

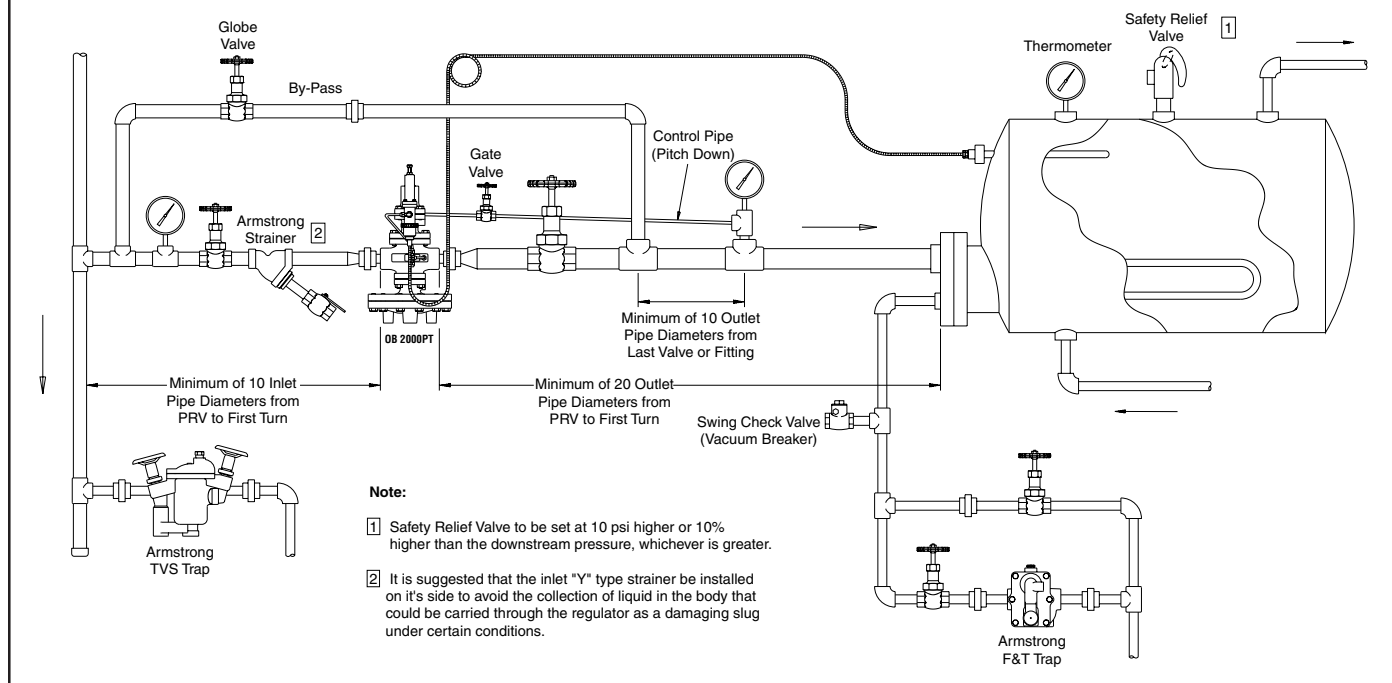


Model OB 2000PT

Pressure/Temperature Regulating Valve

Installation, Operation and Maintenance Instructions

Figure 1 -1. For Steam Service



This bulletin should be used by experienced personnel as a guide to the installation of the Model OB 2000PT Pressure/Temperature Regulating Valve. Selection or installation of equipment should always be accompanied by competent technical assistance. You are encouraged to contact Armstrong International, Inc. or its local sales representative for additional information.

