Steam Pilot Operated
PRESSURE REDUCING VALVES
Class GPKP-1 Regulators

INSTALLATION, OPERATION, AND MAINTENANCE

SECTION I — INSTALLATION

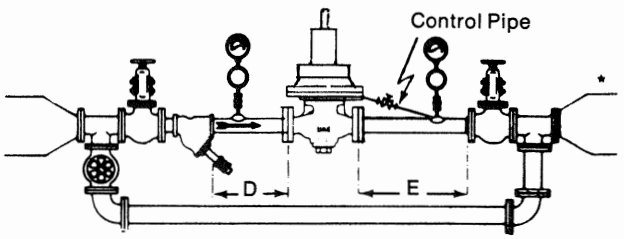


Fig. 1 — For controlled pressures above 25% of Inlet pressure (Compressible Fluid).

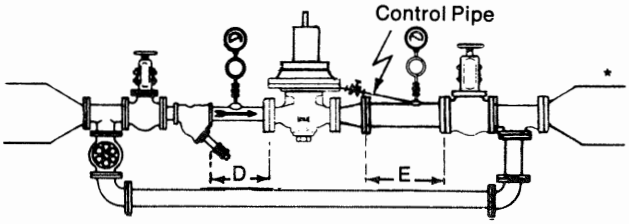
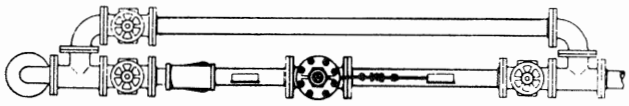


Fig. 2 — For controlled pressures of 25% or less of inlet pressure (Compressible Fluid).



Top view of Pressure Reducing Station showing Bypass arrangement.

*Expand line after stop valve to cross sectional area as required for steam flow.

Figures 1 & 2 Recommended Valve Installation

PIPING DETAILS

Recommended Straight Run Piping Dimensions inlet and outlet — All Types and Pressures

VALVE SIZE	DIMENSIONS	
	D	E
1/2" to 1-1/2"	1'6" to 5'	4' to 5'
2" to 4"	3' to 5'	4' to 8'

VALVE POSITION

Install valve upright in the highest horizontal line of piping, in an accessible location and with the arrow on the side of the body in the direction of fluid flow.

PROBLEM PREVENTING PROCEDURES

1. Provide space above, below and around the valve for removal of parts during maintenance.
2. Blow or flush out the pipe lines thoroughly before installing the valve.
3. Do not use red lead or cement in making up joints. In threaded valves use pipe compound sparingly on male threads only.
4. STRAINER — Protect the valve and following equipment with a Self-Cleaning Strainer and blow down valve.
5. Install stop valves and gages in inlet and outlet lines to provide a means for checking adjustment and operation of the equipment.
6. In steam service, insulate all piping before and after the valve to minimize condensation. Provide proper inlet drainage to prevent water hammer or erosion in the equipment.
7. Adhere to good piping practice. Install a bypass around the valve.

CONTROL PIPE — ALL PRESSURES

Connect 3/8" control pipe (having I.D. equivalent to 40 schedule pipe) with stop valve, union and pressure gage (as shown in Figures 1 and 2) from threaded connection in main body of valve to section of outlet piping before outlet stop valve. Slope control pipe downward to outlet piping to prevent water pockets. Connect control pipe to side of outlet pipe if necessary to obtain proper slope.

IMPORTANT — Make control pipe connection in expanded outlet piping at a point at least 24" downstream from the end of the expander and not

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SECTION I — INSTALLATION (CONT.)

within 18" to 24" of the outlet stop valve, any elbow or other flow direction changing fitting. Control pipe length should be held to approximately 3'.

Recommended outlet piping for valves controlling compressible fluids at values of 25% or less of inlet pressure.

Expand outlet pipe (E dimension) to twice the valve size. Use tapered expander — 15°/20° on included angle.

NOTE: Further expansion of low pressure outlet piping beyond the outlet stop valve has no effect on operation of the valve.

SECTION II — OPERATION

OVERALL VALVE DIMENSIONS

For overall valve dimensions — face-to-face, height, etc. — consult the drawing which applies to the valve in use.

