



# Model GP-2000CS (Carbon Steel)

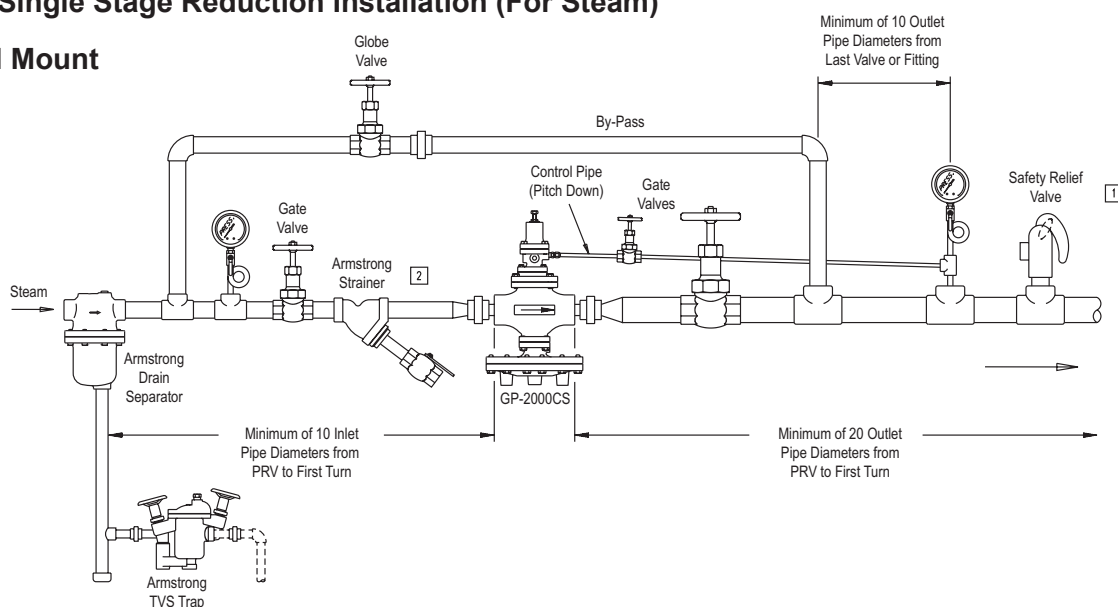
Pressure Reducing Valve

Integral

Installation, Operation and Maintenance

## Typical Single Stage Reduction Installation (For Steam)

### Integral Mount



*This bulletin should be used by experienced personnel as a guide to the installation of the Model GP-2000CS Pressure Reducing 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 Inverted Bucket Steam Trap is recommended to drain the condensate at the inlet of the PRV.
2. An Armstrong Y-Strainer should be installed before the PRV to reduce the chance of dirt fouling.
3. Pressure gauges should be installed before and after the PRV. The downstream gauge should be installed in or near the control pipe (5/16" O.D.).
4. Control pipe connections go into 1/4" tapping on the side of the pilot valve. Be certain the pipe is **pitched away** from the PRV to drain condensate away from pilot. Erratic control could result if this is not done. Control pipe length should be a minimum of 10 outlet pipe diameters from the last tee, elbow or fitting.
5. If a bypass line is needed to allow system operation while the valve is being serviced then install a quality globe valve on the bypass line. Leaking valves will cause system problems.
6. Piping immediately downstream of PRV should be expanded to accommodate low-pressure expansion through a PRV. Approximately 10,000 – 12,000 FPM maximum velocity. (Ref. Pg. 57 APB).
7. Install the PRV with diaphragm chamber down and with flow in the direction of the arrow on the body.
8. Do not install a quick opening or quick closing valve on the downstream side of the PRV. This can cause erratic pressure control and cause safety relief valves to discharge.

