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TYPE 25P, 25PA & 25PI PRESSURE REDUCING VALVES

INSTALLING THE VALVE

Unpack Carefully

Do not lift the regulator by the tubing. Grasp the body of the valve firmly when lifting. The valve is completely assembled with the exception of the pressure sensing line and sensing line fittings.

Piping

1. Typical hookup sketches as shown in Figs. 1 and 2 will aid in planning a correct installation.
2. Piping on the downstream side of the valve should be increased so as not to restrict flow.
3. Swage nipples are recommended for changes in pipe size.
4. Before installing the valve make sure the piping is free of foreign material, scale, etc.
5. Make certain the arrow cast on valve body is pointing in the direction of flow.
6. Valve should always be installed in a horizontal position. (See Figs. 1 and 2.)

Pilot Pressure Sensing Line

1. Copper tubing (5/16" OD) can be used for the sensing line with suitable compression fittings or as alternative 1/4" piping can be used.
2. Connect the sensing line to a straight portion of the piping 10 pipe diameters from nearest fitting downstream from the valve and approximately 1 foot from elbows, tees, valves and other restrictions. (See Figs. 1 and 2.)
3. When the reducing valve is serving a single piece of equipment, the sensing line can be connected to the steam space of the equipment.
4. Install a small gate valve in the sensing line so that this can be closed when servicing the regulator.

5. The sensing line must be pitched downward from the main valve to insure proper drainage.
6. To permit accurate setting of the pressure regulator, a pressure gage should be installed as close as possible to the pilot sensing line connection.

Bypass

1. A bypass connection, as shown in Figs. 1 and 2, is recommended so that the valve can be serviced without shutting down the equipment.
2. The bypass valve should be the same size as the pressure reducing valve.

Steam Line Drain Trap

1. To insure proper operation of the valve and avoid premature wear, it is recommended that a 1/2" Spirax Sarco Thermodynamic Steam Trap be installed on the steam supply line. (See Figs. 1 and 2.)
2. A steam trap should also be installed in the downstream piping at the heel of each rise and ahead of manual or automatic valve.

Pipeline Strainers

1. It is strongly recommended that strainers be installed before the reducing valve and steam traps.
2. Make certain adequate clearance is provided for screen removal and blowdown connection between strainer and valve body.

Stop Valves

All stop valves on the supply side, as well as on the downstream side of the pressure reducing valve and sensing line, should be of the gate type so as to insure full rated capacity and good control.

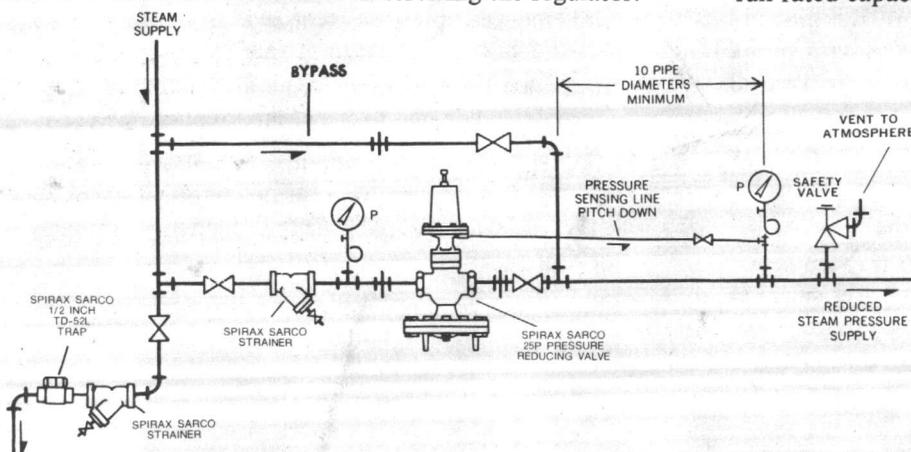


FIG. 1—Essentials of a pressure reducing station are shown here diagrammatically.