Installation Instructions

1. An Armstrong TVS Inverted Bucket Steam Trap is recommended to drain condensate at the inlet of the temperature regulator.
2. An Armstrong 100 mesh screen "Y" strainer should be installed before the pressure/temperature regulator to reduce the chance of dirt fouling.
3. A pressure gauge is recommended before and after the pressure/temperature regulator.
4. If standard piping practice permits, a bypass line around the pressure/temperature regulator is recommended. The bypass line should run horizontal to the steam line.
5. The control pipe connects to a ¼" tapping on the side of the pressure pilot valve. Be certain the control pipe is pitched away from the pressure/temperature regulator. Erratic control could result if this is not done. The pipe should be installed a minimum of 10 outlet pipe diameters downstream of the last obstruction.
6. Install the pressure/temperature regulator with the main diaphragm housing down. Make sure the flow is in the direction of the arrow on the body of the valve.
7. A vacuum breaker should be installed after the outlet of the heater coil and before the steam trap. Automatic air vents should also be installed at all points where non-condensibles can collect.
8. Avoid lifting condensate directly after steam traps. Under light loads the pressure in the steam space is reduced and often is too low to lift condensate. Gravity drain to return pump is recommended, or pipe in a safety drain trap. (See Steam Conservation Guidelines section in Bulletin 326).

Assembly & Installation

The pressure/temperature regulator will come in two (2) boxes. One box will contain an integral mount (pressure pilot mounted on the top of the main valve) main valve and the second box containing the temperature pilot with fittings which is not connected to the integral mounted valve and the capillary system. Please read the instruction bulletin before assembly and installation.

Figure 2-1 OB 2000PT

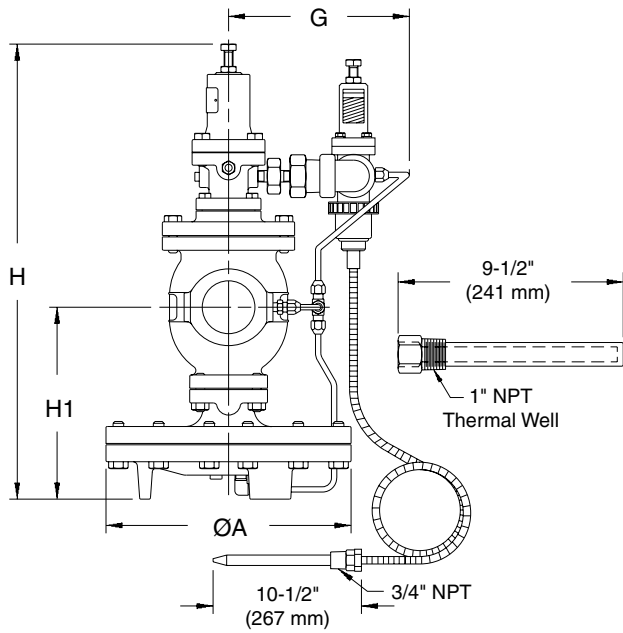
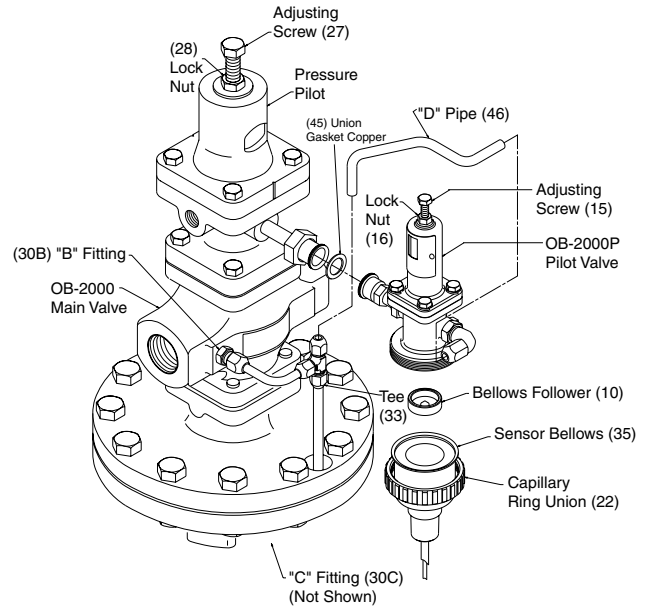


Figure 2-2



A. Assembly

1. Do not lose the bellows follower (10), union gasket (45) and pre-formed copper D pipe (46) as shown in Figure 2-2.
2. Insert copper union gasket (45) into union fitting, tighten the union joint and install pre-formed copper D (46) pipe as shown in Figures 2-1 and 2-2.

