

RP-6,6P Type Pressure Reducing Valve (for Steam)

for **Building Facilities** **Industrial Facilities**, etc., Multipurpose Pilot-operated Type (High capacity)

This is a pilot operated type pressure reducing valve. It is suitable to install in the steam lines with the high capacity of flow, such as industrial production facility and building facility. This model is designed to ensure the perfect performance in various different conditions of the facility, with your easy handling and installation by the light weighted, compact valve body.

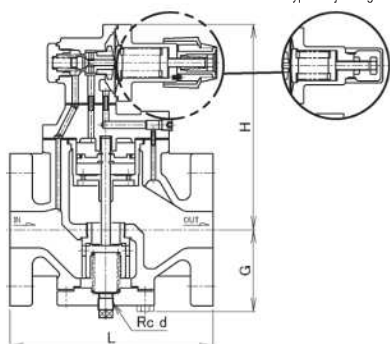
Refer to Page 15 for valve size selection chart.



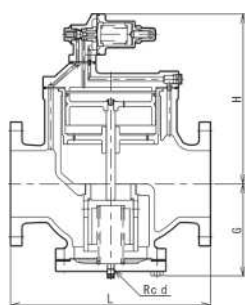
RP-6 Type
(Size 15~80mm)

CONSTRUCTION

RP-6P Type: Adjusting screw



Size 15~80mm



RP-6 Type
(Size 100~200mm)

FEATURES

- It is performed and controlled constantly by adopting piston guide construction and special seal ring.
- Possible to install in a line for wide range of pressure and capacity.
- Easy pressure adjustment by manual handle with automatic lock mechanism. (Size 15~80mm)
- Compact design.

SPECIFICATIONS

Type		Manual handle type (size 15~80mm) Screw-adjusting type (size 100~200mm)		Screw-adjusting type	
Model name		RP-6		RP-6P	
Code name		RP6-B	RP6-G	RP6P-B	RP6P-G
Size		15~200(1/2"~8")		15~80(1/2"~3")	
Applicable fluid		Steam			
Fluid temperature		Max. 184℃*1			
Applicable primary pressure		Max. 1.0MPa			
Adjustable secondary pressure		0.03~0.8MPa			
Maximum reducing rate		20 : 1			
Minimum pressure differential across the disc		Size 15~80mm : 0.05MPa, Size 100~200mm : 0.07MPa			
Lock up pressure		Max. 0.02MPa			
Offset pressure	Size 15~80mm	Within 0.02MPa(Adjustable secondary pressure 0.03~0.035MPa) Within 0.03MPa(Adjustable secondary pressure over 0.035~0.07MPa) Within 0.05MPa(Adjustable secondary pressure over 0.07~0.8MPa)			
	Size 100~200mm	Within 0.05MPa			
Leakage allowance		Less than 0.05% of rated flow			
End connection		Flanged JIS 10KFF			
Materials	Body	Cast iron			
	Disc & seat	Stainless steel			
	Piston & cylinder	Cast bronze	Stainless steel	Cast bronze	Stainless steel
Valve body pressure test		Hydraulic 1.5MPa			

* 1. Applicable temperature Max. 220°C is available upon your request.

* 2. Insulating jacket is available.

* 3. When multiple once-through boilers are operated, the primary pressure of pressure-reducing valve may change significantly. Please contact our agent in your area if this is the case of your application.

* 4. Please contact our agent in your area if the product is used for purposes with high frequency of operation (such as a styrofoam molding machine).

DIMENSIONS

(mm)

Size	L	G	H	d	Cv value	Mass(kg)
15(½")	140	62	155	¼"	1	7.5
20(¾")	140	62	155	¼"	2.5	7.5
25(1")	150	67	160	¼"	4	9
32(1¼")	180	73	182	⅜"	6.5	12
40(1½")	180	73	182	⅜"	9	12.5
50(2")	200	86	187	⅜"	16	15.5
65(2½")	230	94	202	⅜"	25	20.5
80(3")	260	110	221	⅜"	36	26.5
100(4")	320	139	285	⅜"	64	52
125(5")	380	187	320	⅜"	100	82
150(6")	420	206	368	⅜"	144	110
200(8")	540	255	425	⅜"	256	176

