SPENCE ENGINEERING COMPANY, INC.
Walden, New York 12586

INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS FOR TYPE N6 DIFFERENTIAL PRESSURE VALVES

INTENDED PURPOSE

Type N6 Differential Pressure Valves are designed to maintain pump discharge pressures at a constant differential above a separate source of pressure. When installed in a boiler feed pump discharge line as a by-pass valve, a connection from the steam drum is made to the top chamber of the N6. The desired differential is made by adjusting the spring. The boiler feed-water pressure will then be maintained by the N6 at a constant pressure above steam drum pressure by modulating the quantity of water by-passed to pump suction. When installed in a by-pass line across a pumped system the N6 will maintain a constant differential of supply main pressure over return main pressure by modulating the quantity of by-passed water.

GENERAL DESCRIPTION

Type N6 design and materials are aimed at providing long trouble free service. A high temperature rubber sealing ring and teflon piston provide smooth operation. The monel stem guide bushing and stainless steel valve trim afford maximum service life. The pressure and temperature limits are 250 psi and 350 F. Two spring ranges are available. The range of spring differential pressures are 5 to 50 psi and 40 to 125 psi.

PRINCIPLES OF OPERATION

Flow enters the valve such that the initial pressure acts against the working face of the disc and tends to move it open. Opposing the opening are the forces of the differential adjusting spring and the loading pressure acting on the piston. The differential adjusting spring force creates the differential between the retained pressure (supply main or boiler feed water) under the disc and the loading pressure (return main or boiler drum) on top of the piston.

INSTALLATION INSTRUCTIONS

Carefully clear inlet piping system of foreign matter such as: welding beads, scale, sand, pipe compound, etc. Allow head room above the valve for maintenance. Provide a three valve by-pass to facilitate inspection of the regulator without interrupting service. Preferred position for N6 valve is in a horizontal line with spring chamber up and arrow on body pointing in direction of flow. The loading line should be ¼ pipe connected to the spring chamber tap.

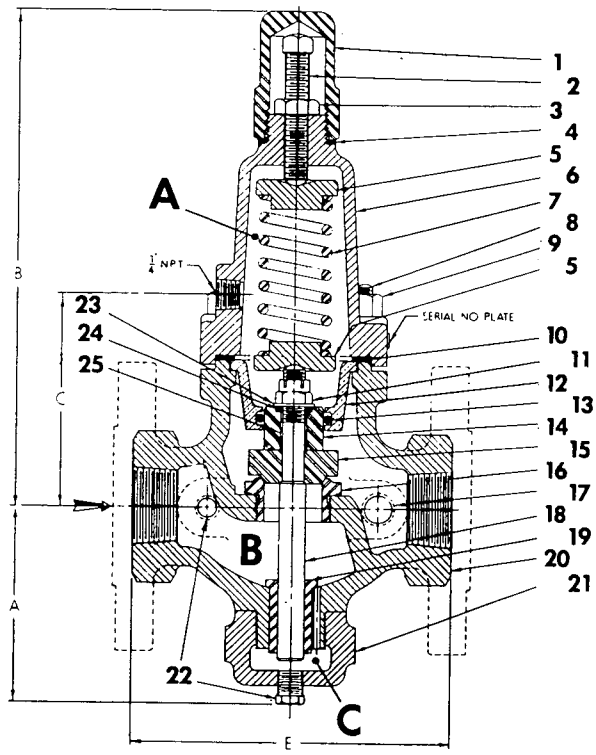
Avoid damaging effects of foreign matter in the flow by using SPENCE strainer ahead of the valve.

IMPORTANT: After valve is in service at operating pressure and temperature, check all gasketed joints and re-tighten. Failure to follow these instructions may result in damage to gaskets and mating surfaces.

