

# 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

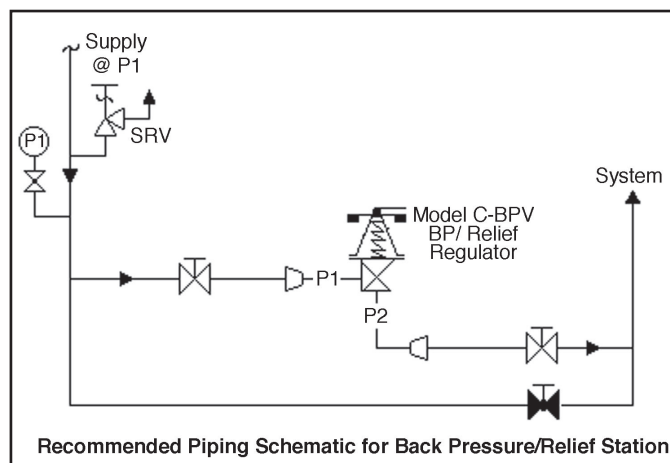
**This is not a safety device and must not be substituted for a code approved pressure safety relief valve or a rupture disc.**

### 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.



#### 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
2. A complete diaphragm failure may cause the regulator to fail close, and process fluid will discharge from the spring chamber vent hole.

movement. 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.
- 2a. **For range springs 2 - 75 psig** - Relax range spring (7) by turning adjustment nut (6) or handle (36) counter-clockwise (CCW) until rotation stops. Rotate adjustment nut (6) clockwise (CW) three (3) full revolutions to maintain spring (7) to diaphragm-plug assembly (14) contact. This reduces the inlet (upstream) pressure setpoint.
- 2b. **For range spring 60 - 125 psig** - Relax range spring (7) by turning handle (36) counter-clockwise (CCW) until rotation stops. Rotate handle (36) 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 adjustment nut (6) or handle (36) 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 adjustment nut (6) or handle (36) 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 adjustment nut (6) or handle (36) 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. Readjust setpoint as necessary at the normal flow rate.

#### C. For systems not utilizing an upstream block valve:

1. Refer to instructions B. 2a and 2b previous.
2. Closely monitor inlet (upstream) pressure, via gauge, to ensure not over-pressurizing as system flow is established. Rotate adjustment nut (6) or handle (36) 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 adjustment nut (6) or handle (36) CCW until the pressure decreases.
4. Follow instructions in "B", Steps 7 through 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.)



#### CAUTION

**Do not walk away and leave a bypassed regulator unattended.**

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

## 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 and disposal of non-reusable parts.
4. After dis-assembly, inspect, replace and clean parts in accordance to owner's specifications.



#### CAUTION

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

**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 without an MSDS form attached to the outside of shipping carton.

4. Refer to Figures 3, 4 and 5 for item numbers ().

#### 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 adjustment nut (6) or handle (36) CCW when viewed from above. Failure to do so may result in flying parts that could cause personal injury.

2. Ensure that the lever (16) is in standard horizontal position. Relax range spring (7) by turning adjustment nut (6) or handle (36) CCW until rotation stops.

- 3a. **For range springs 2 - 75 psig** - pull ring on pin (15) to remove pin, lever (16), nut (6) or handle (36) and collar (19).

- 3b. **For range spring 60 - 125 psig** - pull ring on pin (15) to remove pin, cam (16), slide base (24) assembly, bearing plate (29) and collar assembly (28).

- a. Use a small round punch to tap and remove spring pin (32). Note the location of the eye nut (27). Count the number of revolutions (CCW) to remove eye nut (27) from top of guide post assembly (22). Record the count here.

No. of Revolutions to remove eye nut.	
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4. Loosen clamp (13) and remove.
  - a. **For Opt. -80** 2-piece clamp design See Fig 1: Loosen and remove clamp nuts (13B), washers (13D), bolts (13C) and clamps (13A).

5. Lift spring chamber (2) up off body (1) and set aside. Remove bearing seal (23). Lift up to remove adjusting screw assembly (5), spring button (4) and spring (7) off guide post (22).

6. Grasp cap (5.1) of adjusting screw assembly with hand and lift up to separate and remove cap (5.1) and two u-cup seals (5.4). Do Not remove dowel pin (5.2). See Figure 3.

7. Install two new guide seals (5.4) in adjusting screw cap (5.1). **NOTE:** There are two sizes of u-cup seals - install the seal with the bigger diameter spring first, open face into the wall of the cap recess. Ensure that the u-cup is pressed all the way in. Install the second u-cup seal, open face exposed to face of adjusting screw (5.3). Look into the hole to confirm that the white seal material is showing and not the spring material. (Spring side of u-cup should be visible.)

