H:Size <100mm: 0.3~0.7MPa
Size 125mm, 150mm: 0.3~0.5MPa



■ RATED FLOW (Water and Liquids)

Pressure differential across the disc: More than 0.15MPa

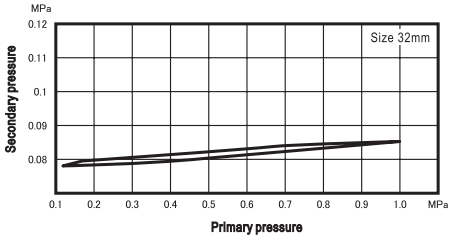
Size(mm)	15	20	25	32	40	50	65	80	100	125	150
Rated flow(l/min)	20	40	60	100	150	240	300	440	700	1200	1800

In case of pressure difference is less than 0.15MPa,the Rated flow will be calculated by 「 $\text{RatedFlow} \times \sqrt{\frac{\Delta P}{0.15}}$ 」

■ PRESSURE CHARACTERISTIC

Pressure characteristic shows the change of the secondary pressure when flow remains the same but the primary pressure changes. In the figure in the right, the secondary pressure is set to be 0.1MPa when flow is 0 and the primary pressure is 0.6MPa. It shows the change of the secondary pressure when the flow is 10% rated flow and the primary pressure changes from 0.6~0.15~1.0~0.6MPa.

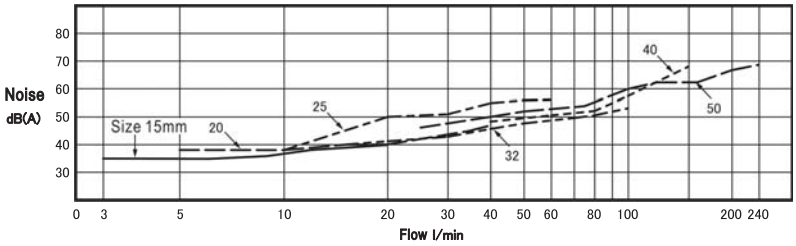
Change of the Secondary pressure = Set pressure×10% or less (minimum 0.02MPa)



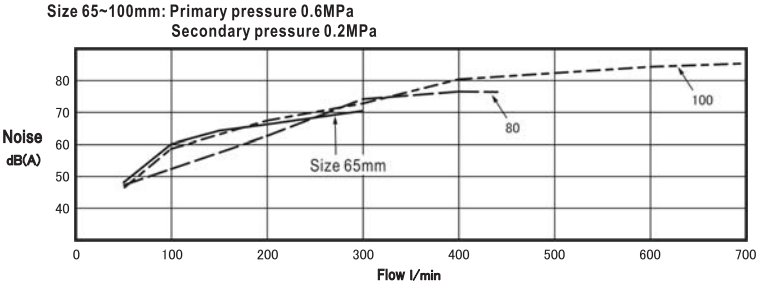
■ NOISE CHARACTERISTIC

Noise characteristic shows the noise at each different flow when the secondary pressure is set and the primary pressure maintains the same.

Size 15~50mm: Primary pressure 0.6MPa
Secondary pressure 0.2MPa



Size 65~100mm: Primary pressure 0.6MPa
Secondary pressure 0.2MPa



■ POINTS FOR INSTALLATION

- Install use bypass line.
- Use a globe valve for the stop valve on the bypass line.
- Install straight pipe before and after pressure reducing valve.
  The length of straight pipe depends on the state of pipe before and after valve. The length should be at least 10~20 times of nominal diameter (Minimum 500mm).
- Install pressure gauge at both the primary and secondary sides.
- Install safety relief valve at the secondary side.
  ① If not otherwise specified, the diameter of the safety relief valve should allow to blow out about 10% of the rated flow of pressure reducing valve.
  ② Set pressure table for safety relief valve is as follows.

