



How To Specify A Plast-O-Matic Pressure Regulator

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How to Specify A Plast-O-Matic Pressure Regulator

The following information is designed to help you specify a pressure regulator. By utilizing your application data and the reference charts on the next page, simply follow this step-by-step process to assure a proper specification.

A pressure regulator is a “Normally Open” valve, which senses and reacts to downstream pressure. This valve is commonly confused with a pressure relief valve, which is “Normally Closed”, and reacts to upstream pressure.

The primary purpose of a regulator is to convert varying or excessive upstream pressure to a pre-determined maximum downstream pressure (prevents the downstream pressure from ever exceeding the set pressure). In a system the regulator is used for the following reasons:

- Protect downstream instrumentation from exposure to excessive inlet pressure.
- Regulate to the correct pressure range so that a flow system or piece of equipment can operate safely and effectively.

Step 1 Gathering Application Data

In order to specify a Plast-O-Matic Regulator, the following information is required:

1. Maximum system inlet pressure
2. Desired set pressure
3. Required flow rate
4. Desired outlet pressure at required flow rate
5. Materials of construction
6. Pipe size

Step 2 Flow Reference Chart

Once the above information has been obtained, it is now necessary to determine which valve has the required capacity. To do so, refer to the “Flow Reference Chart.”

This chart is designed to provide the maximum flow rate according to pipe size, inlet pressure and set pressure.

To size your regulator, follow these simple steps:

1. Under the section entitled “Inlet Pressure”, locate the required pipe size.
2. Locate the system inlet pressure listed directly below the pipe size.
3. Follow the appropriate column down until it intersects with the required set pressure as listed in the “Pressure Settings” column on the left side of the chart.

Note: If the resulting flow rate is either too high or too low for your application, refer to the adjacent pipe size.

Step 3 Flow Capacity vs. Pressure Drop Reference Chart

Now that the appropriate sized regulator has been determined from the previous step, refer to the “Flow Capacity vs. Pressure Drop Reference Chart”. This chart will determine an approximate outlet pressure based on the required flow rate. The pressure drop (ΔP) referred to in the chart is the differential of the set pressure and outlet pressure at the given flow rate.

Refer to the desired pipe size column and then locate the required flow rate and corresponding ΔP . You will notice at a given flow rate, as the pipe size increases the ΔP decreases.

To determine the outlet pressure at your desired flow rate, use the following formula:

$$\text{Set Pressure} - \Delta P = \text{Outlet Pressure}$$

Depending on your system requirements, you may require a larger unit in order to minimize your pressure drop (ΔP).

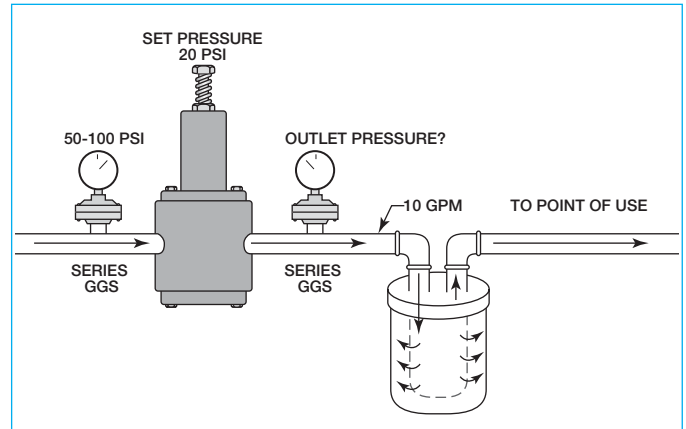
Example

An engineer has a PVC/Viton, 3/4" piping system with a filter which cannot experience pressures above 20 PSI. His inlet pressure can vary from 50-100 PSI. He wants to pass 10 GPM with a clean filter basket. (See illustration #1)

What regulator should he use?

What will his outlet pressure be with a clean basket?

