MODEL SCV-30

GLOBE-STYLE - SANITARY PNEUMATIC CONTROL VALVE BODY IOM

SECTION I

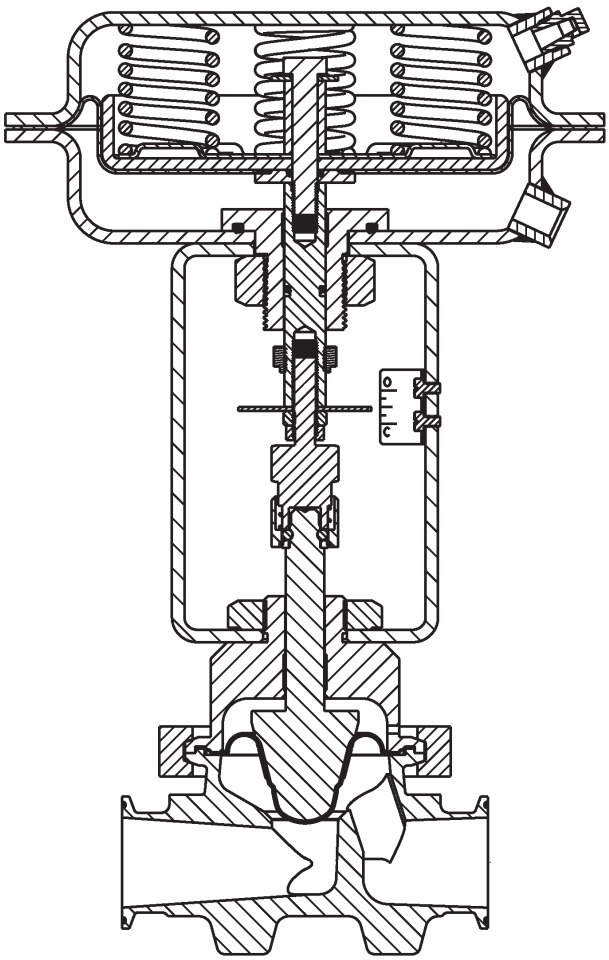
I. DESCRIPTION AND SCOPE

Model SCV-30 is a pneumatically actuated, globe-style control valve for throttling sanitary or biotechnological applications. The globe body comes in two variations; straight-globe pattern and angle-globe pattern, sizes 3/4" - 1-1/2" (DN20 - DN40) with standard Tri-Clover® sanitary end connections. The valve body assembly incorporates a formed internal composition diaphragm that is bonded to a characterized metal plug. The wetted metallic body portion is of forged 316L SST, mechanically and electro-polished to a 10 micro-inch R_a finish.

A field reversible actuator, Model C27, is mounted to the body.
Failure position is determined by actuator, for:
"D" = Direct action; on increasing air loading pressure, the actuator stem extends. Fail-safe position is with the stem retracted.

"R" = Reverse action; on increasing air loading pressure, the actuator stem retracts. Fail-safe position is with the stem extended.

The actuator stem-to-valve stem connection is a Quick Disconnect joint.



Straight Body Pattern with ATO - FC Actuator

SECTION II

II. REFERENCE

Refer to Technical Bulletin SCV-30-TB for complete technical specifications.
www.cashco.com/techbulletins/scv30.pdf

Refer to following Installation, Operation & Maintenance Manuals (IOM's) for the actuator and/or devices that maybe mounted to a Model SCV-30:

Actuators: www.cashco.com/iom/C27-C53.pdf

ABBREVIATIONS

ATC-FO	-	Air to Close, Fail Open
ATO-FC	-	Air to Open, Fail Close
CCW	-	Counter-Clockwise
CIP	-	Clean-in-Place
CW	-	Clockwise
DIR	-	Direct Acting
IAS	-	Instrument Air Supply
REV	-	Reverse Acting
SIG	-	Output Signal from Instrument
SIP	-	Steam-in-Place
V	-	Vent

SECTION III

III. OPERATION CONSIDERATIONS

A. Clean-in-Place (CIP):

1. Control valve unit must be properly oriented per Section IV.A. to assure self-draining of valve's internal passages.

2. Control valve unit comes in the direct action, ATC-FO arrangement or the reverse action, ATO-FC arrangement. Valve should be in the full open position before initiation of the CIP procedure. Control system must accommodate this capability.

