

RD-29A, 29B Type Pressure Reducing Valve (for Low Pressure Gases)

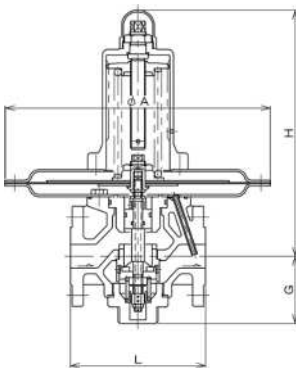
Direct operated type pressure reducing valves for low pressure applications in chemical and steel plants. With embedded dual detecting devices, it is not necessary to install detecting pipes. In addition, these valves allow small pressure control with different differential pressures.



CONSTRUCTION

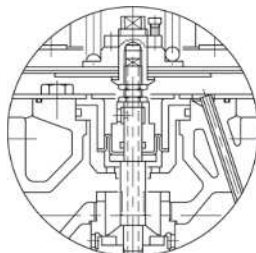
RD-29A Type

O-ring sealed pressure balance construction



RD-29B Type

Bellophragm seal pressure balance construction



FEATURES

- Maximum reducing rate 300:1. (e.g. reduce pressure from 300kPa to 1kPa)
- No leakage through disc and seat ring due to single

seat valve.

- Most suitable pressure balance construction must be selected depending on fluid.

SPECIFICATIONS

Model name	RD-29A	RD-29B
Code name	RD29A-G □	RD29B-G □
	※L, M or H for adjustable secondary pressure is required in □.	
Applicable fluid	Air, N ₂ gas & non-corrosive gases	Coke oven gas & containing tar
Fluid temperature	5~60°C	
Applicable primary pressure	Max. 300kPa	
Adjustable secondary pressure	L:1~3kPa (Offset, Within 0.9kPa), M:3~10kPa (Offset, Within 1.5kPa), H:10~30kPa (Offset, Within 4.5kPa)	
Maximum reducing rate	300:1	
Minimum pressure differential across the disc	2 kPa	
Lock up pressure	Max. 2kPa	
Minimum adjustable flow	2~5m ³ /h (Standard state)	
Leakage allowance	Nil (Confirm at pressure gauge)	
End connection	Flanged JIS 10KRF	
Materials	Body (Cast iron), Disc & seat ring (Stainless steel), Diaphragm & disc tip (Synthetic rubber)	
Valve body pressure test	Hydraulic 1.0MPa (Excluding actuator)*	
Airtight test	Primary side: 300kPa Secondary side:	
	Adjustable secondary pressure range	Airtight test
	L: 1~3kPa	5kPa
	M: 3~10kPa	12kPa
	H: 10~30kPa	32kPa

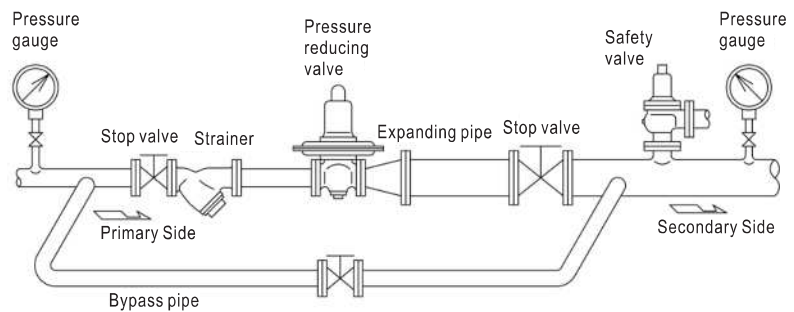
*Adding of pressure exceeding hydraulic test and airtight test pressure may damage the pressure reducing valve.

DIMENSIONS

Size	L	A	G	H	Mass (kg)
15(1/2")	170	360	75	323	21
20(3/4")	170	360	75	323	22
25(1")	170	360	75	323	22
32(1 1/4")	190	360	85	333	27
40(1 1/2")	190	360	85	333	27
50(2")	240	360	95	343	32

Flange code JIS 10KRF

PIPING EXAMPLE



DATA/RD-29A, 29B Type Pressure Reducing Valve (for Low Pressure Gases)

NOMINAL DIAMETER SELECTION CHART (for Air)

