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Pressure Regulating Valves

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D

Best Selection

Pressure Regulating Valves

Pressure Regulating Valve
(Precision Regulator for Analytical Equipment)
MODEL 6600 SERIES
P.116



Large Capacity Pressure
Regulating Valve for Analyzer
MODEL 6700 SERIES
P.118



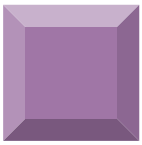
Pressure Regulator Valve
(Precision Regulator for Low Pressure Regulation)
MODEL 6610
P.119



Large Capacity Back Pressure Valve
MODEL 6801 SERIES
P.121



Backpressure Valve
MODEL 6800 SERIES
P.120



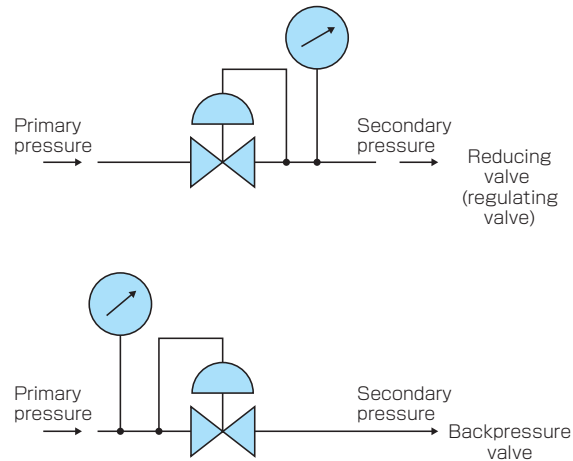
PRESSURE REGULATING VALVE (1)

Pressure regulating valve

The pressure regulating valve (reducing valve) is used to control the pressure applied to the flow so that it will be constant during flow control. Various types of valves are used according to application, as explained below.

Pressure regulating valves are classified into general reducing valves and backpressure valves, and are represented by the symbols shown in the figure. The reducing valve controls the outlet side pressure so that it will be constant when the supply-side pressure changes. It is frequently used in the initial stage of a system. Meanwhile, the backpressure valve is a kind of continuous flow relief valve that removes gas to keep the primary-side pressure constant.

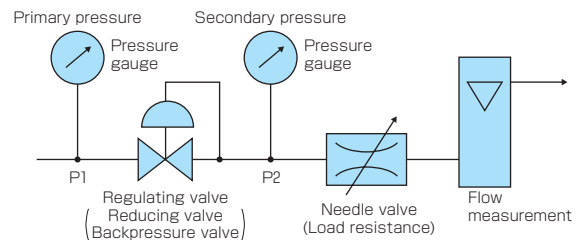
The reducing valve controls the outlet-side pressure, and a pressure gauge is provided on the outlet side. The KOFLOC 6600 is equipped with a pressure gauge port, and a pressure gauge is connected to the port in such a case. The pressure at that port is practically equivalent to the outlet pressure; therefore, the pressure gauge can be connected to the outlet side.



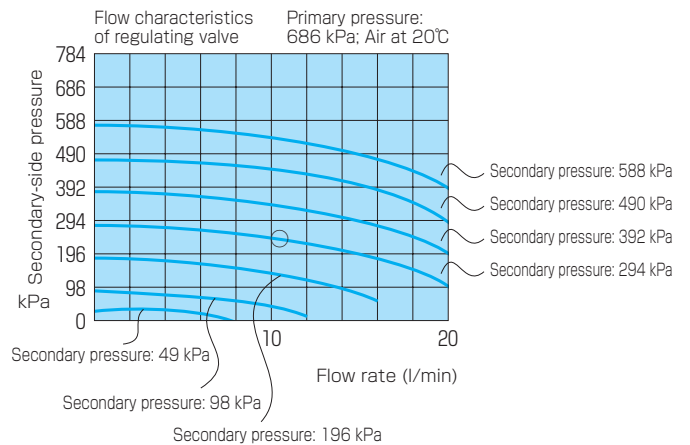
Flow characteristics of regulating valve

The flow characteristics graph of a reducing valve shown in the catalog is based on the flow sheet shown in the figure. In the example graph, the primary pressure (supply pressure) is 686 kPa. In the succeeding stage of the reducing valve, the secondary pressure is set as a load resistance by a regulating valve when the valve remains closed (0 flow). This value is the flow 0 in the graph, namely, the value at the left end. Then the needle valve is opened to let gas flow, and the change of the pressure (secondary pressure) that is set according to the flow is plotted. The state in which the set pressure does not change is ideal, but because of the characteristics of a reducing valve, there is some influence up to a certain flow, and the pressure will change when the flow reaches the limit. This area where the change is minimum is the area where reducing valves should be used. In the case of a backpressure valve, the primary pressure is the set pressure. The way to understand the flow characteristics graph is the same as that for the reducing valve.