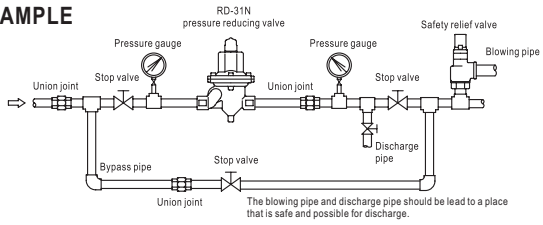
■ SET PRESSURE FOR TABLE SAFETY RELIEF VALVE

(MPa)

Set pressure of pressure reducing valve	Set pressure of safety valve
0.1or less	+0.05
0.1 or more and below 0.4	+0.08
0.4 or more and below 0.6	+0.12
0.6 or more and below 0.8	+0.15

Add the above value to set pressure of Pressure Reducing Valve.

■ PIPING EXAMPLE



Note: In the case of RD-33FN~38F type series pressure reducing valve without embedded strainer, it is necessary to install strainer at the primary side.

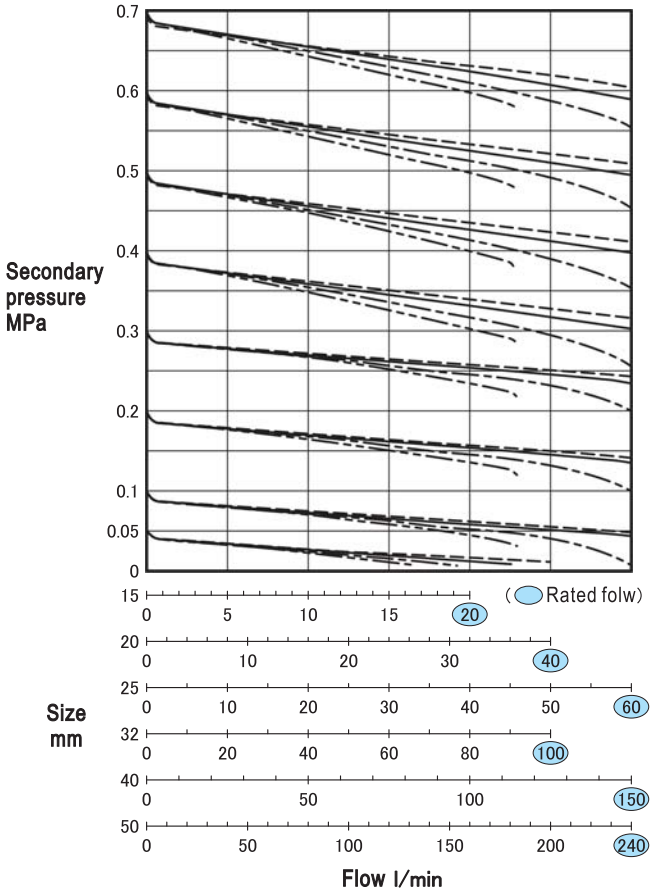
DATA/RD-31N ~ 38F Type Pressure Reducing Valve (for Water, Hot Water, or Liquids)

■ FLOW CHARACTERISTIC (for Liquids)

● Size 15~50mm

Primary pressure (P_1) MPa

- - - - - - - - - P_1=1.0~1.6MPa
(0.5MPa if the set pressure is 0.05MPa)
———— P_1= P_2+0.2MPa
—— - —— P_1= P_2+0.1MPa
—— - - —— P_1= P_2+0.05MPa
P_2: secondary set pressure (MPa)

