

Pressure Regulators vs. Backpressure Regulators

Similarities & Differences, and when to use one or the other...when to use both!

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Your co-worker might call it a "pressure sustaining valve," another might call it a "pressure control valve," while still another might know it as a "pressure reducer valve." To make matters worse, backpressure regulators are commonly mistaken for pressure regulators.

Both valves are often misunderstood and misapplied. It's important to know the similarities, and know the differences between a **pressure regulator** and a **backpressure regulator**.

Both are automatic, mechanical control valves that sense and respond to changes in process pressure. In most pressure control valves, the process fluid acts upon a piston that opens and closes the valve. An adjustable control element in the valve, such as a spring or compressed air, offsets the process pressure. When the process pressure exceeds the force of the control element, it moves the piston up. When pressure drops, the spring or compressed air moves the piston down.

It is the function of that movement that determines whether the valve is a "pressure regulator" or a "backpressure regulator."

In a **backpressure regulator**, when the spring force exceeds the pressure of the process fluid, the downward movement of the piston causes the valve to **close**. In a **pressure regulator**, however, when the spring force exceeds the fluid pressure, downward movement of the piston causes the valve to **open**. Conversely, when fluid process pressure exceeds the set force of the spring, it will cause the backpressure regulator to open, and it will cause the pressure regulator to close. It is also important to know that

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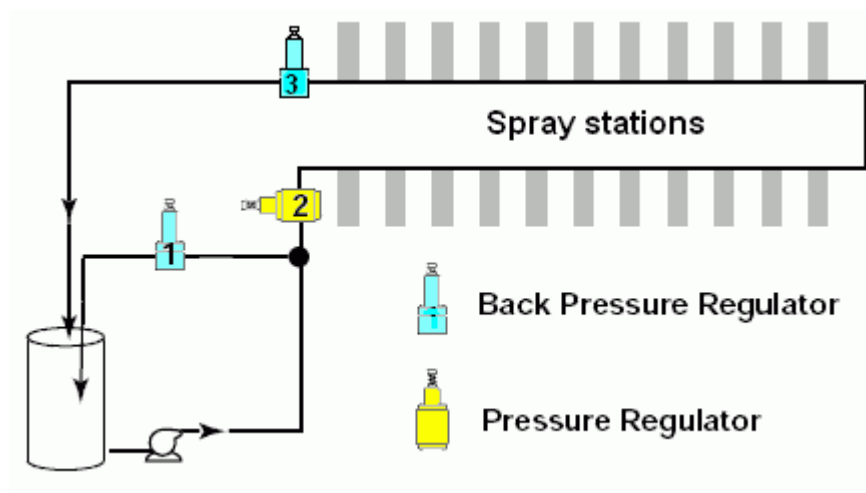
the **backpressure regulator** is designed to sense **inlet** pressure, while the **pressure regulator** is designed to sense pressure at the valve outlet.

Application:

The pressure regulator is a normally-open valve and is installed at the START of a system or before pressure sensitive equipment to regulate or reduce undesirable higher upstream pressure.

The backpressure regulator is a normally-closed valve installed at the END of a piping system to provide an obstruction to flow and thereby regulate upstream (back) pressure. The backpressure regulator is called upon to provide pressure in order to draw fluid off the system.