Flow sheet of regulating valve flow characteristics test



Flow characteristics of regulating valve

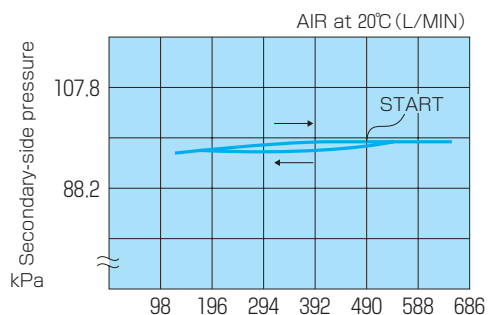


Example: In the case where the set pressure is 294 kPa when the primary-side pressure is 686 kPa in the example graph, the characteristics are satisfactory if the flow is below the ○ mark in the figure, but the pressure characteristics deteriorate when the flow exceeds 11 l/min. Use the valve at a flow rate below 11 l/min.

Pressure characteristics

In the case of a reducing valve, the pressure change on the secondary side, when the primary-side pressure on the aforementioned flow sheet is changed, is shown. The control characteristics differ slightly depending on whether the primary pressure increases or decreases, and the changing condition is shown by the arrows.

Pressure characteristics of regulating valve



List of Pressure Regulating Valves

Page	Product name	Model	Primary-side pressure	Secondary-side pressure	Max. flow	Material	Application	Mounting
116	Pressure Regulating Valve	MODEL6600	MAX 784kPa	A 9.8-294kPa B 29.4-588kPa	10L/MIN-20L/MIN	AI SUS	Analyzer Gas mixing equipment	Panel-mount
118	Large Capacity Pressure Regulating Valve	MODEL6700	MAX 970.2kPa	A 9.8-294kPa B 49-588kPa	50L/MIN-100L/MIN	//	//	//
119	Pressure Regulating Valve for Low Pressure	MODEL6610	MAX 0.4MPa	0.01-0.15MPa	5L/MIN	SUS	//	//
120	Backpressure Valve	MODEL6800	-294kPa -588kPa		1L/MIN-10L/MIN	AI SUS	Backpressure control	//
121	Large Capacity Backpressure Valve	MODEL6801	-294kPa -588kPa		300L/MIN	SUS	Large flow backpressure control	//
122	Cylinder Regulator with Precision Flow Meter	MODEL7700	MAX 19.6MPa	19.6-196kPa 9.8-58.8kPa	20L/MIN	Brass (flow meter only) All SUS	For line	Panel-mount

Tips on selection

#6600, #6610 are panel-mount type high-precision regulating valves. #7700 are for cylinders. #6600 is used for analyzers and others for control of comparatively small flow. #6700 are used when the flow is large. #6610 is a diaphragm type for low-pressure setting. #6600, #6700, #6610 are diaphragm type regulators. Models #6800 and #6801 are backpressure valve and their application is different from that of other regulators. #7700 is a regulator equipped with a flow meter.

Mounting and piping

Refer to the dimensional drawing when mounting valves on a panel. If you find any unclear point concerning the mounting, contact our factory.



Pressure Regulating Valve (Precision Regulator for Analytical Equipment)

MODEL 6600 SERIES

This is a compact, lightweight precision pressure regulator with superior repeatability to provide reliable and speedy regulations. Since all the components are perfectly cleaned before assembly, this model is ideal for high-sensitivity instruments for analysis required for R&D activities.

Features

- **High-precision control characteristic**
High control performance with repeatability within a range of $\pm 1\%$ against fluctuations in pressure on the primary side and load resistance variations on the secondary side
- **Perfect for panel mounting**
Flow inlet and outlet are located on the back of the product to facilitate easy pipe connection. Additionally, it is compact in size and light in weight, ideal for panel instrumentation systems.
- **Bleed-free**
All units are subjected to a rigorous leak test before shipping though the product is bleed-free.