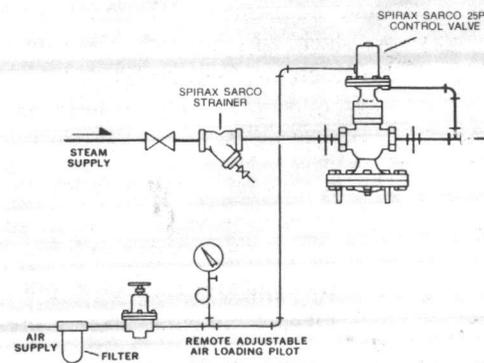


Fig. 1A—Reducing Steam Pressure Remotely Using 25PA Valve.

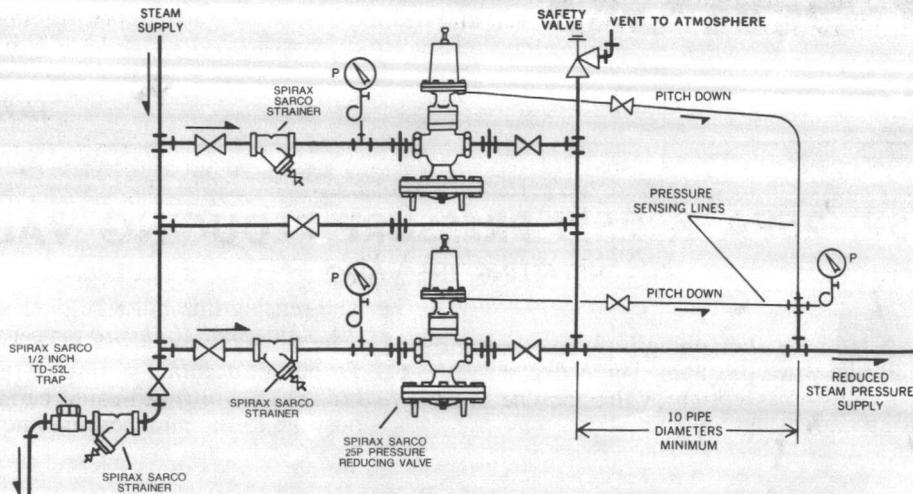
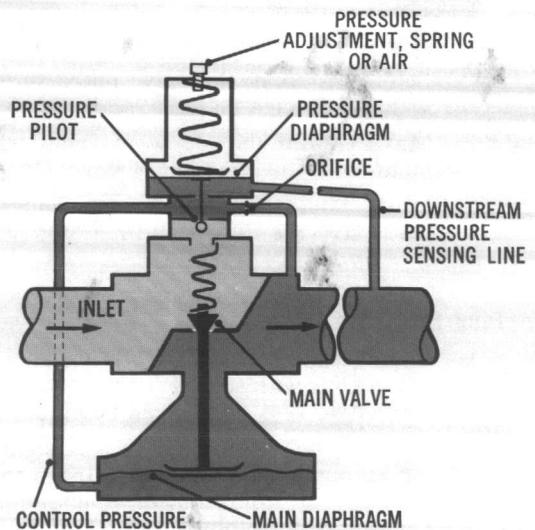


FIG. 2—In a parallel installation, two 25P reducing valves have slightly different pressure settings so that they open sequentially. Diagrammed here in a vertical arrangement, they are usually installed side by side.

HOW THE 25P, 25PA & 25PI WORK

Normal positions before start-up are with the main valve closed and the pilot valve held open by spring force or air pressure. Entering steam passes through the pilot valve into the main diaphragm chamber and also out through the control orifice. As flow through the pilot valve exceeds flow through the orifice, control pressure increases in the diaphragm chamber and opens the main valve. As steam flows through the main valve, the increase in downstream pressure feeds back through the pressure sensing line to the underside of the pressure diaphragm. When the force below that diaphragm balances the compression force of the spring above it, the pilot valve throttles. The control pressure maintained in the main diaphragm chamber positions the main valve to deliver just enough steam for the desired delivery pressure. Adjustment of the spring or air pressure above the pressure diaphragm changes the downstream pressure set point. When steam is no longer required, the Sensing Line pressure increases closing the pressure pilot and the control pressure bleeds back through the control orifice. This allows the main valve to hold the desired reduced pressure and it may close tight for a dead-end shutoff.