Figure 1

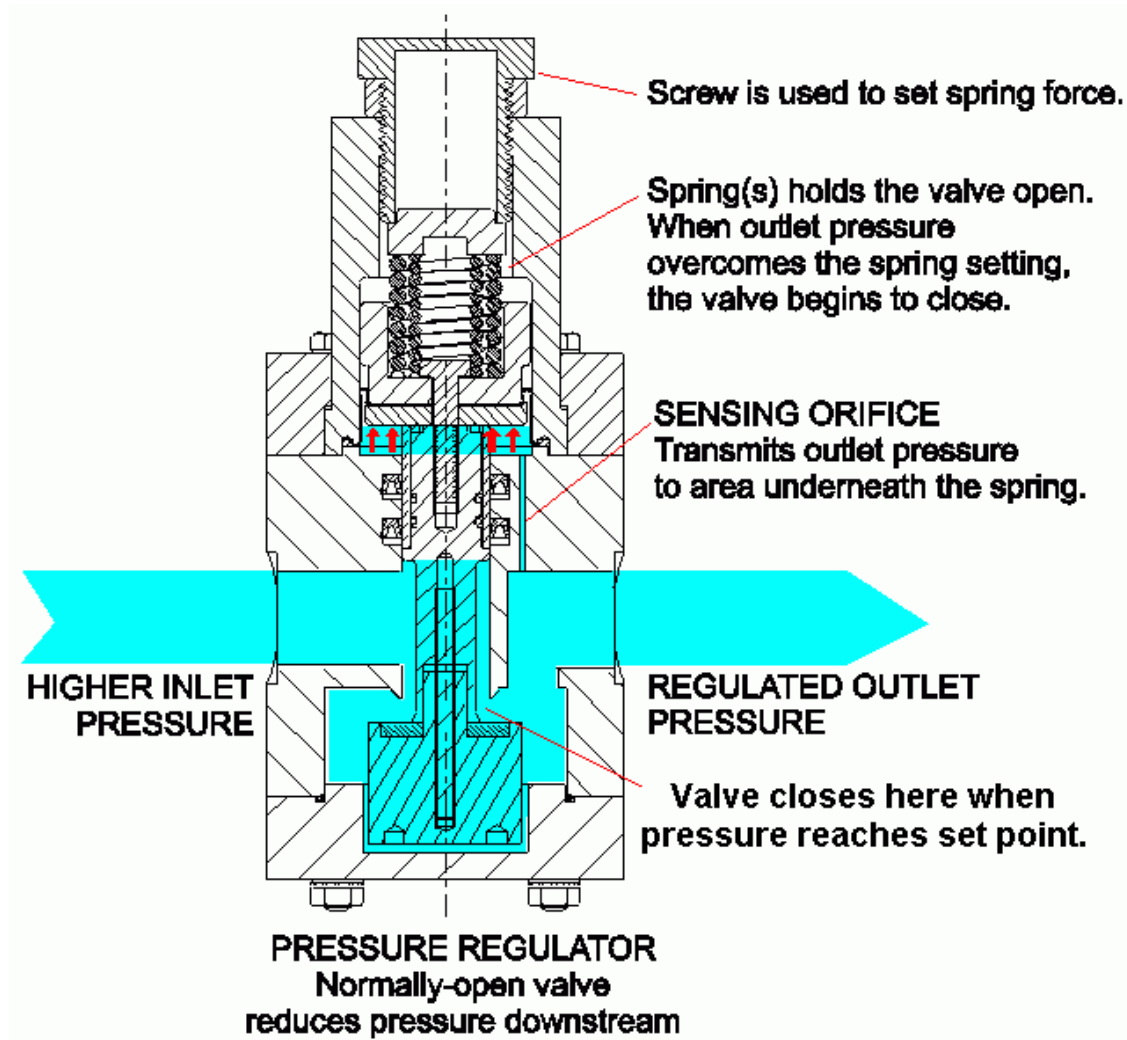


Above, a typical application using Pressure Regulators and Backpressure Regulators. Pump draws process liquid from a holding tank for various points of use. The first pressure control in the line (#1) is a Backpressure Regulator, teed off the main line. This valve ensures proper backpressure on the pump, so that it will operate properly. It provides the additional benefit of relieving pressure if the line should become blocked, thus preventing the pump from deadheading. The second control is a Pressure Regulator, (#2) which ensures that the downstream pressure does not exceed the maximum pressure rating of the spray heads. Finally, another Backpressure Regulator (#3) is used at the end of the line, to provide an obstruction and ensure that all of the spray heads have sufficient pressure to function properly.

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Function of a Pressure Regulator:

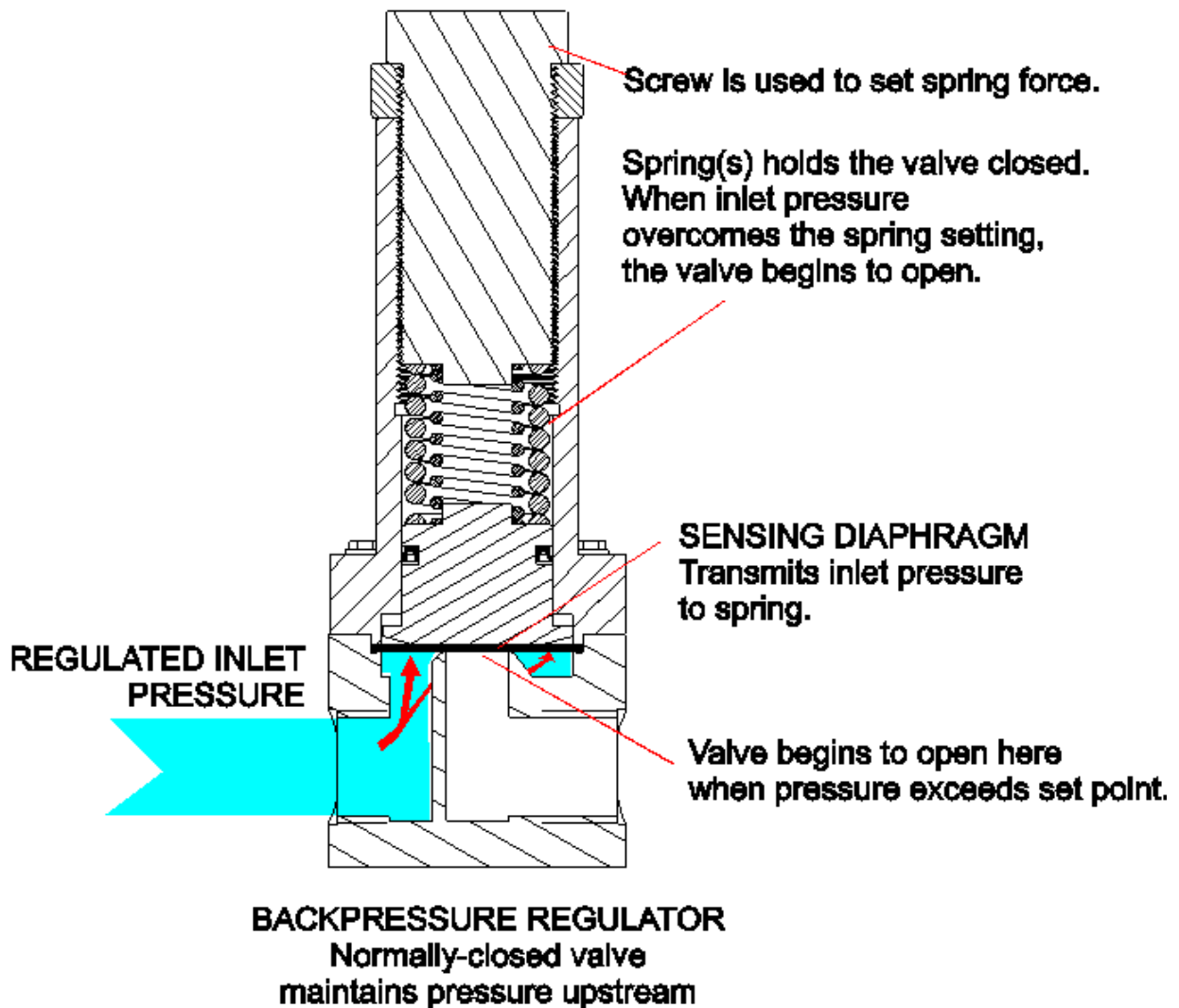
Figure 2.



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Function of a Backpressure Regulator:

Figure 3.



Uses of Each

Where an obstruction will benefit everything *prior* to the valve, for example, at the end of a return line and just prior to the tank, a backpressure regulator should be used to provide an obstruction so that the equipment prior will have sufficient pressure. When pressure is too high, the backpressure regulator opens and dumps into the tank. Too often, a pressure regulator is installed at this point instead. In this case, the pressure regulator will simply stay wide open and just send liquid straight into the tank without maintaining upstream pressure...just a very expensive fitting.

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Where an obstruction will benefit everything *after* the valve, a pressure regulator should be used so that all the equipment after it will not have excessive pressure. Used where it should be -- at the beginning of a process -- the pressure regulator will ensure safe downstream pressure.

Balancing a System

As depicted in figure 1 (above) the combination of a pressure regulator at the beginning of a system, and a backpressure regulator at the end of a system will ensure balanced pressure throughout the system. This is a simplification, of course, and the specifics within any given system can vary greatly. ■

Please note that the features listed above apply to many manufacturers' valves, but the illustrations specifically depict Plast-O-Matic products. For the purposes of this comparison, certain specifications inherent to specialty or unusual models are not addressed.

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