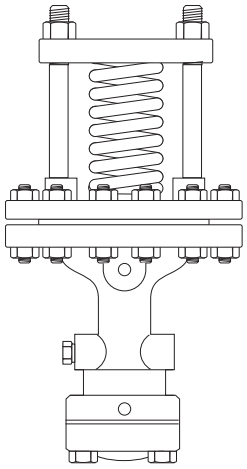
ITT

Hoffman Specialty

Installation & Maintenance Instructions
HS-621(A)

Series SPS Spring Pilots For Series 2000 Pilot-Operated Regulators



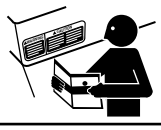
Series SPS Spring Pilots

The Series SPS Spring Pilot Control Valve senses and balances downstream pressure against an adjustable spring to control a Series 2000 Pilot Operated Regulator main valve and thus regulate downstream pressure to a set point. The Series 2000 Regulator reduces a steady or varying inlet pressure to a constant, adjustable delivery pressure.

The Series SPS pilots are spring loaded. Normal accuracy of regulation is within 10% of set point. The adjustable range of the delivery pressure is governed by the choice of adjusting spring as shown below.

Pressure Range psig (bar)	Spring Color	Wire Diameter in. (mm)
2-30 (0.1-2.0)	Blue	3⁄16 (4)
5-60 (0.3-4.1)	Red	1⁄4 (6)
20-175 (1.4-11.9)	Gold	11⁄32 (9)

⚠ WARNING



- **Before using this product read and understand instructions.**
- **Save these instructions for future reference.**

- **All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of plumbing, steam, and electrical equipment and/or systems in accordance with all applicable codes and ordinances.**

- **Turn off steam supply before installing or servicing.**
- **Open supply valves slowly to prevent water hammer or sudden shock.**

- **Wear heat resistant gloves before adjusting steam valves.**
- **Handle regulator with extreme caution. Do not lift regulator by any external tubing.**

Failure to follow this warning may result in property damage, serious burns, personal injury or death.

INSTALLATION

- The mounting hardware kits contain all of the hardware required to install the spring pilot valve on the main valve.
- Pipe sealant should be applied to all pipe threads. Do not use Teflon® tape. **Note:** Follow manufacturer's instructions for applying pipe sealant. Keep sealant off first thread.
- The preformed copper tubing (included in the hardware kits) may have to be shortened with a tubing cutter. Ream to restore original inside diameter of tubing. Avoid getting chips in the tubing or piping.

1. The spring pilot valve can be installed on either side of the main valve. The main valve is shipped with the U-tubing and the bleed orifice installed for left-hand side mounting of the spring pilot valve. If right-hand side mounting of the spring pilot is desired, the U-tubing and the bleed orifice must be relocated to the opposite sides of the main valve.
   Note: Right-hand side positioning occurs when the main valve inlet directly faces the observer.

Figure 1 illustrates mounting the spring pilot on the right-hand side of the main valve.

