

MODEL C-PRV PRESSURE REDUCING REGULATOR

SECTION I

I. DESCRIPTION AND SCOPE

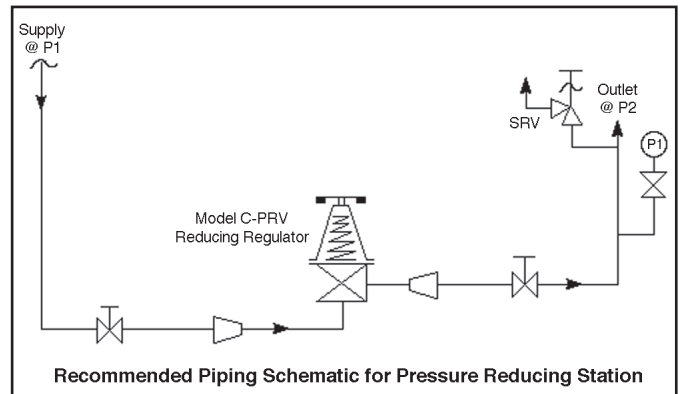
Model C-PRV is a pressure regulator used to control downstream (outlet or P_2) pressure. Inlet and outlet sizes are 1", 1-1/2", 2" and 3" with Tri-Clamp® fitting connections. This regulator is only suitable for liquids and gases at temperatures less than 300°F (149°C). Refer to Technical Bulletin C-PRV-TB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

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

SECTION VI

VI. MAINTENANCE

 WARNING
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.

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.

 WARNING
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.

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[®]" 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 or 18-20 ft-lbs for Gylon Diaphragms.

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

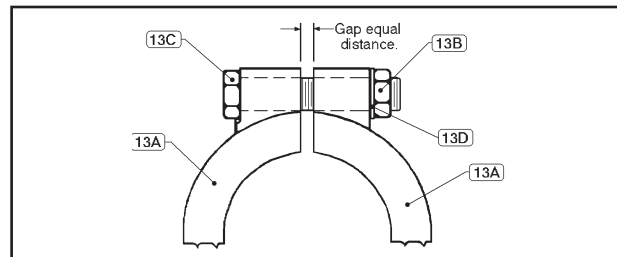


Figure 1: Clamp Arrangement.

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.

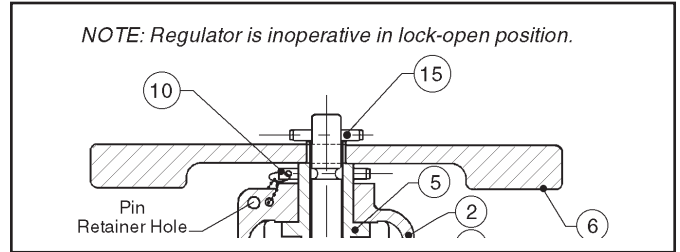


Figure 2: Spring Chamber in Lock-Open Position

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).



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.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such product at any time without notice. Cashco, Inc. does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Cashco, Inc. product remains solely with the purchaser.