Illustration #1



Step 1 Flow Reference

1. Maximum system inlet pressure 100 PSI
2. Desired set pressure 20 PSI
3. Required flow rate 10 GPM
4. Desired outlet pressure at required flow rate ... ??
5. Materials of construction..... PVC/Viton
6. Pipe size 3/4"

Step 2 Flow Reference Chart

As read in the chart below, a 3/4" unit will have a maximum flow rate of 35 GPM with his application parameters. Since 1/2" unit has a maximum flow rate of 10 GPM, this may be an economical substitution for the 3/4" unit.

PLAST-O-MATIC FLOW REFERENCE CHART

Pressure Settings	INLET PRESSURES														
	1/4 NPT or BSP		1/2 NPT or BSP		3/4 NPT or BSP		1 NPT or BSP		1 1/2 NPT or BSP		2 NPT or BSP		3 NPT or BSP		
	15 PSI 1,04 Bars	30 & Up 2,07 & Up	15 PSI 1,04 Bars	30 & Up 2,07 & Up	10 PSI 0,69 Bars	25 & Up 1,73 & Up	10 PSI 0,69 Bars	25 & Up 1,73 & Up	10 PSI 0,69 Bars	25 & Up 1,73 & Up	10 PSI 0,69 Bars	25 & Up 1,73 & Up	10 PSI 0,69 Bars	25 & Up 1,73 & Up	
PSI	Bars	GPM	cm ³ /sec.	GPM	cm ³ /sec.	GPM	cm ³ /sec.	GPM	cm ³ /sec.	GPM	cm ³ /sec.	GPM	cm ³ /sec.	GPM	cm ³ /sec.
05	0,35	1.0	63	1.0	63	2	126	3	189	8	505	8	505	11	694
10	0,69	3.0	189	3.0	189	6	379	7	442	14	883	18	1136	20	1262
15	1,04	3.5	221	4.0	252	7	442	9	568	18	1136	29	1830	25	1577
20	1,38	3.5	221	4.5	315	7	442	10	631	18	1136	35	2209	25	1577
25	1,73	3.5	221	5.0	315	7	442	10	631	18	1136	35	2209	25	1577
30	2,07	3.5	221	5.0	315	7	442	10	631	18	1136	35	2209	25	1577
40	2,76	3.5	221	5.0	315	7	442	10	631	18	1136	35	2209	25	1577
50	3,45	3.5	221	5.0	315	7	442	10	631	18	1136	35	2209	25	1577

NOTE: Above flow characteristics are unique to Plast-O-Matic Pressure Regulators (Reducing Valves) in laboratory conditions. Your results may vary depending on the application. Competitor products do not provide the same performance and must not be evaluated with this data.

Step 3 Flow Reference Chart

As highlighted in the chart below, a 3/4" unit will have a Δ P between 4 and 6 1/2 PSI (approximately 5 PSI) at 10 GPM, while the 1/2" unit will have a Δ P of 13 PSI at 10 GPM.

PLAST-O-MATIC FLOW CAPACITY vs. PRESSURE DROP REFERENCE CHART

VALVE SIZE													
1/4		1/2		3/4		1		1 1/2		2		3	
FLOW GPM	ΔP* PSI	FLOW GPM	ΔP* PSI	FLOW GPM	ΔP* PSI	FLOW GPM	ΔP* PSI	FLOW GPM	ΔP* PSI	FLOW GPM	ΔP* PSI	FLOW GPM	ΔP* PSI
1	4	1 1/2	4	8	4	11	4 1/2	16	5	20	5	50	6
3	7	2 1/2	5	14	6 1/2	20	7	28	7 1/2	40	8	100	9
4	12	6	6 1/2	25	10	25	11	36	12	60	12	130	11
4 1/2	16	7	9	29	12	40	13	58	14	80	14	160	13
5	18	10	13	35	14	50	15	70	16	100	16	200	16

*Pressure drop (ΔP) is measured from set pressure of regulators.

NOTE: The generally accepted safe velocity in plastic piping is 5 feet per second. The above flow goes beyond this rate.

Therefore, with a set pressure of 20 PSI and a flow rate of 10 GPM, the resulting outlet pressure will be as follows:

- 3/4" unit – 15 PSI (set pressure of 20 minus Δ P of 5)
- 1/2" unit – 7 PSI (set pressure of 20 minus Δ P of 13)

With the above information, you can now make an educated decision on which valve is required based on your application requirements.

