FD-2W, 2H Type Differential Pressure Regulating Valve (for Water or Hot water)

for Air Conditioner, Air Conditioning Equipment, etc.

These products can be used as pump relief valve in closed circuit of air conditioning equipments in high buildings.
In open circuit, primary pressure regulating valve is used for the relief valve of pump. In closed circuit, however, since it is required to maintain operating at a constant flow for the pump, no matter how load changes, differential pressure regulating valve should be used.

FEATURES

- Can be used as pump relief valve in closed circuit.

SPECIFICATIONS

Model name	FD-2W	FD-2H
Code name	FD2W-B☐	FD2H-B☐
	※ L(low press.) or H (high press.) for adjustable primary pressure is required in ☐.	
Applicable fluid	Water	Hot water
Fluid temperature	5~60℃	5~90℃
Adjustable primary pressure	Size 15~80mm L:0.05~0.35MPa, H:0.3~0.7MPa Size 100~150mm L:0.05~0.35MPa, H:0.3~0.5MPa	
End connection	Flanged JIS 10KRF	
Materials	Body(Cast iron), Trim(Cast bronze and Stainless steel), Diaphragm & disc(Synthetic rubber)	
Painting	Interior:Epoxy resin	Interior:Rust proof oil
Valve body pressure test	Hydraulic 1.5MPa	

* Refer to Page 108 for size selection of differential pressure regulating valve and Page 100 for valve sizing.

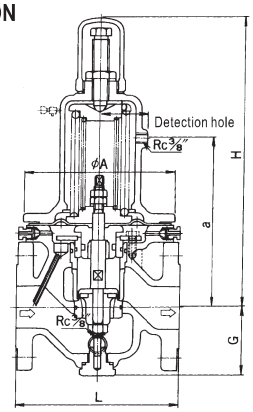
DIMENSIONS

(mm)

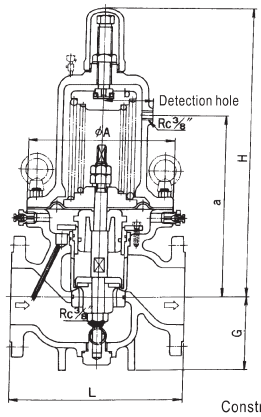
Size	L	A	G	H	a	b	Cv value	Mass(kg)
15(½″)	156	142	65	256	137	40	1	10
20(¾″)	160	142	65	256	137	40	2	10
25(1″)	160	142	65	257	137	40	3.5	10.5
32(1¼″)	180	174	76	332	170	50	5.5	17
40(1½″)	180	174	76	333	170	50	8	17.5
50(2″)	190	174	81	341	177	50	14	19
65(2½″)	230	218	95	434	214	64	22	37
80(3″)	250	218	100	439	219	64	32	40
100(4″)	300	250	125	490	281	78	48	67
125(5″)	370	340	150	640	356	104	75	112
150(6″)	400	340	165	655	371	104	108	150

Flange code JIS 10KRF

CONSTRUCTION



Size 15~80mm

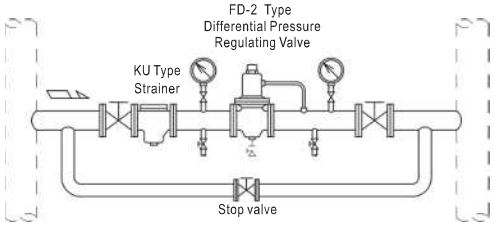


Size 100~150mm

Construction is a bit different depending on sizes.

Note: The detection hole (JIS Rc⅜″) should be pipe connected to the detection part of the outlet side.