3. Cleaning fluid may flow in either direction.

4. Cleaning fluid pressure must not exceed 60 psig (4.1 Barg).

5. Cleaning fluid temperature must not exceed 300°F (149°C).

6. Cleaning fluid must be compatible with wetted materials.

B. Steam-in-Place (SIP):

NOTE: *If the valve will be steam sterilized, the controls must automatically shut the system down when the pressure in the system becomes negative, and must prevent re-starting until the system is resterilized.*

1. Orientation to be same as CIP, Section III.A.1.

2. Steam may flow from either direction.

3. Recommended 20 psig @ SAT (1.4 Barg @ SAT). Maximum 30 psig @ SAT (2.1 Barg @ SAT). Valve must be in the full open during the SIP procedure.

C. Hose-Down Cleaning:

1. Standard Model SCV-30 control valve units supplied with I/P positioners are NOT designed to allow hose-down washing of the unit's exterior.

D. Instrument Air Supply - IAS:

1. For Model SCV-30 with a positioner recommend using cryogenically produced nitrogen gas, or oil-free compressed air desiccant dried to -40°F(-40°C) dew point, filtered to 10 microns or less as the IAS source.

2. All exhaust/vent air utilized by the Model SCV-S unit enters the ambient environment.

SECTION IV

IV. INSTALLATION

A. Orientation:

1. Standard orientation is with the yoke with position indicator plate and valve body outlet port in same plane. If an alternate arrangement is necessary, loosen yoke nut (8) securing yoke (3) to bonnet (2) approximately three revolutions. Rotate actuator assembly (AA) to desired position with respect to body assembly (BA). Re-tighten yoke nut (8) to 85 ft-# (115 N M). ***NOTE:*** *This procedure can be done in-line.*

2. Valve body must be installed in a horizontal or vertical plane where the outlet connection flow direction is downwards or horizontal (see Figure 1). Failure to comply will cause the self-draining of the internal passages to be nullified, allowing CIP cleaning/flushing fluids to be ponded.

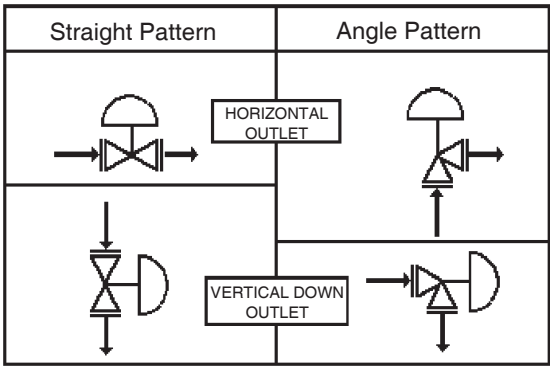


Figure 1: Installation Orientation

SECTION V

V. MAINTENANCE

A. General:

⚠ WARNING

SYSTEM UNDER PRESSURE. Prior to performing any body disassembly or removal for maintenance, inspection or cleaning, isolate the valve body from the system and relieve all pressure. Failure to do so could result in personal injury.

1. Maintenance procedures hereinafter are based upon removal of the control valve unit from the piping system where installed.

2. Owner should refer to their procedures for removal, handling and cleaning of non-reusable parts, i.e. gaskets, diaphragm, etc.

3. Valves supplied from the factory use a light coat of Emhart Bostic White Food Grade "NEVER_SEEZ" or equivalent on seals and threads.