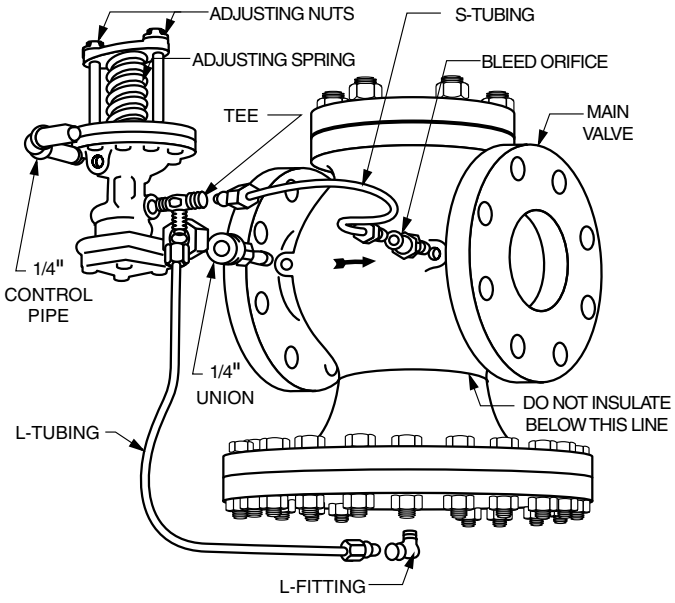


Figure 1

2. Make sure the bleed orifice is installed in the 1/8 NPT tapping on the outlet end of the main valve on the opposite side from the U-tubing. Remove the 1/8 NPT pipe plug from the bleed orifice and replace it with a 1/8 NPT x 1/4" (6mm) O.D. tubing, straight compression fitting.
3. Install the 1/4 NPT x 1-1/2" (38mm) nipple and half the union connection on the inlet end of the main valve.
4. Use the 1/4 NPT x 4" (101mm) nipple and the remaining half of the union connection to mount the pilot.
5. Install the T-fitting on the 1/8 NPT tapping on the side of the pilot with the T pointing down.
6. Install the L-fitting in the tapping at the center of the main valve diaphragm cover.
7. Install the S-tubing from the side of the T-fitting to the bleed orifice on the main valve.
8. Install the L-tubing from the bottom of the T-fitting to the L-fitting in the main valve diaphragm cover.

9. Install a downstream feedback control line to sense pressure at the point of desired pressure control using **1/4 black steel pipe**. Install a 1/4 NPT shut-off valve in this line. The feedback control line should connect to the top or side of the main valve outlet line at least 10 pipe diameters downstream of any valves or elbows, at a point of minimum turbulence (See Figure 2).
   Note: Avoid sensing the downstream pressure immediately at the main valve outlet or after a turn. When the delivery pipe expands in size, select a spot at least 4 pipe diameters beyond the point of enlargement (See Figure 2).
10. The feedback control line should pitch down from the pilot to avoid erratic operation and excessive fouling. Eliminate water pockets.
11. Install a pressure gauge in the feedback control line to show the pressure actually reaching the pilot diaphragm.

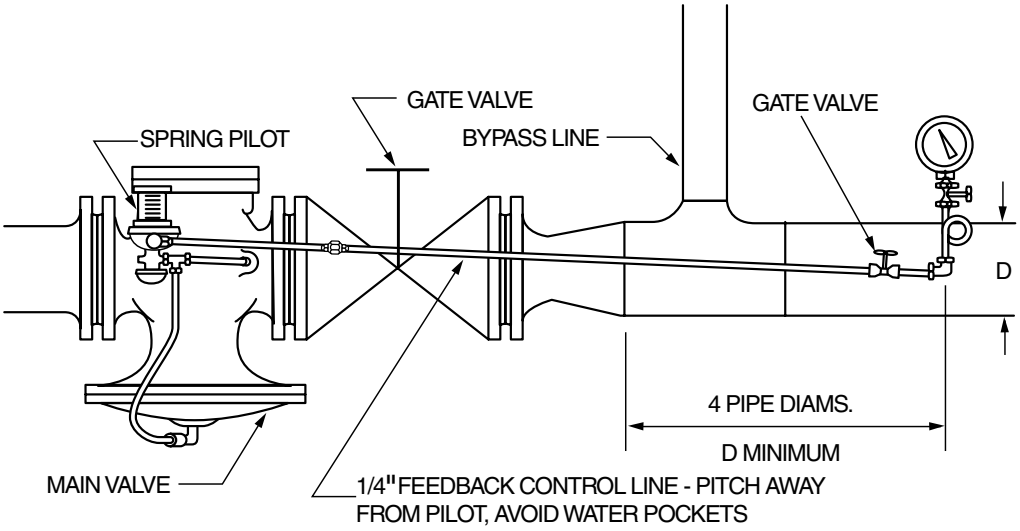


Figure 2

START-UP PROCEDURE

1. Make sure inlet stop valve is closed.
2. Open 1/4 NPT feedback control line shut-off valve.
3. Open outlet stop valve and all equipment drain valves. Allow system to drain completely.