## Start-Up and Adjustment Procedures

Improper sizing or adjustment of the pressure reducing valve may cause hunting, scale problems, water hammer, etc. and can heavily damage the main parts of the valve. Adjust the valve as follows:

1. Close the gate valves before and after the pressure reducing valve and blow fluid leisurely through the by-pass line. Adjusting the opening of the by-pass globe valve so as not to blow the safety relief valve. After draining, be sure to close the by-pass globe valve.
2. Loosen the lock nut and adjusting screw to relieve the pressure on the adjusting spring.
3. Slowly open the inlet side gate valve to the full open position, and open the outlet side gate valve enough so that a little fluid can flow through.
4. Slowly turn the adjusting screw clockwise until the desired pressure is obtained while watching the pressure gauge at the outlet side.
5. Slowly open the outlet side valve to the full open position.
6. After adjustment, tighten the lock nut.

**NOTE:** Downstream usage must be present in order to set any pressure-reducing valve.

**Table 2-1. Spring Chart**

Reduced Pressure	Color Code
3 - 21 psig	Yellow
15 - 200 psig	Green
190 - 300	Brown

## Disassembly

Note: Before disassembly, check to make sure that the valves before and after the reducing valve are closed, including the valve in the control pipe. Also, make sure that the pressure has been relieved and that the valves are holding.

### A. Disassembly of the Pilot Valve

#### Ref: (Fig. 3-1)

1. Loosen the (28) lock nut, turn the adjusting screw (27) counterclockwise and turn until pressure is relieved from spring.
2. Remove the hex head bolts (37) and take out the top spring plate (25), adjusting spring (24), bottom plate (26) and two (2) pilot diaphragms (23).
3. Remove the (18) pilot valve capsule [hexagonal part at the center of the (2) pilot body]. Disassemble pilot valve capsule – place a 7/32" socket over small hexagonal screw in middle of capsule (21) and hold opposite end with a flat-head screwdriver. Turn counterclockwise to unscrew and expose valve stem and seat.

### B. Disassembly of the Main Valve

1. Disconnect the copper tubing on the side of the valve (30A), (30B), and (30C).
2. Remove the four hex head bolts (38) from the pilot

body (2) to remove the pilot from the main body (1). If the pilot is mounted remotely, remove the bolts to the main valve top cover. Care should be taken when doing this – the main valve is held by a spring, which is compressed. Once bodies are apart, remove spring retainer (14), screen (15), main spring (13) and main valve (6).

3. If the seat must be replaced, remove the four nuts (40) that attach the main body (1) to the top diaphragm case. The main valve seat is tightened from the bottom side of the body using a "T" bar. Loosen with "T" bar and unscrew main valve seat from the top.