4. Reference Figures 2 through 5 for identification of item numbers.

5. All item numbers with respect to body assembly (BA) will be in parenthesis and not underscored; i.e. (1). All item numbers with respect to the actuator assembly (AA) will be in parenthesis and underscored; i.e. (1).

B. Separation of Body/Actuator:

1. Place body assembly (BA) into a vise with actuator assembly (AA) in upwards position.

2. Place matchmarks between the yoke (3), bonnet (2), Tri-Clamp® (4), and body (1) to assist in final orientation when the body is disassembled and/or the actuator removed.

3. Using an overhead hoist, rig the actuator assembly (AA) for a vertical lift. Remove slack from rigging.

4. Rotate yoke nut (8), CCW until fully disengaged.

For ATO-FC Reverse Action Units:
Connect a temporary air supply hose that has an adjustable airset with gauge to the actuator and pressurize to a level sufficient to initiate travel to upper limit of the bench range specified on the name plate (40). (*Pressure will lift the plug/stem (3.1) away from the body's (1) integral seat until the plug is 100% open.)*.

For ATC-FO Direct Action Units:
Not necessary to connect temporary air supply.

5. The valve plug/stem (3) -to-actuator stem (6) assembly is a quick disconnect joint. Grasp stem (3.1) between thumb and forefinger of one hand. Grasp the lower collar (42b) between the thumb and forefinger of the other hand. Slide/push lower collar (42b) upwards. Stems (3.1) and (6) should uncouple and separate.

NOTE: *Take care to not "drop" the plug/stem (3.1) downwards into the body's (1) integral seat; lower slowly to this position.*

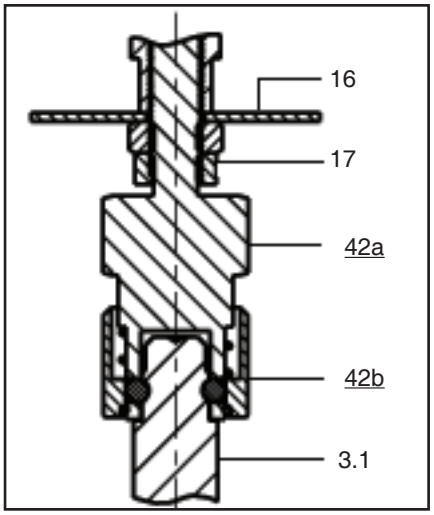


Figure 2: **Quick Disconnect**

6. Raise the actuator assembly (AA) over stem (3.1).

For ATO-FC Reverse Action Units:
Release all pressure from the actuator. Lay actuator assemby aside on work surface.

C. Body Disassembly:

1. Remove actuator assembly (AA) per Section V.B.1-6.

2. Grasp wing nut (4.2) with hand and rotate CCW until there is sufficient room to swing the nut away from the restraining slot of clamp (4).

3. Hold plug/stem (3.1) securely, pull upwards, lifting bonnet (2) and plug/diaphragm sub-assembly away from body (1). It is necessary to grasp the protruding "tab" on the diaphragm (3.2) and pull upwards simultaneously with the plug/diaphragm sub-assembly (3).

4. Slide bonnet (2) up over end of plug/stem (3.1) and set aside.

5. Place plug/stem end (3.1) into a soft-jawed vise with plug head-end oriented upwards.

D. Trim Inspection and Replacement:

1. Inspect body (1), bonnet (2) and plug/diaphragm (3) for wear. If seating surfaces show wear, perform the following repairs:

2. Pull diaphragm (3.2) away from plug/stem (3.1). Discard used diaphragm (3.2).

3. Using palm of hand, rub away any adhesive (3.3) that remains "stuck" onto the plug (3.1).

4. Remove the plug/stem (3.1) and thoroughly clean the area where adhesive is to be reapplied (abraded surface) with a water soluble solvent. Rinse thoroughly with warm potable water. Allow to air dry.