- The flow characteristics are based on air (standard state).
- Flow rate of gas with specific gravity (G) which is different from that of air should be converted to air flow rate:

$$\text{Converted air flow rate} = \text{gas flow rate} \times \sqrt{G}$$

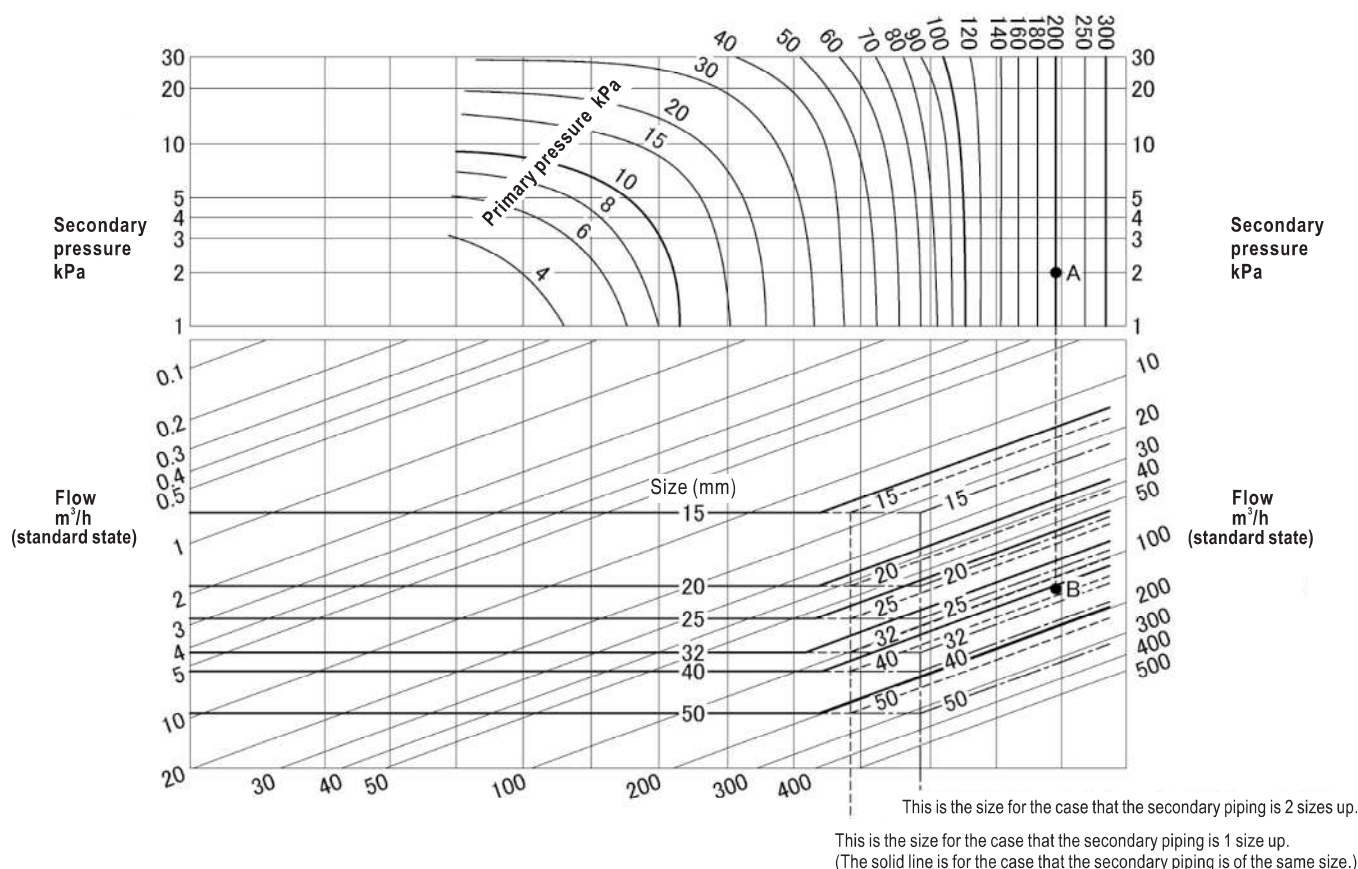
$$= \text{gas flow rate} \times \sqrt{\frac{M}{28.96}}$$

Where:

G: Specific gravity (air: 1)

M: Molecular weight of gas

(Please see the M: Molecular weight of gas in Page 279)



● How to use the chart

Example: find out the nominal diameter meeting the following conditions.

Fluid: air

Primary pressure: 200kPa

Secondary pressure: 2kPa

Temperature: 20°C

Flow: 120m³/h (standard state)

- 1) First, find out the intersection point A of primary pressure curve 200kPa and secondary pressure curve 2kPa.
- 2) Draw a vertical line from point A. This line intersects with flow curve 120m³/h. The intersection point is B.
- 3) When the secondary piping diameter is the same as that of pressure reducing valve, the nominal diameter line is a solid line (———). Since point B is between size 40mm and size 50mm lines, the larger one, which is size 50mm, is selected.