START-UP

1. First make certain that all stop valves are closed.
2. Remove Pilot Spring Cover then turn the pressure pilot adjustment (2D) counter-clockwise until spring is slack. Make certain spring remains in vertical position and centered in its retainers. Air loaded PA pilots must have no air pressure supplied to them.
3. Open stop valves in the following order:
 - a. Open stop valve ahead of steam trap on steam supply line. This will insure water free steam at the regulator inlet when put into operation.
 - b. Open small gate valve on pressure sensing line.
 - c. Open downstream stop valve.
 - d. Slowly open inlet stop valve.
4. Slowly adjust pilot spring at (2D) turning clockwise until reduced pressure required is indicated on pressure gage downstream of valve. Air loaded PA pilots require an air loading-pressure approximately equal to the desired reduced pressure.
5. Once the system has stabilized itself it may be necessary to make a re-adjustment of pilot spring (2D). Replace spring cover then tighten adjustment locknut.
6. Important—Retighten all pilot flange connections to insure steam tight joints.

TROUBLE SHOOTING

REFER TO FIGS. 4, 5 & 6

Symptom	Cause	Check and Cure
1. Controlled pressure over shoots under normal load conditions.	1. (a) Dirt or foreign material between pilot valve seat and head.	1. (a) Loosen screw (2D). Remove copper tubing connections at (J & L). With steam on valve, if steam flows from copper tubing connections at (J & L) remove pilot head and seat assembly (2H) and clean or replace.
	(b) Foreign particles between main valve head and seat.	(b) Inspect and clean head and seat.
	(c) Orifices (B) or (H) or pressure sensing line may be plugged.	(c) Remove, inspect, and clean.
2. Controlled Pressure over shoots only on light loads.	2. (a) Main valve head and seat worn or dirt between them.	2. (a) Inspect and clean head and seat.
	(b) Valve may be severely oversized.	(b) Adjust screw (2D) to give desired pressure under light loads.
	(c) Bypass valve not shut tightly or leaking.	(c) Check and repair as required.
	(d) Dirt or foreign material on main valve stem and guide (1F).	(d) Remove, inspect and clean.
3. Valve fails to open.	3. (a) Main valve diaphragm ruptured.	3. (a) Unscrew copper tubing connection at (G) and crack bypass valve. If steam flows from main valve diaphragm case, diaphragm is defective and must be replaced.
	(b) Orifice (H) is plugged.	(b) Remove and clean.
	(c) Pilot valve seat is plugged with dirt.	(c) Remove head and seat assembly (2H). Inspect and clean or replace.
	(d) Screen (1D) is plugged.	(d) Inspect screen and clean.
	(e) Pipeline strainer blocked.	(e) Inspect and clean.
	(f) Pilot valve adjustment (2D) or air loading pressure not properly adjusted.	(f) Adjust screw (2D) to desired pressure. Check air supply to PA pilots.
4. Delivery pressure low.	4. (a) Pilot valve adjustment (2D) not properly adjusted.	4. (a) Adjust screw (2D) to desired pressure.
	(b) Valve undersized.	(b) Check actual load against valve rating.
	(c) Steam supply pressure too low.	(c) Check and correct.
	(d) Main valve diaphragm ruptured.	(d) Unscrew copper tubing connection (G) and crack bypass valve. If steam flows from diaphragm case, diaphragm is defective and must be replaced.
	(e) Bleed orifice (B) missing.	(e) Replace proper fitting.
5. Valve fails to close.	5. (a) By-pass valve open or leaking.	5. (a) Check and repair as required.
	(b) Pilot sensing line blocked (or not installed).	(b) Remove, inspect, clean or install.
	(c) Pilot diaphragm ruptured (water or steam coming from pilot at spring retainer area).	(c) Replace pilot diaphragm assembly.
	(d) Pilot assembly or main valve seat threads leaking.	(d) Check casting in seat area for erosion.
	(e) Main valve diaphragms re-assembled without return spring and main valve cover holding valve head closed. (1/2" thru 4" sizes only).	(e) With main valve cover installed, loosen all main valve diaphragm bolts (1C) and then re-tighten.