⚠ CAUTION

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

5. Lightly roughen the inside surface of a new plug/diaphragm (3.2), where the adhesive (3.3) will be applied, using a "Scotch-Brite" (TM of 3M), or equal polishing pad. Rinse thoroughly with warm water and allow to air dry.

⚠ CAUTION

DO NOT TEAR DIAPHRAGM FABRIC.

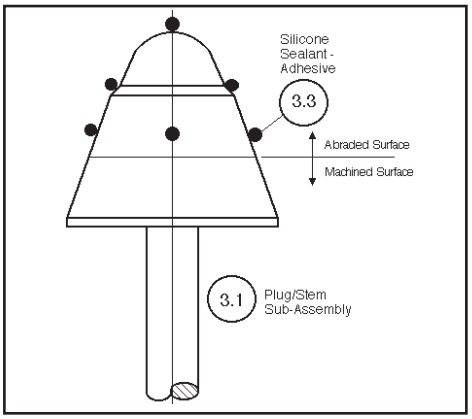


Figure 3: **Adhesive Placement**

NOTE: *Observe the contours of the diaphragm (3.2) to confirm that it will fit over the contour of the plug head-end end (3.1).*

6. Clean body (1) similar to plug/stem (3.1) of Step 4. above. Place body (1) back into vise.

7. Place stem end of plug/stem (3.1) into a soft jawed vise with the plug head-end (3.1) oriented upwards. DO NOT TOUCH PLUG-HEAD END (3.1).

8. Open the small container of silicone sealant/adhesive (3.3). Place seven "dabs" of adhesive (3.3) on the plug head-end (3.1) at the locations indicated in Figure 3. **DO NOT ATTEMPT TO SPREAD THE DABS.** Place a new diaphragm (3.2) over the plug head-end (3.1). Press down on the tip of the diaphragm (3.2) to spread the silicone sealant (3.3). Twist the diaphragm (3.2) back and forth several times while ensuring at least one complete revolution of the diaphragm (3.2) occurs. Starting at the tip of the diaphragm (3.2), press the diaphragm (3.2) against the plug head-end (3.1) to remove any air pockets.

9. Grasping the outer edge of the diaphragm (3.2), lift off the diaphragm (3.2).

10. Examine the plug head-end (3.1) to ensure that the adhesive (3.3) is evenly spread and that all surfaces are covered. **DO NOT TOUCH ADHESIVE (3.3).**

NOTE: *If there are surfaces missing adhesive (3.3), repeat the last half of Step 8. above, and Steps 9. and 10.*

11. Place diaphragm (3.2) back over the plug head-end (3.1). Twist 1/4 revolution. Press the diaphragm (3.2) against the plug head-end (3.1) to remove any air pockets, starting from the tip of the diaphragm (3.2) and moving downwards.

12. Place plug/diaphragm sub-assembly (3) back into the body (1) with the stem (3.1) oriented upwards, and the plug head-end (3.1) resting on the seat portion of the body (1). Place a temporary 6# (3kg) weight (doughnut shaped) over the end of the stem (3.1) so that it can rest on the "shelf" of the plug (3.1), pressing the diaphragm (3.2) against the plug (3.1) at the seating surfaces. Leave this apparatus in place for a 24 hour cure period. ***NOTE:*** *The silicone sealant/adhesive (3.3) cure period can not be shortened through the use of heat; minimum cure time is 24 hours.*

13. After proper cure, remove temporary weight and plug/diaphragm sub-assembly (3) from the body (1). Remove body (1) from vise.

14. Reclean body(1), plug/diaphragm sub-assembly (3), bonnet (2), and "Tri-Clamp" sub-assembly (4) per owner's procedures. A final rinse with ultra-clean water is recommended.

E. Body Reassembly:

1. Place body (1) back into vise oriented for vertical plug/stem (3.1).

2. Set plug/diaphragm sub-assembly (3) back into body (1) cavity, aligning the tab of the diaphragm (3.2) to be located into the slot of the body (1) flange.