B. Installation of OB 2000PT Main Valve

1. Align flow direction with direction of arrow cast into body.
2. Install OB 2000PT perpendicular to horizontal piping so that the diaphragm chamber is located at the bottom.

C. Installation of Capillary System (See Figures 2-1, 2-2 and 4-1 on Page 4)

1. Once the valve body is installed, insert bellows follower (10), which was packaged with the capillary system inside the sensor bellows (35) with the flat side down toward the capillary bellows. Turn the adjusting screw (15) counter clockwise to relieve spring tension. Attach capillary system to temperature pilot valve body and tighten capillary ring union (22). See Figure 2-2.
2. Thermal Bulb (23) may be installed in any position. However, care should be taken so that at least three quarters of the thermal bulb is touching the fluid being heated.
3. Screw in bushing (24) first and attach thermal bulb (23) with packing nut (36). See Figure 4-1, Page 4.

4. Do not twist or bend capillary sharply. Bending radius of capillary should not be more than 1-1/2". Position capillary so that it does not touch steam lines, hot water lines, or regulator.
5. Install a thermometer into the fluid close to the thermal bulb. See Figure 1-1 Page 1.
6. When using the thermal bulb (23) in a pipe, make sure the thermal bulb is installed in a location where the fluid freely flows around the bulb.
7. If a thermal well is used. Make sure heat transfer compound is applied to the thermal bulb before installation into the well.

D. Regulating Method

Important: Temperature control is best achieved when the delivery pressure is the lowest steam pressure capable of maintaining the desired temperature at maximum load.

1. Open valve on drip leg to allow inverted bucket steam trap to drain condensate on OB 2000PT inlet.

Table 2-1.

Capillary Range						
Number on Adjusting Dial	Capillary System Range °F					
0	18 - 59	50 - 97	86 - 144	131 - 201	176 - 260	239 - 361
	12	39	72	113	154	214
1	28	59	99	142	192	266
2	43	77	120	169	225	307
3	57	93	136	196	257	352
4	70	109	153	223	297	410

2. Close inlet and outlet valves to OB 2000PT and open bypass line to clean the system. Be sure to close bypass line after cleaning the system. During blow down, make sure that the temperature does not rise higher than the limit of the capillary unit, otherwise damage to capillary may occur.
3. Loosen lock nut (16) on the temperature pilot and turn the adjusting screw (15) and align the needle with the required temperature position on the dial. See Table 2-1. Note that the number on the dial will give an approximate temperature value with the corresponding temperature range.
4. Loosen lock nut (28) on the pressure pilot and turn adjusting screw (27) counterclockwise removing all tension from adjusting spring (24).
5. Open valve on outlet of OB 2000PT and also on control pipe.
6. Open inlet valve to OB 2000PT – **SLOWLY**.
7. Turn the adjusting screw (27) on pressure pilot valve clockwise until the heater output is 5°F above the desired temperature setting. If temperature adjustment in step 3 limits this operation, adjust temperature pilot adjusting screw accordingly. Make sure all valves between the OB 2000PT and equipment are open and equipment is calling for steam.
8. Turn adjusting screw (15) on temperature pilot counterclockwise, lowering to the desired temperature.
9. Allow system to stabilize and adjust temperature accordingly.
10. Tighten lock nut (16) on the temperature pilot and lock nut (28) on pressure pilot.
11. If adjustments are made at partial load the temperature will sag under heavier loads. When maximum load occurs increase pressure setting enough to maintain desired temperature.

Note: Make sure the set pressure temperature does not exceed the temperature limit of the capillary. Capillary can withstand a maximum of 68°F above the rated range.

Example – Capillary range of 131-201°F will withstand temperature of 269°F.

E. Maintenance Inspection

1. Troubleshooting Hints – many of the problems that occur with pressure/temperature regulators are due to dirt holding the main or pilot valve open. Additionally make sure that the thermometer sensing the fluid temperature is operating correctly.

2. Check that the bellows follower was installed.

Disassembly

Before disassembly, make sure the inlet and outlet valves to the regulator are closed and the pressure has been relieved.

