ISO Registered Company

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

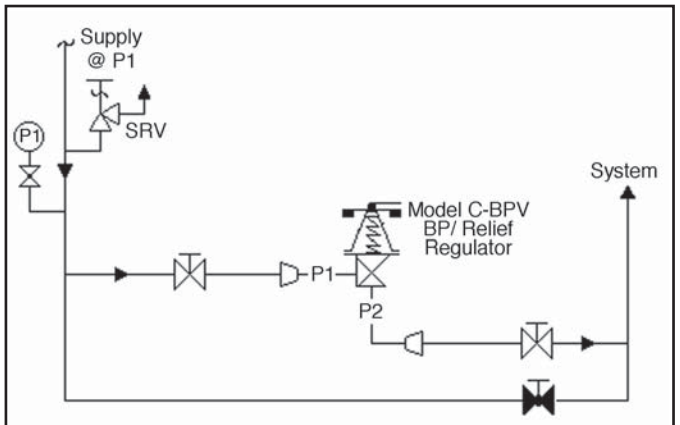
This is not a safety device and must not be substituted for a code approved pressure safety relief valve or a rupture disc.

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

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, Inc. 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.	_____

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 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.*

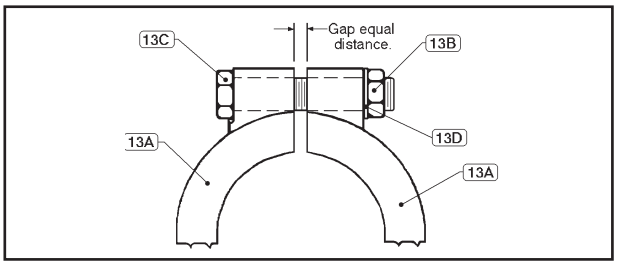


Figure 1: Clamp Arrangement.

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-Sanitation:

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.

⚠ CAUTION

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

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.

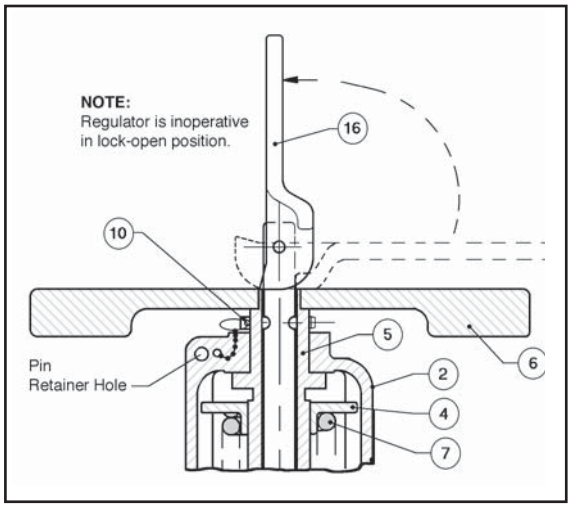


Figure 2: Spring Chamber in Lock-Open Position.

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, Inc., 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.

⚠ 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.

PARTS "KIT" for FIELD REPAIR:

Contact your local Cashco, Inc., 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.