3. Insert upper end of the plug/stem (3.1) through the bonnet (2) as bonnet (2) is lowered over stem (3.1) and down onto flange of body (1) and diaphragm (3.2).

4. Press down firmly on the plug/stem (3.1) upper end.

5. Re-position "Tri-Clamp" assembly (4) around the body (1) to-bonnet (2) joint. Align matchmarks. Latch wing nut back into slot. Rotate wing nut CW and tighten with approximately 4 - 6 ft.- # (5-8 N M) torque.

6. Reinstall actuator assembly (AA) to body assembly (BA) per Section V.F.

F. Mounting - Actuator Assembly to Body:

1. Place body into a vise securely with the plug/stem (3.1) directed upwards.

2. Using an overhead hoist, rig and lift actuator assembly (AA) above body assembly (BA). Lower actuator assembly (AA) down and over valve stem (3.1), so the upper end of the valve stem (3.1) passes through lower opening of the yoke (3) and through yoke nut (8).

For ATO-FC Reverse Action Units:
Connect a temporary air supply hose that has an adjustable airset with gauge to the actuator and pressurize the actuator to upper limit of the bench range specified on the name plate (40).

For ATC-FO Direct Action Units:
Not necessary to connect temporary air supply.

3. Continue to lower actuator assembly until it rest on the bonnet (2). Align actuator assembly (AA) and body assembly (BA) with matchmarks of V.B.2 previous. Place yoke nut (8) onto bonnet threads and hand tighten.

4. Grasp plug/stem (3.1) between thumb and forefinger of one hand. Grasp lower collar (42b) between thumb and forefinger of the other hand. Lift plug/stem (3.1) up and into the opening of the lower collar (42b). Slide/push the collar (42b) upwards while simultaneously lifting the plug/stem (3.1) end into the quick disconnect (42) assembly. A "click" will be felt when the engagement is proper; release the collar (42b). The lower lips of the collar (42b) and the actuator stem (6) assembly should align. Release the plug/stem (3.1) to ensure engagement. ***NOTE:*** *For ATO-FC Action may need to slowly decrease actuator pressure to allow stem and collar to engage.*

5. Tighten yoke nut (8) to 85 ft-# (115 N M).

For ATO-FC Reverse Action Units:
Release all pressure from the actuator.

SECTION VI

VI. CALIBRATION

A. General:

1. This section only covers calibration of the control valve with Actuator Model C27-C53.

2. Positioner, if installed, requires reference to the specific positioner model IOM for proper calibration procedure.

3. All indicated items numbers that are with respect to IOM-C27-C53 will be in parenthesis and underscored; i.e. (20); those that reference the positioner IOM will be in double parentheses; i.e. ((AP)). All item numbers that are with respect to this IOM-SCV-S are not underscored; i.e. (3).

B. Procedure – Reverse Action, ATO-FC:

1. Reference the nameplate (40) attached to the actuator yoke (3). Determine the bench setting of the installed range springs (10) from the nameplate (40).

2. Connect a temporary air supply with an in-line adjustable airset regulator and gauge to the lower actuator connection. **DO NOT LOAD** with any air pressure at this point.

3. To determine when stem/plug (3) begins to lift out of the seat, touch the stem below the coupling with one finger. (Stem will begin to move when actuator pressure exceeds the spring load.)

4. Slowly pressurize the actuator to a pressure equal to the lower pressure level of the bench setting; i.e. for 5-15 psig (.34–1.03 Barg) range, set pressure at 5 psig (.34 Barg). Take note of pressure reading when the stem first begins to move.

5. If the loading pressure for the start of stem movement **is below the lower end** of the desired bench setting, then the combined stem (3, 6) length is too short.
   a. Rotate jam nuts (17) down to base of threads on upper collar (42a).
   b. Increase pressure in actuator to approximately mid range of the bench setting.
   c. Rotate upper collar (42a) CCW to increase the combined stem length. **DO NOT** allow actuator stem (6) to rotate in the actuator.
   d. Rotate upper jam nut CW to hold indicator washer (16) up against stem (6).
   e. Release all pressure from the actuator and repeat Step 4 previous.

6. If the loading pressure for the start of stem movement **is above the lower end** of the desired bench setting, then the combined stem (3, 6) length is too long.
   a. Rotate jam nuts (17) down to base of threads on upper collar (42a).
   b. Increase pressure in actuator to approximately mid range of the bench setting.
   c. Rotate upper collar (42a) CW to shorten the combined stem length. **DO NOT** allow actuator stem (6) to rotate in the actuator.
   d. Rotate upper jam nut CW to hold indicator washer (16) up against stem (6).
   e. Release all pressure from the actuator and repeat Step 4 previous.

7. After the opening set point pressure has been established, rotate lower jam nut (17) CW up tight under the upper jam nut.

8. Release all pressure from the actuator.

9. Observe the location of the indicating washer (16) to the "C" mark on the indicator plate (23), making sure to use the “top edge” of the indicating washer (16) as the reference point. Adjust indicator plate as needed.

10. Slowly increase the pressure in the actuator until the indicating washer (16) is in alignment with the "O" mark on the indicator plate.

11. To limit the up travel at the desired stroke length, rotate the travel stop nut (52) CW and secure to bottom of attachment hub (4).
    NOTE: *Secure the actuator stem (6) by the flats when rotating the travel stop nut.*
    NOTE: *"Stroke" length is indicated on the nameplate (40), and is the distance between the "C" and "O" marks of the indicator plate (23).*
    NOTE: *The proper calibration of the actuator / valve unit will occur when at the lower pressure level of bench setting, the valve plug (3) will just begin to travel from the "C" position. At the upper level of the bench setting, the actuator pressure should be within ±8% of the upper bench range for the desired stroke length.*

12. Release all pressure from actuator.

C. Procedure – Direct Action, ATC-FO:

1. Reference the nameplate (40) attached to the actuator yoke (3). Determine the bench setting of the installed range springs (10) from the nameplate (40).

2. Connect a temporary air supply with an in-line adjustable airset regulator and gauge to the upper actuator connection. **DO NOT LOAD** with any air pressure at this point.

3. To determine when stem/plug (3) makes contact with the seat and travel stops, touch the stem below the coupling with one finger. (Stem movement will stop when the plug engages the seat.)

4. Slowly pressurize the actuator to a pressure equal to the upper pressure level of the bench setting; i.e. for a 5-15 psig (.34 -1.0 Barg) range, set pressure at 15 psig (1.0 Barg). Take note of the pressure reading when stem travel actually stops.

5. If the loading pressure, when stem movement stops, **is below the upper end** of the desired bench setting, then the combined stem (3, 6) length is too long.
   a. Rotate jam nuts (17) down to base of threads on upper coupling (42a).
   b. Decrease pressure in the actuator to approximately mid range of the bench setting.
   c. Rotate upper coupling (42a) CW to shorten the combined stem length. **DO NOT** allow actuator stem (6) to rotate in the actuator.
   d. Rotate upper jam nut CW to hold indicator washer (16) up against stem (6).
   e. Release all pressure from the actuator and repeat Step 4 previous.

6. If the loading pressure, when stem movement stops, **is above the upper end** of the desired bench setting, then the combined stem (3, 6) length is too short.
   a. Rotate jam nuts (17) down to base of threads on upper coupling (42a).
   b. Decrease pressure in the actuator to approximately mid range of the bench setting.
   c. Rotate upper coupling (42a) CCW to increase the combined stem length. **DO NOT** allow actuator stem (6) to rotate in the actuator.
   d. Rotate upper jam nut CW to hold indicator washer (16) up against stem (6).
   e. Release all pressure from the actuator and repeat Step 4 previous.

7. After the closed- set point pressure has been established, rotate lower jam nut (17) CW up tight under the upper jam nut.

8. Increase pressure in the actuator to the upper pressure level of the bench setting.

9. Observe the location of the indicating washer (16) to the "C" mark on the indicator plate (23), making sure to use the “top edge” of the indicating washer (16) as the reference point. Adjust indicator plate as needed.

10. Slowly decrease air pressure in actuator until indicating washer (16) is in alignment with the “O” mark on the indicator plate (23).

11. To limit the up travel at the desired stroke length, rotate the travel stop nut (52) CW and secure to bottom of attachment hub (4).
    NOTE: *Secure the actuator stem (6) by the flats when rotating the travel stop nut.*
    NOTE: *"Stroke" length is indicated on the nameplate (40), and is the distance between the "C" and "O" marks of the indicator plate (23).*
    NOTE: *The proper calibration of the actuator / valve unit will occur when at the upper pressure level of bench setting, the valve plug (3) will be in the "C" position. At the lower level of the bench setting, the actuator pressure should be within ±8% of the lower bench range for the designed stroke length.*

12. Release all pressure from actuator.

SECTION VII

VII.TROUBLE SHOOTING GUIDE

1. Unit can not pass enough flow.

Possible Cause	Remedy
A. Sizing data not correct; valve undersized.	A1. Check actual pressures, temperature, and flow rates against the variables used for sizing. Recalculate Cv Required. A2. Replace unit with larger body size.
B. Obstruction at inlet.	B. Remove valve from line and inspect for something causing blockage.

2. Valve body leaking at clamped end or bonnet connection joints.

Possible Cause	Remedy
A. Excess pressure levels.	A. Check actual pressures against those indicated in technical bulletin. Reduce pressures as necessary.
B. Loose clamp.	B. Remove valve from service. Disassemble and clean. Reassemble and properly tighten all clamps at reinstallation.
C. Excessive piping stress.	C. Place hanger on control valve unit.
D. Improper pipe alignment.	D. Redo piping properly.

3. Fluid leakage at bonnet vent or at bonnet/stem guide zone.

Possible Cause	Remedy
A. Ruptured plug diaphragm.	A. Remove body, disassemble, remove old diaphragm. Install new diaphragm, reassemble and reinstall.

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.

⚠ 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.