### C. Disassembly of the Main Diaphragm

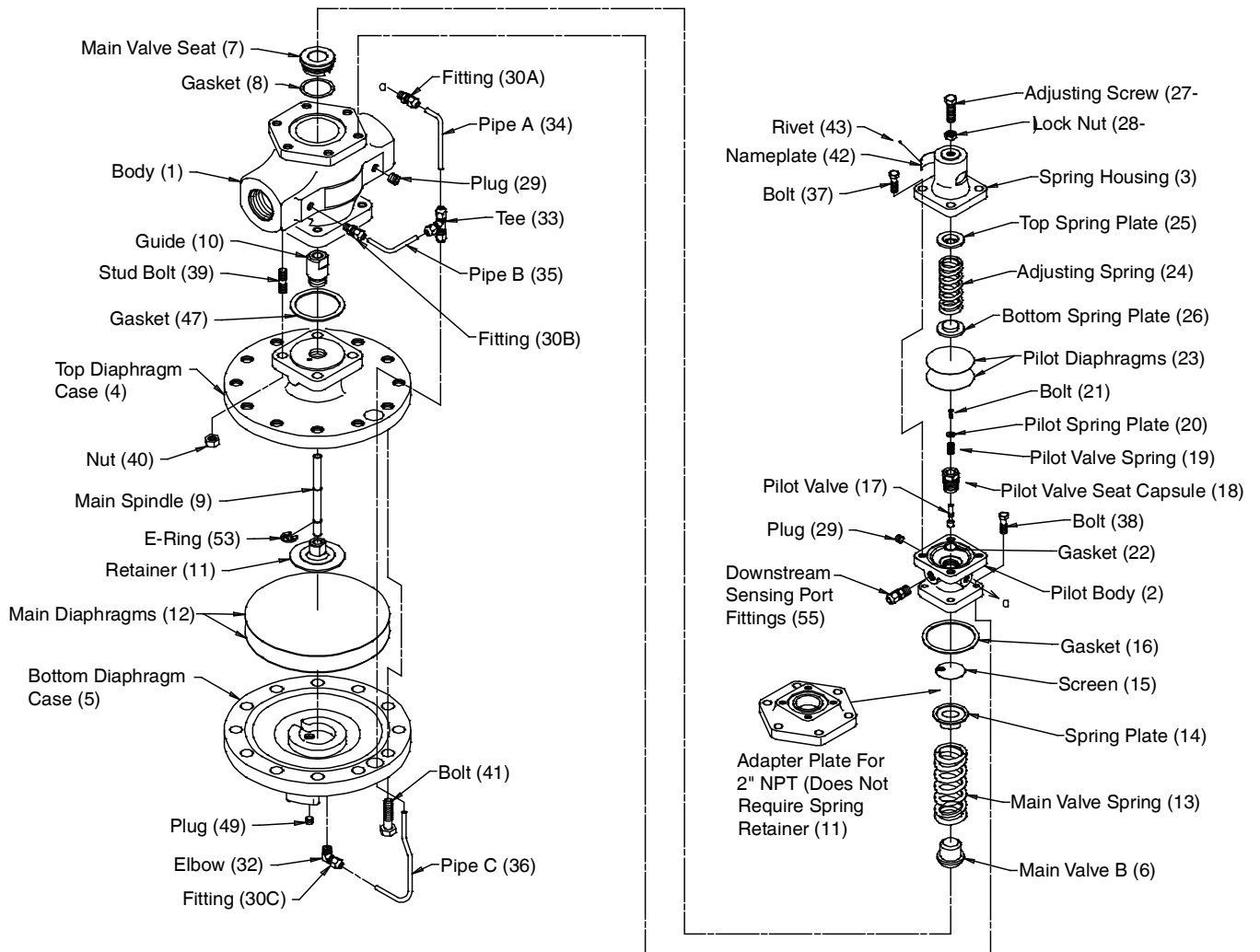
1. Remove all bolts (41) holding the bottom diaphragm cases (4 & 5) together.
2. Separate both halves. Remove both main diaphragms (12), retainer (11) and main spindle(9).

## Assembly

1. Check to make sure there are no scratches on the main valve, valve seat or pilot valve. If there are no scratches apply lapping compound and re-lap the valve and seat. (See Bulletin AY-768).
2. Make sure the sliding parts (Pilot valve stem and main valve stem) move freely.
3. Never-Seeze® gasket compound should be used on both main diaphragms and on bottom of pilot diaphragms.
4. Assemble valve in reverse order from disassembly.
5. Tighten bolts uniformly (crisscross pattern).
6. Verify if your valve has old or new type tubing to assure proper placement of orifices (see page 6).
7. Be sure fitting 30A, 30B and 30C and tee fitting (33) are in the correct position and not over tightened. Ref. Figure 6-1.
8. Make sure copper pilot valve gasket (22) and main valve seat gasket (8) are in place before tightening pilot valve capsule and main valve seat.

