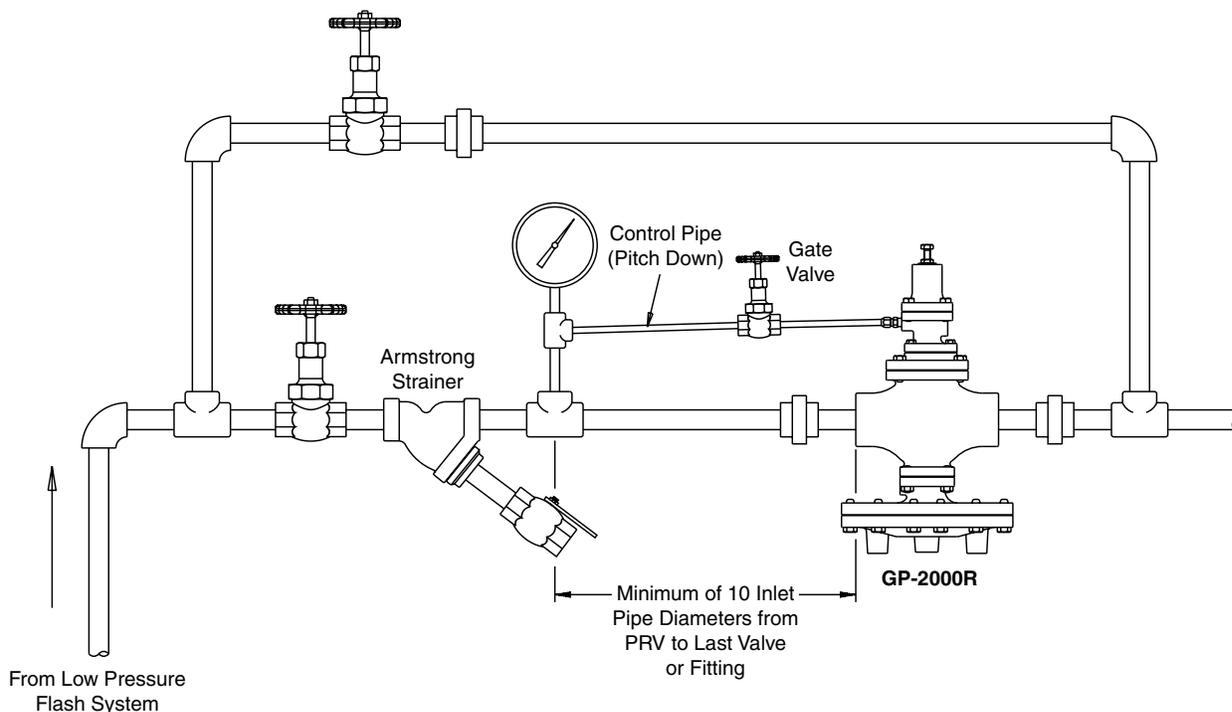




Model GP-2000R Back Pressure Regulator Installation, Operation and Maintenance Instructions

Typical Back Pressure Regulator Installation



This bulletin should be used by experienced personnel as a guide to the installation of the Model GP-2000R Back Pressure Regulator. Selection or installation of equipment should always be accompanied by competent technical assistance. You are encouraged to contact Armstrong International, Inc. or its local representative for additional information.

Installation Instructions

1. An Armstrong Inverted Bucket Steam Trap is recommended to drain condensate at inlet of regulator if required.
2. An Armstrong Y-Strainer (100 mesh) should be installed before the regulator to reduce the chance of dirt fouling.
3. Pressure gauges should be installed before the regulator. The upstream gauge should be installed in or near the control pipe.
4. Control pipe connections go into $\frac{1}{4}$ " tapping on the side of the pilot valve. Be certain the pipe is *pitched away* from the regulator. Erratic control could result if this is not done. Control pipe length should be a minimum of 10 inlet pipe diameters.
5. By-pass line around regulator will allow manual relief while valve is being serviced.
6. Install regulator with diaphragm down and with flow in the direction of the arrow on the body.

