Apollo pressure reducing valve

installation, operating, and maintenance instructions

model A127

GENERAL DESCRIPTION

The OCV Model A127 Pressure-Reducing Valve is designed to perform the following function:

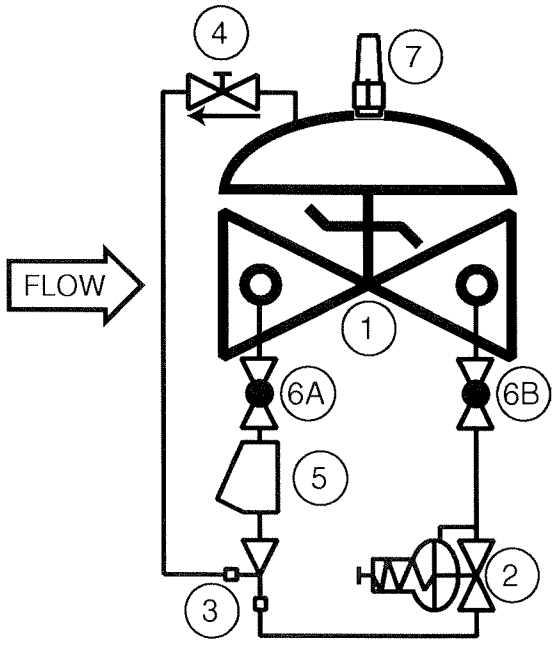
1. Reduce a higher upstream pressure into a lower, **constant** downstream pressure.

The AP127 consists of the following components:

1. **Model 65 Basic Control Valve**, a hydraulically-operated, diaphragm-actuated globe or angle valve which closes with an elastomer-on-metal seal.
2. **Model 36C Pressure-Reducing Pilot**, a two-way, normally-open pilot valve which senses downstream pressure under its diaphragm and balances it against an adjustable spring load. An increase in downstream pressure tends to make the pilot close.
3. **Model 126 Ejector**, a simple "tee" fitting with a fixed orifice in its upstream port. It provides the proper pressure to the diaphragm chamber of the main valve, depending on the position of the pressure-reducing pilot.
4. **Model 141-3 Flow Control Valve**, a needle-type valve which provides adjustable, restricted flow in one direction and free flow in the opposite direction. On the A127, the flow control valve is connected as an opening speed control.
5. **Model 159 Y-Strainer** (standard on water service valves) or **Model 123 Inline Strainer** (standard on fuel service valves). The strainer protects the pilot system from solid contaminants in the line fluid.
6. **Two Model 141-4 Ball Valves** (standard on water service valves, optional on fuel service valves), useful for isolating the pilot system for maintenance or troubleshooting.

At user option, the A127 may also be equipped with the following:

1. Model 155 Visual Indicator.
2. Model 150 Limit Switch Assembly (includes visual indicator).
3. Model 141-3 Closing Speed Control.



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THEORY OF OPERATION (Refer to schematic diagram)

To understand how the A127 operates, it is best to start with the EJECTOR. Due to the orifice in its upstream port, the ejector creates a pressure drop proportional to the flow through it. The flow through the ejector is in turn controlled by the degree of opening of the PRESSURE REDUCING PILOT. The wider the pilot opens, the greater the flow through the ejector and the lower the pressure downstream of the orifice. Conversely, the more the pilot closes, the lower the flow through the ejector and the greater the pressure downstream of the orifice.

Now note that the diaphragm chamber of the MAIN VALVE is connected to the branch port of the ejector and is thus downstream of the orifice. In this manner, the pressure in the diaphragm chamber of the main valve is in fact controlled by the pressure-reducing pilot. As the diaphragm pressure decreases, the main valve opens; as the diaphragm pressure increases, the main valve closes.

Putting it all together, as downstream pressure tends to increase above the set point of the pressure-reducing pilot, the pilot moves further closed. This results in an increase in pressure in the diaphragm chamber of the main valve. The main valve then closes slightly to restore the downstream pressure to the set point. Conversely, as downstream pressure tends to decrease below the set point, the pilot moves further open. This results in a decrease in pressure in the diaphragm chamber of the main valve. The main valve then opens wider to bring the downstream pressure back up to the set point. The net result of all this is a constant modulating action by the pilot and main valve and a downstream pressure which remains constant despite fluctuations in demand or inlet pressure.

INSTALLATION

The A127 is furnished fully factory-assembled and ready for installation at the appropriate point in the system. The user is referred to the Basic Valve section of this manual for full installation details.

