



MODEL C-BPV

BACK PRESSURE / RELIEF REGULATOR

SECTION I

I. DESCRIPTION AND SCOPE

Model C-BPV is a self-contained back pressure / relief regulator utilized in sanitary biotechnological process piping systems and is used to control upstream (inlet or P_1) pressure. Inlet and outlet sizes are 3/4", 1", 1-1/2", 2" and 3". This angle style regulator is only suitable for liquids and gases at temperatures less than 300°F (149°C). Refer to Technical Bulletin C-BPV-TB for specific design conditions.



CAUTION

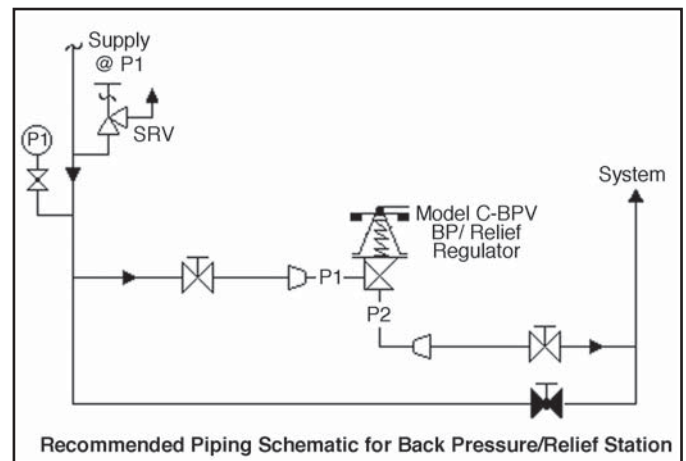
This is not a safety device and must not be substituted for a code approved pressure safety relief valve or a rupture disc.

SECTION II

II. INSTALLATION

A. General:

1. A diaphragm valve should be installed upstream of the regulator.
2. An inlet pressure gauge should be located approximately ten pipe diameters upstream and within sight.
3. All installations should include an upstream relief device if the inlet pressure could exceed the pressure rating of any equipment or the maximum inlet pressure rating of the unit.
4. Flow Direction: Install so flow enters through the side connection and exits the bottom connection.
5. Install with spring chamber (2) in the vertical up position to allow for proper draining.



Recommended Piping Schematic for Back Pressure/Relief Station



CAUTION

Installation of adequate overpressure protection is recommended to protect the regulator from overpressure and all downstream equipment from damage in the event of regulator failure.

SECTION III

III. PRINCIPLE OF OPERATION

A. General:

1. Movement occurs as pressure variations register on the diaphragm. The registering pressure is the inlet, P_1 or upstream pressure. The range spring opposes diaphragm movement.
2. A complete diaphragm failure may cause the regulator to fail close, and process fluid will discharge from the spring chamber vent hole.

As the inlet pressure drops, the range spring pushes the diaphragm down, closing the port; as inlet pressure increases, the diaphragm pushes up and the port opens.

SECTION IV

IV. START-UP

A. General:

1. Ensure that lock-open pin (10) and quick release pin (15) are in proper position. See Section VII.
2. Confirm that the proper range spring is indicated to be within the regulator by inspection of the unit's nameplate. Apply setpoint pressures that are only within the stated range.
3. When stating direction of rotation of the adjusting screw, the view is with respect to looking down towards the spring chamber or its normal location.

B. For systems utilizing an upstream block valve:

1. Start with the block valve closed. A bypass valve may be used to maintain inlet pressure in the upstream system without changing the following steps.
2. Relax range spring (7) by turning T-handle (6) counter-clockwise (CCW) until rotation stops. Rotate T-handle (6) clockwise (CW) three (3) full revolutions to maintain spring (7) to diaphragm-plug assembly (14) contact. This reduces the inlet (upstream) pressure setpoint.
3. Slowly open the block valve until fully open.
4. Observing the inlet (upstream) pressure gauge, rotate the T-handle (6) clockwise (CW) slowly until the inlet pressure begins to rise. Rotate CW until the desired setpoint is reached.
5. If the inlet (upstream) pressure exceeds the desired setpoint pressure, rotate the T-handle (6) CCW until the pressure decreases.
6. When flow is established steady enough that the block valve is fully open, begin to slowly close the bypass valve, if installed.