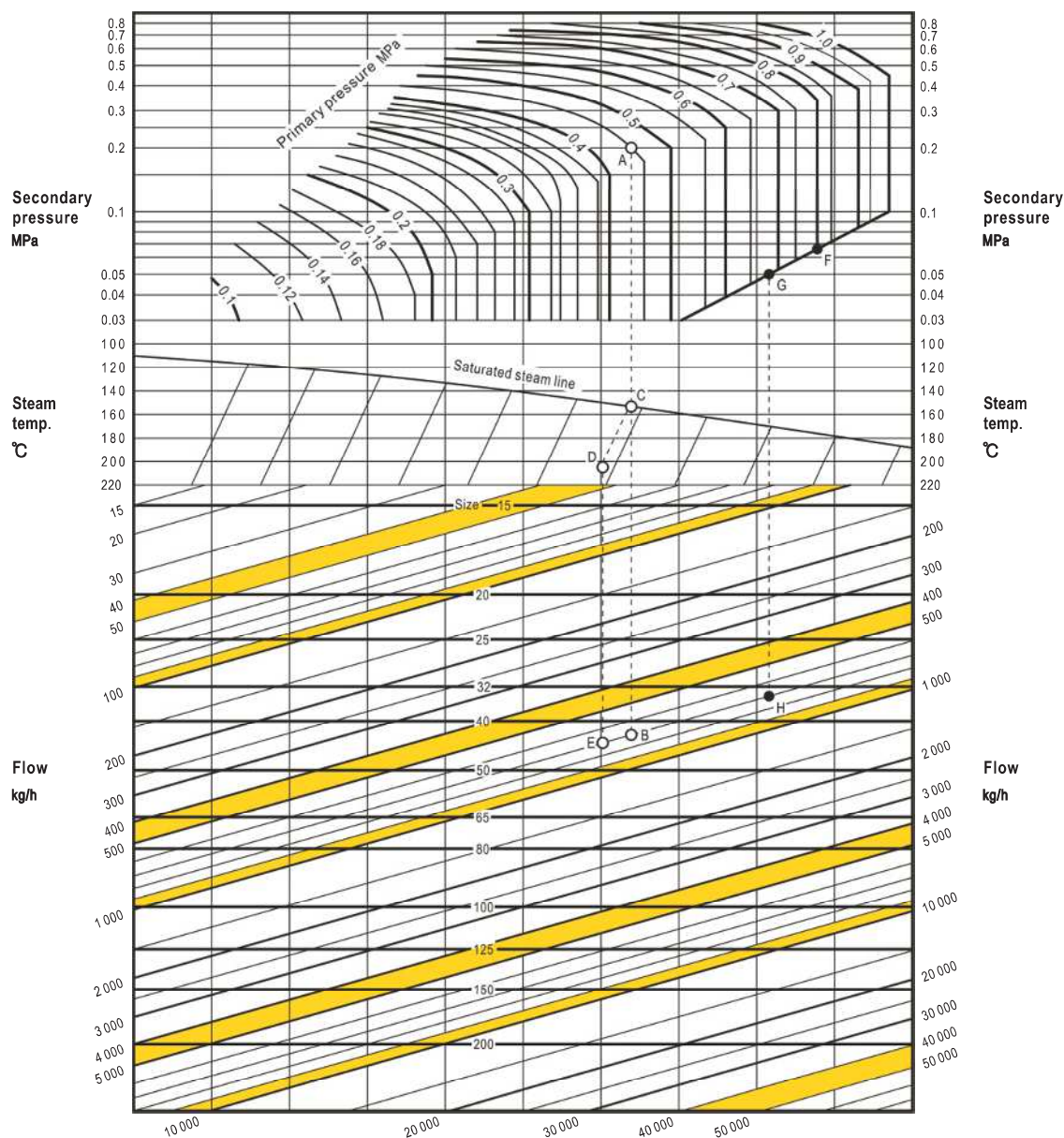
Flange code JIS 10KFF

REFERENCE

When the existing RP-1H Type pressure reducing valve is replaced with the RP-6 Type due to changes in operating conditions, the same face-to-face dimension can be attained by the use of face-to-face dimension adjustment spacers. (Size 15~80mm)

For more details, please contact our agent in your area.