OPERATING INSTRUCTIONS

On starting up proceed as follows:

1. N6 Valves are shipped with the adjusting spring precompressed. This precompression may result in a differential pressure higher than desired. Remove adjusting screw cover and loosen adjusting screw locknut. It is recommended that the precompression be removed by turning the adjusting screw counter-clockwise until the screw turns easily indicating the spring load has been removed.
2. Open the inlet stop valve gradually until the N6 differential valve takes control as indicated by the differential pressure gage.
3. Adjustment of pressure: Turn adjusting screw clockwise to increase the differential pressure; counter-clockwise to decrease it.
4. With no compression on the adjusting spring the pump discharge pressure and the boiler pressure applied to the spring chamber will be the same, due to the fact that the piston and the disc have the same area and are balanced. To increase differential compress adjusting spring until desired differential is obtained.



PC. No.	Name	PC. No.	Name
1	Top Cap	14	Piston
2	Adjusting Screw	15	Skirted Disc
3	Adj. Scr. Locknut	16	Seat Ring
4	Top Cap Gasket	17	Pipe Plug 1/4"
5	Spring Buttons	18	Stem
6	Spring Chamber	19	Bushing
7	Adjusting Spring	20	Body
8	Spring Chamber Studs	21	Body Cap
9	Spring Chamber Nuts	22	Pipe Plug 1/8"
10	Spring Chamber Gasket	23	Washer
11	Stem Locknut	24	Sealing Ring
12	Cylinder	25	Tube
13	Sealing Ring		

DIMENSIONS AND WEIGHTS

Size	Dimensions, Inches E Scr. Ends	E Flg. 250 lb.	A	B	C	Approx. Wt. Lb. Scr. Ends	Flg. 250 lb.
3/4	4-3/4		3	7-3/8	3	10	
1	5-3/8		3-3/8	8-1/2	3-5/8	12	
1-1/4	6-1/2		3-7/8	9-3/8	3-7/8	20	
1-1/2	7-1/4		4	10-7/8	4-1/4	26	
2	7-1/2		4-5/8	11-3/4	4-7/8	38	
2-1/2		10	4-3/4	14-1/2	5-3/8		74

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TROUBLE SHOOTING

1. Failure to Open — differential too high.
   a. Differential adjusting spring setting may have been tampered with.
   b. Valve piston (14) and sealing ring (13) may be binding.
   c. Valve stem (18) and bushing (19) may be binding.
2. Failure to Close — differentail too low.
   a. Foreign material may be between the seat and disc of the main valve.
   b. Line from steam header may be plugged, restricted or broken.
   c. Differential adjusting spring setting may have been tampered with.
   d. Chamber "C" may be dirt plugged or port in bushing (19) may be plugged.
   e. "O" Ring or piston may be damaged and leaking.

MAINTENANCE

1. Inspection
   a. Under normal conditions, complete dismantling at regular intervals is not recommended. A valve kept relatively free of dirt will function for years with minimum attention.
   b. After the first few days of operation and twice a year:
      1. Inspect for dirt collected in chamber "C". Remove plug (22) to "blow down".
      2. Inspect for dirt collected in cylinder (12).
      3. Inspect all joints for leakage. Keep all joints tight, never allow a leak to persist.

DISMANTLING N6 VALVE FOR CLEANING

1. Shut off supply and discharge valves and line from steam headers.
2. Remove top cap (1).
3. Loosen lock nut (3) and unscrew adjusting screw (2) until spring tension is released. (This step can be omitted if setting adjustments cannot be made after cleaning).
4. Disconnect pressure sensing line from boiler steam header.
5. Remove the four spring chamber hex head nuts (9).
6. Separate spring chamber (6) from valve body (20). Spring (7) and buttons (5) will drop out.
7. Remove valve disc assembly which consists of No. 11, 12, 13, 14, 15 and 18.
8. Assemble in reverse order. Use silicone lubricant on piston (14) so that it will move freely through sealing ring (13).

VALVE GRINDING

1. Use fine (grit 400 to 800) compound on the seat, using light pressure.
2. Check seating by blueing the valve disc bevel face before reassembling.
3. Clean all parts with kerosene or carbon tetrachloride before reassembling.
4. Lubricate sealing ring (13) with a silicone lubricant or soap solution to facilitate insertion into guide area of body. Do not use petroleum base lubricants on rubber sealing rings.