7. Develop system flow to a level near its expected normal rate and reset the regulator setpoint by turning the T-handle (6) CW to increase inlet pressure or CCW to reduce inlet pressure.
8. Reduce system flow to a minimum level and observe setpoint. Inlet pressure will rise from the setpoint of Step 6. (Ensure that this rise does not exceed the stated upper limit of the range spring by greater than 30%, i.e. 20-60 psig (1.38-4.14 Barg) range spring, at maximum flow the inlet pressure should not exceed 1.3 x 60 psig (4.14 Barg) or 78 psig (5.4 Barg). If it does, consult the factory.)
9. Increase flow to maximum level, if possible. Inlet (upstream) pressure should fall off. Re-adjust setpoint as necessary at the normal flow rate.

C. For systems not utilizing an upstream block valve:

1. Relax range spring (7) by turning T-handle (6) counter-clockwise (CCW) until rotation stops. Rotate T-handle (6) clockwise (CW) three (3) full revolutions to maintain spring (7) to diaphragm-plug assembly (14) contact. This reduces the inlet (upstream) pressure setpoint.
2. Closely monitor inlet (upstream) pressure, via gauge, to ensure not over-pressurizing as system flow is established. Rotate T-handle (6) CW slowly until the inlet pressure begins to rise to desired setpoint. Slowly close the bypass valve, if installed.
3. If the inlet pressure exceeds the desired setpoint pressure, rotate the T-handle (6) CCW until the pressure decreases.
4. Follow instructions in "B", Steps 7 thru 9.

SECTION V

V. SHUTDOWN

1. On systems with a bypass valve, and where system pressure is to be maintained as the regulator is shutdown, slowly open the bypass valve while closing the inlet (upstream) block valve. Fully close the inlet (upstream) block valve. (When on bypass, the system pressure must be constantly observed and manually regulated.)

2. If the regulator and system are both to be shutdown, slowly close the inlet (upstream) block valve.



CAUTION

Do not walk away and leave a bypassed regulator unattended.

SECTION VI

VI. MAINTENANCE

WARNING

SYSTEM UNDER PRESSURE. Prior to performing any maintenance, isolate the regulator from the system and relieve all pressure. Failure to do so could result in personal injury.

A. General:

1. Unit's lock-open feature allows this regulator to be cleaned in-line; see Section VII.
2. Maintenance procedures hereinafter are based upon removal of regulator unit from the pipeline where installed.
3. Owner should refer to owner's procedures for removal, handling, cleaning and disposal of non-reusable parts.

NOTE: For those fluids which could create a potential hazard to personnel working on this unit, owner must provide an OSHA approved MSDS (Material Safety Data Sheet), and a signed statement attesting to the fact that the unit has been flushed out, for a specific period of time, using an OSHA acceptable neutralizing agent. The name of the agent, manufacturer's name and total concentration level must also be included for both the service medium as well as the neutralizing agent. Returns WILL NOT BE ACCEPTED by Cashco, Inc. without an MSDS form attached to the outside of shipping carton.

4. Refer to Figure 2 for item number reference ().

B. Trim Replacement:

1. Securely install the body (1) in a vise with the spring chamber (2) directed upwards. Ensure that the body (1) is not held in the vise by the edge of the end connection flange.

WARNING

SPRING UNDER COMPRESSION. Prior to removing the clamp (13), relieve spring compression by rotating the T-handle (6) CCW when viewed from above. Failure to do so may result in flying parts that could cause personal injury.

2. Relax range spring (7) by turning T-handle (6) CCW until rotation stops.
3. Loosen clamp (13) and remove.
 - a) For Opt. -80 high pressure 2-piece

clamp (13A): Loosen and remove clamp nuts (13B), washers (13D), bolts (13C) and clamps (13A).

4. Lift spring chamber (2) and T-handle (6) with captured parts up off body (1).
5. Lift tab on diaphragm/plug assembly (14) to remove and inspect body (1) cavity. If excessive wear is apparent, replace with new diaphragm/plug assembly (14). **NOTE:** Diaphragm is molded to plug.
6. Align diaphragm/stem (1.3) assembly in center of the of body (1) cavity. Ensure that "tab" on diaphragm (1.3) is positioned in recess of body (1.1) flange lip.
7. Clean in accordance to owner's specifications.

CAUTION

Owner's cleaning solution must be compatible with regulator's trim materials.

8. Position spring chamber (2) and T-handle (6) with captured parts on to body (1).
9. Reposition clamp (13) around body (1) and spring chamber (2) and hand tighten.
 - a) For Opt.-80 high pressure 2-piece clamp (13A): Re-position clamps (13A) around body (1) and spring chamber (2) flanges. Insert clamp bolts (13C), washers (13D) and tighten clamp nuts (13B) in alternating pattern. **(NOTE:** Gap between clamp (13A) halves should be equal in size. Gap and torque requirements are as follows:

GAP	TORQUE
Equal Distance	225-250 ub-lbs (25-28 N-M)

10. Return to Section II. for Installation, Section IV. for Start-up and Section VII. for Cleaning Procedure.

C. Changing Range Springs:

WARNING

SPRING UNDER COMPRESSION. Prior to removing the clamp (13), relieve spring compression by rotating the T-handle (6) CCW when viewed from above. Failure to do so may result in flying parts that could cause personal injury.

1. Relax range spring (7) by turning T-handle (6) CCW until rotation stops.
2. Remove quick release pin (15) and lift lever (16) and T-handle (6) off of post end of adjusting screw (5).
3. Loosen clamp (13) and remove.
 - a) For Opt. -80 high pressure 2-piece clamp (13A): Loosen and remove clamp nuts (13B), washers (13D), bolts (13C) and clamps (13A).
4. Lift spring chamber (2) off of body assembly (1).
5. Remove the adjusting screw (5), spring button (4) and spring (7).
6. Install new spring (7) on to hub of pressure plate (3). Refer to Table 2 for spring selection.
7. Place spring button (4) and adjusting screw (5) over post end of pressure plate (3) and into spring (7) cavity.

NOTE: Apply a small amount of Emhart Bostic White Food Grade “NEVER-SEEZ” or equivalent to threads of

adjusting screw (5) and the shoulder of adjusting screw where it make contact with the spring chamber (2).

8. Align slot guides inside spring chamber (2) with spring button (4) “ears” and position on to body (1).
9. Place T-handle (6) on post end of adjusting screw (5). Hold lever (16) in a horizontal position on top of the T-handle (6) to align drill holes with hole in post end of pressure plate (3). Insert quick release pin (15). Refer to Figure 2 for lever (16) alignment.
10. Reposition clamp (13) around body (1) and spring chamber (2) and hand tighten.
 - a) For Opt.-80 high pressure 2-piece clamp (13A): Re-position clamps (13A) around body (1) and spring chamber (2) flanges. Insert clamp bolts (13C), washers (13D) and tighten clamp nuts (13B) in alternating pattern (**NOTE:** Gap between clamp (13A) halves should be equal in size. Refer to Section VI.B.9 for gap and torque requirements.
11. Return to Section II. for Installation, Section IV. for Start-up, and Section VII. for Cleaning Procedure.

SECTION VII

VII.CLEANING PROCEDURE

A. Pre-Sanitation:

1. Owner should refer to owner’s operating procedures for system shutdown to include relieving all system pressure.
2. Refer to Figure 2 for item number reference ().
3. Lift lever (16) to vertical position. **NOTE:** Do not change range spring (7) setting by rotating T-handle (6).
4. Remove the lock-open pin (10) from the pin retainer hole in the spring chamber (2) and insert it into drilled passage through the adjusting screw (5). (See Figure 1.)

B. Sanitation:

1. Flush, drain and sanitize system in accordance to owner’s specifications.

NOTE: CIP is limited to 50 psig (3.45 Barg) maximum cleaning solution pressure at 300°F (149°C). SIP is recommended to 20 psig (1.38 Barg) saturated steam pressure; can withstand 30 psig (2.07 Barg), but may reduce elastomer life expectancy.

C. Post-Sanitation:

1. Prior to system start-up, remove the lock-open pin (10) from the adjusting screw (5) and insert it into the pin retainer hole. Lower lever (16) to horizontal position. Unit is again operative at the setpoint established prior to cleaning.

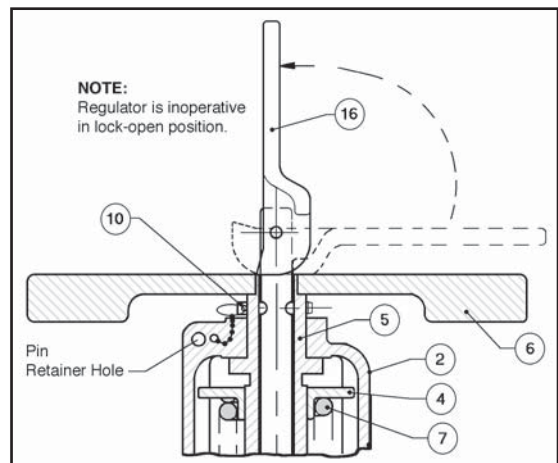


Figure 1: Spring Chamber in Lock-Open Position.

CAUTION

Owner’s cleaning solution must be compatible with regulator’s trim materials.

SECTION VIII

VIII. PARTS ORDERING INFORMATION

Selection of parts is minimal due to the regulator's basic construction. Refer to the three methods below to obtain parts ordering information/numbers.

METHOD A – USE OF PRODUCT CODE.

- Step 1. If available, obtain the 18 character product code number from:
- a. The Bill of Materials sheet attached herein.
 - b. The metal tag attached to the regulator.

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NOTE: Some regulators may not have the product code located on the metal tag.

- Step 2. Identify which parts are desired from the Bill of Materials sheet attached herein or the Parts Kit Nos. Table 1. Kit "B" contains diaphragm and plug assembly.
- Step 3. Contact your local Cashco, Inc., Sales Representative and specify the product code number and the part numbers required.

METHOD B – NO PRODUCT CODE AVAILABLE – DISASSEMBLED REGULATOR.

- Step 1. Determine all available information from regulator's metal tag.
- a. Serial number.
 - b. Regulator "Type" or "Model" number.
 - c. Size.
 - d. Trim.
 - e. Spring range.

**TABLE 1
MODEL C-BPV
PARTS KIT NUMBERS
(Kit Nos. Shaded)**

Trim Design No.	Kit Abbr.	Size		
		1"	1-1/2"	2"
R1	B	CR6-BR1K-B	CR8-BR1K-A	CR9-BR1K-A
R3	B	CR6-BR3K-B	CR8-BR3K-A	CR9-BR3K -A

- Step 2. Contact your local Cashco, Inc., Sales Representative for proper identification numbers.

METHOD C – NO PRODUCT CODE AVAILABLE – ASSEMBLED REGULATOR IN SERVICE.

- Step 1. Determine all available information from metal tag using Step 1, Method B.
- Step 2. Contact your local Cashco, Inc., Sales Representative with the above information.
- Step 3. Sales Representative will contact the factory to determine the original internal construction. Factory will relay information to the Sales Representative.
- Step 4. Await the Sales Representative's return contact with the proper part numbers.

**TABLE 2
MODEL C-BPV
*COLOR-CODED SPRING CHART**

Stainless Steel Range Spring		
Size	Range Spring psig	Part Number/Color
1" & 1-1/2"	10-30	830-78-5-00107-00 (Red)
	20-60	830-78-5-00108-00 (Lt. Blue)
	40-75	830-78-5-00111-00 (Green)
2"	10-30	830-78-5-06215-00 (Dk. Green)
	20-60	830-78-5-06298-00 (White)
	40-75	830-78-5-08940-00 (Lt. Blue)

***NOTE:** If it becomes necessary to change a regulator's range spring and install a new spring for a different pressure range, A NEW CASHCO, INC. NAMEPLATE MUST BE AFFIXED TO THE REGULATOR. Contact your local Cashco, Inc. Sales Representative and specify the new pressure range and the serial number off the existing name plate. They will contact the factory who will review unit's original internal construction and determine new operating pressure limits. Await the Sales Representative's return contact with the proper part numbers and cost.

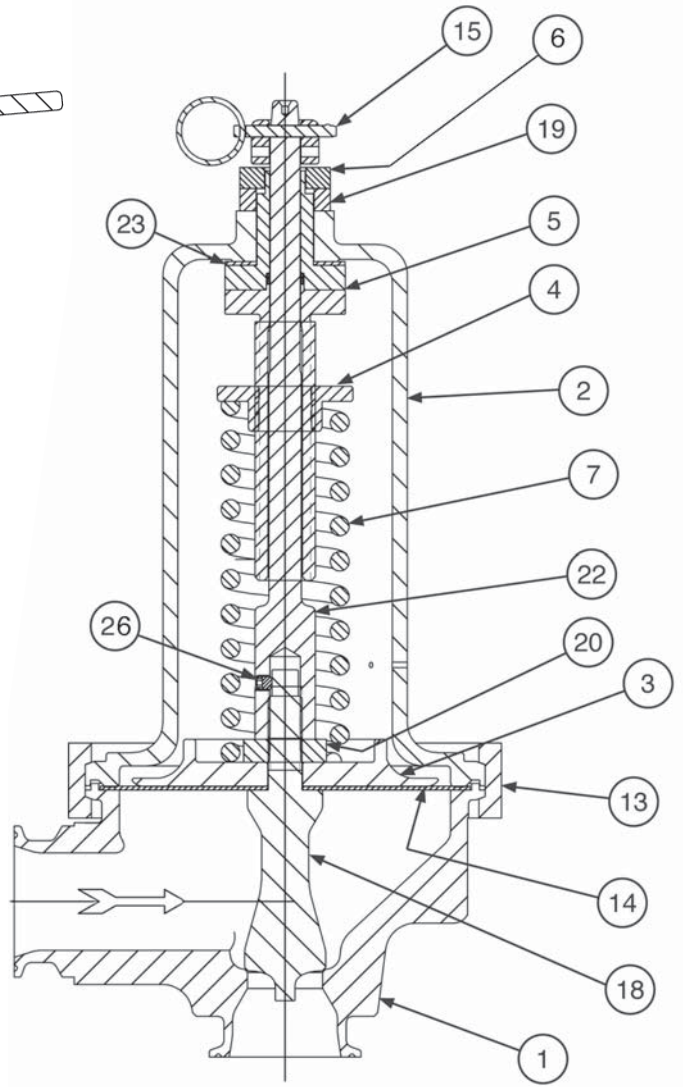
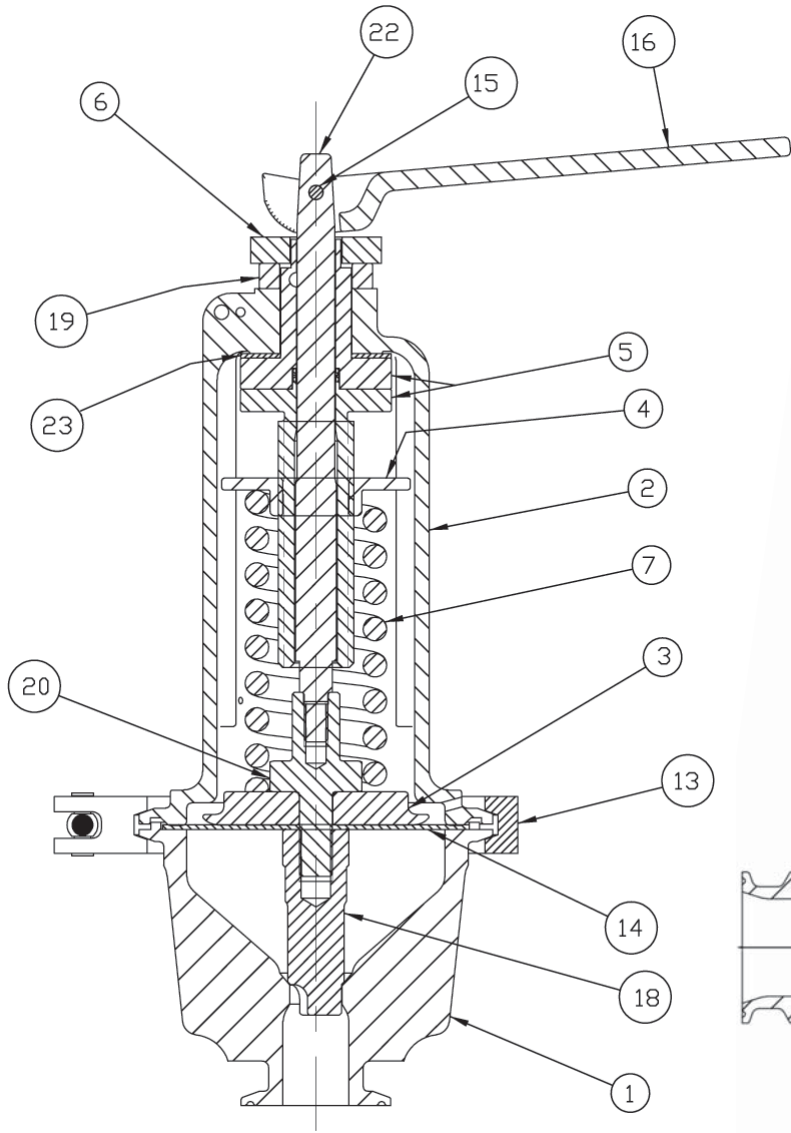


Figure 2:

Model C-BPV

3/4" - 1-1/2" Reduced Port

Forged body with lower range spring shown above.

Model C-BPV

1-1/2" - 3" Full Port

Forged body with lower range spring shown above.

NOTE: This product is to be installed with the spring chamber in the vertical position.

Item No.	Description	Item No.	Description	Not Shown:	Item No.	Description
1	Body	15	Pin (Quick Release)	8	Connector	
2	Spring Chamber	18	Plug	9	Ball Chain	
3	Pressure Plate	19	Load Collar	10	Quick Release Pin (Lock Open)	
4	Spring Button	20	Adapter	11	Name Plate	
5	Adjusting Screw	22	Guide Post	12	Drive Screw	
5.1	Adjusting Screw Cap	22.1	Guide Post	17	3A Symbol Plate	
5.2	Pin	22.2	Cotter Pin	16	Lever / Cam	
5.3	Adjusting Screw	22.3	Shim			
5.4	U-Cup Seal	22.4	Cap			
6	Adjustment Nut	22.5	Curved Disc Spring			
7	Spring	23	Bearing (Seal Soft)			
13	Clamp	26	Set Screw			
14	Diaphragm					

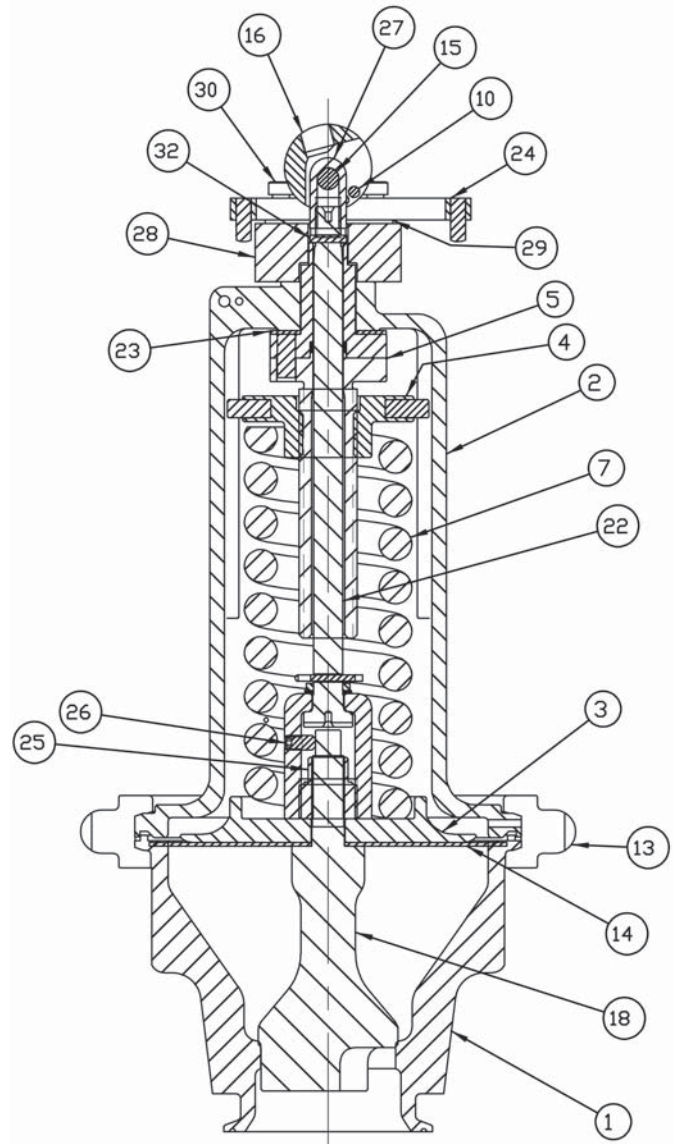
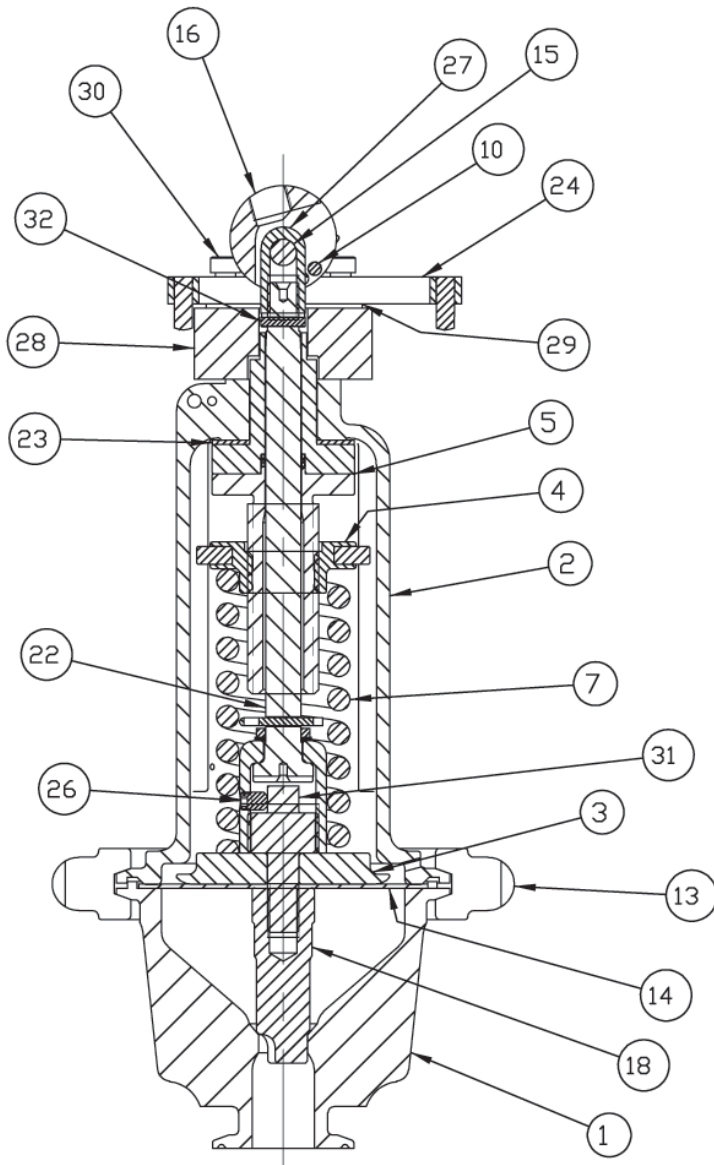


Figure 3:

Model C-BPV

3/4" - 1-1/2" Reduced Port