- 4) When the secondary piping diameter is 1 size larger than the diameter of pressure reducing valve, the nominal diameter line is a dashed line(- - - -). Since point B is between size 32mm and size 40mm lines, the larger one, which is size 40mm, is selected as the nominal diameter. The secondary piping diameter, which is 1 size larger than the diameter of pressure reducing valve, is thus size 50mm.
- 5) When the secondary piping diameter is 1 size larger than the diameter of pressure reducing valve, the nominal diameter line is a dotted and dashed line (— · —). Since point B is between size 25mm and size 32mm lines, the larger one, which is size 32mm, is selected as the nominal diameter. The secondary piping diameter, which is 2 size larger than the diameter of pressure reducing valve, is thus size 50mm.

- The rated flow of pressure reducing valve depends on pressure condition. In this chart, the flows at the intersection points of nominal diameter lines are the rated flows of pressure reducing valve at relevant pressure conditions.

The flow of gases other than air can be calculated by converting air flow.

Air flow/conversion factor = Flow of gas

■ INSTALLATION EXAMPLE

Fig.1 With bypass piping

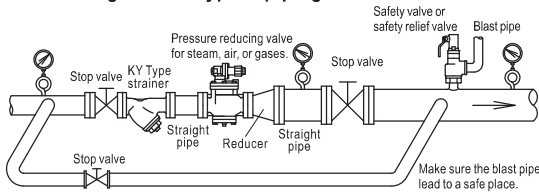
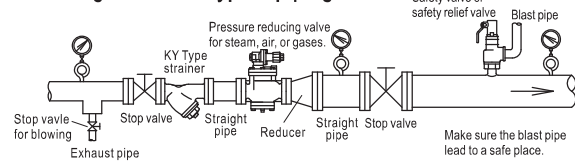


Fig.2 Without bypass piping



■ 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

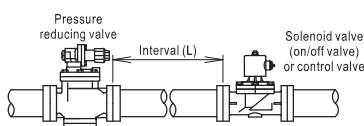
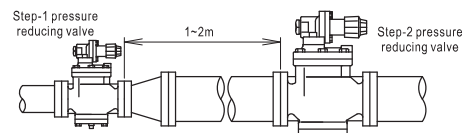


Fig.4 INTERVAL BETWEEN VALVES (2-STEP PRESSURE REDUCTION)



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

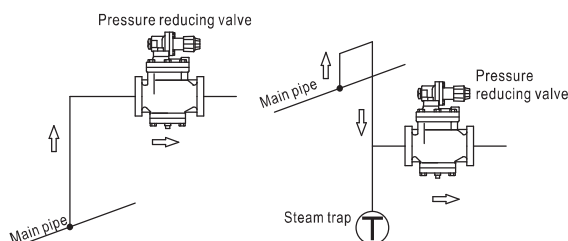


Fig.6: Improper installation

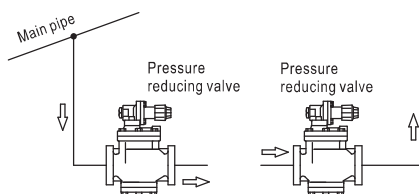
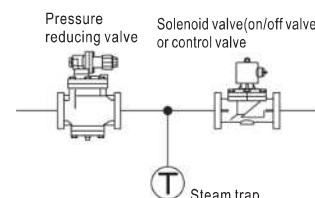


Fig.7: In case of zero steam consumption at secondary side of pressure reducing valve



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.

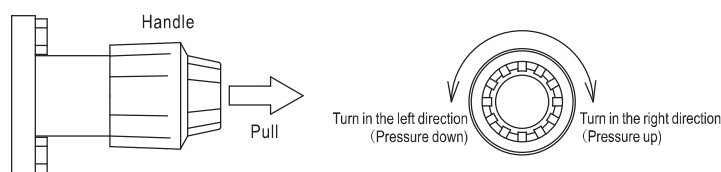
※ The secondary pressure of a non-adjusted valve is near to zero.

※ How to adjust the secondary pressure:

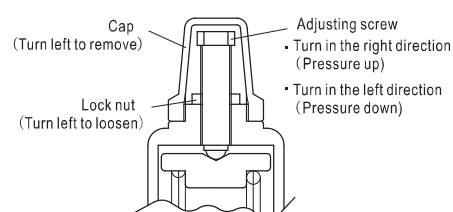
- ① Close the stop valves at primary and secondary sides.
- ② Open the blowing stop valve or stop valve in bypass and remove any content inside. Such operation is called flushing and should be carried out sufficiently by spending sufficient time on it. Take care not to make the secondary pressure rise 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