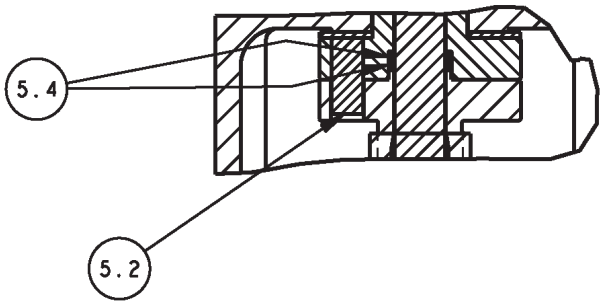
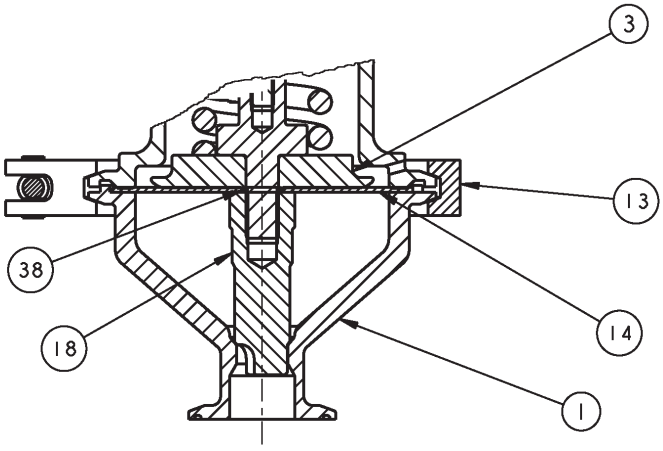
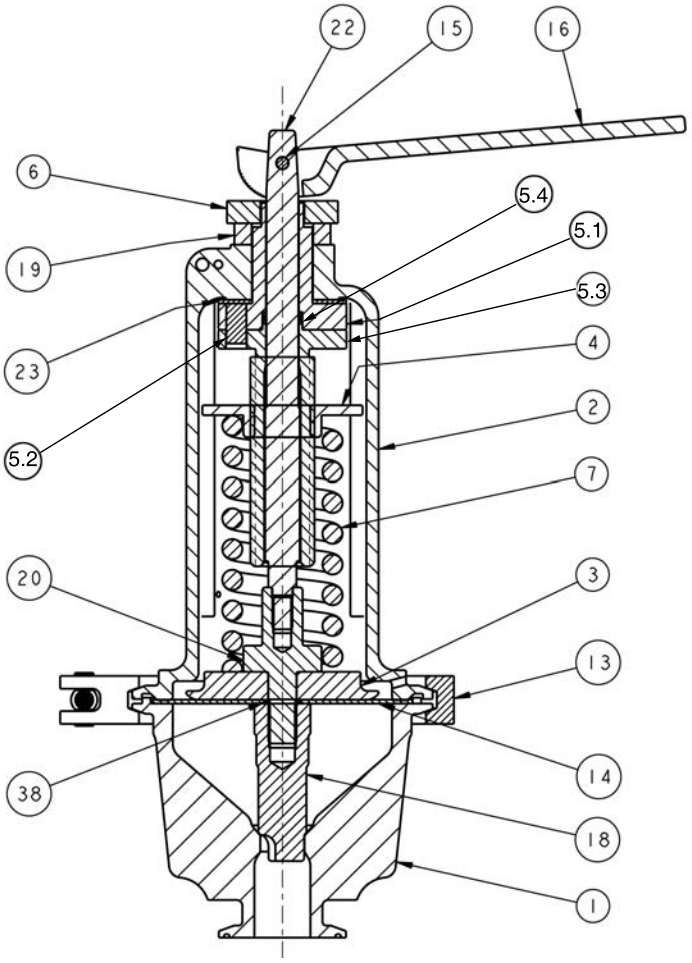


Figure 3: Stem seals - See Figures 4 & 5.

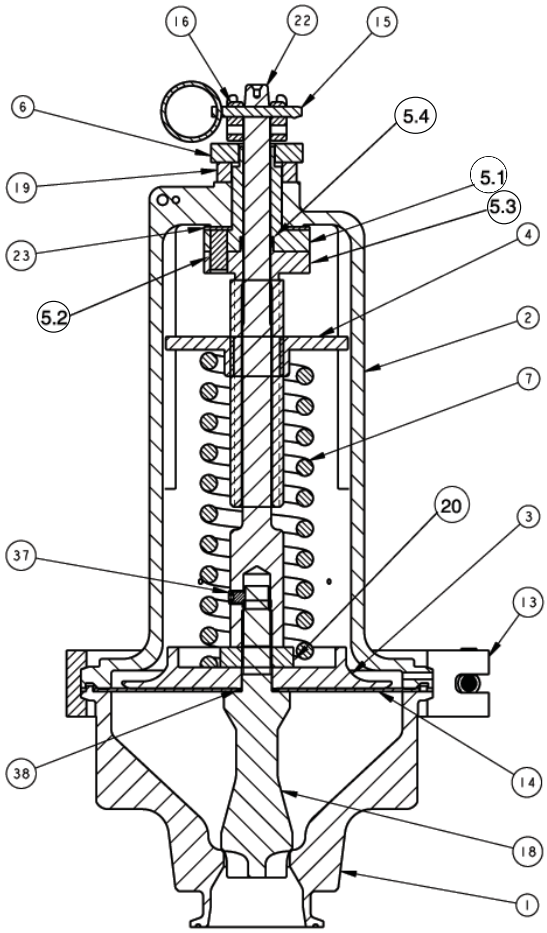


Investment Cast Body 1" Size Only
Refer to Figure 4a & 5a for item numbers and topwork details.



