

# MODEL C-PRV

## PRESSURE REDUCING REGULATOR

### SECTION I

#### I. DESCRIPTION AND SCOPE

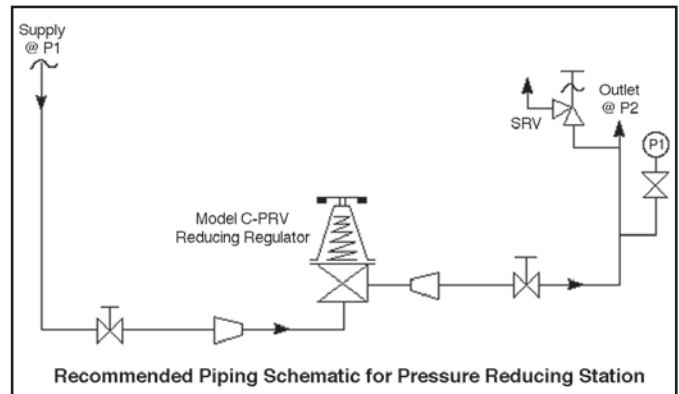
Model C-PRV is a pressure regulator used to control downstream (outlet or  $P_2$ ) pressure. Inlet and outlet sizes are 1", 1-1/2", 2" and 3" with Tri-Clamp® fitting connections. This regulator is only suitable for liquids and gases at temperatures less than 300°F (149°C). Refer to Technical Bulletin C-PRV-TB for specific design conditions.

### SECTION II

#### II. INSTALLATION

##### A. General:

1. An inlet block valve should always be installed upstream of the regulator.
2. An outlet pressure gauge should be located approximately ten pipe diameters downstream and within sight.
3. All installations should include a downstream relief device if the inlet pressure could exceed the pressure rating of any downstream equipment.
4. Flow Direction: Install so flow enters through the bottom connection and exits the side 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 outlet,  $P_2$  or downstream pressure. The range spring opposes diaphragm movement. As the outlet pressure drops, the range spring pushes the diaphragm down, opening the port; as outlet pressure

increases, the diaphragm pushes up and the port opening closes.

2. A complete diaphragm failure will cause the regulator to fail open

#### ⚠ CAUTION

**The Model C-PRV should never be used as a shutoff device.**

### SECTION IV

#### IV. START-UP

##### A. General:

1. Ensure that lock-open pin (10) and hitch 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 nut or handle (6), the view is with respect to looking down towards the spring chamber or its' normal location.
4. Start with the block valve closed.
5. Relax range spring (7) by turning nut or handle (6) counter-clockwise (CCW) until rotation stops. Rotate nut or handle (6) clockwise (CW) three (3) full revolutions to maintain spring (7) to diaphragm assembly (16) contact. This reduces the outlet pressure setpoint.

6. Slowly open the inlet (upstream) block valve observing the outlet (downstream) pressure gauge. Determine if the regulator is flowing and the downstream equipment is operative. Rotate the regulator nut or handle (6) CW slowly until flow begins.
7. Continue to slowly open the inlet (upstream) block valve until fully open.
8. Develop system flow to a level near its expected normal rate and reset the regulator setpoint by turning the nut or handle (6) CW to increase outlet pressure or CCW to reduce outlet pressure.

## SECTION V


### V. SHUTDOWN

- A. In all cases the regulator should be shutdown by slowly closing the inlet (upstream) block valve.

 <b>CAUTION</b>
<b>DO NOT DEAD-END FLOW DOWNSTREAM of the Model C-PRV as internals may be damaged.</b>

## SECTION VI

### VI. MAINTENANCE

 <b>WARNING</b>
<b>SYSTEM UNDER PRESSURE. Prior to performing any inspection and cleaning, isolate the regulator from the system and relieve all pressure. Failure to do so could result in personal injury.</b>

#### 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 nonreusable 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 3 for basic regulator item number reference ( ) and description.