NOMINAL DIAMETER SELECTION CHART (for Steam)



● HOW TO USE THE CHART

Example 1:

This example shows you how to decide nominal diameter of valve at the following conditions: primary pressure 0.45MPa, secondary pressure 0.2MPa, flow of saturated steam 700 kg/h.

First, find out the intersection point A of primary pressure curve 0.45MPa and secondary pressure curve 0.2MPa.

Draw a vertical line from point A. This line intersects with flow curve 700kg/h. The intersection point is B. Since B is located between a nominal diameter range of size 40mm~50mm. The larger value, which is size 50mm, is taken as the nominal diameter that we are looking for.

Now let's find out the nominal diameter at an

additional condition: the temperature is 205°C. Draw a vertical line from point A until it intersects with the saturated steam curve. The intersection point is named C. Now move from point C to temperature curve 205°C parallelly and we can stop at point D. Draw a vertical line from point D until it intersects with flow curve 700kg/h. The intersection point is named E. Since point E is located between a nominal diameter range of size 40mm~50mm. The larger value, which is size 50mm, is taken as the nominal diameter that we are looking for.

Example 2:

Now let's try to find out the nominal diameter at the following conditions: primary pressure 0.8MPa;

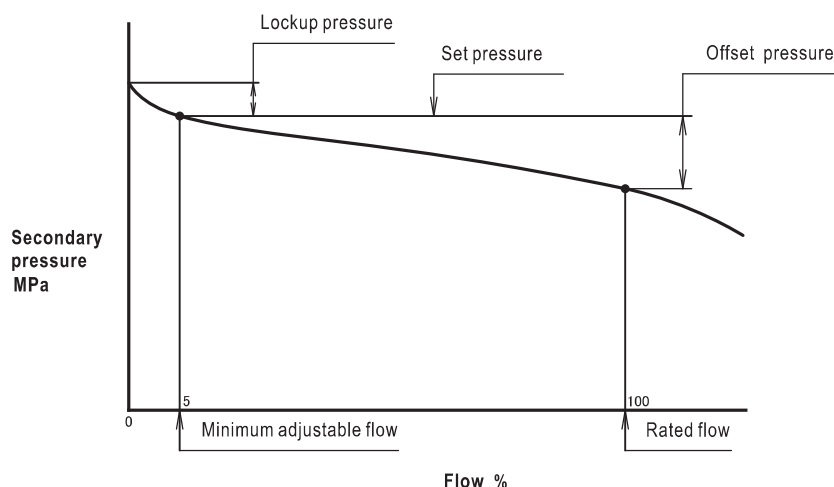
secondary pressure 0.05MPa; and flow of saturated steam 700kg/h.

First, we should find out the intersection point F between primary pressure curve 0.8MPa and oblique line. Next, move on the oblique line and find it the intersection point G on the secondary pressure curve 0.05MPa. Draw a vertical line from point G until it intersects with flow curve 700kg/h. the intersection point is named H.

Since point H is located between a nominal diameter range of size 32mm~40mm. The larger value, which is size 40mm in this case, is taken as the nominal diameter that we are looking for.

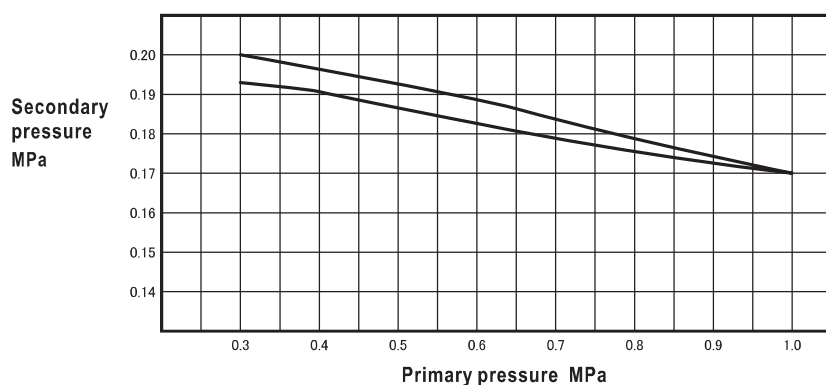
DATA/RP-Type Pressure Reducing Valve (RP-6,8,9,10,11 Type Series) (for Steam or Gases)

■ FLOW CHARACTERISTICS



■ PRESSURE CHARACTERISTICS

Example: RP-6 Type



The secondary pressure is set at 0.2 MPa when primary pressure is 0.3 MPa. The chart shows the change of secondary pressure when primary pressure changes between 0.3~1.0~0.3 MPa.