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

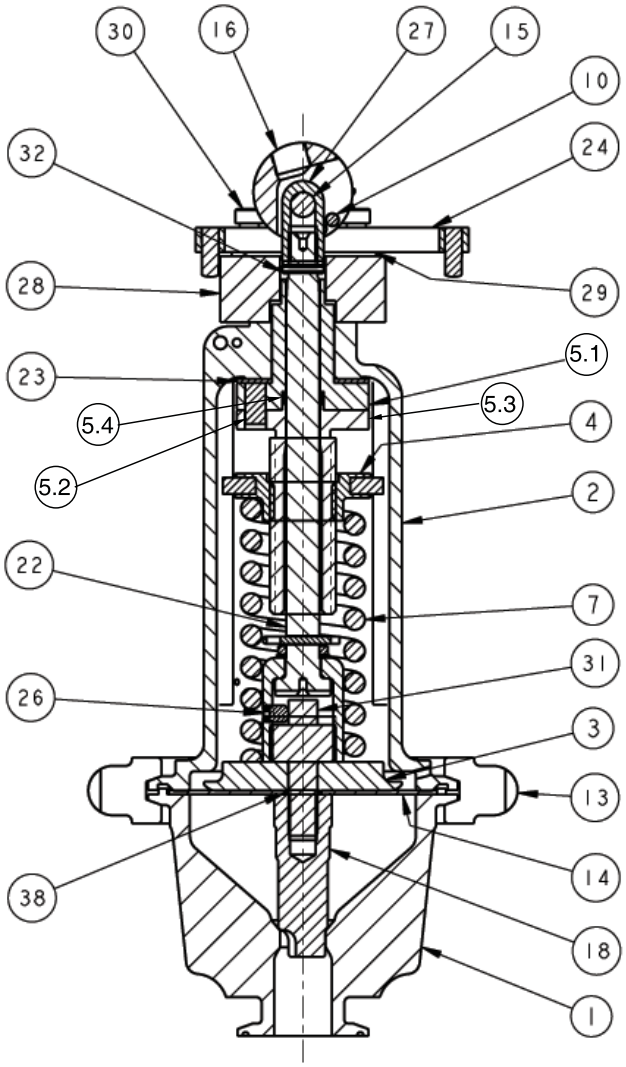
NOTE: This product is to be installed with the spring chamber in the vertical position.

Item No.	Description
1	Body
2	Spring Chamber
3	Pressure Plate
4	Spring Button
5	Adjusting Screw
5.1	Adjusting Screw Cap
5.2	Pin
5.3	Adjusting Screw
5.4	U-Cup Seals
6	Adjustment Nut
7	Spring
13	Clamp
14	Diaphragm

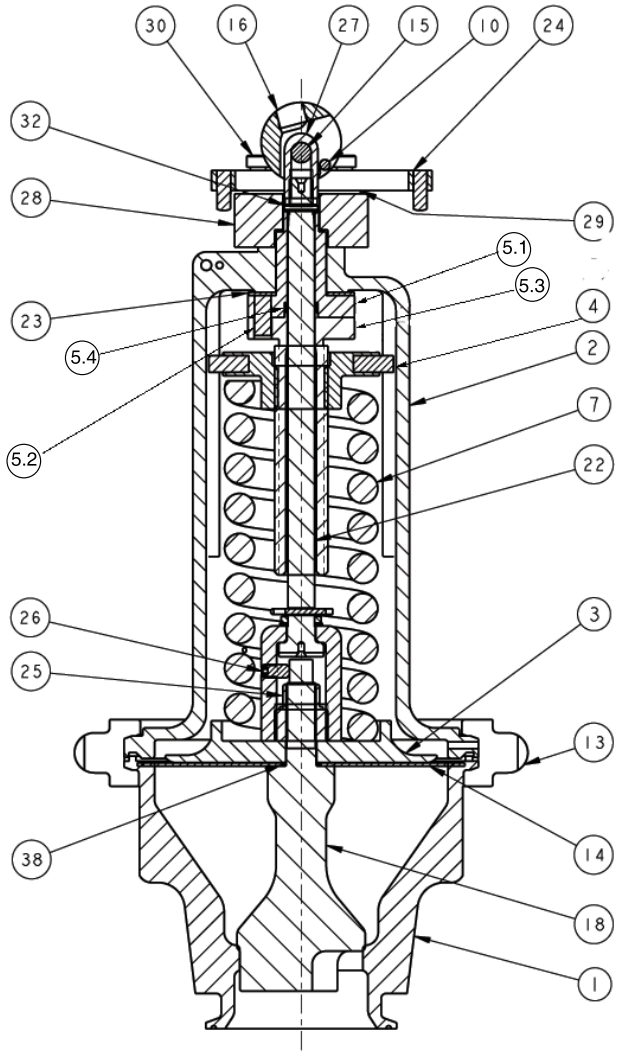
Item No.	Description
15	Pin (Quick Release)
16	Lever / Cam
18	Plug
19	Load Collar
20	Adapter
22	Guide Post
22.1	Guide Post
22.2	Cotter Pin
22.3	Shim
22.4	Cap
22.5	Curved Disc Spring
23	Bearing (Seal Soft)
37	Set Screw
38	Spacer

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
1	Body
2	Spring Chamber
3	Pressure Plate
4	Spring Button
5	Adjusting Screw
5.1	Adjusting Screw Cap
5.2	Pin
5.3	Adjusting Screw
5.4	U-Cup Seals
7	Spring
10	Quick Release Pin (Lock Open)
13	Clamp
14	Diaphragm
15	Pin (Quick Release)
16	Lever / Cam
18	Plug

Item No.	Description
22	Guide Post
22.1	Guide Post
22.2	Cotter Pin
22.3	Shim
22.4	Cap
22.5	Curved Disc Spring
23	Bearing (Seal Soft)
24	Base (Slide)
25	Locknut
26	Set Screw
27	Eye End (Nut)
28	Collar
29	Bearing Plate
30	Shoulder Screw
32	Spring Pin
38	Spacer

Not Shown:

Item No.	Description
6	Adjustment Nut
8	Connector
9	Ball Chain
11	Name Plate
12	Drive Screw
17	3A Symbol Plate
19	Load Collar
20	Adapter
31	Adapter
33	Diaphragm Cover
36	Handle

ATEX 94/9/EC: Explosive Atmospheres and Cashco Inc. Regulators

NOTICE

Only for Product Codes wherein hazard category ATEX has been selected.

These valves satisfy the safety conditions according to EN 13463-1 and EN 13463-5 for equipment group IIG 2 c.

Caution: Because the actual maximum temperature depends not on the equipment itself, but upon the fluid temperature, a single temperature class or temperature cannot be marked by the manufacturer.

Specific Precaution to Installer: Electrical grounding of valve must occur to minimize risk of effective electrical discharges.

Specific Precaution to Installer: Atmosphere vent holes should be plugged to further minimize the risk of explosion.

Specific Precaution to Maintenance: The Valve Body/ Housing must be regularly cleaned to prevent buildup of dust deposits.

Specific Precaution to Maintenance: Conduct periodic Continuity Check between Valve Body/ Housing and Tank to minimize risk of electrical discharges.

Attention: When repairing or altering explosion-protected equipment, national regulations must be adhered to. For maintenance and repairs involving parts, use only manufacturer's original parts.

ATEX requires that all components and equipment be evaluated. Cashco pressure regulators are considered components. Based on the ATEX Directive, Cashco considers the location where the pressure regulators are installed to be classified Equipment-group II, Category 3 because flammable gases would only be present for a short period of time in the event of a leak. It is possible that the location could be classified Equipment-group II, Category 2 if a leak is likely to occur. Please note that the system owner, not Cashco, is responsible for determining the classification of a particular installation.

Product Assessment

Cashco performed a conformity assessment and risk analysis of its pressure regulator and control valve models and their common options, with respect to the Essential Health and Safety Requirements in Annex II of the ATEX directive. The details of the assessment in terms of the individual Essential Health and Safety Requirements, are listed in Table 1. Table 2 lists all of the models and options that were evaluated and along with their evaluation.