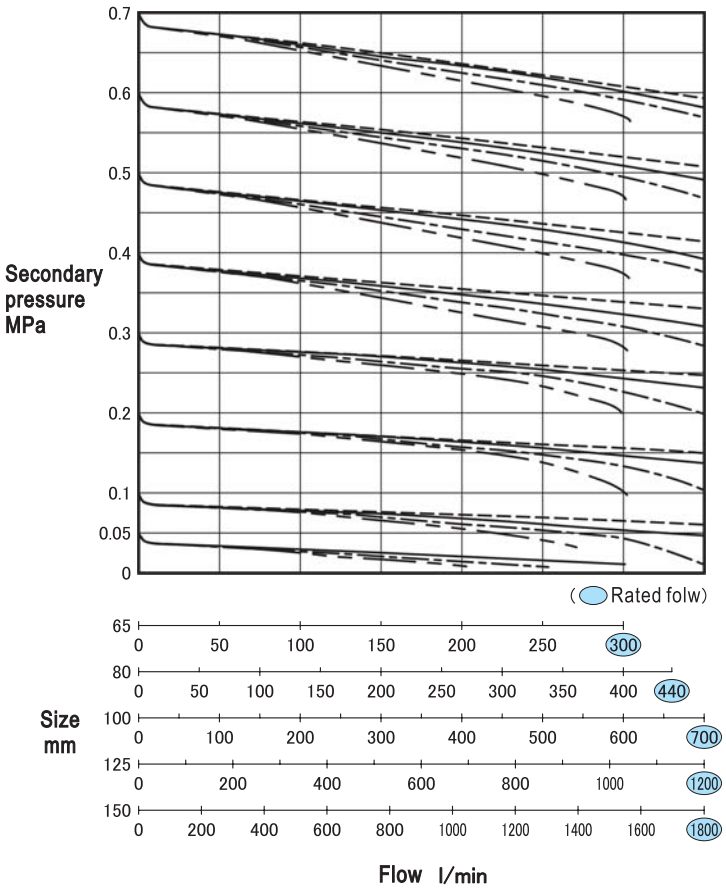


● Size 65~150mm

Primary pressure (P_1) MPa

- - - - - - - - - P_1=1.0~1.6MPa
(0.5MPa if the set pressure is 0.05MPa)
———— P_1= P_2+0.2MPa
—— - —— P_1= P_2+0.1MPa
—— - - —— P_1= P_2+0.05MPa
P_2: secondary set pressure (MPa)

Note: In the case of nominal diameter 125mm, 150mm, the secondary set pressure is Max. 0.5MPa.

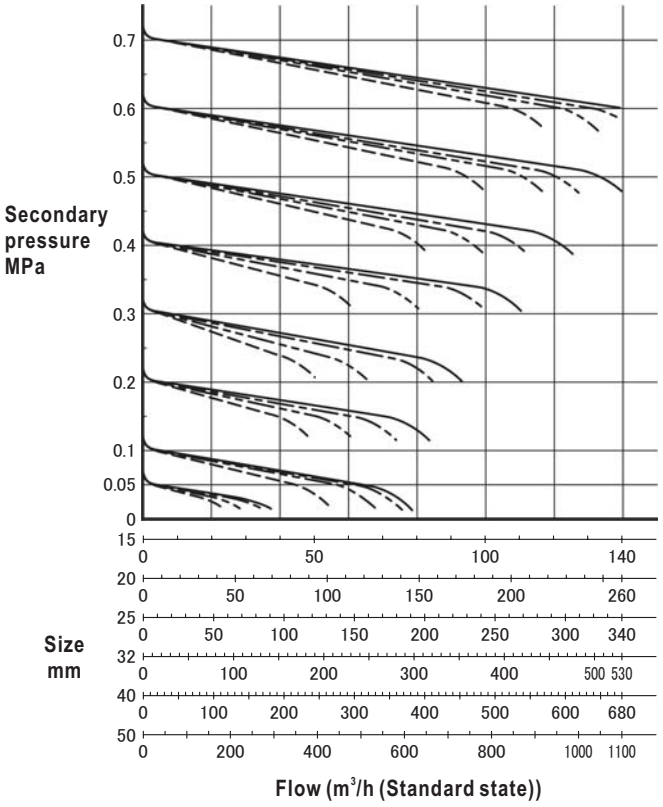


DATA/RD-31N ~ 38F Type Pressure Reducing Valve (for Water, Hot Water, Air or Liquids)

■ FLOW CHARACTERISTIC (for air and non-corrosive gasses)

Primary pressure

- ———— set pressure plus 0.3MPa or lager
- —— - —— set pressure plus 0.2MPa
- —— - - —— set pressure plus 0.1MPa
- - - - - - - - - set pressure plus 0.05MPa



- This flow characteristic is based on air (standard state).
- For gas with specific gravity G, convert the flow into the flow of air.