⚠ CAUTION

- **Never open a reducing valve without positive indication that the high side is clear of condensate. Be sure no one is in area of any open end of pipes when steam is turned on. Failure to follow this caution may result in serious burns.**

4. Make sure bypass globe valve is tightly closed.
5. Close pilot valve by unscrewing adjusting nuts to release compression on the adjusting spring.
6. Slightly open inlet stop valve. Open only enough to allow steam into section. Do not allow pressure to build up. Blow down strainer.

⚠ CAUTION

Hearing protection is required if drain valves are open to atmosphere. Failure to do so may result in hearing loss.

7. Gradually compress adjusting spring until the pilot valve opens.
8. Allow system to stabilize.
9. Open inlet stop valve slightly more. A little pressure will build on the regulator diaphragm, which allows the regulator to open. Then, steam should begin to flow.
10. Open inlet stop valve more.
11. Allow system to stabilize.
12. **Check for leaks.**
13. Close drain valves after system is hot and drain valves are blowing steam (this indicates that all condensate has been removed).
14. Open inlet stop valve until about half open. If there are no problems, open completely.
15. Adjust spring pilot to control the system at desired pressure. The system pressure can be set for full steam or partial steam flow.

    Full Steam Flow - If the spring pilot is adjusted to the required reduced pressure while the system is running at full steam flow, then the reduced pressure will rise approximately 10% when the system is running at low steam flow.

    Partial Steam Flow - If the spring pilot is adjusted to the required reduced pressure while the system is running at 5 - 10% of full steam flow, the reduced pressure will fall (droop) approximately 10% when the system is running at full steam flow.

MAINTENANCE

Dismantling

1. Release compression on adjusting spring (2) by loosening adjusting nuts (1) an equal amount.
2. Remove diaphragm nuts (3) and lift off cowl (4). Lift out diaphragm assembly (5,6 & 7).
3. Disassemble diaphragm assembly by removing diaphragm screw (7) from pressure plate (5).
4. Remove blind flange bolts (16) and take off blind flange (15). Remove screen (12) and gasket (17).
5. Hold the pusher plate (8) and remove stem nuts (14). Lift out stem assembly (8 & 11) and valve spring (9). The disc (13) will drop off.
6. If the seat ring (10) requires replacement, remove it from pilot body with a socket wrench.

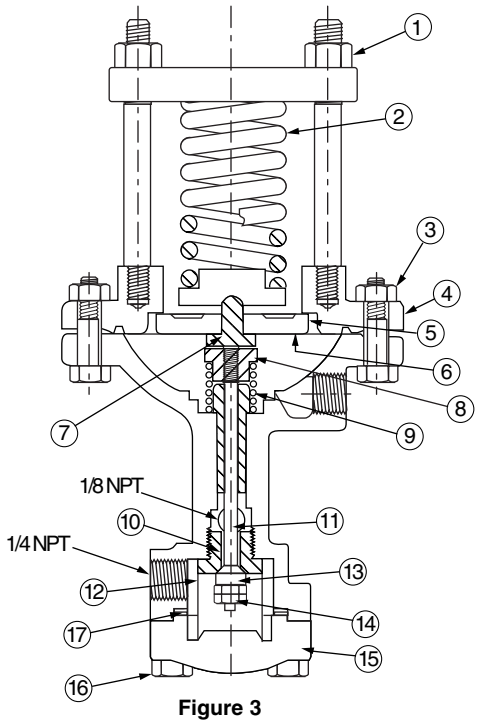


Figure 3

SEAT, DISK & STEM INSPECTION & SERVICE

1. Examine the seat and disc sealing surfaces for nicks or other signs of damage by pipeline debris. Slight imperfections may be removed by lapping the surfaces together. Otherwise the seat and disc must be replaced.
2. Examine the stem for build-up of pipeline contaminants or erosion. Remove any build-up with a wire brush and polish with very fine crocus cloth. Work carefully to avoid bending the stem.
3. Clean the body threads of old sealing compound using a wire brush. Apply new sealing compound (Copalite or equal) to the shoulder of seat ring. Let stand until tacky before installing in pilot body.