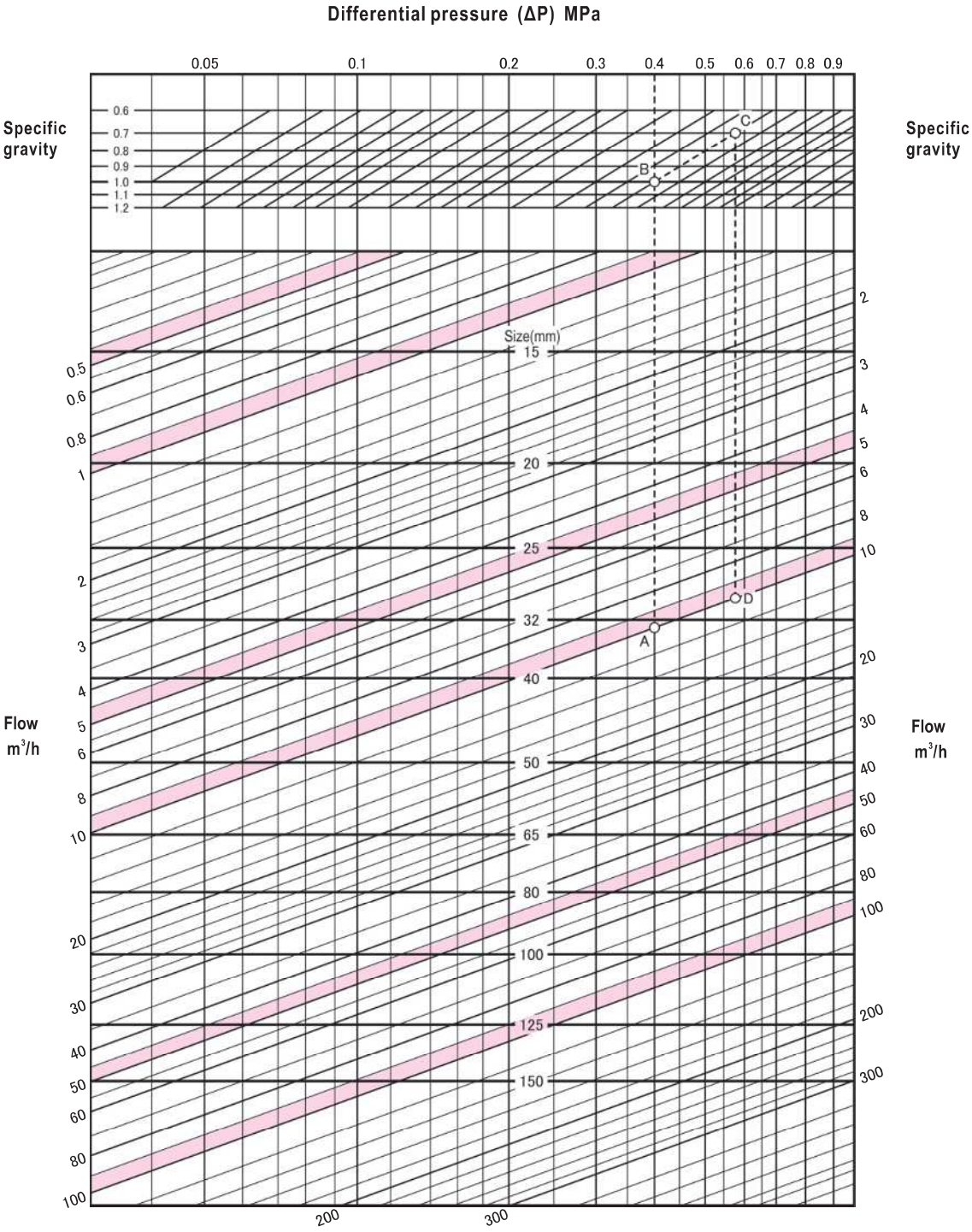
PIPING EXAMPLE



Note: It is recommended to use a 40-mesh strainer.

DATA/MD-14, 20, FD-2 Type Series Circuit Valve

SIZE SELECTION CHART (for Liquids)



● HOW TO USE THE CHART

Where,
Primary set pressure: 0.5MPa
Back pressure: 0.1MPa
Specific gravity: 1 (water)
Flow rate: 10m³/h.
The differential pressure (ΔP) is 0.5−0.1=0.4MPa

Find out the intersection point A between the 0.4MPa differential pressure (ΔP) line and the 10m³/h flow line.

Since point A is between the lines nominal diameter size 32mm and 40mm select, choose the larger one, 40mm.

And here by the same conditions except the specific gravity is 0.7, find out the intersection point B between the 0.4MPa differential pressure (ΔP) line and the 1.0 specific gravity line.