Spring Chart

Relieving Pressure	Color Code
3 to 21 psig	Yellow
14 - 157 psig	Green
143 - 200 psig	Brown

Confirm the valves before and after the regulator are closed, including the valve in the control pipe. Also, make sure that no pressure and drainage remains inside of the regulator.

Disassembly

Pilot valve (Figure 3-1)

1. Slightly loosen lock nut (28) and turn adjusting screw (27) counterclockwise to release adjusting spring (24) (no compression).
2. Remove bolts (37) of spring housing (3). Remove the spring housing, spring, top spring plate (25), bottom spring plate (26), and pilot diaphragms (23).
3. Remove seal bellows (61) using a ring spanner or socket wrench and remove gasket (62), pilot valve (63), and pilot valve spring (64).
4. Remove pilot valve seat (65) using a socket wrench.

Main valve (Figure 3-1)

1. Remove pipe A (34) at fitting (30A) and tee (33).
2. For nominal sizes 1/2" to 1-1/2", remove bolts (38) of pilot body (2). Dismount the pilot body from the body (1). And remove screen (15), spring plate (14), main valve spring (13) and main valve (6). For series 2" to 6", remove bolts of adapter plate and adapter from the main body (1). Remove main valve spring (13) and main valve (6).

Main diaphragm (Figure 3-1)

1. Remove pipe C (36) at tee (33).
2. Remove bolts (41) of bottom diaphragm case (5). Dismount the bottom diaphragm case, main diaphragms (12), retainer (11), and spindle (9). Check that spindle moves up and down freely and that no particulate or scale build-up is obstructing its performance.

Reassembly

1. Check that there is no damage on the main valve, main valve seat, pilot valve, and pilot valve seat. If any scratches exist on the seating surface of valve seat, they may cause an increase in outlet pressure and excess temperature. When any scratches exist on the main valve and valve seat, carry out lapping to remove them. If it is not possible to remove them, replace with new parts. When any scratches exist on the pilot valve and valve seat, replace with new parts.

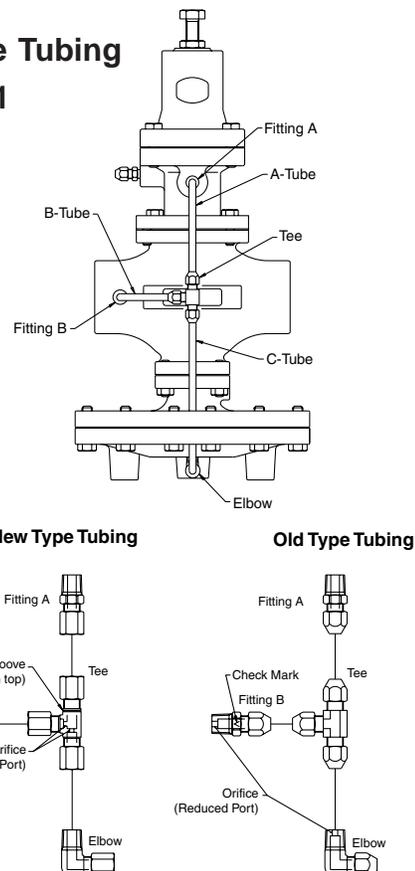
2. Move the sliding section (pilot valve, main spindle, etc.) two to three times and confirm they move smoothly. If they do not move smoothly, original performance may be affected.
3. Replace gaskets with new ones when disassembling. Steam may leak if gaskets are reused.
4. After the main valve, spring, and spring plate are assembled correctly, mount the main diaphragm. **Incorrect assembly may affect the original performance.**
5. Carry-out re-assembling in reverse order of disassembling. Tighten all hexagon bolts evenly on each bolt in turn of diagonal position. When re-assembling the product in the wrong order, proper function may not be possible. Uneven tightening of bolts may cause leakage of steam.

