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Technical Articles

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Introduction to Pressure Regulators/Reducing Valves

Spring operated, air operated & differential pressure regulators — also known as pressure reducing valves or forward pressure regulators

TRUE BLUE® PRESSURE REGULATORS HELP YOU MANAGE PRESSURE “DOWNSTREAM” OF THE VALVE.

Uses of these versatile regulators...

- Prevent overpressure conditions to downstream equipment such as filters, sensitive tools, etc.
- Convert excessive or wildly fluctuating upstream pressure to a constant predetermined downstream pressure.
- Control pressure differential (Delta P) across downstream system equipment (Refer to Series PRD below).
- Regulate to the correct pressure range so that a flow system or piece of equipment can operate safely and effectively.

These valves have many outstanding features...

- Offer wide range of pressure settings with smooth, sensitive operation.
- Engineered thermoplastics for corrosive and ultra pure liquids.
- One piece body construction eliminates internal leakage that can cause malfunction.
- Pressure sensing is done with rolling diaphragms. These have the largest surface area among all diaphragm regulator designs, which results in the greatest accuracy. Furthermore, the sensing chamber is isolated from the flow path, so it provides unrestricted flow.
- Each valve is individually tested prior to shipment.



- No wetted metals; all external fasteners are stainless steel, control springs on spring loaded models are not in the liquid.
- Maintenance-free designs.
- Factory pre-set if requested.
- Internal sensing area flush option.

Common misconceptions about Pressure Regulators

- A pressure regulator **cannot increase** pressure. If upstream pressure drops below the set point, downstream pressure will also...a pressure regulator does not function like a pump.
- Pressure regulators will not function as [backpressure regulators](#) . Pressure regulators are normally-open valves that are used to prevent downstream pressure from exceeding a predetermined set point. In some applications this is known as forward pressure control.
- While they affect flow rates, “pressure regulators” are sometimes applied in systems to control flow — but they are designed to control pressure, not flow. To assure specific flow rates, Plast-O-Matic offers an extremely accurate and cost-effective [flow control valve](#) .
- Speaking of flow, it is important to remember that many manufacturers offer “pressure regulators” that strangle more than they regulate; none deliver the same **flow capacity** as a Plast-O-Matic regulator. Typically, most regulators sense pressure with an actual restriction in the pipeline...Plast-O-Matic designs use a separate pressure sensing chamber off the downstream outlet that **allows unimpeded flow**. The “restriction” regulator designs also create a significant drop-off from set pressure when flow rate increases. The Plast-O-Matic regulators below all provide **minimal drop-off from set pressure**, while providing the maximum flow capacity your system may require.

IMPORTANT NOTE: Effective pressure regulation requires minimal or no pressure loss from your desired set point, with minimal impact on flow capacity. All of the valves listed below represent the ultimate combination of downstream or forward pressure regulation and flow performance.

All Plast-O-Matic Pressure Regulators are 100% Manufactured in USA

Selection Charts

Charts for both Ultra-Pure and typical Corrosive/High Purity applications, using size, material, function and pressure data to help you select the proper product line.

Series PRHM • Premium performance, Complete (5-125 psi) set range, 1/2" through 2" sizes, PVC, CPVC, Polypro, PVDF:

Series PRHM is a molded version of Series PRH. Design incorporates a poppet seat, double u-cups, large area rolling diaphragm and one piece body construction. A pressure balanced shaft assures smooth and stable control, while the valve design provides excellent flow performance.

- Pressure setting is infinitely adjustable from 5 psi to 125 psi.
- Maximum inlet pressure is 150 psi.
- Available in 1/2", 3/4", 1", 1 1/2" and 2" Geon PVC, Corzan CPVC, natural polypropylene, Kynar PVDF.
- Seals in EPDM or FKM.
- High performance, heavy-duty design.
- Designed for low maintenance and easy to adjust.
- Threaded, socket, metric, flanged, JIS and other connection types available.
- Factory installed BCF Spigots (For GF, Asahi or IPS pipe) available.



Series PRH • Premium performance, Complete (10-125 psi) set range:

Series PRH design incorporates a poppet seat, double u-cups, large area rolling diaphragm and one piece body construction. A pressure balanced shaft assures smooth and stable control, while the valve design provides excellent flow performance.

- Pressure setting is infinitely adjustable from 10 psi to 125 psi.
- Maximum inlet pressure is 150 psi.
- Sizes 1/4", 3" and 4" in PVC.
- Sizes 1/4" in CPVC.
- Sizes 1/4" in Natural Polypro.
- Sizes 1/4", 1/2", 3/4", 1" in PTFE.
- Sizes 1/4" & 3" in PVDF.
- Seals in EPDM or FKM.
- High performance, heavy-duty design.
- Designed for low maintenance and easy to adjust.
- Within the size range 3/4" thru 2", valves may be shipped with or without a "rising" adjusting bolt, depending on size/materials.



Series PRH-U • Ultrapure performance, Complete (10-125 psi) set range:

Series PRH-U is a special version of Series PRH designed exclusively for use in ultrapure applications. It features machined Kynar type 740 PVDF bodies, metal-ion free EPDM, and three separate cleaning procedures. PRH-U is shipped standard with choice of Asahi, GF or IPS spigot connections. Non-rising stem on 3/4" and 1" sizes.

- Maximum inlet pressure is 150 psi.
- Sizes 1/2" through 3".
- Capped external fasteners.
- New non-rising, smooth flow stem design.
- Proprietary pre-assembly cleaning procedure.
- 8-hour cold/8-hour hot DI rinse.
- Final clean & double bag in Class 100 cleanroom.
- High performance, heavy-duty design.
- Designed for low maintenance and easy to adjust.