Move from point B on the 0.7 specific gravity line parallelly to reach point C. Now draw a vertical line from point C until it intersects with the 10m³/h flow line. The intersection point is named D. Since point D is located between the lines nominal diameter size 25mm and 32mm select, choose the larger one,32mm.

Types of Circuit Valve

■ OVERVIEW

Circuit valves can be divided into three types: Primary pressure regulating valve, Pressure sustaining valve and Differential pressure regulating valve. These valves are used as pressure regulating valves in air conditioning equipments in high buildings.

Primary pressure regulating valve (Direct operated type MD-14 Type)

Used as bypass valve for pump (pump relief valve), Primary pressure regulating valve can respond to change of pump load and discharge excessive pressure and maintain a constant discharge pressure.
Large capacity type WVM-02 Type is also available.

Pressure sustaining valve (Direct operated type MD-20 Type)

This valve can prevent water from falling in return pipe of open circuit for air conditioning system in high buildings that may occur when pump stops.

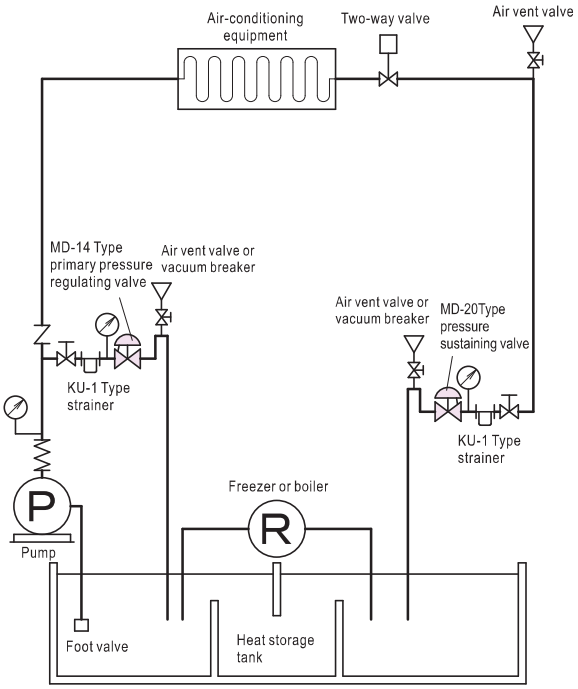
By installing pressure sustaining valve in return pipe, the valve closes immediately after pump stops. This can prevent decrease of water level and accumulation of air, thus can prevent the occurrence of noise and vibration. In addition, the valve can maintain the primary pressure at a constant level and provide stable pressure condition for normal operation of equipments.

Differential pressure regulating valve (Direct operated type FD-2 Type)

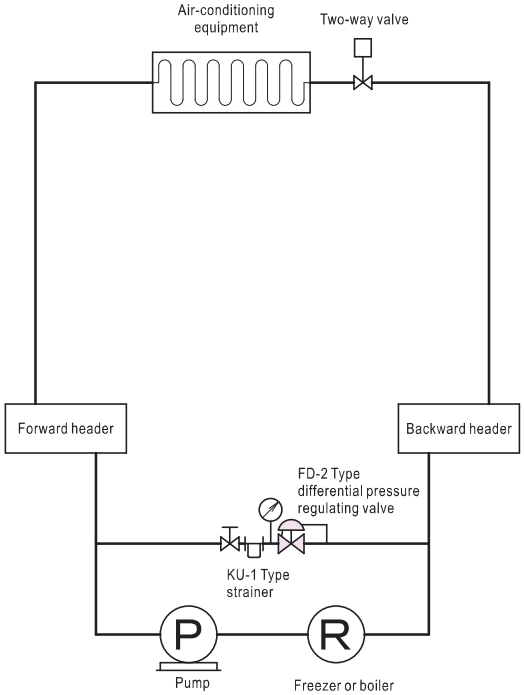
This valve can be used as pump relief valve in closed circuit of air conditioning system in high buildings.

In open circuit, primary pressure regulating valve is used as the relief valve of pump. In closed circuit, however, since it is required to maintain operating at a constant flow, no matter how load changes, differential pressure regulating valve should be used.

