

Guide to Regulator Use and Care

Gas Cylinder Regulators

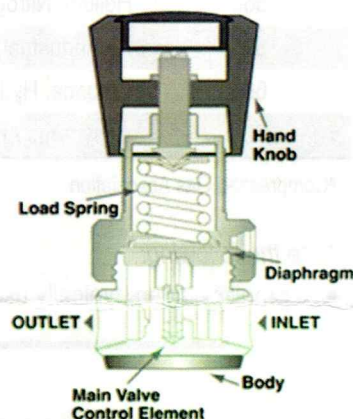
While there are different types of gas cylinder regulators, they all work on the same principle. The simplest type is the single stage regulator, which reduces the pressure from the gas cylinder to the level required by the application in a single step. The basic components of a regulator consist of a spring, a diaphragm (a thin, flexible rubber or metal disc), and a valve. Below is an explanation and illustration of the function of an *adjustable* pressure regulator.

How an adjustable pressure regulator works

When you attach the regulator to a cylinder and open the cylinder valve, gas enters the regulator through the inlet and fills the valve chamber. When you turn the knob to increase gas flow, it presses on the spring. This forces the diaphragm downwards, which pushes the valve stem open.

Opening the regulator valve lets gas flow into the low pressure chamber, which pushes upwards against the diaphragm, creating an opposing force to the downward pressure of the spring. The diaphragm stabilizes when these opposing forces equalize. This equalization allows the gas to flow at a smooth rate. As the supply of gas in the cylinder is used up, the pressure drops there and in the valve chamber. As this pressure drops, the diaphragm moves down, pushed by the spring, letting more gas into the low pressure chamber.

Outlet pressure begins to rise and little gas remains in the inlet. When you turn the cylinder valve off, or the cylinder runs out of gas, the inlet shuts off and the pressure gauge returns to zero as the gas leaves the regulator.



Industrial Scientific regulator types

Industrial Scientific typically recommends two regulators types: pressure and demand flow. Pressure regulators are set to deliver gas at flow rates that accurately simulate the diffusion atmosphere in a calibration cup. Demand flow regulators allow the pump unit in an aspirated gas detection instrument to regulate the flow while drawing gas from the cylinder. This method is just as accurate as vented pressure flow, without excessive waste gas release. These regulators are the single stage type without the flow adjustment knob, since they supply gas at preset rates.

Industrial Scientific pressure regulators can supply gas at the following preset rates: 0.5 LPM (Liter per minute) and 1 LPM, as applicable. Flow rates below these rates would not provide enough gas for accurate instrument calibration. Excess flow, above these rates, would build up pressure above the normal atmospheric range, changing the diffusion rate of the sensors and causing inaccuracy. Industrial Scientific demand flow regulators can supply gas at up to 3 LPM without measurable flow restriction, enabling single or multiple simultaneous connections for aspirated units (instruments or docking stations).

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Regulator Use and Care

Selecting a regulator

Select a regulator with the correct CGA fitting for the gas cylinder you are using (see Table 1, below).

Table 1 CGA fitting numbers for cylinders by gas

CGA ^a Fitting	Gases
320	Carbon Dioxide
326	Nitrous Oxide
330	Hydrogen Chloride, Hydrogen Sulfide, Methyl Mercaptan, Silicon Tetrafluoride
350	Carbon Monoxide, Ethane, Ethylene, Hydrogen, Methane, Phosphine, Silane
510	Acetylene, Butane, Dimethyl Ether, Ethyl Acetylene, Ethylene Oxide, Iso-Butylene, Propane, Propylene
540	Oxygen
580	Helium, Nitrogen
590	Air (Industrial)
660	Chlorine, Hydrogen Fluoride, Nitric Oxide, Nitrogen Dioxide, Phosgene, Sulfur Dioxide
705	Anhydrous Ammonia

^aCompressed Gas Association

Note the following:

- Small cylinders typically use a CGA C-10 or CGA 600 (5-116L cylinders) fitting.

Figure 1 Small cylinder fitting types



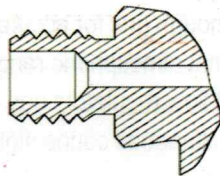
CGA C-10



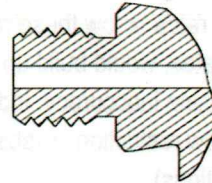
CGA-600

- On larger cylinders (550-4000L cylinders) internal tapers or a flat face is used as a sealing surface.

Figure 2 Internal angle (taper) versus flat face internal seals



Internal Angle Seating face



Flat Face / End – No internal face