MAINTENANCE

GENERAL INSPECTION

While a program of planned maintenance is always to be recommended, the Sarco 25P Valve will give long and trouble-free service if correctly selected, installed and kept reasonably free of dirt and foreign matter. Dirt and foreign matter are most likely to collect during installation and later trouble can be avoided by inspecting the installation after a few days. Check the following:

1. Clean all pipeline strainers. (Remove screens to clean.)
2. Check the main valve seat (1E) and protective screen (1D).
3. Inspect and clean orifices (B) and (H).
4. Check all joints for leakage.

SERVICING PROCEDURE (Refer to Fig. 4)

To determine which part of a malfunctioning pressure reducing valve requires maintenance, refer to the troubleshooting chart and follow this servicing procedure to check the tightness of the seats.

1. With all stop valves closed and the valve cooled down, remove the copper tubing from connectors (J) and (L) being careful to not bend them.
2. Close the pilot valve (2H) by turning the pressure adjustment (2D) counter-clockwise until the spring is slack. (No air pressure supplied to the type PA pilot.)
3. Stand clear of the tubing connectors and open the inlet stop valve slightly so that a small amount of steam reaches the valve inlet and pilot.
4. Open and close the pilot valve a few times by turning the pressure adjustment (2D) and observe the steam flow from tubing connectors (J) and (L). When the pilot valve is closed there should be no steam flow from the connectors; if there is some steam flow it indicates that the pilot valve assembly (2H) is faulty and must be replaced.
5. With the copper tubing removed the main valve head and seat are held closed and should not pass any steam. Observe the downstream orifice connector (B). Steam flow from this connector indicates that the main valve head and seat are leaking and require servicing.

Inspecting and Replacing Pilot Valve Head and Seat. (Refer to Fig. 4)

1. Remove 4 Pressure Pilot Flange cap screws and lift off pressure pilot. Visual examination can be made of the pilot valve head and seat.
2. Pilot valve head and seat are contained in one complete assembly. (See Fig. 4.)
3. To remove head and seat assembly (2H), unscrew hexagon, using 11/16" hex wrench.
4. If it is found that either the head or seat is worn, the entire assembly should be replaced.

Inspecting and Replacing Pilot Head Stem Guide. (Refer to Fig. 4)

The important thing to check is to make sure that the pilot head stem moves freely through the guide. This can be determined by removing the complete pilot from the main valve and turning adjustment (2D) so as to move the head to an open and closed position. Should cleaning or replacement be required proceed as follows:

1. Remove the pilot diaphragm cap screws (2C).
2. Remove pilot yoke (2B) and pilot diaphragm (2F).
3. The stem seal assembly can then be removed with a 7/8" hex socket wrench.

Inspecting and Replacing Pilot Valve Diaphragms. (Refer to Fig. 4)

1. Turn adjustment screw (2D) counterclockwise until spring is slack. Air loaded PA pilots must have no air pressure supplied to them.
2. Remove cap screws (2C). Pilot yoke (2B) can then be removed.
3. The 2 metal diaphragms (2F) can then be inspected for distortion or possible fracture as a result of abnormal operation.
4. At the same time any accumulation of dirt or foreign material should be removed from the lower diaphragm pilot case.
5. When replacing diaphragms, make certain casting surface is clean to insure a steam tight joint. Application of a plastic compound on the casting surface, such as Garlock 101, is recommended.
6. Position pilot yoke on lower diaphragm pilot casting making certain that the yoke is properly centered.
7. Tighten all cap screws uniformly.

VALVE SIZES 1/2" THRU 4"

Inspecting and Replacing Main Valve Head and Seat. (Refer to Figs. 4 and 5)

1. Unscrew copper tubing connections at (J) and (L).
2. Remove main valve cover cap screws (1A).
3. Remove main valve cover, strainer screen (1D), spring support disc and head spring.
4. Head can then be removed by simply withdrawing with a pliers or similar tool.
5. Inspection should then be made to determine if scale or other foreign material prevented tight closure of the head and seat.
6. If the head or seat shows signs of wear this can be corrected by grinding, using a fine grinding compound (400 grit) providing the wear is not too severe. Check for body erosion.