8. Slide adjusting screw cap (5.1) with new u-cup seals (5.4) and adjusting screw (5.3) together, use the dowel pin (5.2) for alignment. **NOTE:** Top end of pin (5.2) should be flush with top surface of adjusting screw cap (5.1). Place new seal (23) on adjusting screw cap (5.1). Set parts aside.

9. Grasp the guide post (22) and lift upwards to remove diaphragm (14) and plug (18) sub-assembly.

10A. **For Sizes 3/4"-1-1/2" w/lower spring ranges:**

Clamp the plug (18) at the flats on the plug in a smooth jawed vice.

- a. Place a wrench at the flats on the adapter (20) and rotate CCW to remove adapter (20), and guide post (22) from the plug (18).
- b. Remove pressure plate (3), diaphragm (14) and diaphragm spacer (38). **NOTE:** *Correct orientation of spacer (38) has the side with the I.D. radius towards the clamping surface of the plug.*
- c. Install diaphragm spacer (38) on plug (18). Place new diaphragm (14) with convolution side facing up, onto plug (18) and fit it around the diaphragm spacer (38).
- d. Lay pressure plate (3) on top of diaphragm (14).
- e. Apply a small amount of medium strength, Food Grade threadlocker to the threads of the adapter (20) and thread adapter (and guide post (22)) through parts and into plug (18) and tighten to 60 in-lbs of torque.
- f. Replace plug/guide post assembly of parts back into body (1). Align tab on diaphragm with the tab slot cut in the body flange lip.
- g. Place spring (7) over guide post (22) and fit it around adapter (20).
- h. Return spring button(4) with adjusting screw assembly (5) and bearing (23) down over guide post (22) onto spring (7). Align one tab (ear) on spring button (4) directly above tab slot in the body flange lip.
- i. Align the two ribs inside the spring chamber (2) with the tabs on the spring button (4) and place the spring chamber (2) over assembled parts directly on body (1).
- j. Position the Tri-Clamp (13) around the mating flanges of the body (1) and the spring chamber (2) with the threaded fastener aligned with the tab slot cut in the body flange lip. Clamp should be tightened to approximately 4 to 6 ft-lbs. (Apply same torque for Opt.-80) - See Figure 1.
- k. Place load collar (19) and adjustment nut (6) or handle (36) over guide post (22).
- l. Place lever (16) over guide post (22) and insert quick release pin (15) through holes in lever and post.
- m. See Section IV for start up and adjustment of set point and Section VII for Cleaning.

10B. **For Sizes 1-1/2"-3" w/lower spring range:**

Clamp the lower end of the plug (18) in a

smooth jawed vice, around the outside edges of the winged design.

- a. Remove set screw (37) from guide post assembly (22).
- b. Rotate guide post (22) CCW and remove from plug (18).
- c. Turn adapter (20) CCW and remove pressure plate (3), diaphragm (14) and diaphragm spacer (38). **NOTE:** *Correct orientation of spacer (38) has the side with the I.D. radius towards the clamping surface of the plug.*
- d. Reinstall diaphragm spacer (38) on plug (18). Place new diaphragm (14) with convolution side facing up, onto plug (18) and fit it around the diaphragm spacer (38).
- e. Lay pressure plate (3) on top of diaphragm (14).
- f. Apply a small amount of medium strength, Food Grade threadlocker to the threads on the plug (18) and secure adapter (20) to plug (18). Tighten to 60 in-lbs of torque.
- g. Secure guide post (22) to threaded end of plug (18) hand tight. Adjust final rotation to ensure that the set screw (37) will lock firmly against one of the surface flats on the plug (18).
- h. Apply a small amount of medium strength, Food Grade threadlocker to the threads of set screw (37) and thread tight into guide post.
- i. Replace plug/guide post assembly of parts back into body (1). Align tab on diaphragm with the tab slot cut in the body flange lip.
- j. Place spring (7) over guide post (22) and around adapter (20).
- k. Return spring button(4) with adjusting screw assembly (5) and bearing (23) down over guide post (22) onto spring (7). Align one tab (ear) on spring button (4) directly above tab slot in the body flange lip.
- l. Align the two ribs inside the spring chamber (2) with the tabs on the spring button (4) and place the spring chamber (2) over assembled parts directly on body (1).
- m. Position the Tri-Clamp (13) around the mating flanges of the body (1) and the spring chamber (2). Align the threaded fastener with the tab slot cut in the body flange lip. The clamp should be tightened to approximately 4 to 6 ft-lbs. (Apply same torque for Opt.-80) - See Figure 1.
- n. Place load collar (19) and adjustment nut (6) or handle (36) over guide post (22).
- o. Position lever (16) over guide post (22) and insert quick release pin (15) through holes in lever and post.



- p. See Section IV for start up and adjustment of set point and Section VII for Cleaning.
- 10C. **For Sizes 3/4" - 1-1/2 w/65-125 psig range spring:**
- Clamp the plug (18) at the flats on the plug in a smooth jawed vice.
- a. Remove set screw (26).
  - b. Rotate guide post (22) assembly CCW and remove from adapter (31).
  - c. Place a wrench on the flats of the adapter (31) and rotate CCW to remove from plug (18).
  - d. Remove pressure plate (3), diaphragm (14) and diaphragm spacer (38). ***NOTE: Correct orientation of spacer (38) has the side with the I.D. radius towards the clamping surface of the plug.***
  - e. Reinstall diaphragm spacer (38) on plug (18). Place new diaphragm (14) with convolution side facing up, onto plug (18) and fit it around the diaphragm spacer (38).
  - f. Lay pressure plate (3) on top of diaphragm (14).
  - g. Apply a small amount of medium strength, Food Grade threadlocker to the long threaded end on the adapter (31) and secure adapter (31) to plug (18) Tighten to 60 in-lbs of torque.
  - h. Secure guide post assembly (22) to threaded end of adapter (31) hand tight. Adjust final rotation to ensure that the set screw (26) will lock firmly against one of the surface flats on the adapter (31).
  - i. Apply a small amount of medium strength, Food Grade threadlocker to threads of set screw (26) and thread tight into guide post.
  - j. Replace plug/guide post assembly of parts back into body (1). Align tab on diaphragm with the tab slot cut in the body flange lip.
  - k. Place spring (7) over guide post (22).
  - l. Return spring button(4) with adjusting screw assembly (5) and bearing (23) down over guide post (22) onto spring (7). Align one tab (ear) on spring button (4) directly above tab slot in the body flange lip.
  - m. Align the two ribs inside the spring chamber (2) with the tabs on the spring button (4) and place the spring chamber (2) over assembled parts directly on body (1).
  - n. Position the clamp (13) halves around the mating flanges of the body (1) and the spring chamber (2). Insert clamp bolts (13C), washers (13D) and tighten clamp nuts (13B) in alternating pattern. The clamp should be tightened to

approximately 4 to 6 ft-lbs or 18 to 20 ft-lbs for Gylon Diaphragms. (***NOTE: Gap between clamp (13A) halves should be equal in size.*** - See Figure 1.

- o. Replace eye nut (27) on guide post (22). Ref to Section VI B. 3b previous to recall the number of revolutions recorded for removal.
- p. Insert spring pin (32) through eye nut (27) and guide post (22).
- q. Place collar (28), bearing plate (29) and base slide assembly (24) over guide post (22).
- r. Position cam (16) over guide post (22) and insert quick release pin (15) through holes in cam and post.
- s. See Section IV for start up and adjustment of set point and Section VII for Cleaning.

10D. **For Sizes 1-1/2"-3" w/65-125 psig range spring:**

Clamp the lower end of the plug (18) in a smooth jawed vice, around the outside edges of the winged design.

- a. Remove set screw (26).
- b. Rotate guide post (22) CCW and remove from locknut (25).
- c. Place a wrench at the flats on the locknut (25) and rotate CCW to remove nut from plug (18).
- d. Remove pressure plate (3), diaphragm (14) and diaphragm spacer (38). ***NOTE: Correct orientation of spacer (38) has the side with the I.D. radius towards the clamping surface of the plug.***
- e. Reinstall diaphragm spacer (38) on plug (18). Place new diaphragm (14) with convolution side facing up, onto plug (18) and fit it around the diaphragm spacer (38).
- f. Lay pressure plate (3) on top of diaphragm (14).
- g. Thread locknut (25) to plug (18) and tighten to 60 in-lbs of torque.
- h. Secure guide post assembly (22) to threaded locknut (25) by hand. Adjust final rotation to ensure that the set screw (26) will lock firmly against one of the surface flats on the plug (18).
- i. Apply a small amount of medium strength, Food Grade threadlocker to threads of set screw (26) and thread tight into guide post.
- j. Replace plug/guide post assembly of parts back into body (1). Align tab on diaphragm with the tab slot cut in the body flange lip.
- k. Place spring (7) over guide post (22).
- l. Install spring button(4) with adjusting screw assembly (5) and bearing (23) down over

guide post (22) onto spring (7). Align one tab (ear) on spring button (4) directly above tab slot in the body flange lip.