Models and options not listed in Table 2 should be assumed to not have been evaluated and therefore should not be selected for use in a potentially explosive environment until they have been evaluated.

Standard default options for each listed model were evaluated even if they were not explicitly listed as a separate option in the table. Not all options listed in the tables are available to all models listed in the tables. Individual TB's must be referenced for actual options.

When specifying a regulator that is to be used in a potentially explosive environment one must review the evaluations in Table 1 and 2 for the specific model and each and every option that is being specified, in order to determine the complete assessment for the unit.

A summary of the models and options found to have an impact on ATEX assessment due to potential ignition sources or other concerns from the ATEX Essential Health and Safety Requirements, are listed below.

1. The plastic knob used as standard on some models, (P1, P2, P3, P4, P5, P7, 3381, 4381, 1171, and 2171) is a potential ignition source due to static electricity. To demonstrate otherwise, the knob must be tested to determine if a transferred charge is below the acceptable values in IEC 60079-0 Section 26.14 (See items 25, 27, and 28 in Appendix A). Until the plastic knob has been shown to be acceptable, then either the metal knob option, or a preset outlet pressure option is required to eliminate this ignition source (See items 45 and 64 in Tables).

2. The pressure gauges offered as options on a few of the regulator models (DA's, P1-7, D, 764, 521), use a plastic polycarbonate window that is a potential ignition source due to static electricity. To demonstrate that the gauges are not a potential source of ignition, the gauges would need to be tested to determine if a transferred charge is below

indicating the gauge is compliant with the ATEX Directive (See items 26, 27, and 28 in Appendix A). Until compliance is determined, regulators should not be ordered with pressure gauges for use in potentially explosive environments.

3. Tied diaphragm regulators with outlet ranges greater than 100 psig should be preset to minimize the risk that improper operation might lead to an outboard leak and a potentially explosive atmosphere (See item 6 in Table 1).

4. 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 regulator with the self- relieving option in a flammable gas system could create an explosive atmosphere in the vicinity of the regulator.

5. Regulators with customer supplied parts are to be assumed to not have been evaluated with regard to ATEX and thus are not to be used in a potentially explosive environment unless a documented evaluation for the specific customer supplied parts in question has been made. Refer to Table 1 for all models and options that have been evaluated.

Product Usage

A summary of ATEX related usage issues that were found in the assessment are listed below.

1. Pressure regulators and control valves must be grounded (earthed) to prevent static charge build-up due to the flowing media. The regulator can be grounded through any mounting holes on the body with metal to metal contact or the system piping can be grounded and electrical continuity verified through the body metal seal connections. Grounding of the regulator should follow the same requirements for the piping system. Also see item 30 in Table 1.

2. The system designer and users must take precautions to prevent rapid system pressurization which may raise surface temperatures of system components and tubing due to adiabatic compression of the system gas.

3. Heating systems installed by the user could possibly increase the surface temperature and must be evaluated by the user for compliance with the ATEX Directive. User installation of heating systems applied to the regulator body or system piping that affects the surface temperature of the pressure regulator is outside the scope of this declaration and is the responsibility of the user.

4. 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 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 rise under any operating conditions. If a process gas temperature rise is possible under operating conditions, then the system designer must investigate whether the regulator body and downstream piping may increase in temperature enough to create a potential source of ignition.

The process gas expansion is typically modeled as a constant enthalpy throttling process for determining the temperature change. A Mollier diagram (Pressure – Enthalpy diagram with constant temperature, density, & entropy contours) or a Temperature – Entropy diagram with constant enthalpy lines, for the process gas, can be used to determine the temperature change. Helium and hydrogen are two gases that typically increase in temperature when expanding across a regulator. Other gases may increase in temperature at sufficiently high pressures.

Product Declaration

If the above issues are addressed by selecting options that do not have potential sources of ignition, avoiding options that have not been assessed, and by taking the proper usage issue precautions, then Cashco regulators can be considered to be a mechanical device that does not have its own source of ignition and thus falls outside the scope of the ATEX directive.

Cashco, Inc.
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