Applications

- Gas chromatographs
- Scientific instruments
- Gas mixing systems in various fields

Standard Specifications

Max. primary pressure	784 kPa
Secondary control pressure	Type A: 9.8-294 kPa Type B: 29.4-588 kPa
Min. operating differential pressure	49 kPa
Proof pressure	784 kPa
Repeatability	Within $\pm 1\%$ of the rated pressure
Temperature characteristic	Within $\pm 1\%/10^\circ\text{C}$ of the rated pressure
Heat resistance	Aluminum body: 60°C ; Stainless steel body: 120°C
Flow rating	See the rated value diagrams on page 117.
Connection end	Rc1/8, Rc1/4
Materials of parts exposed to fluids	A: Al, Brass, NBR, Duracon® SS: SUS 316, Viton, fluorocarbon resin

Optional Items

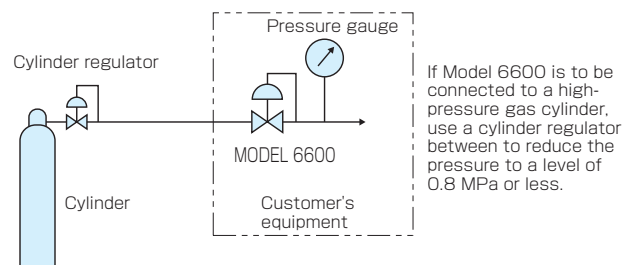
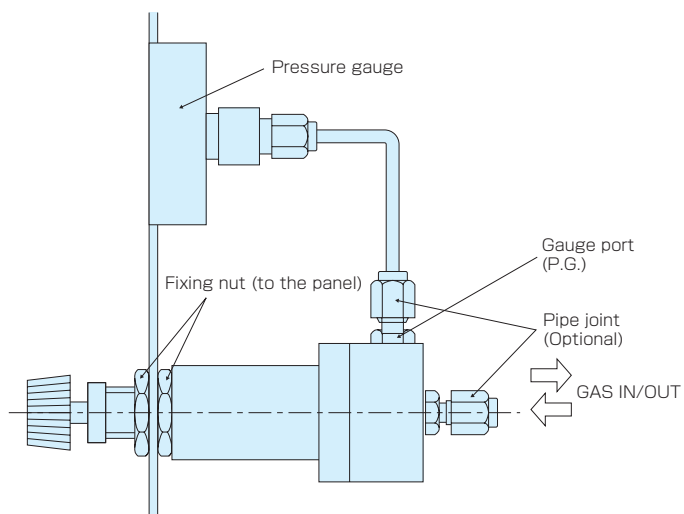
- Set pressure lock nut
- Joints other than the standard ones (Refer to page 129.)
- Press fitting of the OUT side filter

Notes:

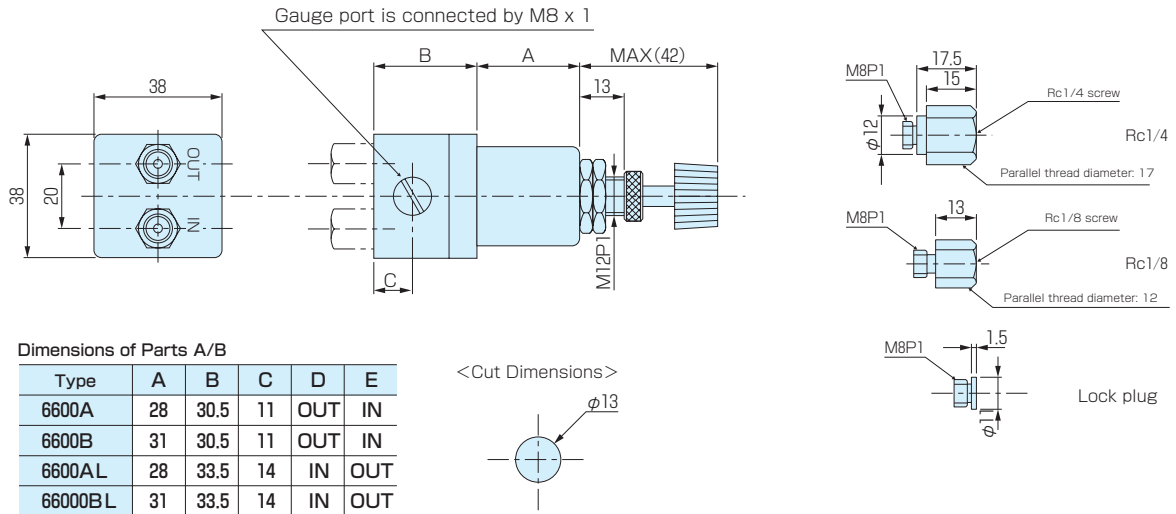
- IN/OUT joints only are optionally available. Lock plug is used for the gauge port.
- Press fitting of the OUT side filter is actually custom-made. Contact us for consultation.
- Pressure gauge port and OUT port are identical. Either will do for pressure gauge port or OUT port.