■ TERMS

- **Primary pressure:** The inlet pressure of pressure reducing valve or the inlet pressure of piping that is near to pressure reducing valve.
- **Secondary pressure:** The outlet pressure of pressure reducing valve or the outlet pressure of piping that is near to pressure reducing valve.
- **Set pressure:** Secondary pressure at minimum adjustable flow.
- **Offset pressure:** The difference between secondary pressure and set pressure when primary pressure is kept at a constant level but flow increases gradually from minimal adjustable flow to the rated flow of pressure reducing valve.
- **Lockup pressure:** The increased pressure above set pressure when the secondary valve of pressure reducing valve is closed.
- **Minimum adjustable flow:** The minimum flow of pressure reducing valve for maintaining stable flow.
- **Rated flow:** The maximum flow at the specified offset pressure when primary pressure is kept at a constant level.

■ TIPS:HOW TO SELECT AN APPROPRIATE NOMINAL DIAMETER?

- ① When you select the size, use nominal diameter selection chart. Considering pressure loss and thermal loss, the flow amount for selecting the nominal diameter should be larger by 10-20% than designed flow amount, particularly in case of the pressure reducing rate is large or the set pressure is lower than 0.1MPa.
- ② The secondary pressure of a pressure reducing valve changes when primary pressure or flow changes. Therefore, when selecting nominal diameter, it is necessary to consider lockup pressure and offset.
- ③ In the case when primary and secondary pressure are not constant but change within a certain range, the nominal diameter can be determined using the primary and secondary pressures that produce the smallest differential pressure.
- ④ In the case the pressure reduction rate exceeds its maximum value, it is required to perform two-step pressure reduction by using 2 pressure reducing valves. Although the flow at step 1 and step 2 are the same, the nominal diameter of the valve at step 1 should be different from that at step 2, because primary pressure is different from secondary pressure. Therefore, it is necessary to select two nominal diameters for the valves to be used.
- ⑤ It is easy to understand that an extremely small valve allows only a tiny flow. However, this does not mean a large valve is better than a small valve. In fact, an extremely large valve may cause the occurrence of "hunting", which can lead to abnormal wearing. Another thing to be noted is the minimum adjustable flow, which is about 5% of the rated flow. You should not select a valve which may be used when the flow is lower than the minimum adjustable flow. In winter or summer, flow may change extremely. It is recommended that you install two pressure reducing valves, a large one and a smaller one, and switch between them according to change of flow.

(See flow characteristics and pressure characteristics.)

■ INSTALLATION EXAMPLE

Fig.1 With bypass piping

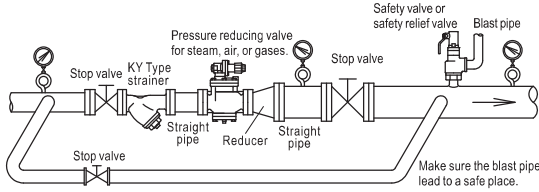
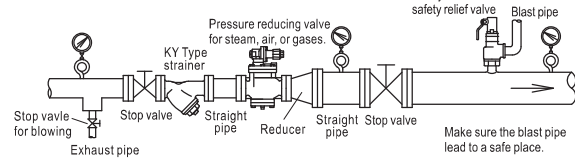


Fig.2 Without bypass piping



■ POINTS FOR INSTALLATION

- Installation of pressure reducing valve and piping.
- 1. Pressure reducing valve should be installed in horizontal pipe vertically.
- 2. Install safety valve or safety relief valve on the secondary side of pressure reducing valve.
 - ※1. Equipment may be damaged due to increase of secondary pressure at the time of failure of pressure reducing valve.
 - ※2. See Table 1 for set pressure of safety valve and 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, safety valve or safety relief valve may allow discharge of maximum flow of pressure reducing valve. (reference value: see Table 2 and Table 3).