New Tubing Set-Up

The external tubing for our GP-2000R series has been modified to enhance the performance of these models. The following explains the difference between the old and new tubing assembly. It is important to have these fittings in the correct location in order to get optimum performance from these valves. It is very important that the old and new tubing assemblies are not mixed. The location of all fittings is critical and should not vary from the assembly instructions.

New Type Tubing

Figure 5-1



Note: Fittings and tee are to be located in similar positions for all GP-2000 models.

Troubleshooting Guide

Problem	Cause	Solution
Adjustment is impossible	Main diaphragm is damaged.	Remove pipe C (36) and open the by-pass valve. If fluid runs out from the elbow replace main diaphragm.
	Orifice of tee fitting is clogged.	Remove and clean it or replace.
	Screen is clogged	Remove and clean it or replace.
	Sensing pipe is clogged.	Remove and clean it or replace.
	Pressure guage is malfunctioning.	Replace the pressure guage.
	Incorrect pressure is being used.	Correct the pressure.
Excessive leakage.	Check for foreign matter stuck to main valve and main seat, or for scratches on these components.	Remove pipe A (34). If fluid runs out from tee when pressure is applied to the inlet side of the regulating valve at a pressure below the setting level, clean the main valve and main valve seat. When any scratches are identified, lap the main valve and main valve seat.
	Check for foreign matter stuck to pilot valve and pilot valve seat, or for scratches on these components.	If fluid runs out from joint when pressure is applied to inlet, remove the pilot valve assembly to clean or replace it.
	Bellows seal is damaged.	Remove the joint (to pilot body). If fluid runs out from the joint when it is supplied from pressure sensing port, replace the bellows seal.
	Fluid leaks from by-pass valve.	Repair or replace it.
Inlet pressure increases beyond the prescribed level.	Nominal size is too small for the application.	Change to an appropriate nominal size.
	The amount of steam released (amount used) at the regulating valve's outlet side is insufficient.	Increase the amount of released steam.
	Too much condensate collecting prior to the regulator.	Install a steam trap.
	The flow of steam is being obstructed at the outlet pipe of the regulating valve.	Check the pipe diameter and the isolation valve to be sure it is open.
	The pipe diameter for outlet side is too small.	Make a pipe diameter selection that will keep flow velocity less than 6000 ft/min.
	Strainer placed in front of regulating valve is clogged.	Disassemble and clean it.
Excessive error	Movement of pilot valve is not smooth.	Remove and clean or replace.
	Flow at the connection of the sensing pipe fluctuates excessively.	Examine the connections.
	Too much condensate collecting prior to the regulator.	Install a steam trap.
	Drain is present in the sensing pipe.	Connect the sensing pipe in upward slope to the regulating valve.