# Assembly

Figure 3-1



## Troubleshooting Guide

**Before working on the valve, make sure that the inlet strainer is clean, bypass valve is closed and upstream and downstream pressure gauges are working properly.**

Problem	Cause	Test	Solution
<b>Outlet Pressure does not reach desired value.</b>	Inlet pressure is not adequate for desired results.	Maximum outlet pressure is 85% of the inlet with a minimum DP = 7 psi.	Raise inlet pressure if possible.
	Adjustment is not proper.	Turn adjusting screw (27) clockwise.	Dismantle and clean.
	Orifice is too large in fitting (30B).	Remove and check.	Install proper fitting.
	Orifice of fitting (30C) is plugged.		Clean or replace fitting.
	Pilot valve is clogged.	Close inlet valve. Remove fittings (30A) and (30B). Turn (27) adjusting screw counterclockwise until it is loose. Open inlet steam valve and turn (27) adjusting screw clockwise. If fluid does not appear at (30A), pilot valve is clogged.	Disassemble and clean (18) pilot valve seat. Also, check (15) screen.
	Main diaphragms are damaged.	Close all valves and remove fitting (30C). Open bypass valve around PRV. If fluid appears out of diaphragm casing at (30C), diaphragm has failed.	Disassemble and replace (12) main diaphragms.
	Valve size is too small and cannot supply enough capacity.	Throttle downstream valve located downstream of sensing line. If desired pressure can be reached after throttling valve PRV is too small.	Resize and install larger valve.
<b>Secondary pressure exceeds the pressure setting.</b>	A) Adjustment is not proper.	Turn (27) adjusting screw counterclockwise.	Readjust.
	B) Orifice of fitting (30B or C) is plugged.	Remove and check.	Clean or replace fitting.
	C) Dirt is either caught between the main valve and seat or pilot valve and seat.	1) Close inlet and outlet steam valves. 2) Turn (27) adjusting screw counterclockwise until loose. 3) Remove all copper tubing from the side of the valve. 4) Open inlet steam valve. 5) If fluid appears at (30A), proceed to solution #1. 6) If fluid appears at (30B), proceed to solution #2 and also see 'D' below. 7) Fluid does not appear at either part, proceed to 'E' below.	1) Tighten or loosen adjusting screw to flush out dirt. If pilot valve still leaks, clean or replace it. 2) Disassemble and remove main valve (it will lift out easily). If it appears shiny at one point, apply lapping compound and lap the valve and seat (see bulletin AY-768 for lapping instructions).
	D) Dirt is between main spindle (9) and guide (10).	If valve fails test at (30B) (as described above in item 6) check while assembled.	Clean.
	E) By-pass valve is not shut or is leaking.	Close and listen with stethoscope.	Repair or replace.
	F) Sensing line is plugged.	Break union and open valve.	Clean and replace.
	G) Sensing line is not connected.	Refer to Drawings on Page 1.	Install sensing line as shown on installation drawing on Page 1.
<b>Operation is unstable.</b>	Orifice fitting is partially plugged.	Check (30B) and (30C).	Remove and clean or replace.
	Sensing pipe is installed at a point where there is too much turbulence.	Refer to Drawings on Page 1.	Install sensing pipe at another location.
	Liquid is collecting in sensing line.		Slant pipe away from PRV.
	Quick opening/closing valve located too close to the outlet or inlet PRV.		Relocate PRV.
<b>Excessive noise is present.</b>	Valve size is larger than what was required causing valve chatter.	Recalculate load. Check for valve chatter.	Change valve or add orifice plate to outlet of PRV.
	Pressure reduction ratio exceeds 20:1.	Verify inlet and outlet pressure.	Use two stage reduction.
	Fluid velocity is too high.	Verify with PRV software (consult factory).	Resize station using two stage reduction or use sound silencer down from PRV.
	Automatic valve (i.e. solenoid) is too close to PRV.	Visual.	Relocate.

## Tubing Set-Up

The external tubing for our GP-2000CS series has been modified to enhance the performance of these models. It is important to have these fittings in the correct location in order to get optimum performance from these valves. The location of all fittings is critical and should not vary from the assembly instructions.

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

**Figure 6-1**