TABLE2. FLOW FOR SAFETY RELIEF VALVE (Saturated steam)

SL-37~40 TYPE (kg/h)

Set pressure (MPa)	Size(mm)					
	15(1/2")	20(3/4")	25(1")	32(1 1/4")	40(1 1/2")	50(2")
0.05	13.5	23.1	33.5	62.2	97.4	158
0.1	17.5	29.8	43.4	80.4	125	204
0.2	25.4	43.3	63	116	182	297
0.3	34.2	58.2	84.6	156	245	399
0.4	42	71.6	104	193	302	490
0.5	50.6	86.2	125	232	363	590
0.6	59.2	100	146	271	424	690
0.7	67.7	115	167	310	486	790
0.8	76.3	129	188	350	547	890
0.9	84	143	207	385	602	979
1.0	92.4	157	228	424	663	1070

TABLE1. SET PRESSURE FOR SAFETY RELIEF VALVE

(MPa)

Set pressure of pressure reducing valve	Set pressure of safety valve [※]
0.1 or less	+ 0.05 (+0.08)
Over 0.1 and less than 0.4	+ 0.08 (+0.14)
0.4 or more and less than 0.6	+ 0.12 (+0.2)
0.6 or more and less than 0.8	+ 0.15 (+0.28)
0.8 or more and less than 1.0	+ 0.19
1.0 or more and 1.2 or less	+ 0.23

Add the above value to set pressure of the pressure reducing valve.

※ 1. The above value is added to the set pressure of pressure-reducing valve.

※ 2. The values in parentheses are applicable to soft-seated type (SL-37V~40FV, 43V, 44V Type).

TABLE3. FLOW FOR SAFETY RELIEF VALVE (Air)

SL-37~40 TYPE (kg/h)

Set pressure (MPa)	Size(mm)					
	15(1/2")	20(3/4")	25(1")	32(1 1/4")	40(1 1/2")	50(2")
0.05	21.7	37	53.8	99.8	156	253
0.1	28.3	48.3	70.2	130	203	331
0.2	41.2	70.2	102	189	296	481
0.3	55.3	94.3	137	254	397	645
0.4	69.5	118	171	318	498	810
0.5	83.6	142	206	383	600	975
0.6	97.7	166	241	448	701	1140
0.7	111	190	276	513	803	1300
0.8	126	214	311	578	904	1470
0.9	140	238	346	643	1000	1630
1.0	154	262	381	708	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. If bypass piping is not suitable, then install blowing stop valve, which is derived from the main pipe before the primary side of pressure reducing valve, so as to make flushing possible.
5. Install straight piping, stop valve, and pressure gauge before and after pressure reducing valve.
If end connection of pressure reducing valve is realized using screw, then use union joint to make it easy to fix and remove.
 - ※ The diameter of piping before and after pressure reducing valve should be determined based on the standard velocity of flow of fluid.
Generally, since the nominal diameter of secondary piping of pressure reducing valve for steam and gases is larger than the diameter of pressure reducing valve, it is necessary to use reducer.
6. If you install solenoid valve (on/off operation) or control valve at the secondary side of pressure reducing valve, there should be an interval (L) between such solenoid valve or control valve and pressure reducing valve. The interval (L) should be larger than 2m in the case of solenoid valve. As for control valve, the interval should be larger than 1m if nominal diameter is less than 100mm, and larger than 1.5m if nominal diameter is larger than 125mm (see Fig.3).
7. In the case of 2-step pressure reduction, the interval between 2 valves should be 1~2m (see Fig.4).

Fig.3 INTERVAL BETWEEN PRESSURE REDUCING VALVE AND CONTROL VALVE

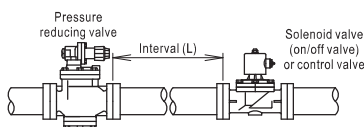
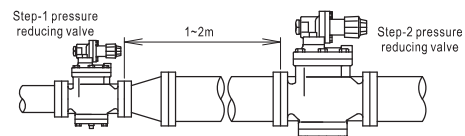


Fig.4 INTERVAL BETWEEN VALVES (2-STEP PRESSURE REDUCTION)



DATA/Pressure Reducing Valve (for Steam or Gases)

8. For pressure reducing valve for steam, "hunting" or vibration may occur if drain accumulates.

To prevent hunting and vibration, it is necessary to prevent drain from entering into the piping or install steam trap at the primary side.

