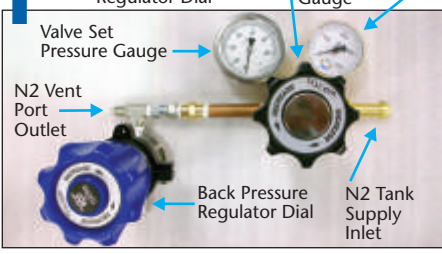
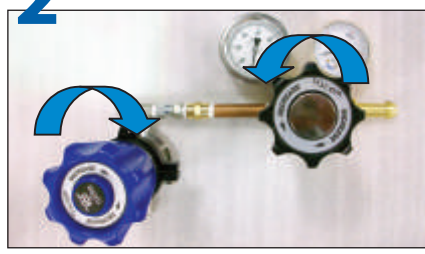
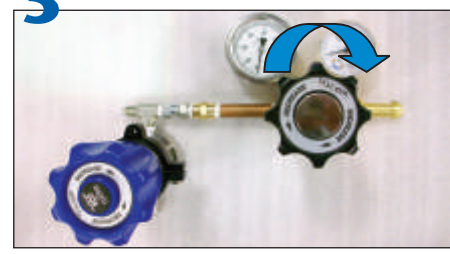

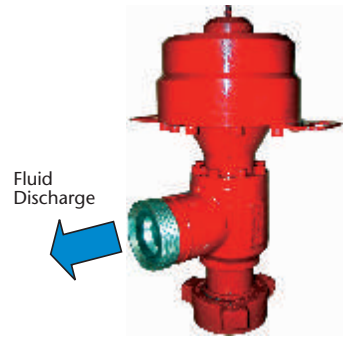



Weir SPM Back Pressure Emergency Relief Valve Setting Guide



Weir SPM's Emergency Back Pressure Relief Valve provides overpressure protection for reciprocating pumps, treating lines, pressure vessels, and other equipment operating under high pressure, high flow conditions. Compact and simple to operate, the valve is direct acting, relying on the system's hydraulic pressure to overcome a preset nitrogen gas force to relieve. This valve is primarily utilized in well service and stimulation operations. **This valve is an "emergency" relief valve and should NOT to be used as a system pressure regulator and should not be sequenced prior to each stage.** The valve should be set at minimum of 500 PSI above system pressure and preferably 1000 PSI. If the valve is sequenced prior to each stage, than valve life decreases due to frequent exposure to abrasive fluids. The more the valve is exposed to abrasives, the greater likelihood that the valve will not reseat and possible washing may occur. The following information is to be used as a best practices guide, based on extensive field utilization, to assist the user in more convenient and accurate operation of the relief valve system.

<p>1</p>  <p>Connect the N2 tank supply inlet of the regulator assembly to the outlet valve of the nitrogen tank. Tighten the nut with a wrench to ensure no leaks exist.</p> <p>The regulator assembly will allow the user to control the nitrogen pressure in the Emergency Relief Valve (ERV).</p>	<p>2</p>  <p>To calibrate the system, make sure the valve set regulator dial (black dial) is closed by turning counter-clockwise fully. Fully Increase the back pressure regulator (blue dial) by turning clockwise.</p> <p>Open the outlet valve on the nitrogen tank. The N2 tank pressure gauge should indicate the pressure in the nitrogen bottle. Weir SPM recommends a minimum pressure of 2,000 psi from the tank.</p>	<p>3</p>  <p>Increase the valve set regulator (black dial) until the regulator gauge reads near the figure suggested in the provided table. Note: The nitrogen pressure in the valve differs depending on variables in the field and in particular valve assemblies. Use the provided pressure table as an approximate value to begin fine tuning the system. Weir SPM recommends setting the pressure to 40 psi above chart's figures. The user will then back down the pressure to fine tune its setting in later steps.</p>
<p>4</p>  <p>Perform a category pressure test of the pumping system to achieve system working pressure, and hold at that pressure.</p> <p>Note: The system pressure is the level of pressure under which all components will see while physically pumping.</p> <p>Note: The working pressure is the highest level of pressure the system should be allowed to see before the ERV releases.</p>	<p>5</p>  <p>Slowly decrease the valve set pressure regulator (black dial) at intervals of 5 until the ERV pops-off. The pop-off will be indicated visually by a physical discharge of fluid from the valve discharge outlet, and by a drop in pressure of the system which can be seen in the data van. The pressure of the valve is now set properly.</p>	<p>6</p>  <p>To set the backpressure, slowly decrease the back pressure regulator (blue dial) until the nitrogen begins to vent from the exit port on the back pressure regulator. On most frac sites, the noise during setup will make the venting from the exit port difficult to be heard. Weir SPM recommends attaching a 1/4"-18 NPT fitting to the exit port and placing the end of the tubing into water, as shown. Visually look for bubbles in the water to indicate any venting. Slowly increase the back pressure regulator until the venting stops (until the bubbles stop).</p>

Safety Notes:

Only those familiar with the operation of this valve should maintain and calibrate the product. Further information can be obtained in the Back Pressure Relief Valve Operations & Maintenance Instructions Manual. Failure to read, understand and follow the Operating & Maintenance Instructions Manual could result in severe personal injury or death.

Operation & Maintenance Notes:

After unanticipated sequencing of valve, the Emergency Relief Valve must undergo a teardown and general inspection. This should be done immediately following the completion of the current job. Pay particular attention to all mating metal seal surfaces.

Weir SPM recommends that the valve be given a detailed inspection every six months. This inspection process is documented in the Operations and Maintenance Instructions Manual. General maintenance may prevent internal loss of nitrogen due to worn seals.