GP-2000-R Startup and Adjustment Procedures

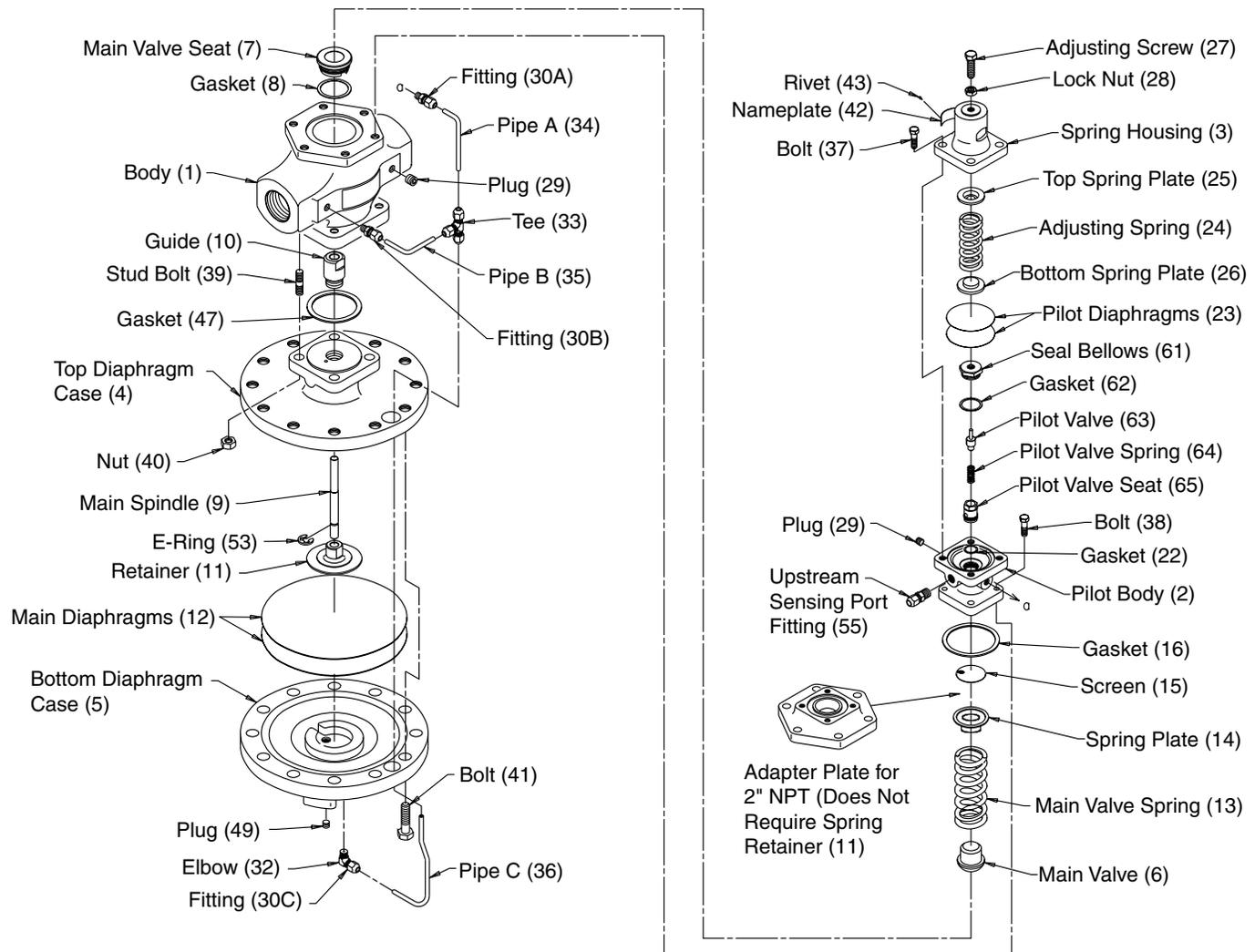
Improper adjustment of the pressure reducing valve may cause hunting, improper control and possible damage to the valve itself. Adjust the valve as follows:

1. Close the gate valves before and after the pressure reducing valve and blow fluid through the by-pass line. After draining, be sure to close the by-pass globe valve.
2. Turn the adjusting screw clockwise to **close** and counterclockwise to **open**.
3. Close the pilot valve **before** opening up the steam inlet valve.
4. Open the outlet valve to the full open position and then slowly open the inlet side gate valve to the full open position.
5. Slowly turn the adjusting screw clockwise until the desired pressure is obtained while watching the pressure gauge on the inlet side of the regulator. Turning clockwise will increase the set pressure of the back pressure regulator.
6. After adjustment, tighten the lock nut.