A. Disassembly of Temperature Pilot Valve (See Figure 4-1 on Page 4)

1. Loosen capillary ring union (22) and temperature sensor bellows (35). Make sure not to lose bellows follower (10).
2. Loosen lock nut (16) and turn adjusting screw (15) counter clockwise (left), freeing up adjusting spring (14).
3. Remove four hexagonal bolts (17) from the spring housing (2) and remove adjusting spring (14).
4. Remove top bellows plate (6) and top seal bellows (5).
5. Loosen the guide (7) and remove the bottom bellows plate (8) and the bottom bellows seal (5) from the bottom half of temperature pilot.
6. Remove pilot valve and stem (3).
7. For assembly procedure, follow reverse order.

B. Disassembly of Pressure Pilot Valve (See Figure 5-1 on Page 5)

1. Loosen the lock nut (28) and the adjusting screw (27) counterclockwise (left) and turn until the pressure is relieved from set point adjusting spring (24).
2. Remove four hex head bolts and take out adjusting spring (24), bottom spring plate (26), top spring plate (25), and two pilot diaphragms (23).
3. Remove pilot valve assembly (17, 18, 19, 20, 21) at the center of the pilot body (2).
4. Pilot body can be removed from main valve by disconnecting fitting (30A) and removing four hex bolts (38). Care should be taken when removing pilot from main valve. The main valve is held by a spring which is compressed.

C. Disassembly of Main Valve (See Figure 5-1 on page 5)

1. Disconnect the copper tubing on the side of the valve (See Fittings 30A, 30B, 30C).

2. Remove the four hex head bolts (38) from the pilot body (2) to remove the pressure pilot from the main valve body (1). Care should be taken when doing this procedure. The main valve is held by a spring (13) which is compressed. Once bodies are apart, remove spring plate (14), screen (15), main valve spring (13) and main valve (6).
3. Use a T-Bar wrench to remove valve seat (7).
4. Remove all nuts and bolts (41) from diaphragm case separating the top diaphragm case (4) and the bottom diaphragm case (5), main diaphragms (12), retainer (11) and main spindle (9).
3. Before assembling the main diaphragm (12), make sure the main valve (6) is supported correctly by the main valve spring (13).
4. Confirm that the retainer (11) and main spindle (9) are connected correctly.
5. * Make sure the main diaphragm case has *Never Seize*[®] applied and the surface thoroughly cleaned before the diaphragms are installed. Proper performance can not be obtained in case of wrong thickness.
6. Tighten hex bolt and nuts uniformly.