Series UPR • ultrapure pressure regulator:

Series UPR uses a convoluted PTFE diaphragm to sense pressure and isolate the spring used to regulate pressure. No elastomers or metals are in contact with liquid in the ultra-high purity, non-positive shut-off version. Design incorporates one piece body construction and no external fasteners. Highest industry flow performance/minimal droop.

- Pressure setting is infinitely adjustable from 5 psi to 100 psi
- Maximum inlet pressure is 120 psi.
- Available in Kynar PVDF or PTFE.
- 1/4 – 2" Pipe connection in socket, spigot, flare, or NPT.
- Convoluted diaphragm is TFM.
- High performance, heavy-duty design.
- For applications requiring positive shut-off, an alternate version with minimal elastomers is available; consult factory.

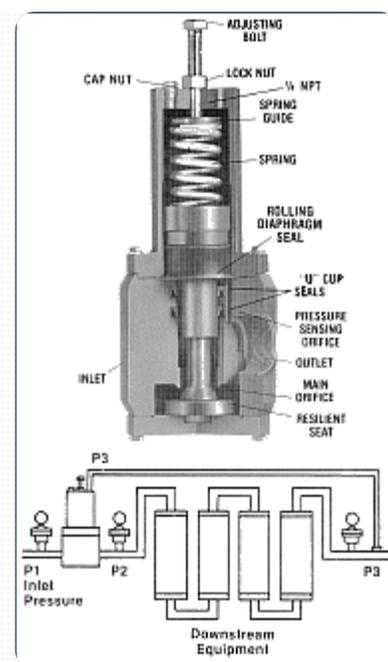


Series PRD • Differential pressure regulator:

Series PRD is a differential pressure regulator based on Series PR (above) with two threaded ports. One port is for a downstream pressure sensing line, the other is

fitted with a bleed screw to exhaust air from the housing. Otherwise, design is identical to Series PR/PRH. The sensing line feeds the pressure downstream (P3) of the equipment being protected to the top of the spring housing (also P3). This pressure assists the spring in keeping the regulator open against the pressure directly at the regulator outlet (P2). When pressure downstream begins to drop (as it would when a filter becomes more and more clogged), the regulator begins to close and becomes fully closed when the differential setting is reached. This assures against overpressure across the bank of filters or whatever the equipment may be. The differential pressure setting is P2 minus P3.

- Pressure setting is infinitely adjustable from 10 psi to 50 psi.
- Maximum inlet pressure is 150 psi.
- Sizes 1/4", 1/2", 3/4", 1", 1-1/2", 2" & 3".
- Installs easily; common tubing is used to connect to desired point downstream.
- Spring is fluoropolymer coated since downstream liquid is in contact.
- High performance, heavy-duty design.
- Designed for low maintenance and easy to adjust.

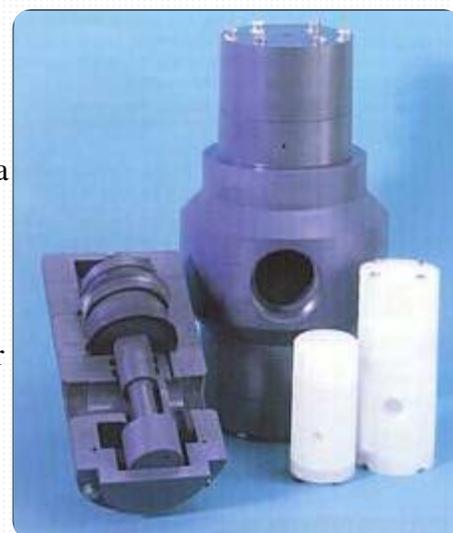


Series PRA/PRAM • Air loaded pressure regulator:

Series PRA/PRAM uses the standard air from a compressor instead of a spring to generate the force needed to regulate pressure. Design incorporates a poppet seat, double u-cups, large area rolling diaphragm and one piece body construction. A pressure balanced shaft assures smooth and stable control, while the valve design provides excellent flow performance.

A common self-relieving type compressed air valve is needed to connect your compressed air line to the regulator. The PRA/PRAM will mimic whatever pressure you apply to the top via the self-relieving valve. If you apply 40 psi to the top of the PRA/PRAM, you can expect downstream liquid pressure to be 40 psi as well.

- Pressure setting is infinitely adjustable from 5 psi to 125 psi.
- Maximum inlet pressure is 150 psi.
- Available in PVC, Natural polypro, and Kynar PVDF;
- Sizes 1/4", 1/2", and 3" Series PRA; 3/4", 1", 1-1/2", 2" Series PRAM.
- Seals in EPDM or FKM.
- High performance, heavy-duty design.
- Outperforms spring loaded regulators through improved response to pressure changes; pressure is maintained without sacrificing flow.
- Performance rivals exotic control valves but at much lower cost.
- Used with the optional [Stabilizer — U.S. Patent No. 6,418,956 — Series PRS](#) , this air-loaded regulator will



perform with virtually zero drop off from set pressure.

- Incorporates the patented [Fail Dry](#) safety vent.

Spigot Ends:

Plast-O-Matic pressure regulators are available with metric or IPS spigot ends when required for high purity piping systems.

- Kynar PVDF, Natural Polypro, CPVC & PVC.
 - All pipe sizes & models.
 - Factory installed by Plast-O-Matic valve technicians.
 - [High Purity Quality Assurance Procedure/Class 1000 \(or better\) cleanroom procedure](#) also available.
- Request Catalog PR for description.