GP-2000R Back Pressure Regulator

For Steam Service

Figure 3-1

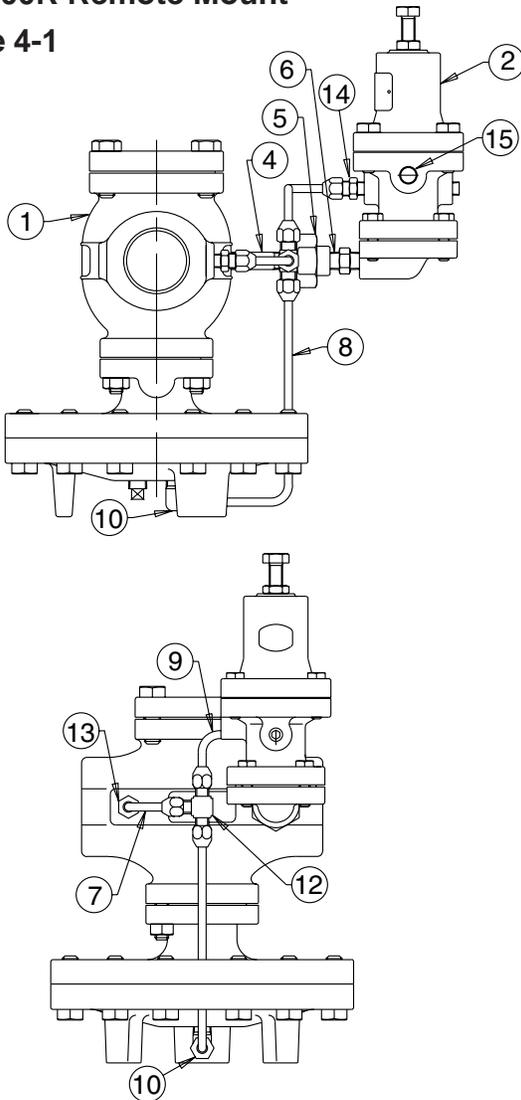


Tubing Assembly Instructions

1. All 2000 series valves with remote mount pilots have the following similar parts: 1/4" long nipple (4), 1/4" x 1/4" short nipple (6), fitting B (13), and union set (5). Use thread tape on the threads of both nipples.
2. Remove the 1/4" plug on the inlet side of the main valve (1) with an allen wrench.
3. Thread the 1/4" long nipple (4) into the main valve (1) in place of the 1/4" plug.
4. Thread one-half of the union set (5) onto the long nipple (4). Thread the other half onto the short nipple.
5. Thread the short nipple (6) into the pilot (2). The short nipple (6) will thread into the bottom cap of the pressure pilot (2) remote mount.
6. Place fitting "A" (14) into the pilot and thread into place. Note: This fitting is full port with no restriction fitting (14). Use Teflon® tape on valve fittings.
7. Once the union set (5) has been tightened it should be facing the main valve (1). See remote mount drawing.
8. Connect the "S" shaped D-tube (9) to the outlet of the pressure pilot at fitting "A" (14) and to the top of the tee (12) and tighten. Note: Make sure the downstream sensing port (15) on the pilot faces upstream.

GP-2000R Remote Mount

Figure 4-1



Part Listing

1. Main Valve Body
2. Back Pressure Pilot
3. Temperature Pilot (not shown)
4. 1/4" Long Nipple
5. Union Set
6. 1/4" x 1/4" Short Nipple
7. B-Tube
8. C-Tube
9. D-Tube
10. Elbow
11. Capillary (Not Shown)
12. Tee
13. Fitting B
14. Fitting A
15. Upstream Sensing Port

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Special Warranty Periods are as follows:

Flo-Rite-Temp Instantaneous Water Heater—The tube bundle shall have a 10-year guarantee against failure caused by materials or workmanship provided by Armstrong but not against gasket failure or damage caused by corrosion, water hammer or lack of proper cleaning.

Flo-Rite-Temp Packaged Instantaneous Water Heater—

Two (2) years from the date of installation, but not longer than 27 months from the date of shipment.

Flo-Direct Gas Fired Water Heater—The stainless steel structure and stainless steel internals shall have a 5-year guarantee against failure caused by materials or workmanship provided by Armstrong. Provided only clean potable water is heated.