Inside CLA-VAL
Automatic Control Valves

- Basic Main Valve
- Non-Modulating Controls
- Modulating Controls
- Automatic Controls
- Anti-Cavitation Operation

Main Valve with Standard Trim

Main Valve with KO Anti-Cavitation Trim
**BASIC MAIN VALVE**

Most CLA-VAL valves consist of a main valve and pilot control system. The basic main valve is called a Hytrol Valve.

**NON-MODULATING CONTROLS**

A simple control which either opens the valve wide or closes it tightly is a three-way valve. The type of operation this control gives is called “non-modulating” because the valve cannot pause in a partially open position.

Once the control is turned to either position, operating fluid flow into or out of the cover chamber until the valve is open or closed. For example...

Ordinary three-way valves usually are not satisfactory because they require so much force to operate. An easy-turning control which can be operated in a variety of ways is usually used. Several examples of controls and their operation are shown at right.

To open...
Control is turned to exhaust cover chamber pressure.

To close...
Control is turned to apply pressure to cover chamber.
MODULATING CONTROLS

The Cla-Val Automatic Control Valve modulates if the cover pressure is held between the inlet and outlet pressure. To achieve modulating operation, a slightly different type of control system is utilized.

Valve Open
When the throttling control opens to a point where more pressure is relieved from the cover chamber than the restriction can supply, cover pressure is reduced and the valve opens.

Valve Closed
When the modulating control closes sufficiently to direct a great enough pressure into the cover chamber to overcome opening forces of line pressure, the main valve closes.

Valve Throttling
The main valve modulates to any degree of opening in response to changes in the throttling control. At an equilibrium point, the main valve opening and closing forces hold the valve in balance. This balance holds the valve partially open, but immediately responds and readjusts its position to compensate for any change in the controlled condition.

AUTOMATIC CONTROLS

The following examples illustrate several different types of operation utilizing automatic controls.

Pressure Reduction
Outlet pressure on control diaphragm causes the main valve to hold a steady outlet pressure.

Liquid Level Controller
Slight changes in flow through the float control causes main valve to counteract changes in reservoir level so liquid level is held constant.

Pressure Relief
Inlet pressure on control diaphragm causes the main valve to hold a steady inlet pressure.

Rate of Flow Controller
Limits the maximum flow rate by changes to the main valve counteract any slight changes in differential pressure across an orifice plate located in the main line.
**Q** What purpose does the internal spring in the Hytrol valve serve?

**A** To provide enough force to close the valve when no difference exists between inlet, cover and outlet pressures. When the inlet pressure is greater than outlet pressure (even by a small amount) the hydraulic forces, NOT THE SPRING hold the valve tightly closed.

**Q** Can pressure other than line pressure be used to operate CLA-VAL Valves?

**A** Yes. Frequently, when line fluid is too dirty or otherwise unsuitable, a separate source of pressure is desired. Clean water, air (with some limitations), or oil are suitable. The important point is to make sure the operating pressure is equal or greater than inlet pressure AT ALL TIMES.

**Q** What should be done if line pressure is very low? (Below 10 psi)

**A** Usually a separate source of operating pressure is required. A spring to open the valve may be necessary. Consult the factory for recommendations.

**Q** Can the opening and closing speed of a CLA-VAL Valve be controlled?

**A** Yes. It is a matter of controlling the rate at which operating fluid flows into or out of the cover chamber.

Here is a typical valve equipped with both opening and closing speed controls. A simple needle valve can be used for these controls.