Open circuit



Closed circuit

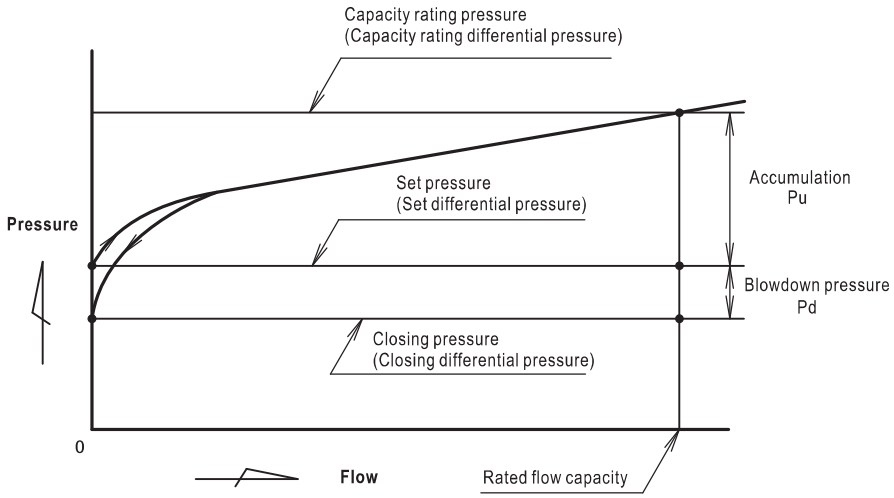


■ TERMS

- Set pressure (set differential pressure): The pressure at inlet side when primary pressure regulating valve and pressure sustaining valve start (differential pressure regulating valve) start to operate and fluid starts to flow (difference of pressure before and after valve).
- Closing pressure (closing differential pressure): The inlet pressure when primary pressure regulating valve and pressure sustaining valve close (differential pressure regulating valve) and fluid stops (difference of pressure before and after valve).
- Blowdown pressure: Difference of set pressure (set differential pressure) and closing pressure (closing differential pressure).
- Accumulation: The pressure exceeding set pressure (set differential pressure) for acquiring desired discharge (in percentage or pressure unit).
- Capacity rating pressure (capacity rating differential pressure): Standard pressure for deciding rated capacity, which is the pressure at inlet side when pressure reaches a required level, higher than set pressure (set differential pressure), and the fluid keeps on flowing (difference of pressure before and after valve).
- Rated discharge capacity: The maximum flow at capacity rating pressure (capacity rating differential pressure).

Note: The words in parenthesis are applicable to Differential pressure regulating valve.

PRESSURE-FLOW CHARACTERISTICS CHART

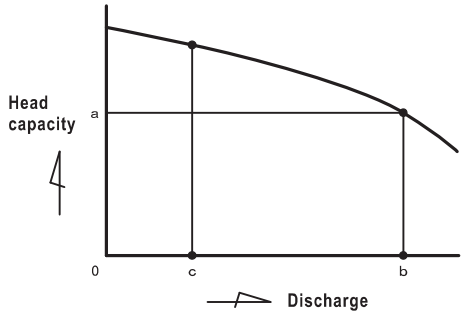


■ CHARACTERISTICS

Operation mode	Model	Accumulation Pu	Blowdown pressure Pd
Direct operating	MD-14W, 14H, 14CN	≦Max. spring regulating range ×15% (≦20%,in case of size 100mm or larger and spring for 0.5MPa.)	≦Set pressure ×10% (Min. 0.02MPa)
	FD-2W, 2H		
	MD-35F, 37F	See Flow Characteristics Chart, Page 103	
	MD-20W, 20H	See Accumulation Chart, Page 109	≦0.04MPa
Pilot operating	WVM-02	≦Set pressure ×10% (Min. 0.03MPa)	Adjusting spring range 0.05~0.35 (0.3)MPa; ≦ set pressure× 20% (Min. 0.03MPa) 0.3~1.0(0.7)MPa and 0.5~1.6MPa; ≦Set pressure ×15%

■ SIZE SELECTION OF PRIMARY PRESSURE REGULATING VALVE

PUMP CHARACTERISTICS CHART



❶ Use the size selection chart to decide the nominal diameter.

❷ When primary pressure and back pressure are not constant, but change within a certain range, use the primary pressure and back pressure that allows for minimum difference between these two pressures to decide the size.

❸ In the case of fluid which viscosity cannot be ignored (e.g. oil), make viscosity correction when deciding size.

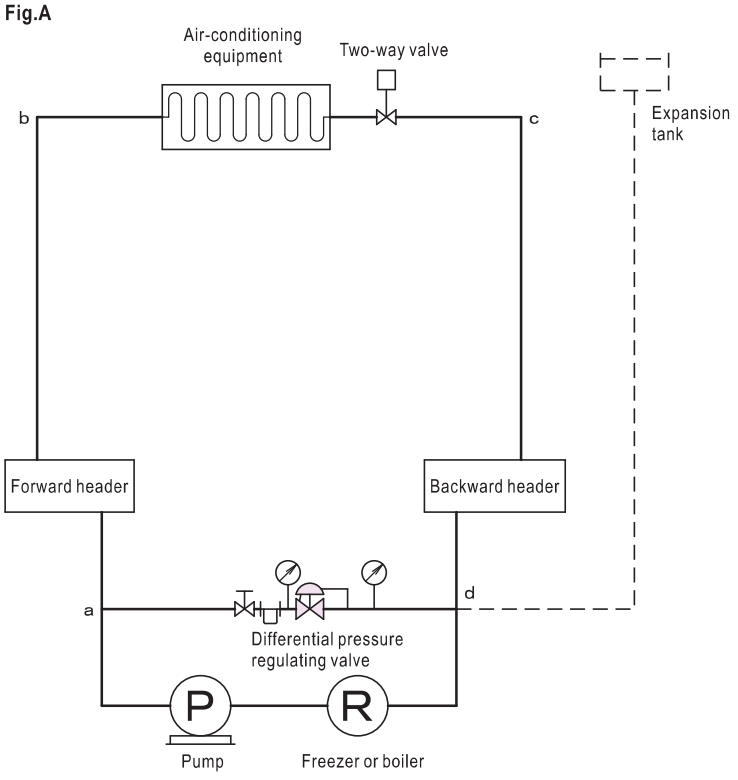
❹ If primary pressure regulating valve is used as pump relief valve, the relief volume can be decided using the following method.

The discharge side of the pump is completely closed: in the pump characteristics chart (on the left), find out the relief volume (b) of head capacity (a) that is equivalent to regulating pressure. In this case, b is the relief volume of primary pressure regulating valve.

The discharge side of the pump is not completely closed: The relief volume of primary pressure regulating valve is the difference of(b-c),as c is the minimum flow at normal operation.

■ SIZE SELECTION OF DIFFERENTIAL PRESSURE REGULATING VALVE

Fig.A



❶ Use the size selection chart in Page 100. If water temperature is higher than 60℃, the size should be large enough to allow additional 10~20% flow.

❷ In Fig.A, the differential pressure before and after valve (ΔP), which is necessary for deciding size, is the total pressure loss between a, b, c, and d.

❸ In stead of differential pressure regulating valve, primary pressure regulating valve can be used if there is expansion tank as shown by dash line in Fig. A. However, the set pressure of spring is different.

For WV Type series, see Page 101.

Key points for installation

■ PIPING EXAMPLE

Fig.1 Primary pressure regulating valve/pressure sustaining valve (with bypass pipe)

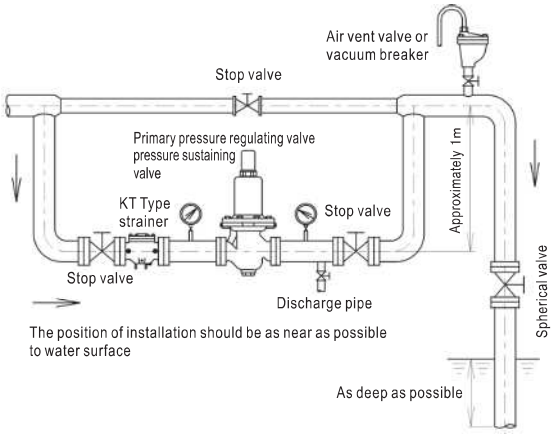


Fig.2 Primary pressure regulating valve/pressure sustaining valve (without bypass pipe)