Assembly – Hints

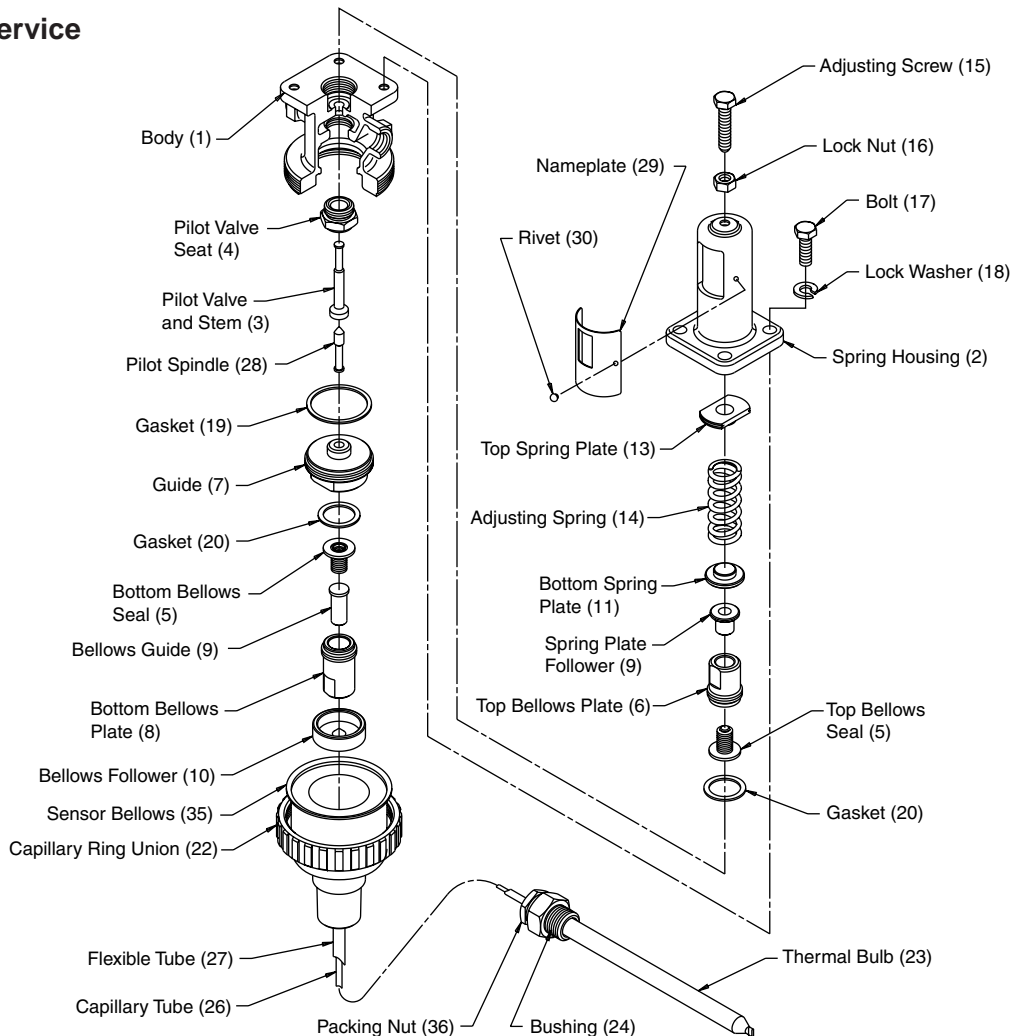
1. Check to make sure there are not scratches on the main valve or seat. If there are scratches, apply lapping compound and relap valve and seat.
2. Make sure all sliding parts (main spindle) move freely.

Note: Repair kits are available for temperature pilot valve, main valve, tubing, gaskets, liquid gasket and diaphragms.

*Please note that most valves will require liquid gasket for assembly on the main diaphragms.