   Secure disc (13) to stem (11) with a stem nut (14). Insert this assembly into pilot body (omit valve spring).
4. Apply lapping compound to the seat to disc joint. Using a socket and extender on the stem nut, rotate the disk back and forth against the seat with light pressure for about 30 seconds.

Lap sparingly using 500 grit lapping compound and light pressure. Heavy grinding may cause galling, wide sealing surfaces and a grooved disc, all of which tend to produce leakage.

After the sealing surfaces are lapped in, disassemble and clean all parts.

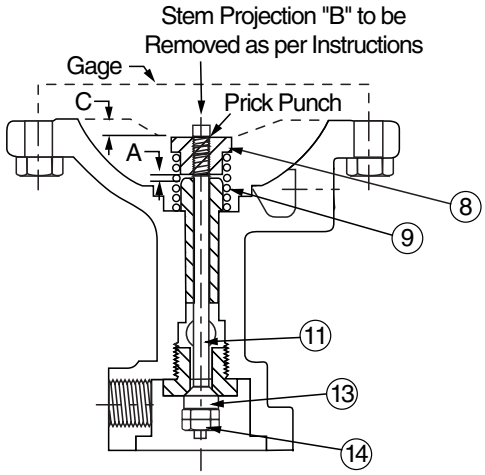


Figure 4

MAINTENANCE SERVICE (cont'd)

5. Screw pusher plate (8) on stem (11). Holding disc against its seat, adjust the pusher plate (8) so that dimension C = 11/64" (4.4mm) (See Figure 4). A pilot travel setting gage is supplied with each repair kit.
6. Remove stem nut, being careful not to disturb the pusher plate adjustment. Lift stem out the top of the pilot. Grind off stem projection B flush with upper surface of the pusher plate.
7. Reinsert stem into pilot body. Install disc and stem nut. Check dimension C and, if correct, lock the adjustment by prick punching the stem threads at several points. Work carefully to avoid bending the stem.
8. Scrape away burrs raised by the prick punching. Upper surface of pusher plate must be smooth and flat.
9. Check that the valve travel A = 3/64" (1.2mm). This need not be exact. Stem should move smoothly. Binding indicates a bent stem.
10. Remove stem nut and disc; withdraw stem. Install stem with valve spring disc and both stem nuts in place.

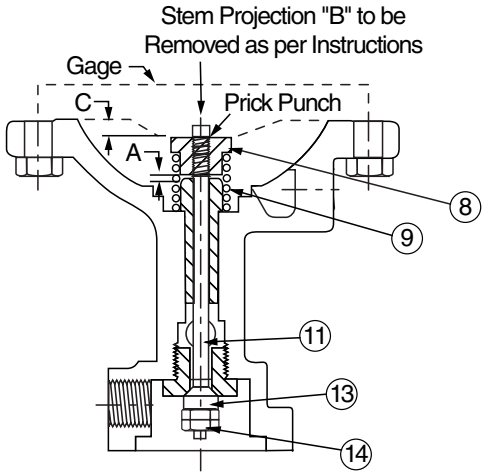


Figure 4

Assembly

1. When replacing diaphragms, apply sealing compound (Copalite or equal) sparingly to the shoulder of the diaphragm screw (see item 7 in Fig. 3).
2. When replacing gaskets, be sure that any serrated sealing surfaces are cleaned of old gasket material.

Pressure Range psig (bar)	Spring Color	Number of Diaphragms
2-30 (0.1-2.0)	Blue	2
5-60 (0.3-4.1)	Red	2
20-175 (1.4-11.9)	Gold	3

3. Reassemble the pilot in the reverse order of the disassembly procedure described above.

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