PRINCIPLE OF OPERATION

Pilot supply steam enters the pilot valve chamber and is modulated to provide a loading force on the main actuating diaphragm. The lower sensing diaphragm compares the loading pressure and downstream reduced pressures. The upper sensing diaphragm measures the downstream reduced pressure and compares it with the adjusting spring setting.

As flow demand is increased a slight drop in reduced pressure occurs. The downward force from the adjusting spring deflects the pilot assembly downward thus opening the pilot valve further and increases loading pressure on the main actuating diaphragm. The increased loading pressure acts on the lower sensing diaphragm in a direction opposite to the adjusting spring force. The fixed ratio of the two sensing diaphragm areas provides the precise positioning of the pilot valve and hence correct loading pressure to match system flow demand.

As flow demand decreases, the reduced pressure rises slightly. This increase causes the upward motion of the pilot assembly which closes the pilot valve. Further decreases in flow demand will result in the opening of the "bleed" port. This allows pressure on the main actuating diaphragm to exhaust to the downstream side of the valve permitting the main valve to close.

OPERATION OF GPKP-1 REDUCING VALVES

STARTING UP:

1. Open inlet stop valve.
2. Close outlet stop valve.
3. Dispose of condensation, dirt, etc., by opening the strainer blow-off valve.
4. Crack outlet stop valve to permit slight flow when adjusting the regulating valve.
5. Slowly turn adjusting screw clockwise with a wrench until proper pilot valve setting and downstream controlled pressure is obtained.
6. Slowly open outlet stop valve.
7. To increase controlled pressure, turn adjusting screw clockwise, to decrease loading pressure turn adjusting screw counterclockwise.

SHUTTING DOWN:

To turn steam off, turn adjusting screw counterclockwise so that pilot shuts. Close inlet and outlet stop valves.

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SECTION III — MAINTENANCE

Leslie control valves may be dismantled without removal from pipeline when maintenance checks are desired.

Play Safe! Use Only Genuine Leslie Replacement Parts

All Leslie controls are made of the finest material obtainable, are time-tested and backed by more than a half century of knowhow. Machining is done by expert craftsman and each valve is inspected and service-tested before shipment to you.

Use of other than GENUINE LESLIE PARTS may impair their ability to serve you. DO NOT change any dimensions except as noted in these instructions. To assure long life, preservation of parts interchangeability and low maintenance costs, use only standard LESLIE parts.

DISMANTLING
(See Figure 3 for parts.)

1. Release all compression on adjusting spring by turning adjusting screw counterclockwise. Allow downstream steam pressure to dissipate.

2. Close Stop valve on inlet and outlet sides of the steam pilot regulating valve and crack open the strainer blow-down valve to vent trapped fluid and steam. After all pressure is relieved open blowdown valve completely.

CAUTION: Be especially careful during this procedure to avoid being scalded by steam or hot water condensate.

3. Loosen and unscrew bottom cap (28), 1/2" to 2" size, with an appropriate wrench. For the 2-1/2" to 4" size the bottom cap complete is flanged and nuts (40) and bolts (41) must be loosened and removed. The gasket (27), bushing (26), 1/2" to 2" sizes only, the valve plug spring (25) and the valve plug (22) are removed with the bottom cap.

4. Do not remove seat ring (24) unless remachining or replacement is necessary. If removal is required, see section titled REPLACING SEAT RINGS.

5. Disconnect tubing and remove adjusting spring case assembly, consisting of spring case (8), adjusting screw (1), lock nut (2), spring case cover (3), range washer (42) and cover plate (12) by removing bolts (6) holding the spring case assembly to the diaphragm cover (16).

6. Remove upper spring seat (4) and adjusting spring (5).

7. Remove subassembly consisting of upper diaphragm complete (7), diaphragm spacer (9), male elbow (23), lower diaphragm (10) and nozzle (29).

8. Remove retaining ring (11) pilot valve guide (30) and pilot valve stem.

9. Using a long 3/4" socket and socket wrench, unscrew the pilot valve seat (31). Remove the pilot ball seat (13) and pilot valve spring (34).

