



APPLICATION NOTE

Back Pressure Regulator Relief Valve (BPRV)

A back pressure regulator is a control valve which maintains a set pressure on the upstream side of the valve. If the pressure increases, the regulator opens to allow additional flow through the device. As the pressure decreases the regulator closes to restrict flow. This automatic adjustment of flow stabilizes the upstream pressure.

During fluid sampling the objective is to maintain as constant a pressure and flow rate to the on line analyzers as possible. Even small upsets in flow or pressure can cause fluctuations in analyzer readings. To maintain conditions as constant as possible, Sentry recommends that the discharge of the back pressure regulator be used for the grab sample. This ensures that no minor upsets occur due to opening or closing of separate grab sample valves. The economic benefit of this practice is the elimination of separate tubing and grab sample valves.

The regulator made by Sentry is designed specifically for sampling. It is intended to be operated in series with a VREL or needle valve, which is used as the primary flow control device. Sentry's standard model is provided with a fixed set point of 20 psig (1.4 barg). This is low enough for almost all analytical analyzers but sufficiently high to maintain desired flow through restrictive flow passages. Contact factory for other available set points.

The fixed pressure design is considered superior because it:

- 1) Forces the operator to adjust flow with the primary flow control valve.
- 2) Maintains the finest pressure control for on-line analyzers.
- 3) Prevents closure of the device to allow use of the full relieving capacity. The flow passages, diaphragm and spring have been matched to provide extremely sensitive operation throughout the normal sampling range. Other springs are available to provide higher or lower pressure settings.

Safety considerations dictate that the pressure of the system not exceed the design limits of any components. Normally this would require the addition of a relief valve to the system. A back pressure regulating valve operates in the same manner as a relief valve. Specifically, a spring pushes against a device, which in turn holds a valve closed. An increase in pressure above a set point compresses the spring allowing fluid to flow through the device. Considerations include the flow capacity versus pressure and the consequences of a diaphragm rupture. The Sentry regulator has enlarged flow orifices



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which provide flow capacity equal to a comparable ¼" tube relief valve. Bleed holes have been provided which can handle a comparable flow should the diaphragm rupture.

Sentry uses a Viton® diaphragm, which has been pressure tested to 650 psi (44.8 barg) without failure. This far exceeds the pressure rating of the components in the sample line (flow meters, analyzers, gauges, etc.).

This required relief valve capacity is a function of the system pressure and temperature and the sample supply line size and length. Each system should be evaluated for these parameters. If in doubt, consult Sentry Equipment for recommendations.

⚠WARNING

It is solely the responsibility of the end-user, through its own analysis and testing, to select products and materials suitable for their specific application requirements, ensure they are properly installed, safely applied, properly maintained, and limit their use to their intended purpose. Improper selection, installation, or use may result in personal injury or property damage.



SENTRY EQUIPMENT CORP

966 Blue Ribbon Circle N
Oconomowoc, WI 53066 USA
Phone: 262-567-7256
Fax: 262-567-4523

E-mail:
sales@sentry-equip.com

Website:
www.sentry-equip.com



For further information, contact: