



865 South Business Park Drive
Port Arthur, TX 77640
409-988-0453
www.burlingvalves.com

Installation, Operation, and Maintenance Manual

Type BS-1

Direct Acting, Spring-Loaded Pressure Regulator Valves

INSTRUCTIONS FOR TYPE BS REGULATORS

CAUTIONARY NOTE

It is important that all procedures including start-up and shutdown outlined in this Manual are followed to avoid damage to the Regulator and to ensure Personal Safety.

TABLE OF CONTENTS

	Page	
1.	PRIOR TO INSTALLATION	2
2.	INSTALLATION	3
3.	OPERATION	4
4.	MAINTENANCE	5
5.	TROUBLESHOOTING	6

LIST OF ATTACHMENTS:

DRAWING BS 8003, DATED 12/7/00

Burling Valves

Proprietary & Confidential

I. PRIOR TO INSTALLATION

- 1.1 Upon receipt of the regulator, inspect for any damage that may have occurred during shipping
Check the nameplate on the regulator to ensure it conforms with what was ordered.
- 1.2 The serial number is of utmost importance for purposes of future reference of the regulator. Please record this number and provide with all future correspondence, or ordering parts.
- 1.3 The regulator and piping internal surfaces should be clean and free of debris. A filter or strainer may be necessary upstream of the regulator for improved performance.

BurlingValve Chatham NJ 07928 USA	
Tel 973-665-0601	SERIAL NUMBER <input type="text"/>
Fax 973-665-0603	MODEL NUMBER <input type="text"/>
	PRESSURE RATING <input type="text"/>

Burling Valves

Proprietary & Confidential

II. INSTALLATION

2.1 Installation Guidelines

Provide space below, above, and around the regulator to allow for removal of parts during maintenance. **IF VALVE IS TO BE WELDED INTO PIPING SYSTEM**

- a) **ALL INTERNAL TRIM AND SOFT GOODS MUST BE REMOVED PER DISASSEMBLY INSTRUCTION IN THIS MANUAL.**
- b) In screwed end regulators, use pipe compound sparingly on male threads only
- c) Install isolation valves and pressure gauges to provide means for adjustment, operation, by-pass, or removal of the regulator.
- d) The operating temperature/pressure must never exceed the maximum allowable rating of the regulator.

2.2 Valve Position

Install the valve with the flow in the direction of the arrow cast or stamped into the valve body. For liquids bleed off any trapped air through the external sensing port (port "A" – Part Number 55 on DWG. A-8003).

2.3 Recommended Piping Dimensions:

For best performance, it is recommended that the piping upstream and downstream of the regulator be straight and free from any restrictions for a minimum length of approximately fifteen (15) to twenty (20) pipe diameters. For external sensing, the sensing point should be downstream, at a point of minimum turbulence, usually 10-15 pipe diameters

- a) Pipe size should be given special consideration, particularly downstream of the regulator, to ensure that the fluid velocity does not exceed industry standards/guidelines. Expanders may need to be utilized to accomplish this.

2.4 Considerations for Valves with External Sensing

- a) The Type BS valve may be installed with internal or external sensing (never both). The valve may be easily converted in the field from one sensing mode to the other. Generally, external sensing is used when the effects of downstream system pressure losses (fluid friction, velocity flow) can be significant. For valves set up for external sensing, use an external control line. The line is connected from the port (1/4" NPT) on the side of the body flange to a point of minimum turbulence as described in paragraph 2.3 above. Use 1/4" outer diameter tubing or pipe having an inner diameter equivalent to schedule 40 pipe. Slope the external sensing line downward 2° to 5° to the downstream piping to prevent water pockets.
- b)

Burling Valves

Proprietary & Confidential

III. OPERATION

3.1 General:

- The valve is normally open. Pressure enters the inlet port and flows through the seat orifice and out of the valve. The downstream pressure is sensed on the underside of the diaphragm by either an internal sensing port within the valve body, or by means of an external sensing line. Note that unless specified by the customer at the time of order, the valve has internal sensing. If external sensing is utilized, ensure that a control line is connected from the external sensing port to the desired sensing location in the process.
- a) The downstream pressure that is pushing up on the membrane is opposed by the spring force that is pushing down on the membrane. The valve plug will move up or down until these two forces are equal, which occurs when the downstream pressure equals set point.
- b) To adjust the reduced pressure, simply turn the adjusting screw, P/N 56, clockwise to increase the pressure, or counterclockwise to decrease the pressure. The reduced pressure adjustable range is determined by the particular spring installed in the regulator. If a different spring range is required, order a new spring only from Burling Valve, since tolerances and ratings are critical. The standard available spring (specials are available upon request) are tabulated below; (Contact factory if metal membrane was originally supplied)
- c) The operating temperature/pressure must never exceed the maximum allowable rating of the regulator.
- d)

SPRING RANGE CHART							
Valve Size (inches)	Available Spring Ranges (PSI)						
1/2, 3/4, 1	0.1 – 10	2-20	10-35	20-80	30-150	70-200	100-300
1-1/2	0.2 – 10	5-20	15-45	10-70	40-125	70-200	-
2	0.2 – 5	5-15	10-30	15-50	30-90	50-150	-
2-1/2, 3	5 – 20	10-40	10-70	40-125	-	-	-

3.2 Start-up Procedure:

- a) Fully open the outlet stop valve.
- b) Slowly open the inlet stop valve.
- c) Readjust the outlet stop valve to permit a slight flow when adjusting the Type BS regulator.
- d) Adjust the spring setting by turning the screw clockwise for increased outlet pressure and counter-clockwise for decreased outlet pressure.
- e) Gradually open the outlet stop valve
- f) Readjust the pressure setting as a desired flow condition.

3.3 Shutdown Procedure:

- a) Shut off the inlet stop valve.
- b) Allow sufficient time for the trapped pressure between the inlet stop valve and the Type BS valve to bleed down to the set pressure. Check by using upstream gauge.
- c) Remove the spring compression by turning the adjusting screw counter-clockwise to reduce the outlet pressure.
- d) Shut off the outlet stop valve
- f) Relieve the trapped upstream and downstream pressures
- g) The regulator may now be disassembled for inspection. Always wear safety apparel when operating or dismantling the valve.

Burling Valves

Proprietary & Confidential

IV. MAINTENANCE

4.1 General:

- a) The Type BS valve may be serviced without removing it from the pipeline. The regulator is especially designed with quick-change trim for easy maintenance.
- b) Check the nameplate for **serial number**, Model number (valve size, body material, type number, pressure rating, and sensing number).
- c) If external sensing is used, be sure that the external sensing (control) line is connected.

REFER TO DRAWING A-8003 FOR RECOMMENDED SPARE PARTS. USE ONLY ORIGINAL EQUIPMENT SUPPLIED BY BURLING VALVE FOR RE-BUILD OR REPAIR OF TYPE BS REGULATORS.

4.2 Disassembly Procedure for Regulators with Elastomeric and Metal Membranes:

- a) Shut down the system in accordance with Sub-section 3.3.
Remove the chamber (P/N 20) by removing the body nuts (P/N 52) and body bolts (P/N 51). **BE SURE TO ELIMINATE ALL SPRING COMPRESSION PRIOR TO REMOVAL OF THE CHAMBER.**
- b) Remove the membrane nut (P/N 50). When removing this nut, hold the valve stem (P/N 4) by the Hex on the top of the stem. Remove the upper (P/N 7) and lower (P/N 6) membrane plates along with the membrane (P/N 9).
- c) Remove the cylinder bolts (P/N 53).
Pipe size should be given special consideration, particularly downstream of the regulator, to ensure that the fluid velocity does not exceed industry standards/guidelines. Expanders may need to be utilized to accomplish this.
- d) Remove the complete inner trim by pulling up on the valve stem. The inner trim resembles the trim shown in **Figure 1**. (See drawing A8003 attached.)

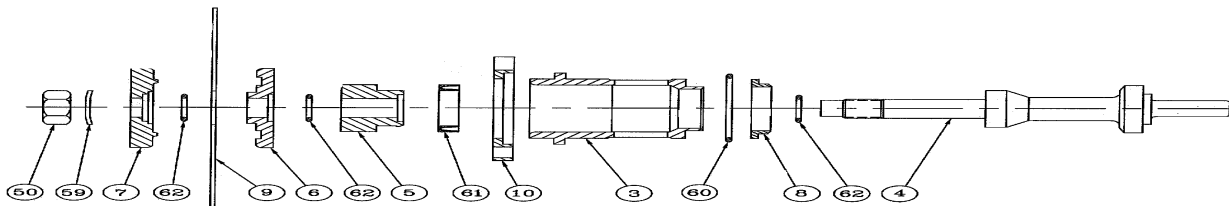


FIGURE 1

- g) Disassemble the complete inner trim by pulling the valve stem out of the piston.
- g) Inspect all of the parts for deterioration/damage.
Check and replace as required all soft goods. Check with factory or your local Burling Valve sales representative for price and availability for parts (rebuild) kits.
- h) Be sure to provide the valve serial number when ordering. **USE ONLY FACTORY SUPPLIED PARTS FOR PROPER RECONDITIONING**

4.3 REASSEMBLY

- a) Reassemble the valve by reversing the applicable disassembly procedure.
- b) The cylinder bolts should be torqued to 15-18.-ft. lbs.
- c) The body bolts should be torqued to 1/2" to 1-1/2" 25-30 ft. -lbs. 2" to 4" 30-35 ft. lbs. TORQUE values for membrane nuts 70-80 ft.- lbs on 1/2" through 1" size valves and 120-130 ft.-lbs. On 1-1/2 " and larger size valves. Wait at least 15 minutes, then re-torque the membrane nut again. The torque value decreases because the membrane material takes a compression set. **ONLY AFTER THE MEMBRANE NUT RETAINS THE SPECIFIED TORQUE VALUE SHOULD THE REASSEMBLY CONTINUE. THIS TORQUE IS CRITICAL IN ORDER TO OBTAIN THE MAXIMUM LIFE FROM THE STEAM MEMBRANE ASSEMBLY.**
- d)

Burling Valves

Proprietary & Confidential

V. TROUBLESHOOTING

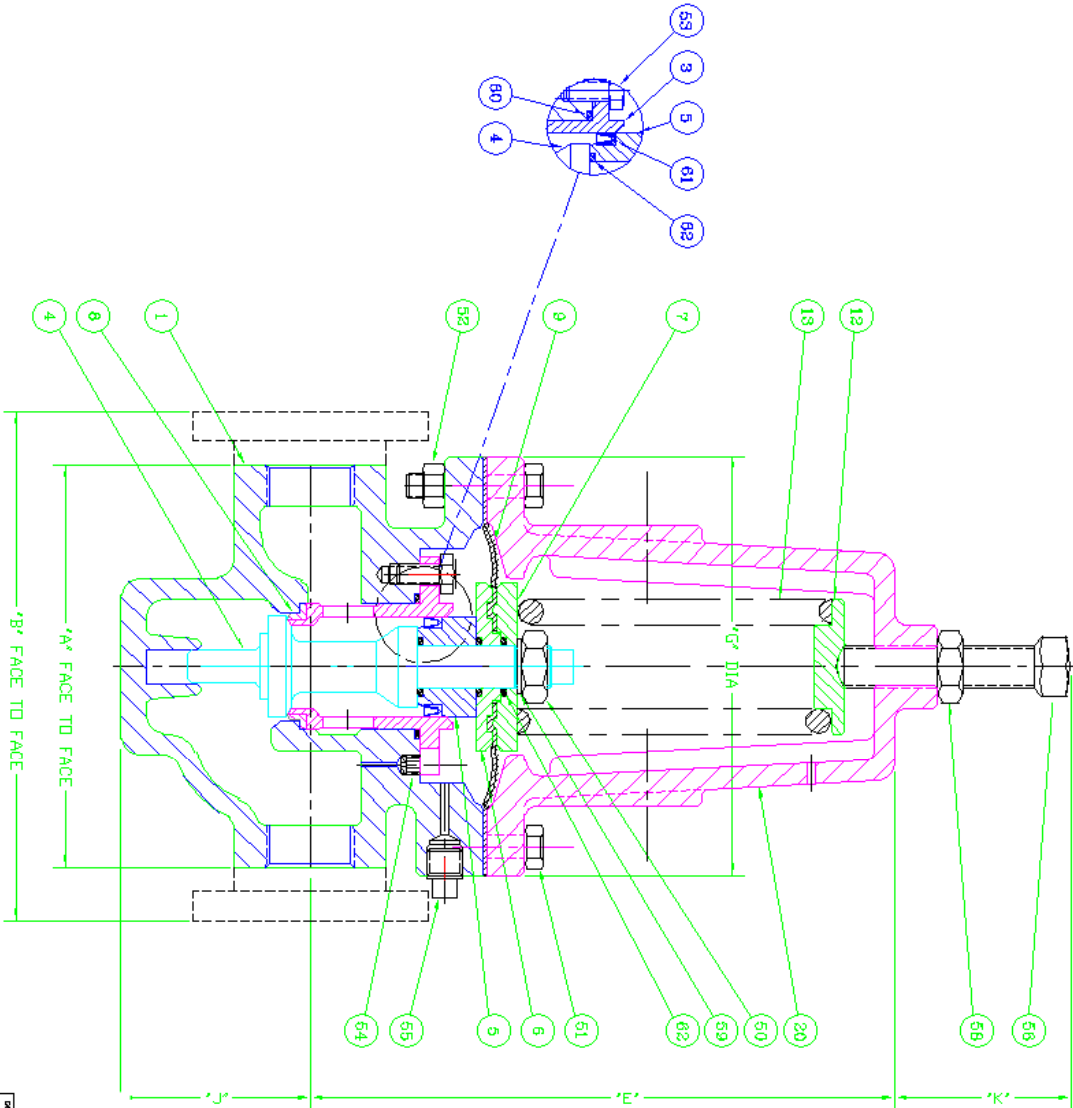
Below is a partial list of potential difficulties that may be encountered along with corresponding possible causes and remedies.

OBSERVED PROBLEM	POSSIBLE CAUSE	REMEDY
Over-riding delivery pressure, or failure of main valve to close.	<ul style="list-style-type: none">• Setting of adjusting spring may have been tampered with• Valve may be held open due to debris on seat	<ul style="list-style-type: none">• Readjust as necessary• Clean and/or replace parts as necessary
Hunting	<ul style="list-style-type: none">• Valve may be sticking due to debris buildup on stems and guiding passages	<ul style="list-style-type: none">• Clean and/or replace parts as necessary
Sagging delivery pressure, or failure of main valve to open.	<ul style="list-style-type: none">• Setting of adjusting spring may have been tampered with• Initial pressure (noted on pressure gauge at inlet to valve) may be down• Sensing port (or line if external sensing is used) may be plugged	<ul style="list-style-type: none">• Readjust as necessary• Confirm initial pressure is at minimum required level to obtain desired delivery pressure• Clean as necessary

Burling Valves

Proprietary & Confidential

VALVE SIZE	"A" SCREWED ENDS	156# CL./D.L.	160# C.S./S.S.	160# BRONZE	260# CL./D.L.	300# C.S./S.S.	300# BRONZE	600# C.S./S.S.	1900# C.S./S.S.	"E" DIM	"G" DIA	"I" DIM	"K" MAX
1/2"	6"		8 5/8"	9 5/8"		8 3/8"	9 5/8"	9 5/8"		8 11/16"	6 1/4"	2 13/16"	3 1/4"
3/4"	8"		8 3/8"	9 5/8"		8 3/8"	9 5/8"	9 5/8"		8 11/16"	8 1/4"	2 13/16"	3 1/4"
1"	6"		8 3/8"	9 5/8"		8 3/8"	9 5/8"	9 5/8"		8 11/16"	6 1/4"	2 13/16"	3 1/4"
1 1/2"	9 7/8"		12 1/2"	11 1/2"		12 1/2"	11 1/2"	13 1/2"		12"	8"	3 3/4"	3 1/4"
2"	9 7/8"		18 1/2"	11 1/2"		12 1/2"	11 1/2"	13 1/2"		12"	8"	4"	3 1/4"
2 1/2"		10 7/8"	10 7/8"	10 7/8"		11 1/2"	11 1/2"	13 1/2"		20 3/8"	10"	5 1/4"	4 1/2"
3"		12"	12"	12"		12 1/2"	12 1/2"	13 1/2"		19 5/32"	10 3/4"	5 5/16"	4 1/2"
4"		14"	14"	14"		14 1/2"	14 1/2"	14 1/2"		19 5/32"	10 3/4"	5 5/16"	4 1/2"



62	3	STEM SEAL
81	1	PISTON SEAL
80	1	CYLINDER SEAL
59	1	BELEVILLE WASHER
58	1	LOCK NUT
55	1	ADJUSTING SCREWS
54	1	PIPE PLUG
53	1	INTERNAL PLATE
52	3	CYLINDER BOLT
51	6	BODY NUT
50	1	BODY BOLT
		STEM NUT
20	1	CHAMBER
19	1	ADJUSTING SPRING
12	1	SPRING PUSHER
9	2	MEMBRANE
8	1	SEAL
7	1	UPPER MEMBRANE PLATE
6	1	LOWER MEMBRANE PLATE
5	1	PISTON
4	1	STEM
3	1	CYLINDER
1	1	BODY

ITEM NO. QTY DESCRIPTION
 1 1 BODY

BURLING VALVE
 CHANTAM, NEW JERSEY
 PRESSURE REDUCING VALVE
 TYPE 88 (U- CUT)
 1/2" THRU 4"

FORM NO. R.G. 12/7/00
 DATE
 D
 PART NO. 88003
 QTY
 NTS