- If it is necessary to replace the valve seat, this can be removed from the valve body using a standard hexagon socket. (Valve sizes 1/2" to 2".) When replacing the valve seat, a new gasket should be used to insure a tight joint.
2-1/2" thru 6" valves contain raised lugs for removal and seal metal-to-metal without a gasket. Replacement heads and seats should be lapped in.

VALVE SIZES 1/2" THRU 4"

Inspecting and Replacing Main Valve Diaphragms. (Refer to Figs. 3, 4 and 5)

- Unscrew copper tubing connection at (G).
- Remove main valve diaphragm bolts (1C).
- This will allow the lower diaphragm case to be removed.
- The 2 metal diaphragms (1H) should be inspected to insure that they have not become distorted or possibly fractured as a result of abnormal operating conditions.
- At the same time any accumulation of dirt or foreign material should be removed from the diaphragm case.
- The valve stem should also be checked to make sure it is free to move and that there is no scale or foreign material lodged in the guide bushing (1F).
- Before reassembling diaphragms in 1/2" thru 4" sizes, main valve head must be in place and held in a closed position with the return spring and main valve cover.
- Make certain pressure plate (1G) is set properly. (Refer to Fig. 3.)
- Care should be taken in centering the diaphragms properly and equalizing bolt take-up uniformly.

6" VALVE ONLY

Inspecting and Replacing Main Valve Diaphragms, Seat, and Head Assembly (Refer to Fig.6).

Diaphragms

- Unscrew copper tubing connections (G) to lower diaphragm chamber.

- Remove main valve diaphragm bolts (1C) and drop lower diaphragm case.
- The 2 metal diaphragms (1H) should be inspected and replaced if they have become distorted or fractured.
- Clean any accumulation of dirt from the diaphragm case and orifice (H).

Servicing the Main Valve Head and Seat.

- Loosen the diaphragm plate set screw and remove the diaphragm plate (1G).
- Remove the top cover bolts (1A) and cover.
- Remove the stem and head assembly from the valve. Inspect the head and seat for wear.
- Check for body erosion around the seat ring.
- Replacement seats and heads should be lapped in, and minor wear can also be corrected by lapping with 400 grit compound.
- On re-assembly be sure diaphragm plate (1G) is set at 27/64" and set screw securely tightened.

NOTE: For replacement parts refer to Spirax Sarco Parts List No. P19.

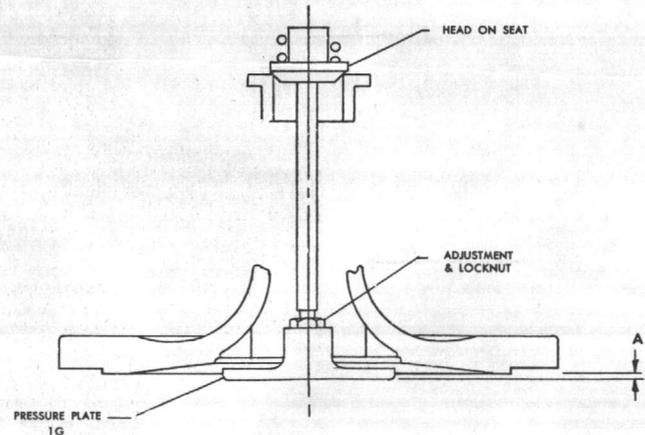


FIG 3.—NOTE IN 1/2" THRU 4" SIZES, TOP OF VALVE MUST BE COMPLETELY ASSEMBLED AND HEAD MUST BE ON SEAT WHEN MEASURING DIMENSION "A" AND WHEN RE-ASSEMBLING DIAPHRAGMS.