#### B. Trim Replacement:

1. Secure the bottom portion of the plug (17) in a smooth jawed vise with the spring chamber (2) directed upwards and the face of the inlet flange of the body (1) resting on the vise.

 <b>WARNING</b>
<b>SPRING UNDER COMPRESSION. Prior to removing the clamp (13), relieve spring (7) compression. Failure to do so may result in flying parts that could cause personal injury.</b>

2. Relax range spring (7) by turning nut or handle (6) CCW until rotation stops. Count and record the number of revolutions in the box below.

Number of revolutions required to relax range spring: _____
---

3. Remove socket head set screw (27) CCW from end of guide post (18).
4. Remove hitch pin (15) and lift up nut or handle (6) to remove.

 **CAUTION**

**Do not apply spring load or operate regulator with hitch pin (15) removed from top of guide post (18). Premature diaphragm failure will result.**

5. Loosen thumbclamp screw (13) and remove. **For Opt-80:** 2 piece clamp (13A): Loosen and remove clamp nuts (13B), washers (13D), bolts (13C) and clamps (13A). See Figure 1.
6. Place matchmarks between body (1) and spring chamber(2) to assist in final orientation when reassembled.
7. Lift spring chamber (2) vertically up and off guide post (18) and body (1) and set aside. *NOTE alignment of spring button (4) tab (ears) with slot guides inside spring chamber (2).*
8. Remove bearing seal (22). Lift up to remove adjusting screw assembly (5), spring button (4) and spring (7) off guide post (18).
9. Grasp cap (5.1) of adjusting screw assembly with hand and lift up to separate cap (5.1) from (5.3) to reveal and remove two u-cup seals (5.4). Do Not remove dowel pin (5.2).
10. 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.
11. 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 (22) on adjusting screw cap (5.1). Set parts aside for final assembly later.
12. Remove set screw (19) rotate CCW. Rotate guidepost (18) CCW and remove.

**For 1" Investment Cast Body:**

- a. Remove spacer (21).
- b. Remove set screw (24) CCW.

13. **For Metal Seat:** Place a wrench on flats of the adapter nut (20) and rotate CCW to remove. **For Composition Seat:** Use a wrench to secure the flats on the top of the stem (17.1). Place a wrench on flats of the adapter nut (20) and rotate CCW to remove.
14. Remove pressure plate (3), diaphragm (16) and diaphragm spacer (26). **NOTE:** *Correct orientation of spacer (26) has the side with the I.D. radius facing towards the clamping surface of the plug (17).*
15. Lift body (1) over end of plug (17).
16. Inspect seating surface of plug. **For Metal Seat:** replace plug if surface is worn or damaged. **For Composition Seat:** Use a wrench to secure the flats on the top of the stem (17.1). Rotate the stem CCW to remove it. Remove seat disc (17.2) from tail piece (17.3).
17. Clean parts in accordance with owner's specifications.

 **CAUTION**

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

18. Secure bottom part of plug (17) or tailpiece (17.3) in a smooth jawed vise. Set body (1) over top of plug. Ensure that the plug or seat of tail piece is in contact with the seating area of the body (1) and the face of the inlet flange of the body (1) is resting on the vise.  
**For Composition Seat:** Place a small amount of medium strength, Food Grade threadlocker on threaded end of stem (17.1). Insert threaded end of stem into tail piece, rotate CW tight fit.
19. Install diaphragm spacer (26) on plug (17). Place new diaphragm (16) with convolution side facing up, onto plug (17) and fit it around the diaphragm spacer (26). Align tab on O.D. of diaphragm (16) with the tab slot cut in the body flange lip.
20. Lay pressure plate (3) on top of diaphragm (16).
21. Apply Emhart Bostic White Food Grade "Never Seeze" or equivalent to threaded end of plug (17). Thread adapter nut (20) onto plug (17) and tighten to 60 in-lbs of torque.

**For 1" Investment Cast Body:**

- a. Install spacer (21).
  - b. Apply medium strength, Food Grade threadlocker set screw (24). Thread set screw into adapter nut (20) secure tight to "flat" on plug (17).
  - c. Apply Emhart Bostic White Food Grade "Never Seeze" or equivalent to the external threads of the adapter (20) and thread guide post (18) securely to the adapter.
22. Thread guide post (18) onto end of plug (17), tighten firmly into place.
  23. Apply medium strength, Food Grade threadlocker to set screw (19). Thread set screw tight into guide post (18).
  24. Position spring (7) over guide post (18) - resting flat on pressure plate (3).
  25. Place spring button(4) with adjusting screw assembly (5) and bearing (22) down over guide post (18) into spring (7) cavity. Align one tab (ear) on spring button (4) directly above tab slot cut into the body flange lip.

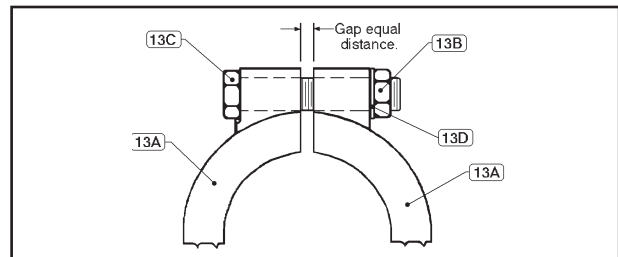
**NOTE:** Apply a small amount of Emhart Bostic White Food Grade "NEVER-SEEZ<sup>®</sup>" or equivalent to threads of adjusting screw (5) .

26. Align the two ribs inside the spring chamber (2) with the tabs (ears) on the spring button (4) and place the spring chamber (2) over assembled parts directly on body (1). Refer to step 6 previous for alignment of match marks for final orientation.

27. 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.

- a. **For Opt.-80:** 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.

**NOTE:** Gap between clamp (13A) halves should be equal in size. See Figure 1.



**Figure 1:** Clamp Arrangement.

28. Place nut or handle (6) onto square end of adjusting screw assembly (5).
29. Insert hitch pin (15) through hole near the top of the guide post (18). Apply medium strength, Food Grade threadlocker to set screw (27) and secure tight into the top of the guide post (18).
30. 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 3 for item number reference ().
3. Remove the lock-open pin (10) from the pin retainer hole in the spring chamber (2). (See Figure 2.)
4. System internal pressure must be at/near 0 psig (0 Barg). This will ensure plug (17) is fully open. **NOTE: Do not change range spring (7) setting by rotating nut or handle (6).**
5. Insert pin (10), jostle nut or handle (6) lift up or push down to secure pin (10) thru adjusting screw (5).

**B. Sanitation:**

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

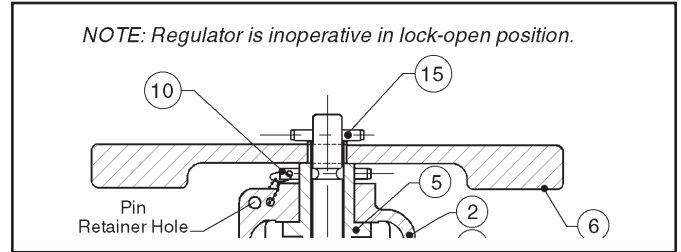
**CAUTION**

**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. 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).

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**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.

**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.



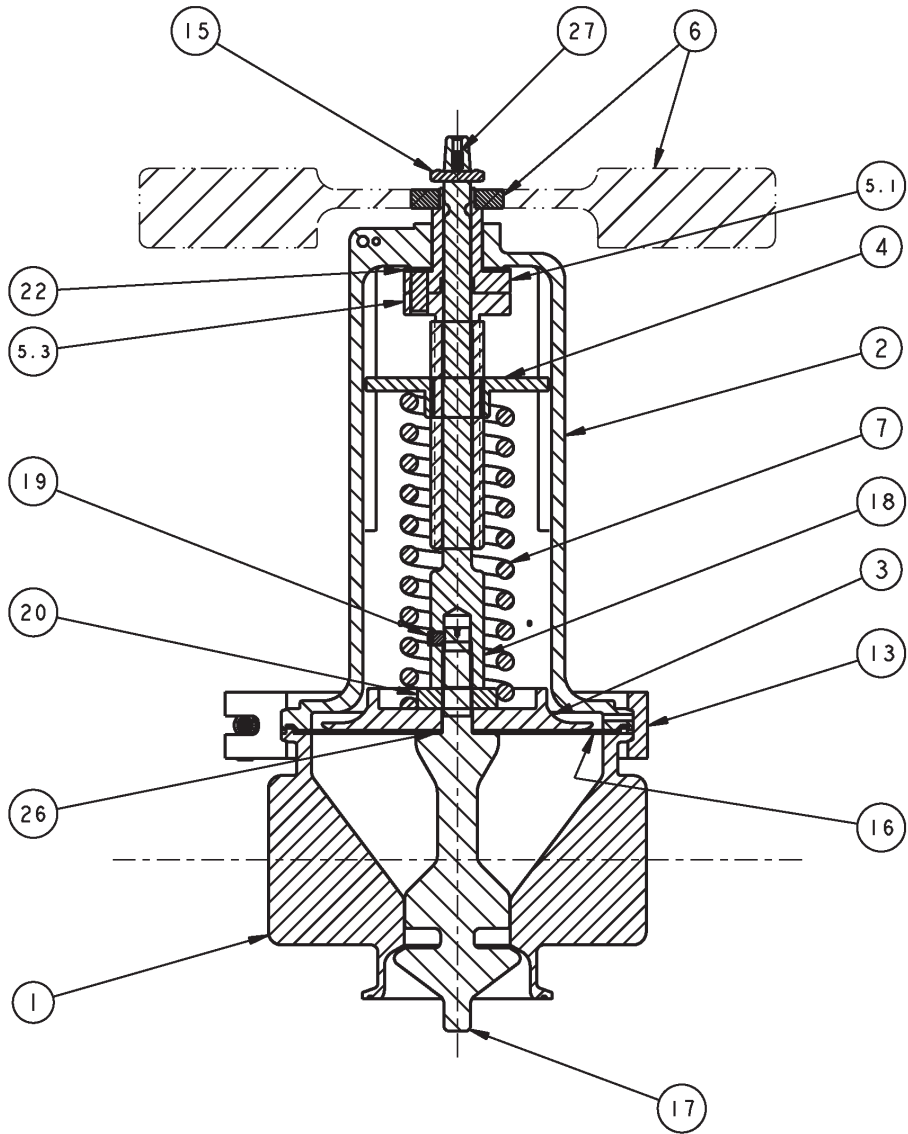
**CAUTION**

**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.**

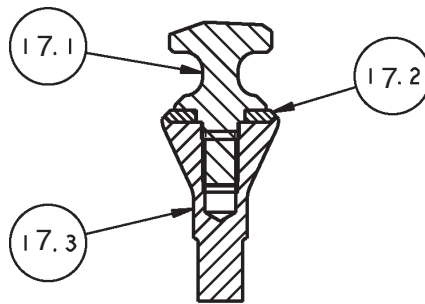
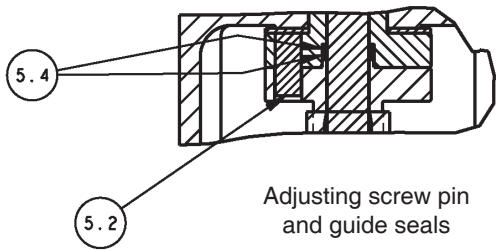
**NOTE:** Those part numbers that have a quantity indicated under "Spare Parts" in column "A" reflect minimum parts required for inspection and rebuild, - "Soft Goods Kit". Those in column "B" include minimum trim replacement parts needed plus those "Soft Goods" parts from column "A".