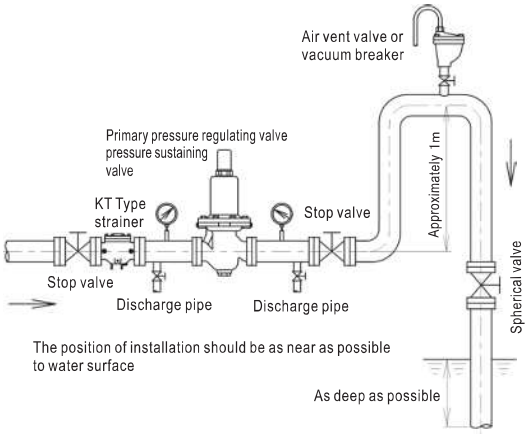


Fig. 3 Differential pressure regulating valve (with bypass pipe)

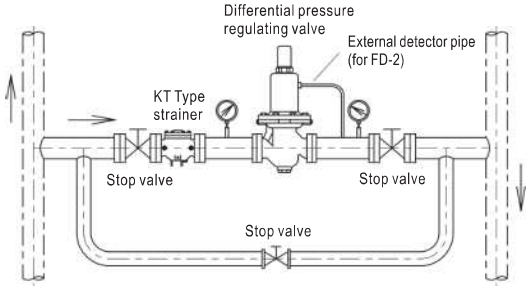
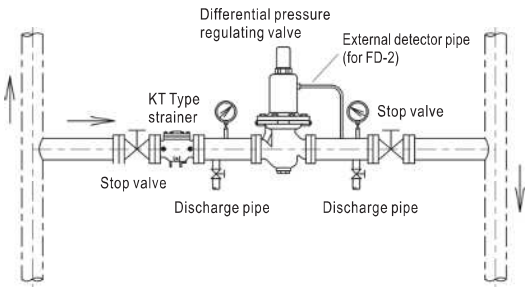


Fig. 4 Differential pressure regulating valve (without bypass pipe)



■ KEY POINTS FOR INSTALLATION

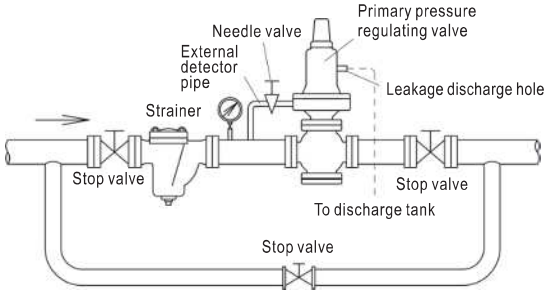
1. If not otherwise specified, primary pressure regulating valve should be installed vertically on the horizontal piping.
2. Install strainer at the primary side of the valve.
3. For equipments which operation cannot be stopped, install bypass piping (with stop valve) between primary and secondary sides (see Fig. 1 and 3). If bypass piping is not installed, install blowing stop valve, which is branched from the main pipe and located immediately before the primary side of the product, to allow flushing (see Fig. 2 and 4).
4. In the case of primary pressure regulating valve and pressure sustaining valve that discharge to open tank, the outlet piping of the valve should have a 1m ascending part and then a descending part and be immerged into water. In addition, the top of the ascending pipe should have air vent valve or vacuum breaker.

   ※By installing ascending pipe, air vent valve or vacuum breaker at the outlet side of the valve, it is able to maintain a stable flow and normal functioning of valve (see Fig. 1 and 2).
5. Install stop valve and pressure gauge.

   The pressure gauge should be installed on the primary side in the case of primary pressure regulating valve and pressure sustaining valve, or primary/secondary side in the case of differential pressure regulating valve (see Fig. 1~4).
6. Depending on model of primary pressure regulating valve, there may be external detector (which can detect pressure using a pipe branched from piping). For such model, connect pressure detecting hole and piping with a pipe and install a needle valve on the pipe (to make it possible to adjust the sensibility of primary pressure regulating valve based on the opening degree of needle valve).

   If there is leakage outlet on spring case, install a pipe that leads to liquid discharge tank (see Fig. 5).

Fig.5 Piping example: Primary pressure regulating valve with external detector



7. Leave some space for dissembling and maintenance.
8. Apply appropriate support to product to make sure it does not bear the weight of piping, bending force, or vibration directly.
9. If you think there is possibility of freezing, insulate or discharge the drain.