10. To examine diaphragm set (36), the diaphragm cover must be removed. This is accomplished as follows. Remove formed tubing assemblies (32) and (20) from diaphragm cover (16), male elbow (23) and elbow (33) using appropriate open end wrenches. Then remove elbow (33). Unscrew nuts (18) and remove bolts (15). Remove diaphragm cover (16), diaphragm set (36), consisting of two leaves. Bottom leaf has a bleed hole in it. Then remove the diaphragm disc (17).

11. Disassemble subassembly removed in step 7 by holding the stem in the upper diaphragm complete (7) with an open end wrench and removing the nozzle (29) with a 1/2 inch hex socket and socket wrench. Remove lower diaphragm (10) and diaphragm spacer (9).

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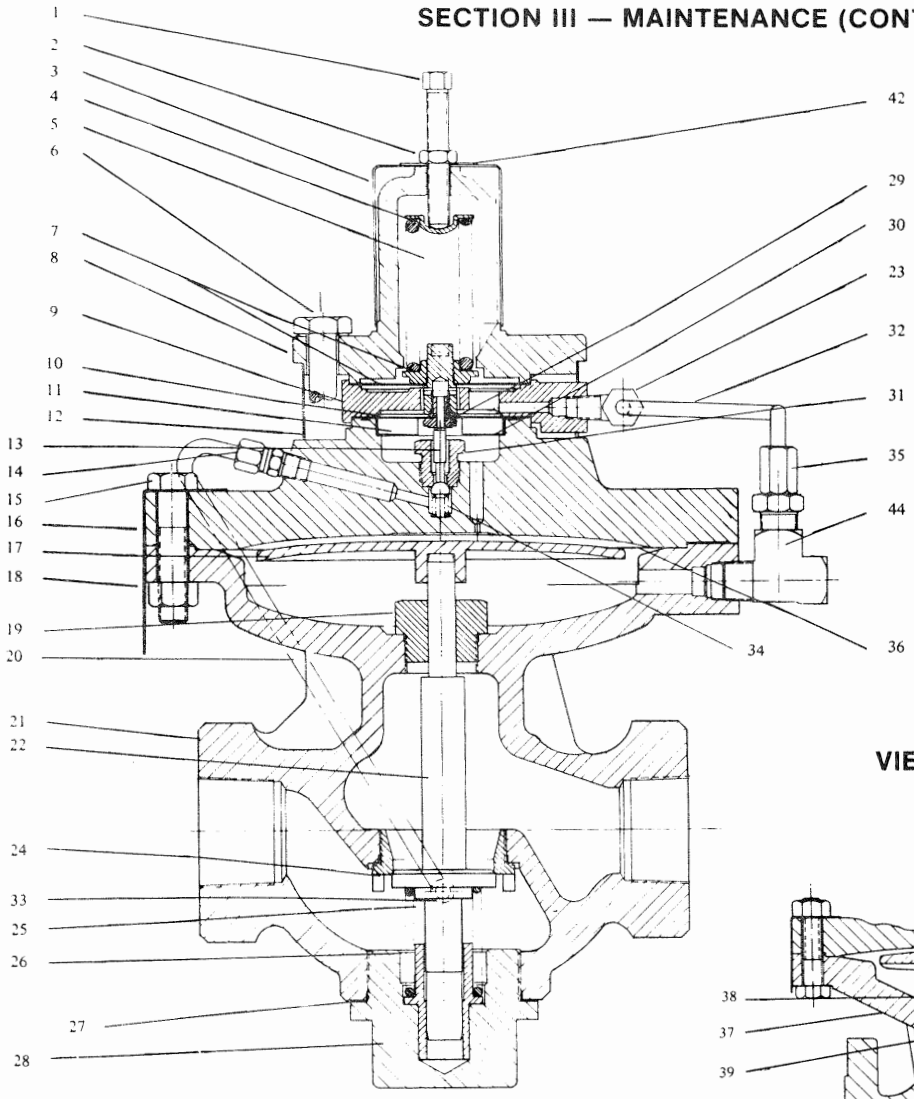