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.

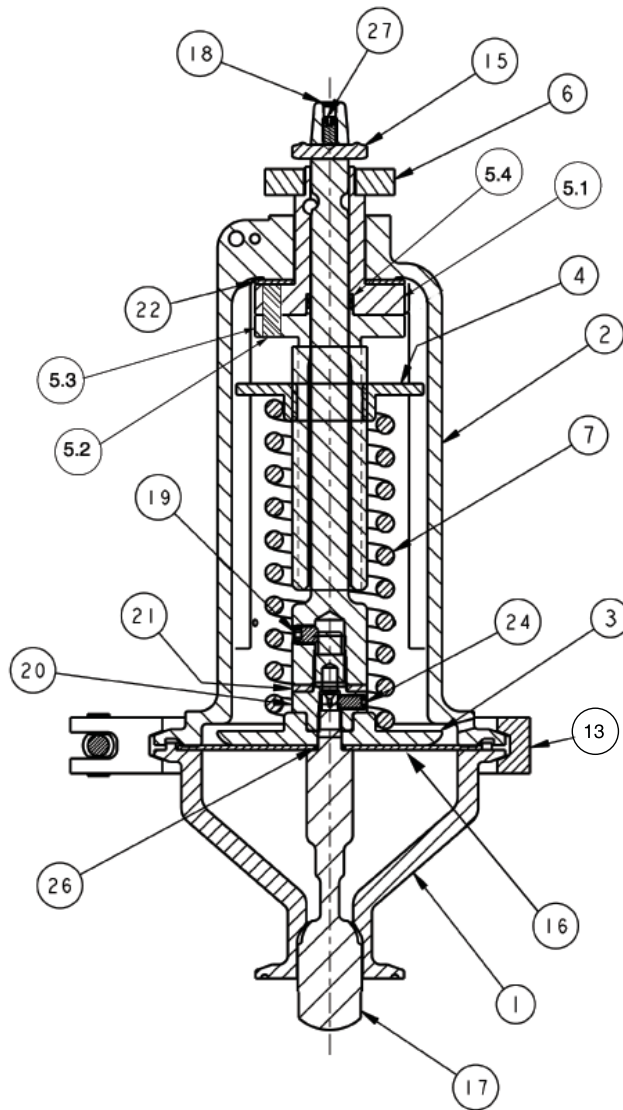


**Figure 3**  
 Barstock Body shown above.  
 See the next page for Item Number Descriptions.



Composition Seat





**Figure 4**

1" Investment Cast Red. Port shown above

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

<u>Item No.</u>	<u>Description</u>	<u>Item No.</u>	<u>Description</u>	<u>Not Shown:</u>	<u>Item No.</u>	<u>Description</u>
1	Body	17	Plug	8	Connector	
2	Spring Chamber	17.1	Stem	9	Ball Chain	
3	Pressure Plate	17.2	Seat	10	Quick Release Pin	
4	Spring Button	17.3	Tail Piece	11	Name Plate	
5	Adjusting Screw	18	Guide Post	12	Drive Screw	
5.1	Adjusting Screw Cap	19	Set Screw	14	3A Symbol Plate	
5.2	Pin	20	Adapter / Nut	23	Diaphragm Cover	
5.3	Adjusting Screw	21	Guide (Spring) / Spacer (1" & 1-1/2" Red. Port Only)	25	Diaphragm Gasket (LG Trim)	
5.4	U-Cup Seal (2 pcs.)	22	Bearing (Soft Seal)			
6	Nut - (Handle Opt-4)	24	Set Screw (Investment cast only.) (Set Screw not needed for C-PRV with comp seat.)			
7	Spring	26	Diaphragm Spacer			
13	Clamp	27	Set Screw			
15	Pin (Cotterless Hitch)					
16	Diaphragm					

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