Layout Example with Model 6600



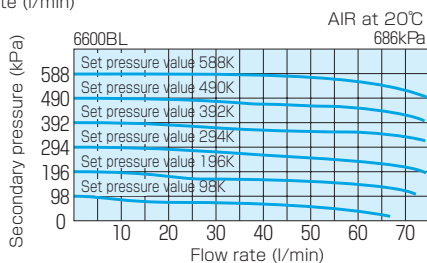
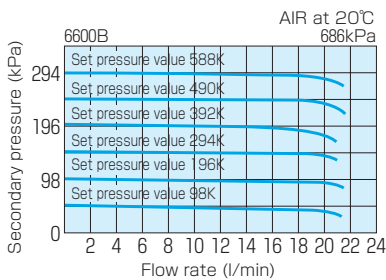
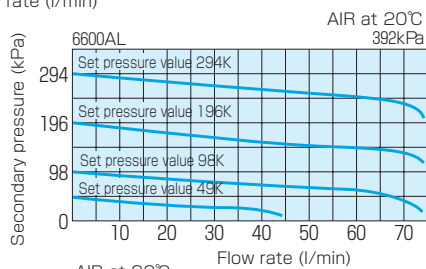
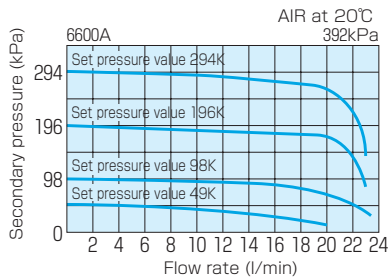
Dimensions



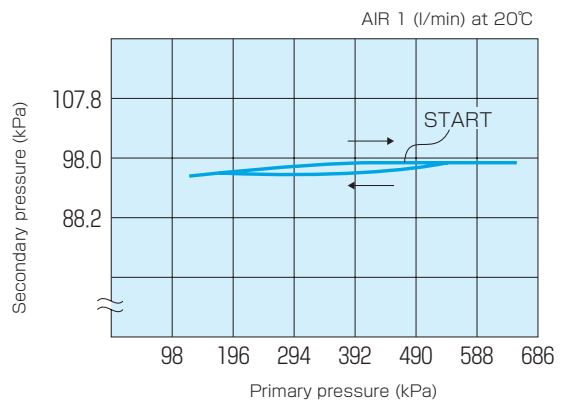
Lineup

Model/Type	Set pressure	Max. flow rate
6600A	9.8-294kPa	10L/MIN
6600B	29.4-588kPa	10L/MIN
6600AL	9.8-294kPa	20L/MIN
6600BL	29.4-588kPa	20L/MIN

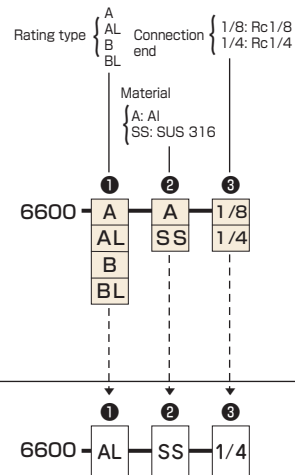
* Note that there may be differences in the range of 80% to 130% between the maximum flow values indicated in this table and those that are actually used by the customer. Please use these values for reference only.



Pressure Characteristic Curve



Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.



Large Capacity Pressure Regulating Valve for Analyzer

MODEL 6700 SERIES

This regulating valve is a larger version of our 6600 regulator. The design is compact, yet it permits quick, reliable, high-accuracy pressure regulation in a large flow range.

Features

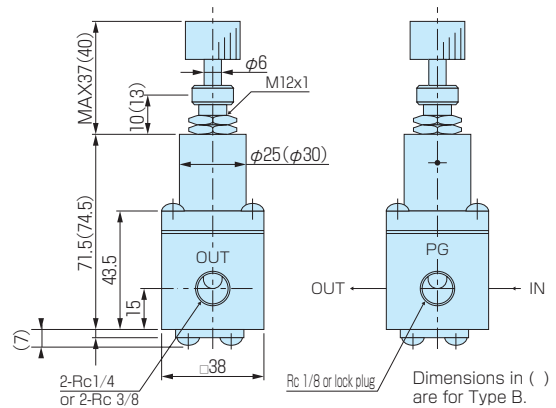
- Compact regulating valve for large flow**
 The compact, lightweight valve has excellent control characteristics in a large flow range, ensuring the repeatability of $\pm 1\%$ when the primary and secondary pressure change.
- Complete fluid shutoff**
 When the secondary pressure is set at 0, it functions also as a stop valve.
- Ideal for in-line mounting**
 The fluid inlet and outlet are provided on the sides of the body, permitting easy in-line piping.
- Non-bleed type**
 This non-bleed type valve has passed stringent leak tests, thus eliminating concerns.

