

## HOW TO CHOOSE A REGULATOR?

While all regulators can reduce pressure in a gas system, ALTAIR's high purity regulators conform to very exacting standards of pressure control. Below, we discuss some bases of comparison that can help you navigate this catalog and choose a regulator that best suits your needs. Further our Technical Support Team would be happy to answer any further questions you may have about regulator design and operation.

### **Single Stage vs. Dual Stage**

Single stage regulators reduce pressure in a single step to deliver a pressure within a specific range. Regulators designed in this way will show a slight variation in delivery pressure as the cylinder pressure falls during use. For this reason, single stage regulators are best suited for applications where a constant outlet pressure is not critical, where an operator can monitor and readjust pressure, or where inlet pressure is constant. Dual stage regulators perform the same function as single stage regulators. However, delivery pressure remains constant as cylinder pressure decreases and greater accuracy in pressure control is maintained because the pressure reduction is performed in two steps. Dual stage regulators are recommended for applications requiring a constant outlet pressure over the life of a gas cylinder.

### **Helium Leak Integrity**

Helium leak integrity is a measure of how well a regulator prevents gases from leaking into or out of a regulator body. The measured quantity is expressed as a flow rate such as  $1 \times 10^{-9}$  cc/sec He (1 billionth of a cc/sec). In this case, a Helium Leak integrity rating of  $1 \times 10^{-9}$  would indicate that the regulator would leak enough gas to fill a cubic centimeter every 33 years. If the rating were  $1 \times 10^{-3}$  the regulator would leak enough gas to fill a cubic centimeter in just 17 minutes. Helium is used as the test gas because it is chemically inert, it is easy to detect, and it is an extremely small molecule able to pass through the smallest leak. The lower the helium leak specification, the better the regulator will be at preventing leaks into the atmosphere and at minimizing contamination from gases outside the body.

### **Materials of Construction**

The materials of construction for a regulator should be based on the properties and purity of the gas. ALTAIR provides regulators from brass, aluminum, SS 304, SS 304L, SS316, SS 316L, Carbon Steel Hastelloy and Monel. Brass is compatible with most of the non-reactive gases. A choice of forged body or barstock construction is available. Forged body regulators are economical; however, their internal surface finishes are relatively rough as compared to barstock body regulators. Barstock body regulators have all wetted surfaces machined to a smooth finish which reduces the possibility of contamination. The 316L stainless steel material is highly corrosion resistant and is suitable for use with many of the highly corrosive gases in their anhydrous form. Aluminum is an economical lightweight alternative to stainless steel for many of the mildly corrosive gases. Hastelloy and Monel gas special metals and are used to highly corrosive gases. Please refer to the Materials Compatibility Chart on our website [www.altair-gec.com](http://www.altair-gec.com) or consult your ALTAIR Representative to determine suitable materials of construction.

### **Cylinder Connections**

In INDIA the Chief Controller Of Explosive (CCOE) and Bureau Of India Standards (BIS) has designated specific cylinder connections for each gas service and pressure rating. Refer to IS:3224 standard for more information.

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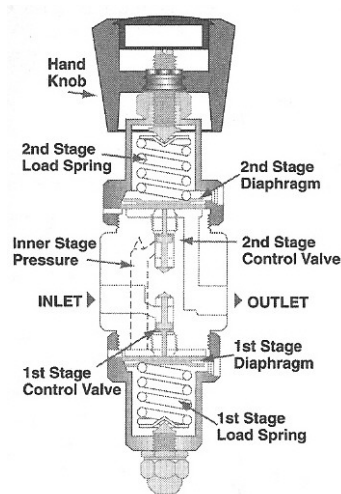
In the United States, the Compressed Gas Association (CGA) has designated specific cylinder connections for each gas service and pressure rating. Refer to CGA publication V-1 for more information. Please note that a CGA connection limits the temperature range of a regulator to the guidelines of the connection.

## Diaphragms

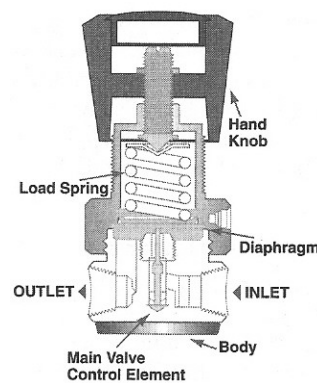
The diaphragm is a sensing element crucial to the function of the regulator and the purity of gas delivery. Stainless steel diaphragms are corrosion resistant and have low leakage rate characteristics. Neoprene diaphragms may offer more sensitive pressure control, but do not offer the gas purity of stainless steel. Coating a neoprene diaphragm with Teflon® enhances gas purity greatly.

## Special Applications

While a single or dual stage regulator of the appropriate material will suffice for most gas service, some applications require specially designed regulators. For example in the HPR-306/360/540/369/396/378/720 Series, regulators are specifically designed for use with highly corrosive gases and the HPR-630/720 Series regulators can safely deliver gas at extremely high pressures. If you are unsure about your requirements, please contact ALTAIR for assistance.



Two Stage Regulator



Single Stage Regulator

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