Forged body with upper range spring (60-125) shown above.

Model C-BPV

1-1/2" - 3" Full Port

Forged body with upper range spring (60-125) shown above.

NOTE: This product is to be installed with the spring chamber in the vertical position.

Item No.	Description	Item No.	Description	Not Shown:	Description
1	Body	22	Guide Post	Item No.	Description
2	Spring Chamber	22.1	Guide Post	6	Adjustment Nut
3	Pressure Plate	22.2	Cotter Pin	8	Connector
4	Spring Button	22.3	Shim	9	Ball Chain
5	Adjusting Screw	22.4	Cap	11	Name Plate
5.1	Adjusting Screw Cap	22.5	Curved Disc Spring	12	Drive Screw
5.2	Pin	23	Bearing (Seal Soft)	17	3A Symbol Plate
5.3	Adjusting Screw	24	Base (Slide)	19	Load Collar
5.4	U-Cup Seal	25	Locknut	20	Adapter
7	Spring	26	Set Screw	31	Adapter
10	Quick Release Pin (Lock Open)	27	Eye End (Nut)	33	Diaphragm Cover
13	Clamp	28	Collar		
14	Diaphragm	29	Bearing Plate		
15	Pin (Quick Release)	30	Shoulder Screw		
16	Lever / Cam	32	Spring Pin		
18	Plug				

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