How to Write a Specification for a True Blue Pressure Regulator

Step 1 Begin with Regulator Series and Description

Series PRH/PRHM (5 - 125 set pressure) Thermoplastic [PVC, CPVC, Polypropylene, PTFE, or PVDF (Kynar)] pressure regulator, [1/4" through 3"] NPT threads. Valve to have a one piece body housing containing the inlet port, outlet port, valve seat, and pressure sensing orifice. Regulator is to have a piston with a fabric reinforced [EPDM or Viton] rolling diaphragm sensing the downstream pressure and providing for maximum sensitivity and control accuracy. The shaft connecting the piston and the valve seat seal assembly shall have a double u-cup seal for safety.

Series PR (5-50 PSI set pressure) Thermoplastic [1/2" PTFE or 3" Polypro] pressure regulator, NPT threads. Valve to have a one piece body housing containing the inlet port, outlet port, valve seat, and pressure sensing orifice. Regulator is to have a piston with a fabric reinforced [EPDM or FKM] rolling diaphragm sensing the downstream pressure and providing for maximum sensitivity and control accuracy. The shaft connecting the piston and the valve seat seal assembly shall have a double u-cup seal for safety.

Series PRA/PRAM (5-125 PSI set pressure) Thermoplastic [PVC, Polypropylene, PTFE, or PVDF (Kynar)] pressure regulator, [1/4" through 3"] NPT threads. Valve to have a one piece body housing containing the inlet port, outlet port, valve seat, and pressure sensing orifice. Regulator is controlled by external compressed air (not provided with regulator-source must be filtered), opposing a piston with a fabric reinforced [EPDM or FKM] rolling diaphragm sensing the downstream pressure and providing for maximum sensitivity and control accuracy. The shaft connecting the piston and the valve seat seal assembly shall have a double u-cup seal for safety.

Series PRD/PRDM (5-75 PSI set pressure) Thermoplastic [PVC or Polypropylene] pressure regulator, [1/4" through 3"] NPT threads. Valve to have a one piece body housing containing the inlet port, outlet port, valve seat, and pressure sensing orifice. Regulator is to have a piston with a fabric reinforced [EPDM or FKM] rolling diaphragm sensing the downstream pressure and providing for maximum sensitivity and control accuracy. The shaft connecting the piston and the valve seat seal assembly shall have a double u-cup seal for safety. Spring housing is ported for a fitting to allow a sensing line to be connected downstream, so that the pressure differential across the intermediary piping/equipment will not exceed the regulator's setting.

Series PRHU Thermoplastic PVDF Kynar 740 body pressure regulator, [1/2" through 3"] with connections for [Asahi or GF] piping system. Valve to have a one piece body housing containing the inlet port, outlet port, valve seat, and pressure sensing orifice. Regulator is to have a piston with a metal-ion free EPDM rolling diaphragm sensing the downstream pressure and providing for maximum sensitivity and control accuracy. Valve is a shut-off design with a

metal-ion free EPDM seat and redundant metal-ion free EPDM u-cups sealing the upper chamber on a pressure balanced shaft. All components are to receive pre-assembly DI cleaning. All units are to be receive 8 hour hot/8 hour cold DI rinse, and final multi-stage cleaning with DI water, 18 megohm DI rinse, nitrogen purge, blacklight inspection, and double bagging in 6 mil heat-sealed polyethylene.

Please consult catalog for specific valve series prefix.

Step 2 Next, note if the Regulator is to be Factory Pre-Set (not applicable for PRA):

Manufacturer shall at the factory set the pressure regulator at _____ PSI.

Step 3 Add for Ultra-Pure Applications when required: (included standard with PRHU)

Manufacturer shall provide multi-stage cleaning with DI water, 18 megohm DI rinse, nitrogen purge, blacklight inspection, and double bagging in 6 mil heat-sealed polyethylene.

Step 4 End with Testing Procedure:

All units are to be 100% individually tested at the factory. As manufactured by Plast-O-Matic Valves, Inc., Cedar Grove, NJ USA.

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