Converted flow = flow of gas $\sqrt{G}$

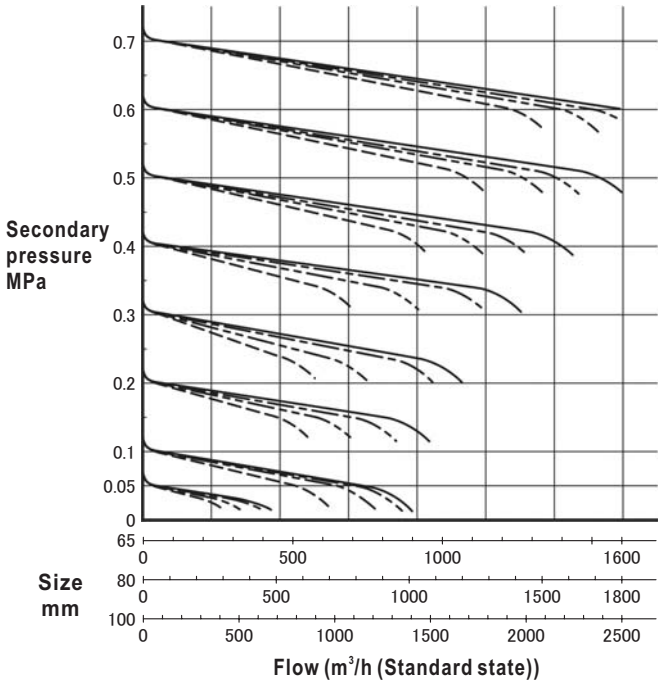
= flow of gas $\sqrt{\frac{M}{28.96}}$

G: specific gravity (air=1)
M: molecular weight of gas .

(M: See page 264 for molecular weight of gas)

Primary pressure

- ———— set pressure plus 0.3MPa or lager
- —— - —— set pressure plus 0.2MPa
- —— - - —— set pressure plus 0.1MPa
- - - - - - - - - set pressure plus 0.05MPa



DATA/Pressure Reducing Valve (for Water or Liquids)

■ PIPING EXAMPLE

Fig 1. With bypass line

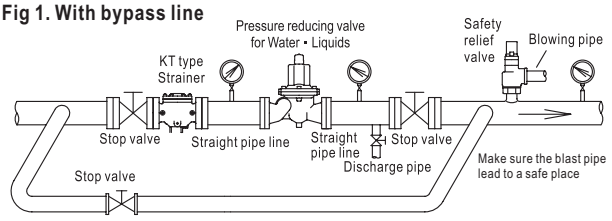


Fig 2. Without bypass line

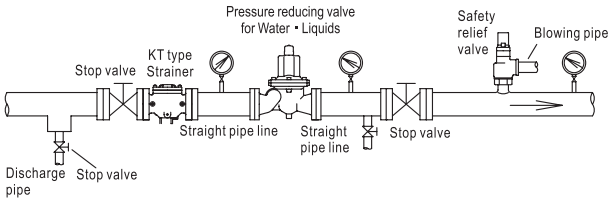
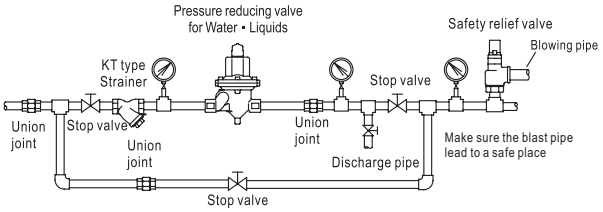


Fig 3. Screwed type connection with bypass line



Note: See Fig.2 for piping with screw type end connection and without bypass pipe.