In addition, since pressure reducing valve cannot be closed completely, it is necessary to install steam trap at the secondary side if the amount of steam used is near zero. (See Fig.7)

Fig.5: Proper installation

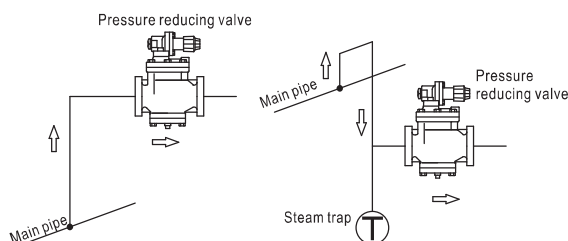


Fig.6: Improper installation

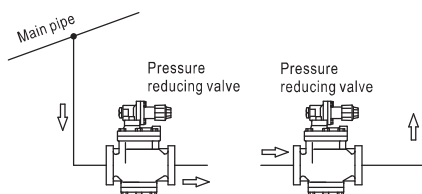
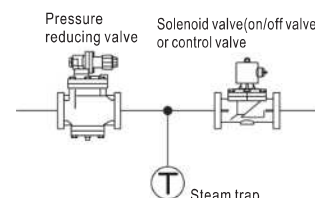


Fig.7: In case of zero steam consumption at secondary side of pressure reducing valve



9. Make sure sufficient space should be left for maintenance.

10. Apply appropriate support to pressure reducing valve to make sure it should not bear the weight of piping, bending force, or vibration directly.

11. If there is possibility of freezing, apply thermal insulation or discharge the drain.

12. The secondary pressure of the valve is not adjusted at delivery. Therefore, you should adjust the secondary pressure to the desired pressure before use.

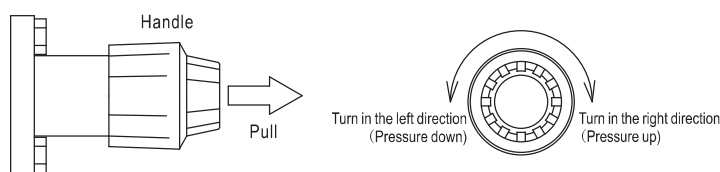
※ The secondary pressure of a non-adjusted valve is near to zero.

※ How to adjust the secondary pressure:

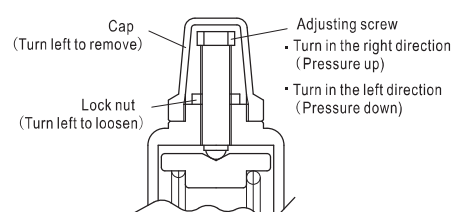
- ① Close the stop valves at primary and secondary sides.
- ② Open the blowing stop valve or stop valve in bypass and remove any content inside. Such operation is called flushing and should be carried out sufficiently by spending sufficient time on it. Take care not to make the secondary pressure rise excessively.
- ③ Close the stop valve in by pass or blowing stop valve completely.
- 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 Apply a small spring load using handle or adjusting screw. Once the fluid starts flowing, open the stop valve at the secondary side gradually.
- ⑧ Read the pressure gauge and apply more spring load to make the pressure reach the set pressure. The pressure rises if you turn the handle or adjusting screw in the right direction and falls if you turn them in the left direction.
- 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.

• ADJUSTING SECONDARY PRESSURE

For RP-6 Type series and RD-40 Type series.



• OTHER PRESSURE REDUCING VALVES



■ DIAMETER OF PIPING BEFORE AND AFTER PRESSURE REDUCING VALVE

The nominal diameter of pressure reducing valve can be determined using relevant graphs made for such purpose. The diameter of piping before and after pressure reducing valve must be determined based on the standard velocity of fluid.

Extremely small diameter or large velocity of fluid may cause large loss of pressure inside the piping and wearing, vibration of the piping. Therefore, it is necessary to consider the standard velocity of fluid when determining the diameter of piping.

● Table of velocity of steam as standard condition.

Item	For steam	Standard velocity (m/s)
Pipe	Saturated steam (0.2~0.5MPa)	15~20
	Saturated steam (0.5~1.5MPa)	20~30
(Steam engine)	Saturated steam	20~30
	Super heated steam	30~40

● Table of velocity of air as standard condition.

Item	For air	Standard velocity(m/s)
Pipe	(0.1~0.2MPa)	8~15
	(20~30MPa)	5~7
(Compressor)	Saturated line	10~20
	Low pressure supplyline	20~30
	High pressure supply line	10~15