- m. Align the two ribs inside the spring chamber (2) with the tabs on the spring button (4) and place the spring chamber (2) over assembled parts directly on body (1).
- n. Position the clamp (13) halves around the mating flanges of the body (1) and the spring chamber (2). Insert clamp bolts (13C), washers (13D) and tighten

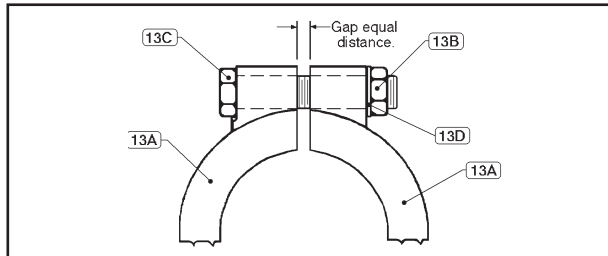


Figure 1: Clamp Arrangement.

clamp nuts (13B) in alternating pattern. The clamp should be tightened to approximately 4 to 6 ft-lbs or 18 to 20 ft-lbs for Gylon Diaphragms. (**NOTE:** Gap between clamp (13A) halves should be equal in size.

- o. Replace eye nut (27) on guide post (22). Ref to Section VI B. 3b previous to recall the number of revolutions recorded for removal.
- p. Insert spring pin (32) through eye nut (27) and guide post (22).
- q. Place collar (28), bearing plate (29) and base slide assembly (24) over guide post (22).
- r. Position cam (16) over guide post (22) and insert quick release pin (15) through holes in cam and post.
- s. See Section IV for start up and adjustment of set point and Section VII for Cleaning.

## SECTION VII

### VII. CLEANING PROCEDURE

#### A. Pre-Sanitization:

1. Owner should refer to owner's operating procedures for system shutdown to include relieving all system pressure.
2. Refer to Fig. 3 and 4 for item number reference().
3. Lift lever (16) to vertical position. **NOTE:** Do not change range spring (7) setting by rotating adjustment nut (6) or handle (36).
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 2.)

#### 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.

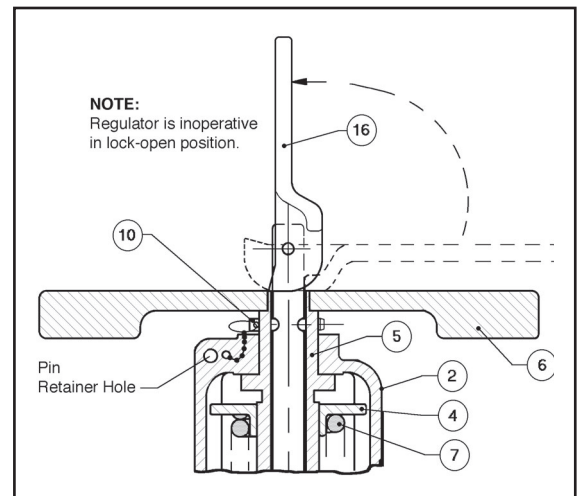


Figure 2: Spring Chamber in Lock-Open Position.

### CAUTION

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

## SECTION VIII

### VIII. ORDERING INFORMATION

#### NEW REPLACEMENT UNIT vs PARTS "KIT" FOR FIELD REPAIR

To obtain a quotation or place an order, please retrieve the Serial Number and Product Code that was stamped on the metal name plate and attached to the unit. This information can also be found on the Bill of Material ("BOM"), a parts list that was provided when unit was originally shipped. (Serial Number typically 6 digits). Product Code typical format as follows: (last digit is alpha character that reflects revision level for the product).

□□□□ - □□□□ 7 - □□□□□□□□□□

#### NEW REPLACEMENT UNIT:

Contact your local Cashco Sales Representative with the Serial Number and Product code. With this information they can provide a quotation for a new unit including a complete description, price and availability.

#### PARTS "KIT" for FIELD REPAIR:

Contact your local Cashco Sales Representative with the Serial Number and Product code. Identify the parts and the quantity required to repair the unit from the "BOM" sheet that was provided when unit was originally shipped.

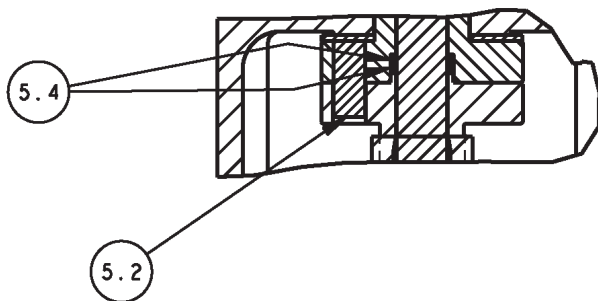
**NOTE:** Those part numbers that have a quantity indicated under "Spare Parts" in column "A" reflect minimum parts required for inspection and rebuild, - "Soft Goods Kit". Those in column "B" include minimum trim replacement parts needed plus those "Soft Goods" parts from column "A".

If the "BOM" is not available, refer to the cross-sectional drawings included in this manual for part identification and selection.

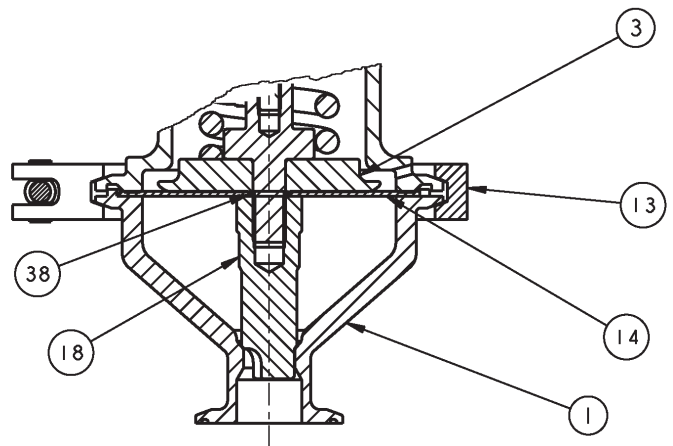
A Local Sales Representative will provide quotation for appropriate Kit Number, Price and Availability.


**CAUTION**

**Do not attempt to alter the original construction of any unit without assistance and approval from the factory. All purposed changes will require a new name plate with appropriate ratings and new product code to accommodate the recommended part(s) changes.**

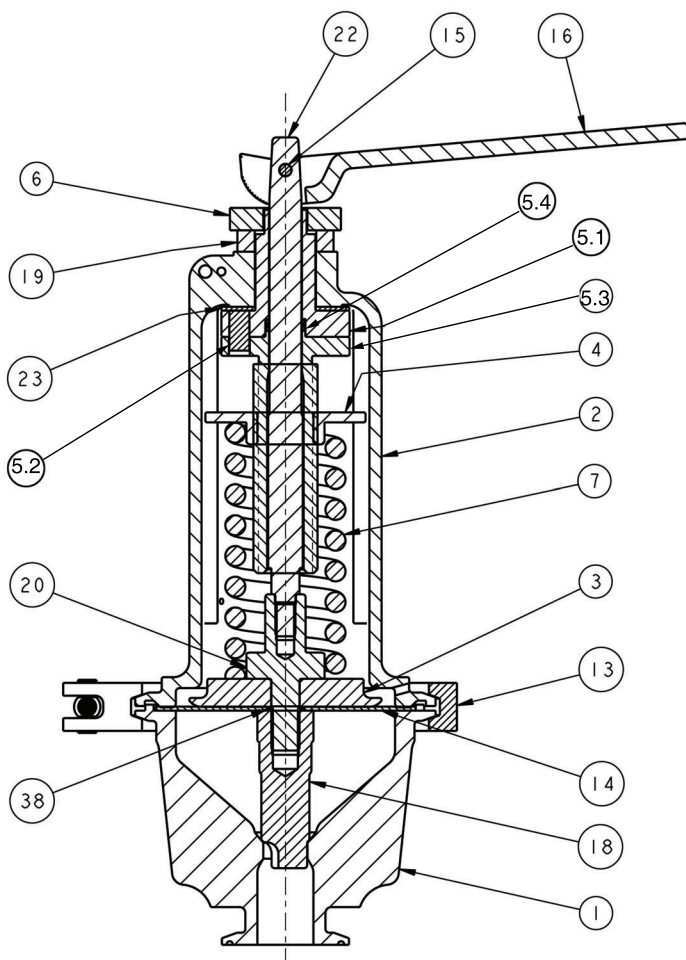


**Figure 3:** Stem seals - See Figures 4 & 5.



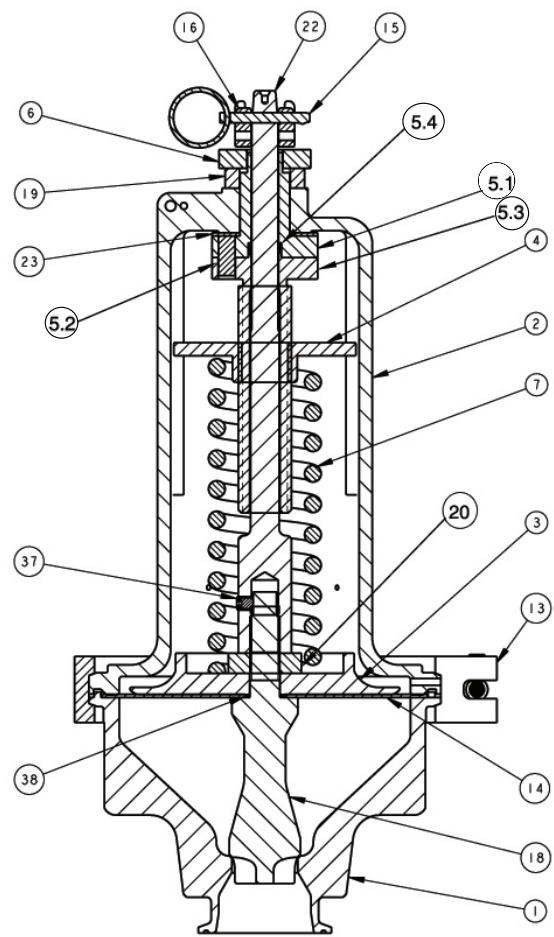
Investment Cast Body 1" Size Only  
Refer to Figure 4a & 5a for item numbers and topwork details.

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Model C-BPV  
3/4" - 1-1/2" Reduced Port  
Barstock body with lower range spring shown above.

**Figure 4a**



Model C-BPV  
1-1/2" - 3" Full Port  
Barstock body with lower range spring shown above.

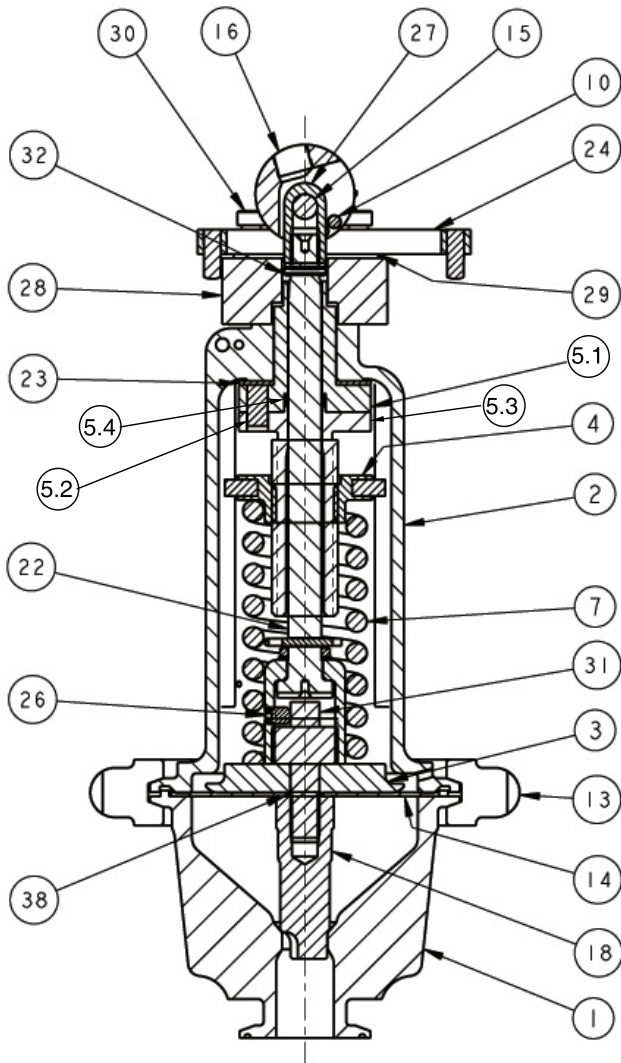
**Figure 4b**

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

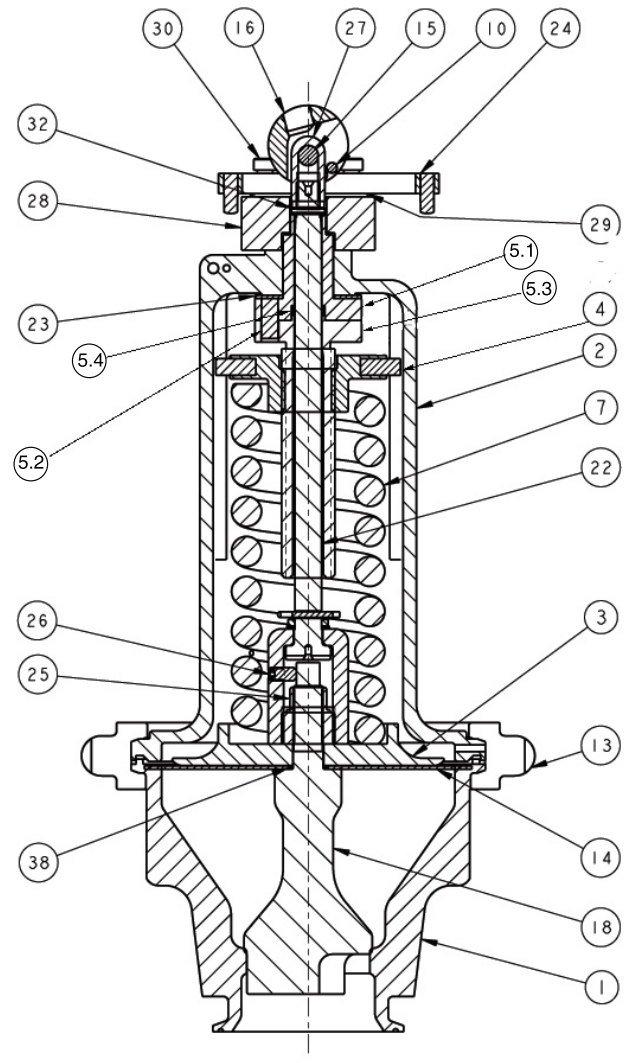
Item No.	Description	Item No.	Description
1	Body	15	Pin (Quick Release)
2	Spring Chamber	16	Lever / Cam
3	Pressure Plate	18	Plug
4	Spring Button	19	Load Collar
5	Adjusting Screw	20	Adapter
5.1	Adjusting Screw Cap	22	Guide Post
5.2	Pin	22.1	Guide Post
5.3	Adjusting Screw	22.2	Cotter Pin
5.4	U-Cup Seals	22.3	Shim
6	Adjustment Nut	22.4	Cap
7	Spring	22.5	Curved Disc Spring
13	Clamp	23	Bearing (Seal Soft)
14	Diaphragm	37	Set Screw
		38	Spacer

Not Shown:	
Item No.	Description
8	Connector
9	Ball Chain
10	Quick Release Pin (Lock Open)
11	Name Plate
12	Drive Screw
17	3A Symbol Plate
36	Handle





Model C-BPV  
3/4" - 1-1/2" Reduced Port  
Barstock body with upper range spring (60-125) shown above.  
**Figure 5a**



Model C-BPV  
1-1/2" - 3" Full Port  
Barstock body with upper range spring (60-125) shown above.  
**Figure 5b**

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

Item No.	Description	Item No.	Description	Not Shown:	
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 Seals	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	36	Handle
14	Diaphragm	29	Bearing Plate		
15	Pin (Quick Release)	30	Shoulder Screw		
16	Lever / Cam	32	Spring Pin		
18	Plug	38	Spacer		



IOM ADDENDUM:

**ATEX DIRECTIVE 2014/34/EU and THE EQUIPMENT AND PROTECTIVE SYSTEMS INTENDED FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES REGULATIONS 2016**

Cashco declares that the products listed in the table below has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II of the ATEX Directive 2014/34/EU and given in Schedule 1 of The Equipment and Protective Systems Indented for Use in Potentially Explosive Atmospheres Regulations 2016. Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN ISO 80079-36:2016 and EN ISO 80079-37:2016. The product will be marked as follows:



The 'X' placed after the technical file number indicates that the product is subject to specific conditions of use as follows:

1. The maximum surface temperature depends entirely on the operating conditions and not the equipment itself. The combination of the maximum ambient and the maximum process medium temperature shall be used to determine the maximum surface temperature and corresponding temperature classification, considering the safety margins described prescribed in EN ISO 80079-36:2016, Clause 8.2. Additionally, the system designer and users must take precautions to prevent rapid system pressurization which may raise the surface temperature of system components and tubing due to adiabatic compression of the system gas. Furthermore, the Joule-Thomson effect may cause process gases to rise in temperature as they expand going through a regulator. This could raise the external surface temperature of the regulator body and the downstream piping creating a potential source of ignition. Whether the Joule-Thomson effect leads to heating or cooling of the process gas depends on the process gas and the inlet and outlet pressures. The system designer is responsible for determining whether the process gas temperature may raise under any operating conditions.
2. Where the process medium is a liquid or semi-solid material with a surface resistance in excess of  $1\text{G}\Omega$ , special precautions shall be taken to ensure the process does not generate electrostatic discharge.
3. Special consideration shall be made regarding the filtration of the process medium if there is a potential for the process medium to contain solid particles. Where particles are present, the process flow shall be  $<1\text{m/s}$  ( $<3.3\text{ ft/s}$ ) in order to prevent friction between the process medium and internal surfaces.
4. Effective earthing (grounding) of the product shall be ensured during installation.
5. The valve body/housing shall be regularly cleaned to prevent build up of dust deposits.
6. Regulators must be ordered with the non-relieving option (instead of the self-relieving option) if the process gas they are to be used with is hazardous (flammable, toxic, etc.). The self-relieving option vents process gas through the regulator cap directly into the atmosphere while the non-relieving option does not. Using regulators with the self-relieving option in a flammable gas system could create an explosive atmosphere in the vicinity of the regulator.
7. Tied diaphragm regulators with outlet ranges greater than 7 barg (100 psig) should be preset to minimize the risk that improper operation might lead to an outboard leak and a potentially explosive atmosphere.
8. All equipment must only be fitted with manufacturer's original spare parts.
9. Ensure that only non-sparking tools are used, as per EN 1127-1, Annex A.

	PRODUCT
	31-B, 31-N
	1164, 1164(OPT-45)
	1171, 1171(OPT-45), 1171(CRYO)
	2171, 2171(OPT-45), 2171(CRYO), 3171
	1465, 3381, 3381(OPT-45), 3381(OPT-40)
	4381, 4381(OPT-37), 4381(CRYO), 4381(OPT-45), 5381
	MPRV-H, MPRV-L
	PBE, PBE-L, PBE-H
	CA-1, CA-2
	CA1, SA1, CA4, SA4, CA5, SA5
	DA2, DA4, DA5, DA6, DA8
	DA0, DA1, DAP, SAP
	SLR-1, SLR-2, PTR-1
	ALR-1, ULR-1, PGR-1
	BQ, BQ(OPT-45), BQ(CRYO)
	123, 123(CRYO), 123(OPT-45), 123(OPT-46G)
	123-1+6, 123-1+6(OPT-45), 123-1+6(OPT-46G), 123-1+6+S, 123-1+6+S(OPT-40)
	1000HP, 1000HP(OPT-37), 1000HP(OPT-45), 1000HP(OPT-45G), 1000HP(CRYO)
	1000HP-1+6, 1000HP-1+8, 1000LP, 1000LP(OPT-45), 1000LP(OPT-46G)
	6987
	8310HP, 8310HP-1+6, 8310HP-1+8, 8310LP, 8311HP, 8311LP
	345, 345(OPT-45)
	BA1/BL1, PA1/PL1
	C-BPV, C-PRV, C-CS
	D, D(CRYO), D(OPT-37), D(OPT-20), D(OPT-45)
	DL, DL(LCC), DL(OPT-45)
	BR, BR(CRYO)
	HP, HP(LCC), HP(OPT-45), HP(OPT46G), HP-1+6+S(OPT-40), HP-1+6+S
	P1, P2, P3, P4, P5, P7
	B2, B7
	POSR-1, POSR-2
	5200P, 5300P
	135
	NW-PL, NW-SO
	CG-PILOT
	FG1
REGULATORS	RANGER, 987, PREMIER
	964, 521, 988, 988-MB, 989
	2296/2296HF
	SCV-30, SCV-S
TANK BLANKETING	8700, 8910, 8920, 8930, 8940
	2100, 2199
	3100, 3200, 3300, 3400, 3500, 3600, 3700
	1078, 1088, 1100, 1049
	5100, 5200, 5400, 5500
	4100, 4200, 4300, 4400, 4500, 4600
MISC	764P/PD, 764-37, 764T

Cashco  
P.O. Box 6  
Ellsworth, KS 67439-0006  
PH (785) 472-4461  
Fax. # (785) 472-3539  
www.cashco.com  
email: sales@cashco.com  
Printed in U.S.A. IOM-C-BPV

Cashco GmbH  
Handwerkerstrasse 15  
15366 Hoppegarten, Germany  
PH +49 3342 30968 0  
Fax. No. +49 3342 30968 29  
www.cashco.com  
email: germany@cashco.com

Cashco do Brasil, Ltda.  
Al.Venus, 340  
Indaiatuba - Sao Paulo, Brazil  
PH +55 11 99677 7177  
Fax. No.  
www.cashco.com  
email: brazil@cashco.com