■ POINTS FOR INSTALLATION

○ **Installation of pressure reducing valve and piping**

1. If not otherwise specified, the pressure reducing valve should be vertical to horizontal pipe.
   Install safety valve or safety relief valve at secondary side.
   ※ 1. In the case of failure of pressure reducing valve, expansion of fluid due to rise of ambient temperature, or water hammer, the secondary pressure may rise and equipment may be damaged.
   ※ 2. See Tab.1 for set pressure of safety valve or safety relief valve.
   ※ 3. In the case safety valve or safety relief valve is used as an alarm, its nominal diameter should be big enough to allow discharge of 10% maximum flow of pressure reducing valve, which is about the leakage of pressure reducing valve. In very few cases, nominal diameter is selected by discharging amount of maximum flow for pressure reducing valve.(reference value: see Table 2 and Table 3)

■ TABLE1. SET PRESSURE FOR SAFETY RELIEF VALVE (MPa)

Set pressure of pressure reducing valve	Set pressure of safety valve
0.1or less	+0.05
0.1 or more and below 0.4	+0.08
0.4 or more and below 0.6	+0.12
0.6 or more and below 0.8	+0.15
0.8 or more and below 1.0	+0.19
1.0 or more and 1.2 or less	+0.23

Add above value to set pressure of Pressure Reducing Valve.

■ TABLE2. FLOW FOR SAFETY VALVE (Water) (kg/h)

Set pressure (MPa)	Size					
	15(½″)	20(¾″)	25(1″)	32(1¼″)	40(1½″)	50(2″)
0.05	375	640	930	1720	2690	4380
0.1	531	905	1310	2430	3810	6200
0.2	742	1260	1830	3400	5320	8650
0.3	875	1490	2160	4010	6280	10200
0.4	976	1660	2410	4480	7000	11300
0.5	1070	1820	2650	4910	7690	12400
0.6	1150	1970	2860	5310	8310	13500
0.7	1230	2110	3060	5680	8890	14400
0.8	1310	2240	3250	6030	9440	15300
0.9	1380	2360	3430	6360	9950	16100
1.0	1450	2470	3600	6680	10400	16900

■ TABLE3. FLOW FOR SAFETY VALVE (Air) (kg/h)

Set pressure (MPa)	Size					
	15(½″)	20(¾″)	25(1″)	32(1¼″)	40(1½″)	50(2″)
0.05	21.8	37.1	53.9	100	156	254
0.1	28.2	48	69.8	129	202	329
0.2	41	69.9	101	188	294	479
0.3	55.1	93.9	136	253	396	643
0.4	69.3	118	171	318	497	808
0.5	83.4	142	206	382	598	972
0.6	97.5	166	241	447	700	1130
0.7	111	190	276	512	801	1300
0.8	125	214	311	577	902	1460
0.9	139	238	346	641	1000	1630
1.0	154	262	381	706	1100	1790

3. Install strainer at the primary side of pressure reducing valve.
4. For devices that cannot be stopped, install bypass piping (with stop valve) from the primary side to the secondary side of pressure reducing valve (see Fig.1).
   If bypass piping is not suitable, then install blowing check valve which is derived from the main pipe before the primary side of pressure reducing valve, so as to make flushing possible(see Fig.2).
5. Install straight piping, stop valve, and pressure gauge before and after pressure reducing valve.
   In case of screwed type end connections, use union joint for easy maintenance and repair.(see Fig. 3).
6. In the case a solenoid valve (ON/OFF operation) is installed at the secondary side of pressure reducing valve, the solenoid valve should 1~2m away from pressure reducing valve.

There should also be a 1~2m distance between pressure reducing valves in the case of 2-step pressure reduction. (See Fig.4, Fig.5)

Fig.4 Solenoid valve (on/off operation) installation

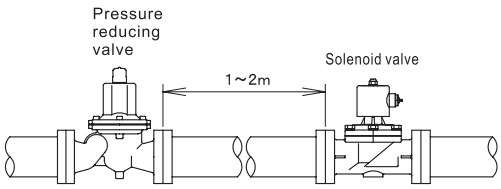
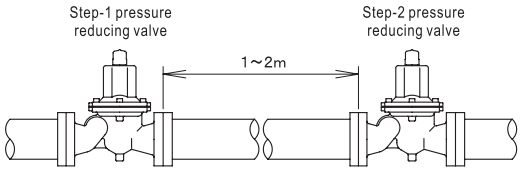