GPKP-1 REDUCING VALVE
VIEW SHOWING 1/2" TO 2" SIZE
WITH THREADED ENDS

GPKP-1 REDUCING VALVE
VIEW SHOWING 2-1/2" TO 4" SIZES
WITH FLANGED BODY
ALL OTHER PARTS SAME
AS 1/2" TO 2" SIZE VIEW

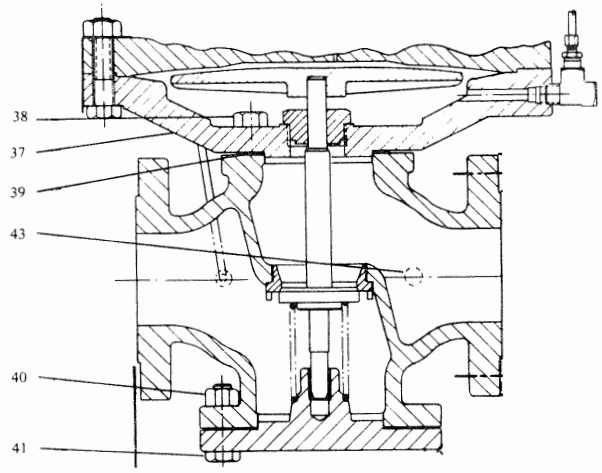

FIGURE 3

Steam Pilot Operated PRESSURE REDUCING VALVES Class GPKP-1 Regulators

SECTION III — MAINTENANCE (CONT.)

CLEANING AND CHECKING PARTS

Clean all parts with an approved solvent. Use crocus cloth where necessary to remove encrusted matter. Check parts as shown below.

1. Examine valve plug (22), seat ring (24) bushing-bottom flange (26), 1/2" to 2" sizes and staked bushing in the flanged end cap assembly, 2-1/2" to 4" sizes.

2. If main valve or seat ring (2-1/2"— 4" size) surfaces are scored or cut, regrind with very fine grinding compound. Remove all traces of grinding compound before reassembly. Replace bushings with new ones if required.

NOTE: FOR 2-1/2" to 4" SIZE:
If main valve, seat ring or both must be remachined due to extensive damage to seating surfaces, it will be necessary (in order to maintain correct diaphragm disc to diaphragm seat dimension) to shorten the valve plug (22) by an amount equal to the amount of metal removed from the main valve and/or seat ring faces. This is done by removing the correct amount of metal from the top (diaphragm) end of the valve plug stem.

FOR 1/2" to 2" SIZE:
The seat ring has a resilient seat. If the resilient seat is damaged the seat ring must be replaced. (Stellited hard faced seat is optional.)

3. Clean impulse port and diaphragm seating face in the main body thoroughly.

4. Check bore of main valve guide (19). Bore must be clean. Replace guide if damaged.

5. Check all diaphragms for cracks and perforations. Diaphragms should be replaced if any of the above defects are found. In addition, check for surface imperfections such as deep scratches and blisters. Reject and replace diaphragms if imperfections are considered excessive.

6. Check all formed tubing assemblies for cracks and deep scratches. Replace if any of the above defects exist.

7. Check pilot ball and pilot valve seat for wire drawing, scoring and radial scratches across the seat areas. The parts should be rejected if above defects are noted and replaced with new parts.

REMOVING AND REPLACING SEAT RINGS

To remove seat ring, use the special wrench which is available on request. See Fig. 4

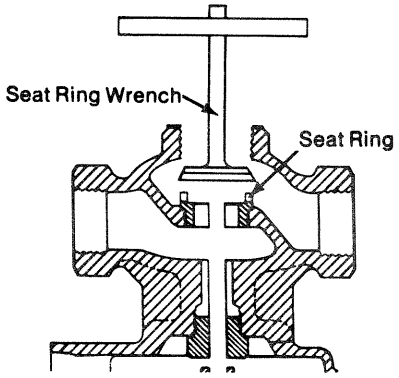

FIG. 4

TO INSTALL SEAT RING

Position seat ring wrench and socket wrench as shown in Fig. 4. Hold tightly against seat ring. Tap handle of socket with hammer to loosen seat ring. Then unscrew seat ring.