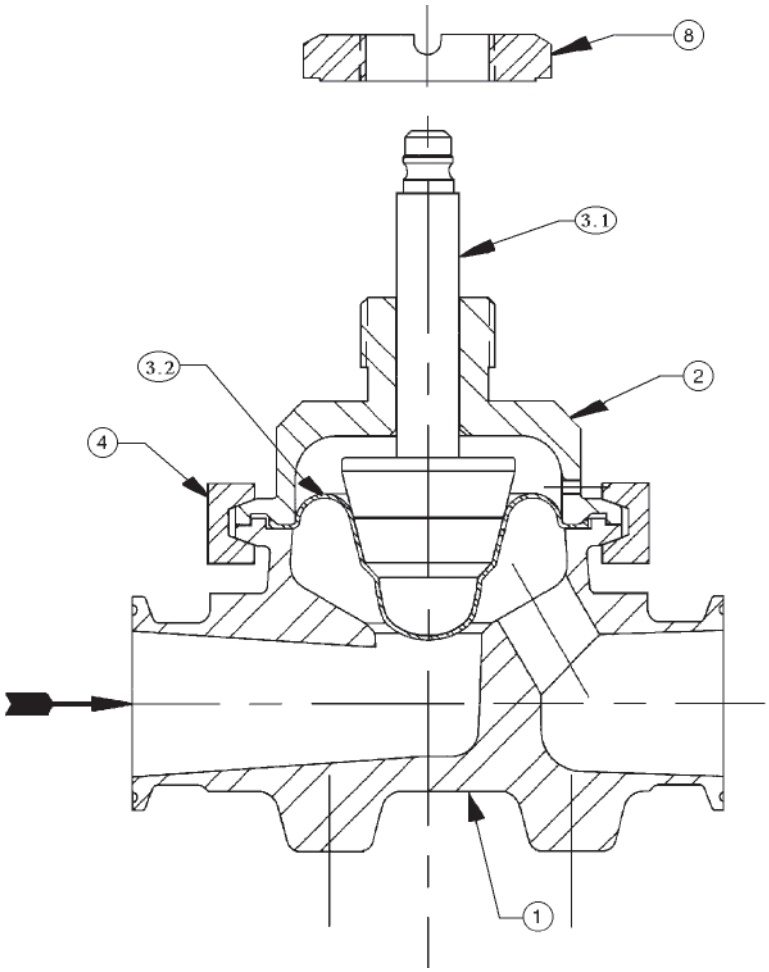

FIGURE 4:
Straight-Globe Body Assembly (BA)

ITEM NO.	DESCRIPTION
1	Body
2	Bonnet
3	Plug/Diaphragm Assy.
3.1	Plug/Stem
3.2	Plug Diaphragm
4	"Tri-Clover" Clamp
8	Yoke Nut

ITEMS NOT SHOWN

ITEM NO.	DESCRIPTION
3.3	Adhesive
4.2	"Tri-Clover" Clamp Wing Nut
5	Flow Arrow Tag
6	Drive Screw
16 *	Indicating Washer
17 *	Jam Nut

* See Figure 2

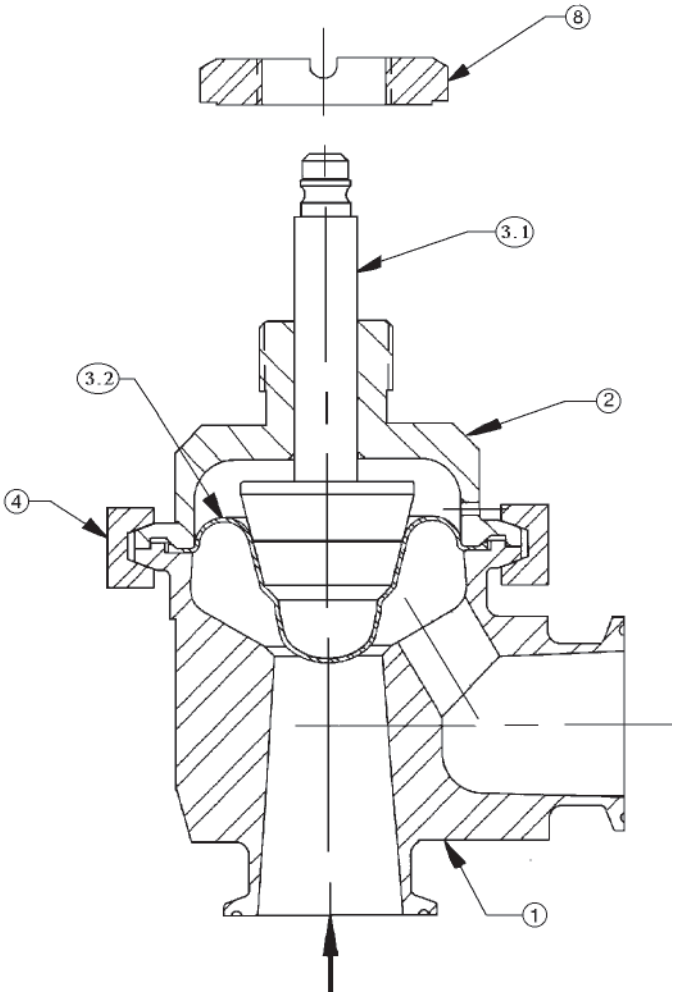

FIGURE 5:
Angle-Globe Body Assembly (BA)

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:

II 2 G
Ex h IIB T6... T1 Gb
1000ATEXR1 X

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 1GΩ, 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 <1m/s (<3.3 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

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