Fig.5 2-Step pressure reduction



7. In water supply system with roof tank in tall/medium height buildings, water hammer may occur if one stop or 2 more steps of pressure reducing valves are installed. In such case, install a water hammer preventing device at the primary side of pressure reducing valve. (See Fig.6)
8. Leave some space for dissembling and maintenance.
9. Apply appropriate support to pressure reducing valve to protect from the weight of piping itself, bending force, or vibration.
10. If it is possibility of freezing, perform thermal insulation or discharge the drain.
11. In the case of buried piping, install pressure reducing valve in pit (box).
    The pit should have drainage system to prevent accumulation of rain etc., and thermo-insulation or drainage may be necessary if there is possibility of freezing. (See Fig. 7)

Fig.6 Roof tank in tall/medium height building

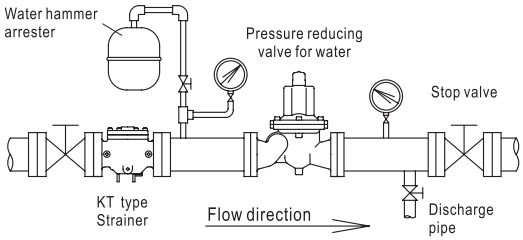
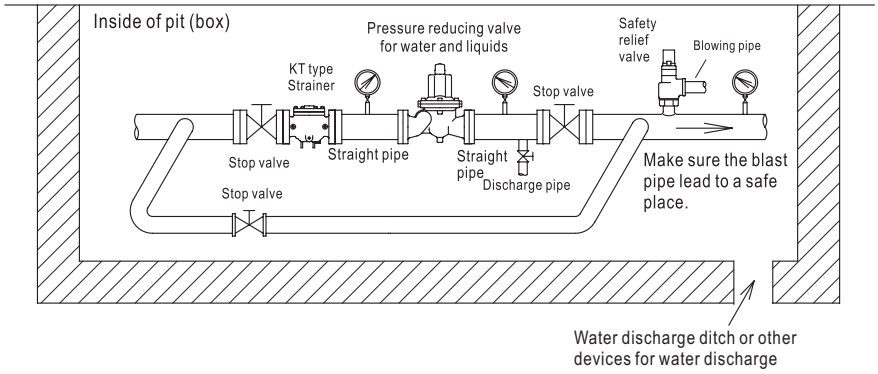


Fig.7 BURIED PIPING



12. In most cases, the secondary pressure is not adjusted when product is delivered.
    Therefore, adjust the secondary pressure to a desired pressure.

※ The secondary pressure of a non-adjusted valve is near to zero.To adjust the secondary pressure, follow the following steps.

※ How to adjust the secondary pressure:

① Close the stop valves at primary and secondary sides.

② Open the blowing stop valve or stop valve in bypass and remove any content inside.Such operation is called flushing and should be carried out sufficiently by spending sufficient time on it. take care not to make the secondary pressure rise excessively.
Take care not to make the secondary pressure rise excessively.

③ Close the blowing stop valve or stop valve of bypass pipe.

④ Make sure there is not any spring load caused by adjusting screw.

⑤ Open the stop valve at primary side gradually.

⑥ Make sure you have adjusted the secondary pressure. Open the stop valve at the secondary side slightly to allow small flow.

⑦ Use the adjusting screw and apply a tiny spring load. Open the secondary stop valve gradually once fluid starts to flow.

⑧ Read the pressure gauge and apply more spring load to make the pressure reaching the set pressure. The secondary pressure rises if you turn the adjusting screw clockwise, and the pressure drops if you turn the screw counterclockwise.

⑨ Once the desired pressure is reached, use the lock nut to lock the adjusting screw.
After the screw is locked, the spring load will not change.

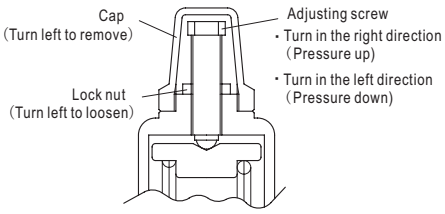



Fig.8 A TYPICAL ADJUSTING METHOD