



Cemline® Pilot Operated Valves Quick Explanation

OVERVIEW

Cemline Corporation may use a pilot operated control valve on either a water heating or an unfired steam generation application. A pilot operated valve consists of two main assemblies. The pilot valve which regulates the flow of the source steam to operate the actuator of the main valve and the main valve when actuated allows the source steam to pass through to the heat exchanger.

Water heating applications use a temperature pilot. The temperature pilot uses a sensing bulb filled with a fluid which expands when heated to build pressure. Unfired Steam generators use a pressure pilot. A pressure pilot uses a sensing line or capillary to transfer the pressure from within the vessel to the pilot.

The pilots used by Cemline are reverse acting, meaning that the higher the temperature or pressure within the vessel the lower the amount of steam that is allowed to pass through the pilot to actuate the main valve. When less steam passes through the pilot to the diaphragm of the main valve the less the main valve opens passing less steam through to the heat exchanger. Alternatively, when more steam passes through the pilot to the diaphragm of the main valve the more the main valve opens passing more steam through to the heat exchanger.

ADJUSTING SETPOINT

Both of the temperature and the pressure pilots use pressure to close the pilot valve and spring tension to open the pilot valve. The spring tension is used to set the desired set point.

When using a temperature pilot as more tension is applied to the spring the higher the heated water temperature needs to be to cause the fluid in the sensing bulb to expand and build enough pressure to overcome the tension of the spring and close the pilot. Therefore, the more tension applied to the spring the higher the temperature set point.

When using a pressure pilot as more tension is applied to the spring the higher the generated steam pressure required to overcome the tension of the spring and close the pilot. Therefore, the more tension applied to the spring the higher the generated pressure set point.

REDUCED PORT FUNCTION

With either pilot type when closed any steam within the actuator of the main valve is forced out of the actuator by springs on the reverse side of the diaphragm. The steam deadheads at the pilot and is exhausted through a reduced port tee downstream from the main valve. If the steam were not allowed to be exhausted downstream through the reduced port tee the valve would remain open until the steam within the actuator condensed. Condensate would then form under the diaphragm of the main valve actuator and prevent the valve from fully closing and stopping the flow of steam through the main valve into the heat exchanger.



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SAFETY SOLENOID

A 3/8" normally closed 24 VAC solenoid valve is placed in the copper tubing between the pilot outlet and the reduced port tee as a safety. The solenoid valve is powered with 24 VAC from the controller. The controller will be a *CEM-TROL®II* for a water heater or a *STEAM-TROL®* for an unfired steam generator. If the controller loses power or experiences an alarm condition the 24 VAC will be removed and the solenoid valve will fail closed. When the solenoid valve is closed no steam may pass through the pilot to the main valve. This prevents the main valve from opening while in an alarm condition or while the unit is unmonitored by the controller.

The 3/8" solenoid valve is placed between the pilot and the reduced port tee so that when the solenoid valve closes, the steam within the actuator of the main valve can be exhausted downstream through the reduced port tee. This allows the main valve to close.

PILOT MANUFACTURES

Cemline typically uses two manufacturers of pilot operated valves.

Armstrong International pilot operated valves have an adjustment screw on the pilot with a jam nut to apply tension to the spring. Turning the adjustment screw clockwise applies more tension to the spring, raising the setpoint. When the desired setpoint has been achieved the jam nut is used to lock the adjustment screw in place.

Spence Engineering pilot operated valves use a handwheel located beneath the spring to apply tension to the spring. Turning the handwheel counter clockwise will move the handwheel up a threaded shaft which applies more tension to the spring, raising the set point. When the desired setpoint has been achieved the pilot closes.

Armstrong International and *Spence Engineering* are trademarks of their respective Companies. For further information on these pilot valves please refer to their Installation, Operation, and Maintenance Manuals.

For more information on the *CEM-TROL®II* or the *STEAM-TROL®* controllers please refer to their Installation, Operation, and Maintenance Manuals.