Standard Specifications

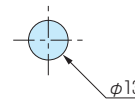
Max. pressure on primary side	970.2kPa
Max. pressure on secondary side	9.8-294kPa (Type A) 49-588kPa (Type B)
Min. operating differential pressure	49kPa
Proof pressure	980kPa
Repeatability	$\pm 1\%$ of rated pressure
Ambient temperature and fluid temperature	5°C-60°C
Flow rating	See the graph.
End connection	Rc1/4 Rc3/8
Materials of parts in contact with gases	A: Al 63S, BSBM, NBR, Duracon SS: SUS316, Viton, fluororesin



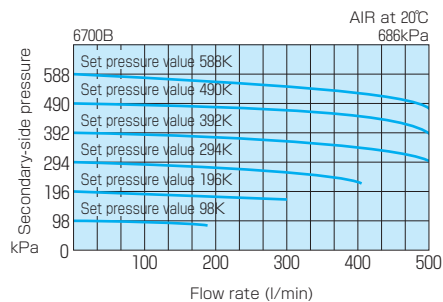
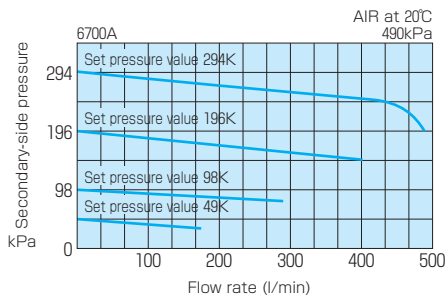
Dimensions



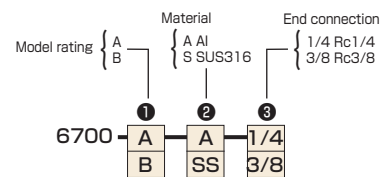
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Flow Characteristics



Ordering



Illustrative example



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Pressure Regulator Valve (Precision Regulator for Low Pressure Regulation)

MODEL 6610

This valve has been developed for better repeatability and quick, reliable pressure regulation by increasing the accuracy of the low-pressure side compared with the Model 6600.

It is ideal for high-sensitivity analyzers and semiconductor manufacturing equipment, as well as for research and development.

Features

- **High-precision regulation on the low-pressure side**
High regulation performance with repeatability of $\pm 1\%$ or less when the pressure on the primary side and load resistance on the secondary side change under the set pressure condition of 0.01–0.15 MPa.
- **Non-grease specification**
The sections in contact with gas are made of stainless steel, Viton, and Teflon without using grease. This valve is ideal for the semiconductor industry which requires ultra-clean conditions.
- **Lock nut**
The regulating position, once it has been set, can be fixed by a lock nut to prevent the setting from changing.
- **Non-bleed type**
This non-bleed type valve prevents gas from leaking to the outside.

Applications

- Gas chromatography
- High-purity gas control
- Low-pressure controllers
- Semiconductor industry

Standard Specifications

	Model 6610
Fluid	Various gases
Max. pressure on primary side	0.4MPa
Max. pressure on secondary side	0.01-0.15MPa
Max. flow rate	5L/MIN
Min. operating differential pressure	0.1 MPa or more
Materials of parts in contact with gases	SUS316, Viton®, Teflon®, SUS304, SUS303
Proof pressure	0.8MPa
Repeatability	$\pm 1\%$ with respect to rated pressure
Max. operating temperature	50°C
End connection	Rc1/8

Special Specifications

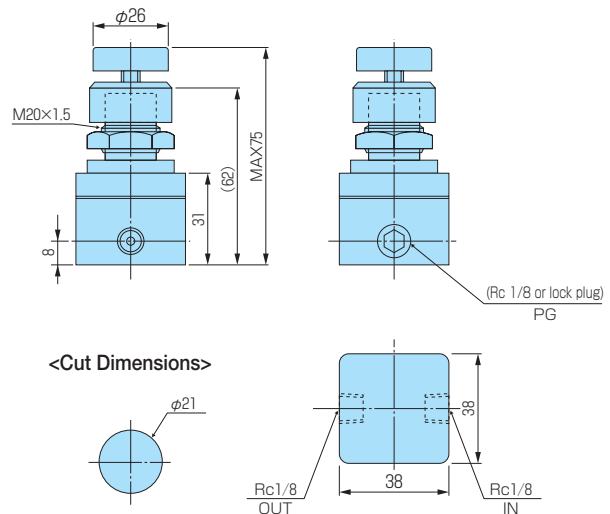
- Joint other than standard joint. (Refer to page 129.)

Purchasing

- Only the IN and OUT joints can be specified. A lock plug is used for the gauge port.
- The pressure gauge port is equivalent to the OUT port. Either one can be used as a gauge port or OUT port.