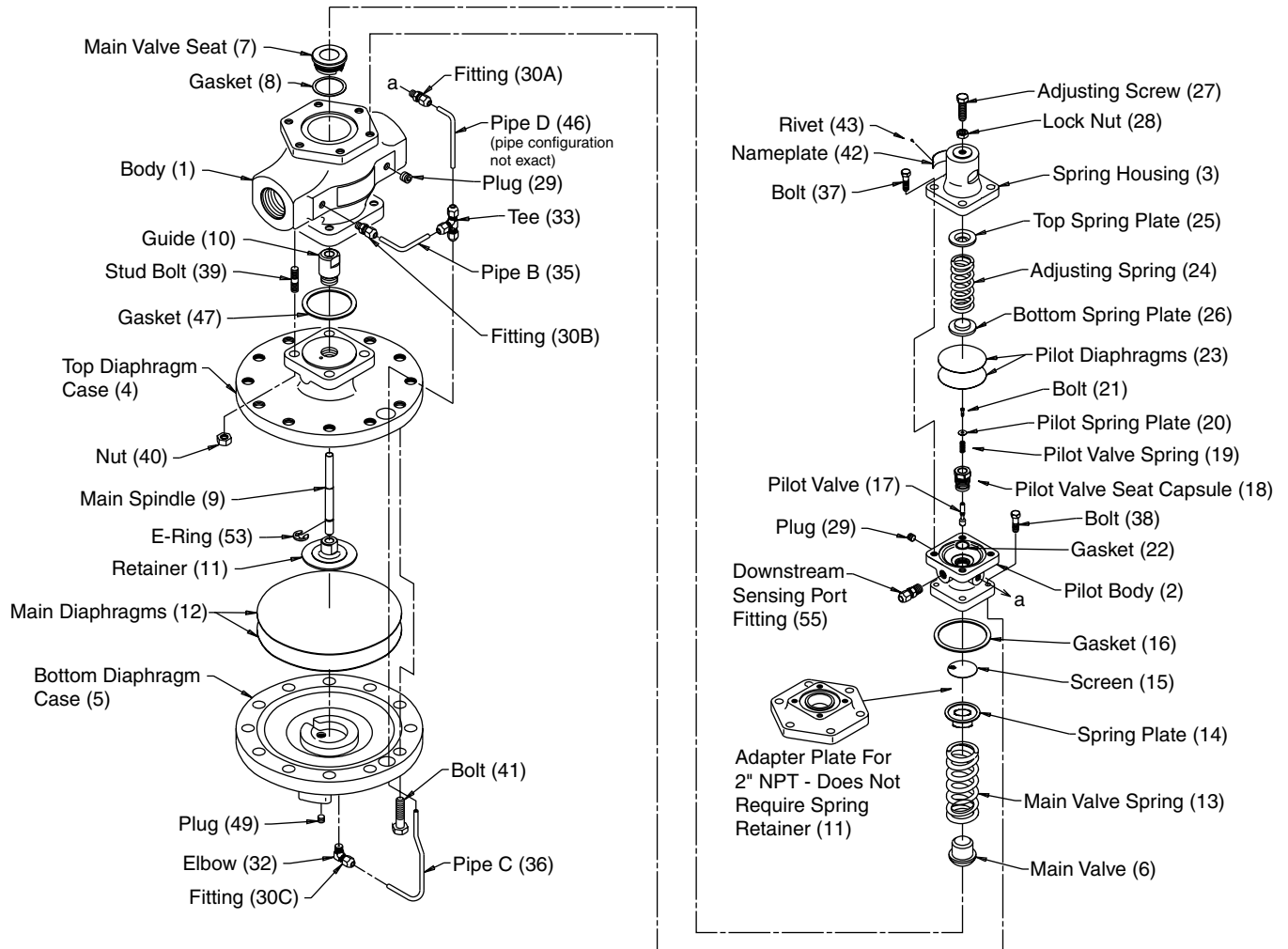
OB 2000PT Pilot Valve Assembly

**Figure 4-1
For Steam Service**



OB 2000PT Pressure/Temperature Regulating Valve Integral Mount Pilot Assembly

**Figure 5-1
For Steam Service**



Troubleshooting Guide

Problem	Cause	Solution
Temperature Regulator does not reach desired set temperature.	Improper adjustment.	Re-adjust according to Regulating Methods on Pages 2 and 3.
	Faulty steam trap draining equipment.	Check trap and correct problem.
	Inadequate pressure to eliminate condensate.	Re-pipe system.
	Bellows follower (10) was not installed.	Install bellows follower.
	No transfer medium applied to sensor.	Apply heat transfer paste to thermal bulb before installing in well.
	Incorrect capillary range.	Check label and change to correct range.
Temperature rises excessively.	Improper adjustment.	Re-adjust according to Regulating Methods on Pages 2 and 3.
	Dirt or scale on main valve (6) and main valve seat (7) or flawed valve and seat.	Disassemble and clean valve and seat, see Page 3 for disassembly. In case of flawed valve and seat replace them.
	Dirt or scale on pilot valve and stem (3), pilot valve seat (4).	Disassemble pilot and clean. See Page 3 for disassembly.
	Fitting orifice (30B) is blocked.	Remove and clean.
	Broken capillary system.	Replace capillary system.
	By-pass line leaks.	Repair by-pass line.
Large variation between thermometer and temperature regulator setting.	Thermal bulb or thermometer are installed in wrong location. See Page 1.	Relocate the thermal bulb so the fluid freely flows around 3/4" of the bulb and/or relocate the thermometer closer to the thermal bulb.
	Inlet pressure too high.	Lower inlet pressure. On low load applications, the lower the inlet pressure, the more stable the control will be.
	Dirt or scale on pilot valve and stem (3), guide (7) and pilot valve seat (4), main spindle (9) is dirty.	Disassemble and clean.
	Body gasket leaks.	Tighten bolts and replace gaskets
External leak.	Broken top bellows seal (5).	Replace top bellows seal. Kit K-2611