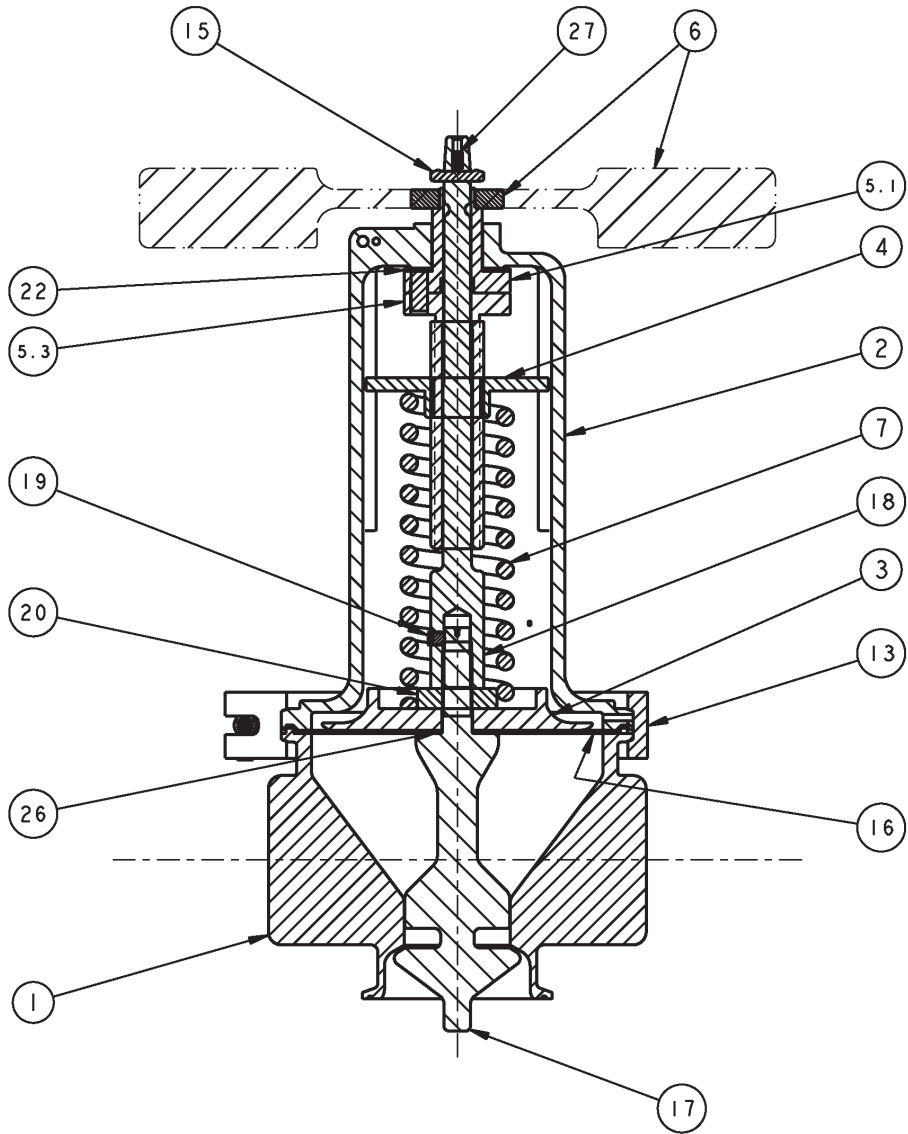
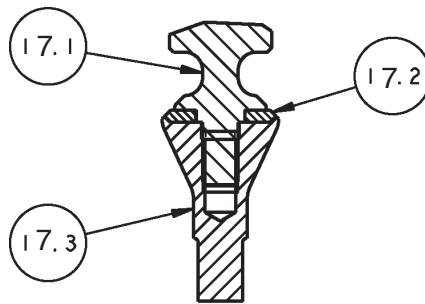
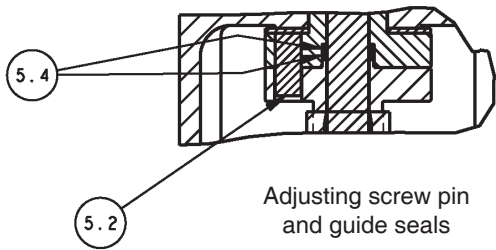


Figure 3
 Barstock Body shown above.
 See the next page for Item Number Descriptions.



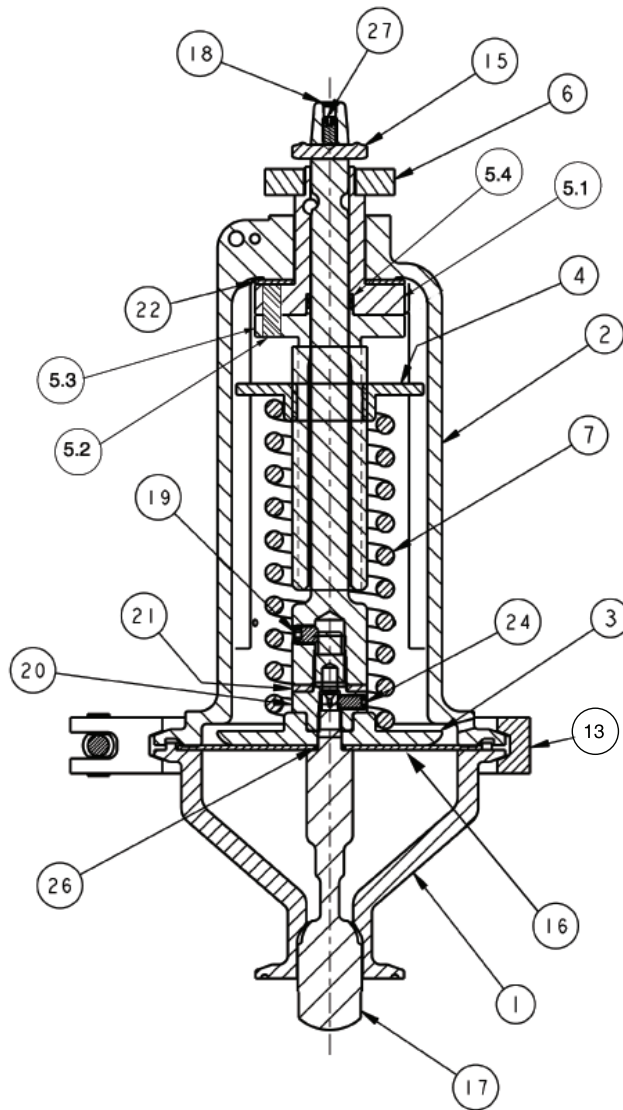


Figure 4

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					



IOM ADDENDUM:

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

Cashco, Inc. 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 $1G\Omega$, 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
REGULATORS	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	
CONTROL VALVES	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, 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-PRV

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