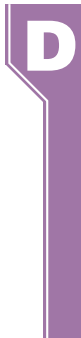
Dimensions

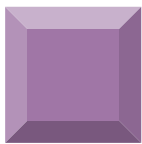


Ordering

6610 (Standard specifications only)

* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.





Backpressure Valve MODEL 6800 SERIES

The backpressure valve is a kind of relief valve that keeps the pressure at the front stage of a valve constant. It can easily and quickly control the pressure of a tank with a large buffer and remove the constant flow of a mixed gas, which cannot easily be done by general regulation valves with a subsequent stage controlling function. This new concept of pressure regulation has been attracting much attention.

Features

- Convenient panel-mount type
- Compact design
- High-speed regulation of primary-side pressure
- This greaseless clean valve permits gas control in a pure state.

Applications

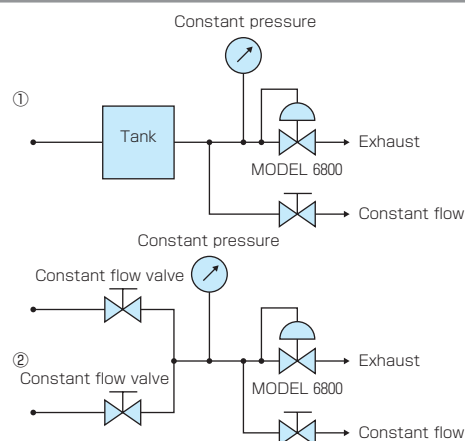
- Tank pressure control
- Constant flow control of mixed gas

Model	6800A	6800B	6800AL	6800BL
Set pressure	9.8-294kPa	9.8-588kPa	9.8-294kPa	9.8-588kPa
Max. exhaust flow rate	1L/MIN	0.8L/MIN	10L/MIN	10L/MIN
Proof pressure	784kPa	784kPa	784kPa	784kPa
Materials of parts in contact with fluids	(A) Al, brass, NBR (SS) SUS316, Viton			
End connection	Rc 1/8, Rc 1/4			

Note: The maximum flow rate is subject to instrument errors and operating conditions.

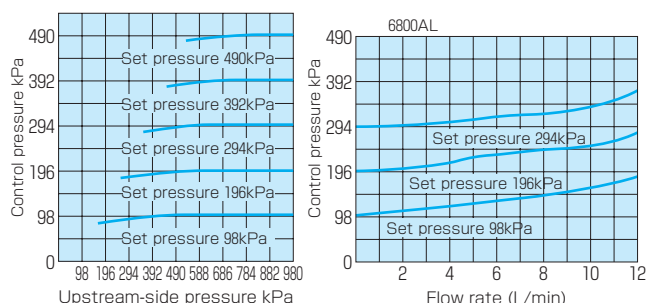


Example of use

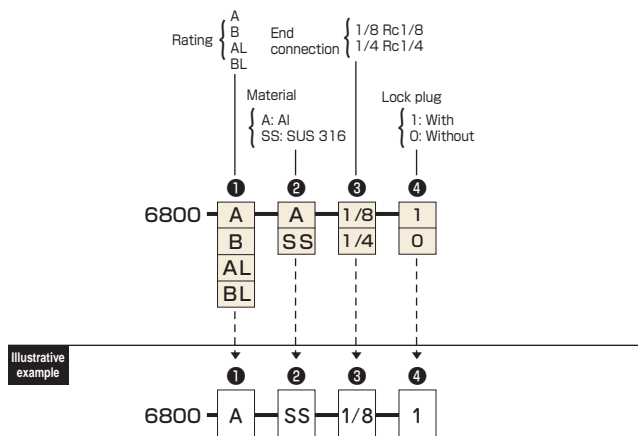


- ① In this example, constant flow is discharged, while the tank inside pressure is kept constant.
- ② In this example, constant-flow mixed gas is discharged by the constant flow valve.

Flow Characteristics

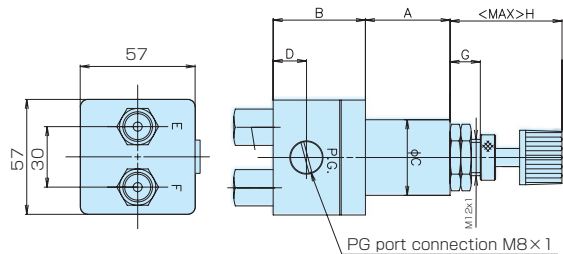


Ordering



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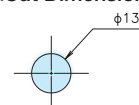
Dimensions



Dimensions of each part

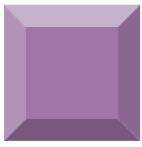
Model	A	B	C	D	E	F	G	H
6800A	28	30.5	25	11	IN	OUT	10	37
6800B	31	30.5	30	11	IN	OUT	13	40
6800AL	28	34.5	25	14	OUT	IN	10	37
6800BL	31	34.5	30	14	OUT	IN	13	40

<Cut Dimensions>



Purchasing

- When a gauge port lock plug is provided, IN and OUT ports alone can be specified, and when there is no lock plug, the end connection for the IN, OUT, and gauge ports can be specified.
- Refer to page 129 for the dimensions of end connection.