STARTUP AND ADJUSTMENT

The following procedures should be followed in the order presented in order to effect an initial startup of the A127:

1. Install a pressure gauge of the proper range downstream of the A127. The unused downstream side port on the main valve body may be used for this purpose if there is no convenient location in the downstream piping.
2. Remove the plastic cap from the pressure-reducing pilot, and loosen the adjusting screw jam nut. Turn the adjusting screw **counterclockwise** until it is loose enough to be turned by hand.
3. Turn the adjusting screw of the flow control valve fully **clockwise**, then back it off **three full turns**.
4. Start the pump, or otherwise start the system flowing. The main valve will at this time be either fully closed or open only a very small amount.
5. Carefully loosen one of the pipe plugs in the main valve bonnet until fluid appears around the threads. When only clear fluid (no air) is discharging, re-tighten the plug.
6. Check downstream pressure. It should be lower than desired at this point. If it is already too high, there is too much restriction downstream. Open further valves or otherwise increase demand until the pressure falls below the desired set point.
7. Slowly turn the adjusting screw of the pressure reducing pilot **clockwise** until downstream pressure rises to the desired set point. Tighten the adjusting screw jam nut, and replace the plastic cap.
8. If there are small-scale oscillations in the downstream pressure, slowly turn the adjusting screw of the flow control valve **clockwise** until the oscillations disappear. CAUTION: Never close this valve fully. To do so will prevent the main valve from opening.
9. If pressure readjustment should ever be required, the pressure-reducing pilot is adjusted **clockwise** to **increase** pressure; **counterclockwise** to **decrease** pressure.

MAINTENANCE

Due to the simplicity of design of the A127, required maintenance is minimal. However, the following checks, periodically performed, will do much to keep the valve

operating properly and efficiently.

1. Check for chipped or peeling paint.
2. Check for leaks at fittings and around flanges and connections. Tighten as required.
3. If the valve is equipped with a Y-strainer, check the screen for buildup of solid material. Clean as required. This point is most important, as a clogged strainer can keep the valve from operating properly. On new installations, it is recommended that the strainer be checked every day or two until experience dictates a greater or lesser interval.

TROUBLESHOOTING

In the event of malfunction of the A127, the following guide should enable the technician to isolate the specific cause of the problem.

A. MAIN VALVE FAILS TO OPEN:

1. Valve closed downstream of A127. Open as required.
2. Downstream pilot system ball valve closed. Open as required.
3. Flow control valve fully closed. See Adjustment instructions.
4. Pressure-reducing pilot adjusted too far counterclockwise. See Adjustment instructions.
5. Stem of pressure-reducing pilot binding. See 36C section of this manual.
6. Stem of main valve binding. See Basic Valve section of this manual.

B. MAIN VALVE FAILS TO CLOSE:

1. Upstream pilot system ball valve closed. Open as required.
2. Strainer clogged. Clean as required.
3. Pressure-reducing pilot adjusted too far clockwise. See Adjustment instructions.
4. Diaphragm of pressure-reducing pilot ruptured. This will be evidenced by a discharge of fluid from the vent port in the pilot bonnet. Disassemble pilot and replace diaphragm.
5. Close downstream pilot system ball valve.
   a. If main valve closes, proceed to Step 6.
   b. If main valve remains open, proceed to Step 7.
6. Pressure-reducing pilot stem binding or seat badly deteriorated. Disassemble pilot and determine cause. See 36C section of this manual.
7. Close both pilot system ball valves, and loosen a pipe plug in the main valve bonnet. A **continuous** discharge of fluid from the loosened plug indicates that the main valve diaphragm is ruptured. See Basic Valve section of this manual. SEE NOTE BELOW.
8. Main valve stem binding or object in valve. Disassemble valve and determine cause. See Basic Valve section of this manual.

NOTE: Certain valves, predominantly those in fuel service, are assembled "fail closed." In this case, a ruptured diaphragm would keep the valve from opening, rather than keep it from closing. To determine which type you have, examine the bridge mark cast into the side of the main valve body. If the bridge mark slants downward on the upstream end, the valve is "fail closed." If the bridge mark slants upward on the upstream end, the valve is "fail open."

C. MAIN VALVE OPEN AND CLOSES, BUT DOES NOT CONTROL PRESSURE:

1. If pressure remains too high despite adjustment of the pressure-reducing pilot, refer to MAIN VALVE FAILS TO CLOSE, above.
2. If pressure remains too low despite adjustment of the pressure-reducing pilot, refer to MAIN VALVE FAILS TO OPEN, above.
3. If pressure oscillates, you may likely be in a period of very low demand. Frequently this problem will disappear as demand increases. In the meantime, further closing of the flow control valve may help damp out the oscillations. In an extreme case, try adjusting the pressure slightly higher.