Size	1/2" & 3/4"	1"	1 1/4" & 1 1/2"	2"	2 1/2"	3"	4"	6"
Dim. A	1/16"	5/64"	3/32"	1/8"	13/64"	13/64"	1/4"	27/64"

1/2" THRU 2" SIZES

NOTE—In the PA pilot, air loading pressure replaces the adjustment screw (2D) and spring.

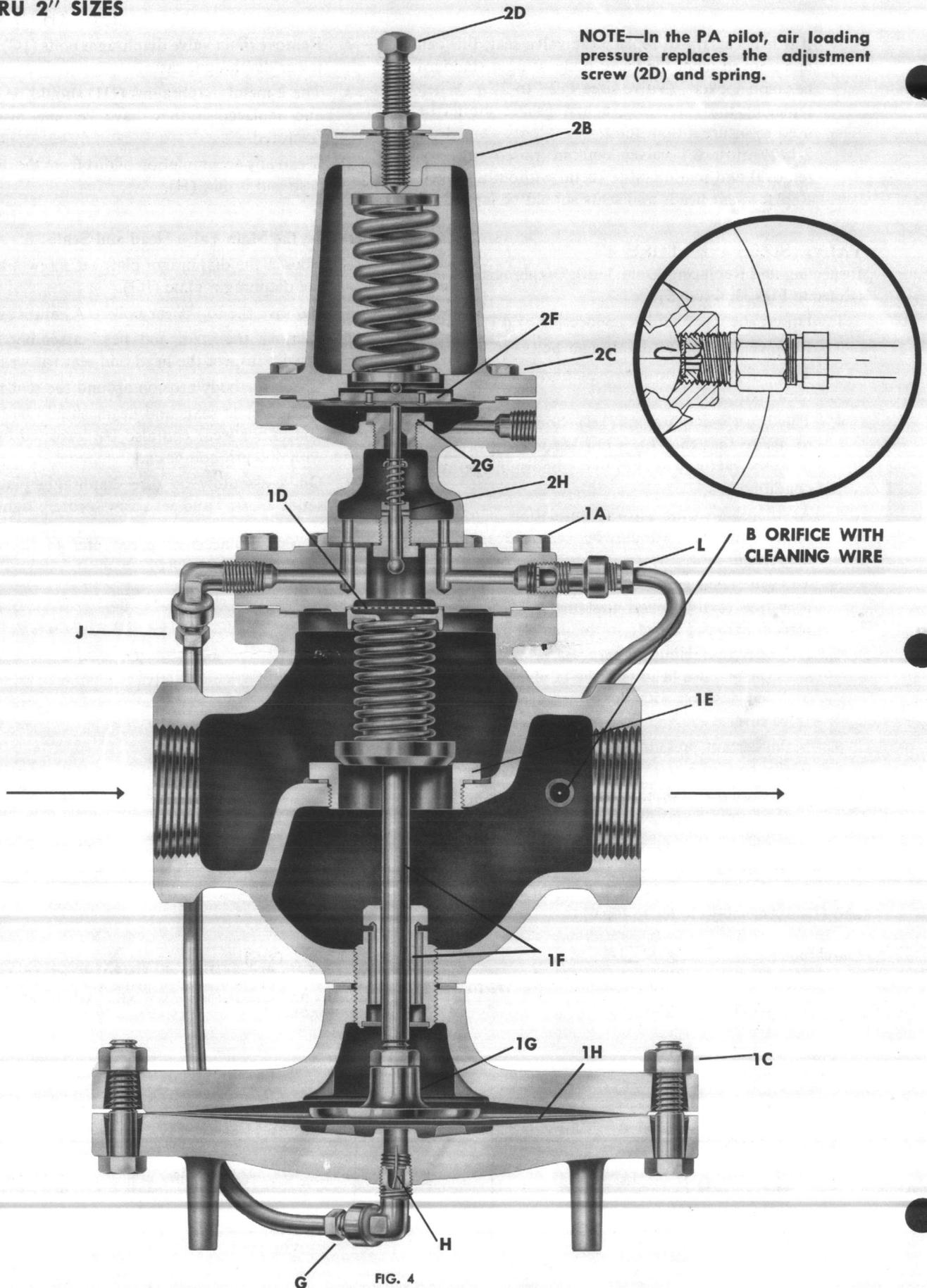


FIG. 4

2½" THRU 4" SIZES