Large Capacity Back Pressure Valve

MODEL 6801 SERIES

A back pressure valve is a kind of relief valve to obtain a constant level of pressure in the first stage of valve operation. This type of valve makes it easier and speedier for the user to control pressure in the tank with a large buffer, purge a given quantity of mixed gas or to carry out such other operations which are rather hard to do with a second-stage control valve commonly in use.

Features

- Handy panel mount type
- Quick regulation of primary pressure
- Greaseless, clean valve perfect for control of pure gases

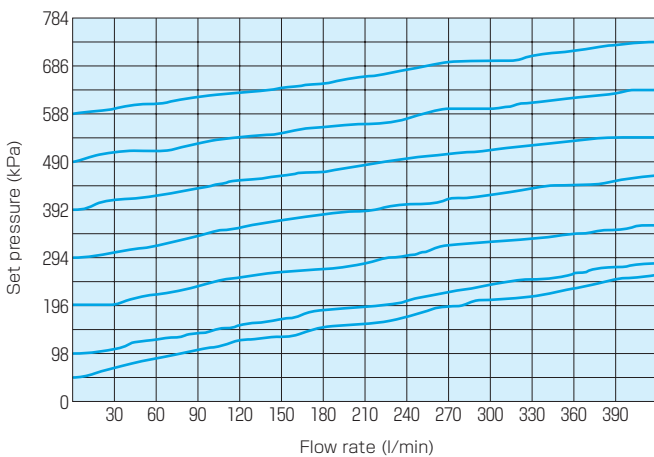
Applications

- Tank pressure control
- Control of constant flows of mixed gases

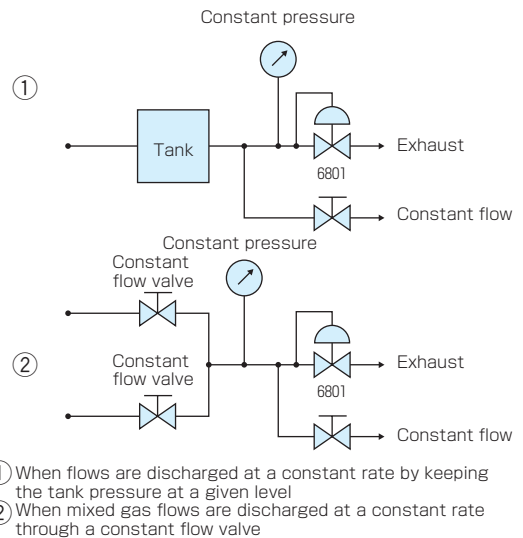
Standard Specifications

Type	6801A	6801B
Set pressure range	0-294kPa	0-588kPa
Max. exhaust flow rate	300L/MIN	
Proof pressure	784kPa	
Repeatability	Within ±1% of the rated pressure	
Heat resistance	70°C	
Materials of parts exposed to fluids	SUS 316, Viton, fluorocarbon resin	
Connection end	Rc1/2	

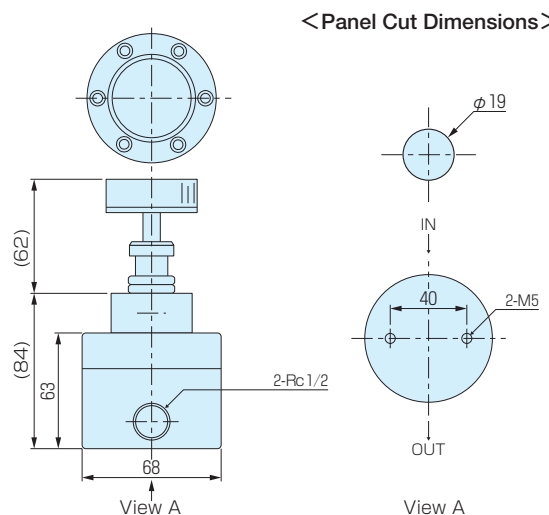
Flow Characteristic Curves



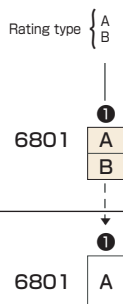
Layout Example with Model 6801



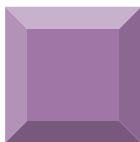
Dimensions



Ordering



* Refer to "Ordering" and "Illustrative Example" when placing an order or requesting a quotation. Fill in the blanks in the "Order/Quotation Request Card" at the end of the catalog, and send the card by fax.