1. Carefully clean threads and joint contact surfaces on seat ring and in the valve body.

2. Make sure joint surfaces are undamaged.

3. Use a light coating of Never-Seez or similar lubricant on the first two threads only of the seat ring. Screw seat ring into valve body threads and pull up tight with a wrench.

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SECTION III — MAINTENANCE (CONT.)

4. Tap handle of socket wrench with hammer to lock seat ring in place.

5. Lap in main valve and seat carefully. Use very fine lapping compound. (For metal seats only.)

REASSEMBLY

1. Do not use graphite or compound on joints.

2. Place the bushing-bottom flange (26), 1/2" to 2" sizes only into the bottom flange (28). Install valve plug spring (25) and valve plug (22) onto bottom flange. Place gasket over bottom flange and screw bottom flange to main body with an appropriate wrench. In the 2-1/2" to 4" sizes the bottom flange is bolted to the lower flange of the valve body. Pull up bolt/nuts evenly across from each other until a tight seal is made.

3. Reassemble lower diaphragm (10) onto nozzle (29). Insert upper diaphragm complete (7) into diaphragm spacer (9). After orienting spacer so that diaphragm parts of upper diaphragm complete seats on the same side as the raised center hub. Holding the stem of upper diaphragm complete (7) with an open end wrench, screw the diaphragm (10) and nozzle (29) subassembly into the threaded female portion of the upper diaphragm complete (7) until a tight assembly of the diaphragm complete, (7) the spacer, (9) the lower diaphragm (10) and the nozzle (29) is made.

4. Install the diaphragm disc (17) onto the stem of the main valve (22). Put two diaphragm leaves together, matching convolutions as closely as possible, to form a diaphragm set (36). The bottom leaf has a bleed hole in it. The bleed hole faces the diaphragm disc (17). Place the set into the main body (20) and position them carefully above the diaphragm disc (17). Orient and position the diaphragm cover (16), and lower onto the valve body flange. Insert bolts (15) and nuts (18) and tighten sequentially and evenly across from each other until a tight diaphragm seal is achieved.

5. Install pilot valve spring (34) onto pilot of pilot ball then make sure spring is all the way to shoulder of pilot valve. There is a slight interference between pilot valve and spring. Position assembly into the diaphragm cover cavity bore. Make sure it is properly seated and moves up and down freely. Screw pilot valve seat (31) into cover (16) and tighten to 50 ft. lb.

6. Install pilot valve stem, pilot valve guide (30) and retaining ring (11), into diaphragm cover cavity. Make sure that guide (30) is not cocked or center hole edges are not damaged.

7. Orient nozzle, (29) lower diaphragm (10), spacer (9), and upper diaphragm complete assembly (7), with nozzle end pointing downward, and place onto diaphragm cover (16).

8. Place the adjusting spring (5) on the adjusting spring seat of the upper diaphragm complete (7). Install upper spring seat (4) onto spring (15). Make sure that seat hemi-head is pointing downward.

9. Orient and install adjusting spring case (8), onto upper diaphragm spacer assembly. Make sure pilot of case fits into counter bore of spacer (9) and seats against upper diaphragm. Insert bolts (6) through flange of spring case (8) and screw them into the diaphragm cover (16). Pull up bolts sequentially and evenly across from each other to 30 ft. lb. Install cover plate (12) by sliding over spring case flange.

10. Fasten formed tubing (20) to male connector (14) in street tee (16) and male elbow (23) in valve body (21). Screw on elbow (33) to nipple (35) and tighten. Make sure male connection #67205 is properly oriented to accept formed tubing (32). Attach formed tubing (32) to male elbow (23) in diaphragm spacer (9) and attach to male connection #67205 in street tee. Tighten all connectors wth appropriate open end wrenches.

11. Install spring case cover (3) and range washer (42) over spring case (8) if previously removed.

12. Screw adjusting screw (1) and lock nut (2) into adjusting spring case (8) until end of adjusting screw bottoms into upper spring seat hemi-sphere. Tighten lock nut. Reconnect control pipe to tee in valve body flange.

13. Follow starting up procedure under section entitled "Operation of GPKP-1 Reducing Valves."

LESLIE CONTROLS, INC., TAMPA, FL 33637