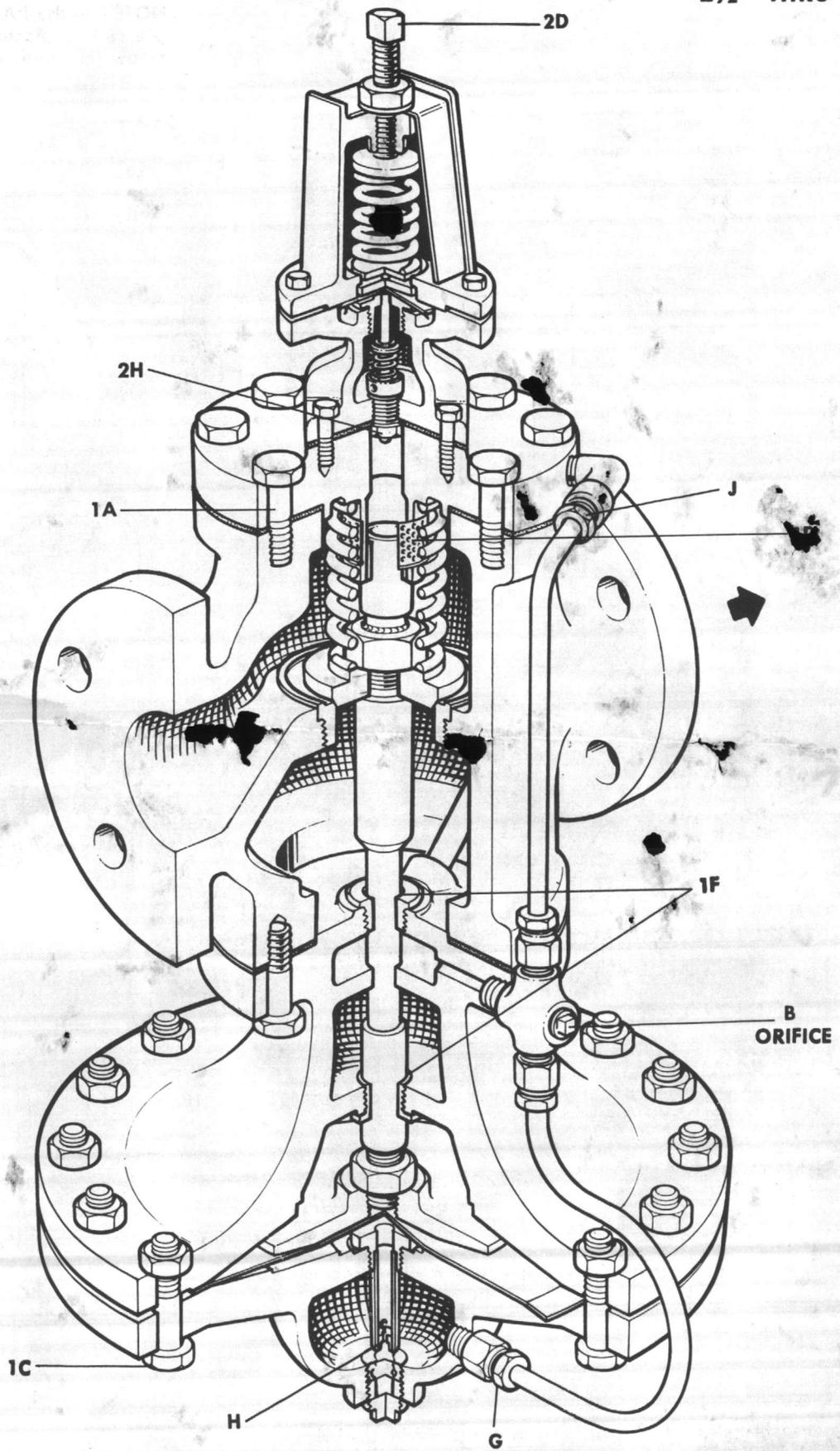


FIG. 5

6" SIZE

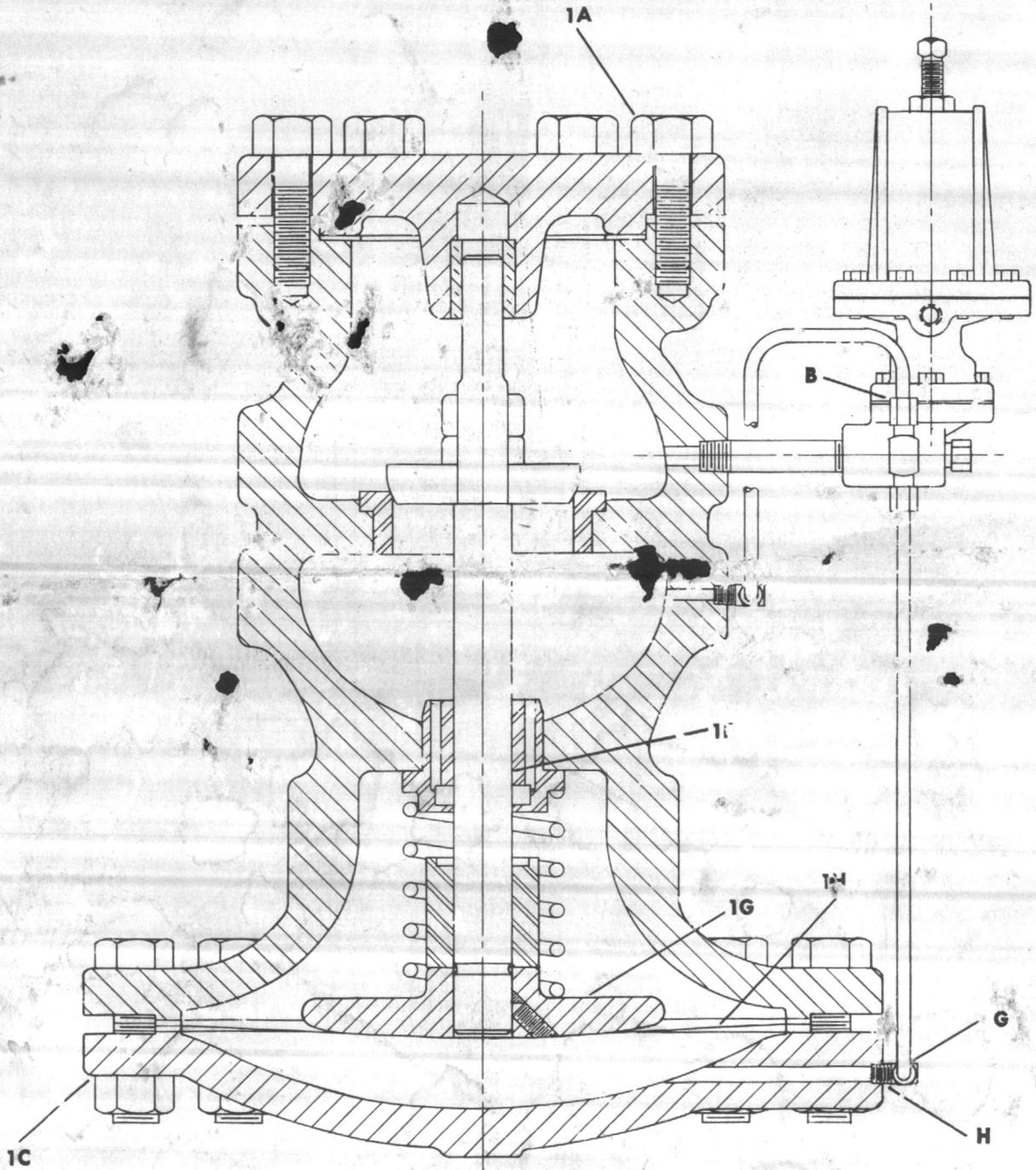


Fig.6

spirax
sarco

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