Cylinder Regulator with Precision Flow Meter

MODEL 7700 SERIES

Features

- This two-stage type excels in durability, ensuring stable set pressure and flow at all times even when used continuously.
- The precision needle valve with a linear flow curve permits reliable setting of arbitrary flow even in a small flow range.
- Precision setting for general industry and medical equipment, especially for standard gases.

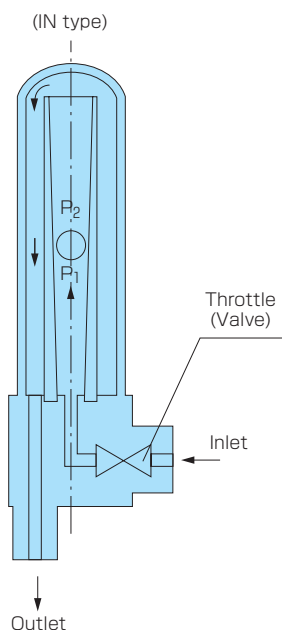
Standard Specifications

Specification pressure range	Max. flow rate	Pressure gauge: kPa		Material
		Primary side	Secondary side	
kPa	(/MIN)			
19.6-196	20L	0-24517	0-294	Brass, SUS316
9.8-58.8	20L	0-24517	0-98	

* The Model 7700 Series is made by attaching a special flow meter (Model 4400) to various cylinder regulators. Contact us for combinations other than the above.



Flow Meter Specifications



As shown at left, the flow meter valve is provided on the inlet side. The scale is manufactured in condition that fluid flows in an atmospheric condition. The following flow correction is necessary when a resistance, or a tank that causes backpressure, is placed on the downstream side.

$$\text{Actual flow} = \text{Reading of flow meter} \times \sqrt{\frac{0.1 + \text{Secondary air pressure}}{0.1}}$$

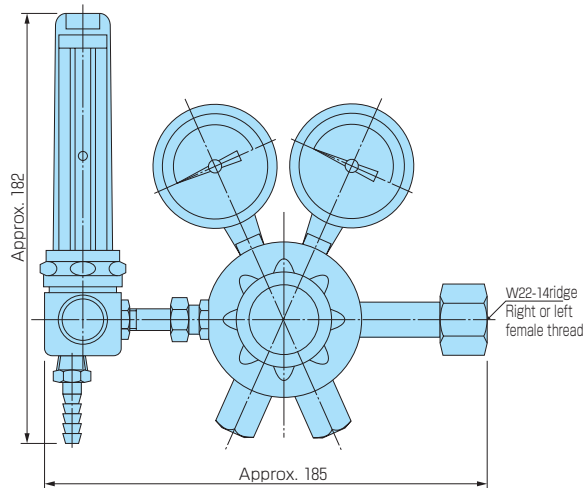
$$6 \text{ l/min} = 3\text{L} \times \sqrt{\frac{0.1 + 0.3}{0.1}}$$

when the reading of the secondary pressure gauge is 0.3 MPa and the reading of the flow meter is 3 l/min, and the actual flow rate is greater than the reading.

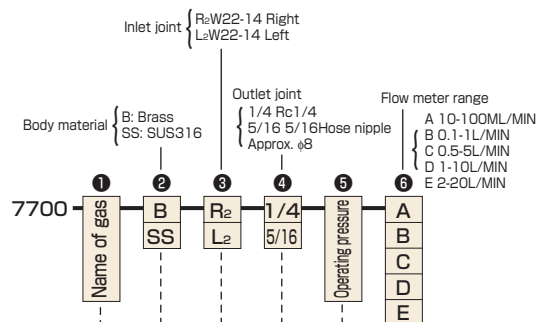
Inlet joint

R ₂ (Right)	L ₂ (Left)
Air	Carbon monoxide
Argon	Ethane
Carbon dioxide	Ethylene
Nitrogen monoxide	Ethylene oxide
Nitrogen	Hydrogen
Nitrogen dioxide	Methane
Oxygen	Propylene
	Sulfur dioxide
	Hexavalent sulfur

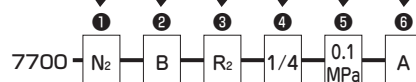
Dimensions



Ordering



Illustrative example



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