

MODEL SCV-S

GLOBE-STYLE - SANITARY PNEUMATIC CONTROL VALVE BODY IOM

SECTION I

I. DESCRIPTION AND SCOPE

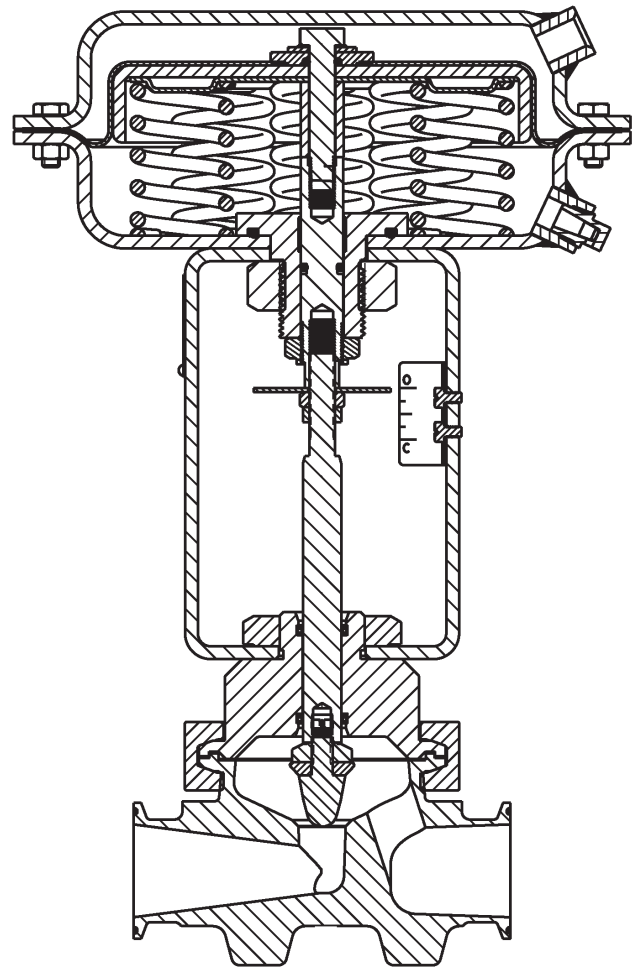
Model SCV-S is a pneumatically actuated, globe-style control valve for throttling sanitary or biotechnological applications. The globe body comes in two variations - straight-globe pattern and angle-globe pattern, sizes 3/4" - 1-1/2" (DN20 - DN40) with standard Tri-Clover® sanitary end connections. The valve is available in either a metal or composition seat construction. 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 standard actuator stem-to-valve stem connection is a screwed joint design; Opt.-68 Quick Disconnect Joint is also available.



**Straight Body Pattern
with ATC - FO Actuator**

SECTION II

II. REFERENCE

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

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

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 50 psig (3.4 Barg).
5. Cleaning fluid temperature must not exceed 366°F (186°C).
6. Cleaning fluid must be compatible with wetted materials.

B. Steam-in-Place (SIP):

1. Orientation to be same as CIP, Section III.A.1.
2. Steam may flow from either direction.
3. Recommended 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-S 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-S 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 valve 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. Failure to comply will cause the self-draining of the internal passages to be nullified, allowing CIP cleaning/flushing fluids to be ponded. See Figure 1.

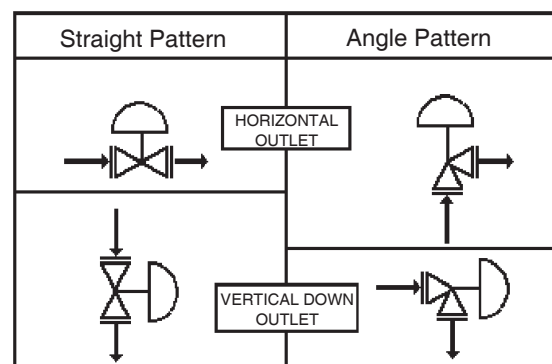


Figure 1: Installation Orientation

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 6 for identification of item numbers.
5. All item numbers with respect to body assembly (BA) will be in parentheses and not underscored; i.e. (1). All item numbers with respect to the actuator assembly (AA) and positioner will be in parentheses and underscored; i.e. (3). Reference with respect to the positioner is in double parentheses; i.e. ((AP)).
6. **Special care must be exhibited when rotating the stem (3,10) of the valve to not mar that portion of the surface of the stem where it contacts with the seal o-rings (9).** To rotate the stem (3,10), use the jam nuts (17) or grasp stem with soft-jawed pliers. **NOTE:** *When using the jam nuts to rotate the stem, use the upper jam nut to rotate the stem CW, and the lower jam nut to rotate the stem CCW, when viewed from above valve stem.*
7. Hereafter, whenever text has the following notation, "**(Note PA.)**", the following text is to be applied;

"For ATO-FC reverse action units, connect a temporary air source to the actuator and pressurize to a level sufficient to initiate travel to approximately mid-stroke.

8. Hereafter, whenever text has the following notation, "**(Note RP.)**", the following text is to be applied:

"For ATO-FC reverse action units, release all temporary air pressure.

B. Separation of Body/Actuator with Std Threaded Stem:

NOTE: *For units with Opt-68 Quick Disconnect Stem proceed to Section V.C. See Fig. 2.*

1. Secure body (1) into a vise with the actuator assembly (AA) in the upwards orientation. 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.
2. Using an overhead hoist, rig the actuator assembly (AA) for a vertical lift. Remove slack from rigging.
3. **(Note PA.)** Rotate yoke nut (8), CCW (viewed from above) approximately 2 revolutions. Secure the actuator stem (6). Loose jam nuts (17) by rotating CW one-at-a-time to base of stem (3) threads.
4. Fully loosen any accessory devices that are connected to the stem (3,6) such as accessory plate ((AP)) for positioner. **(Note RP.)**

NOTE: *To fully disengage actuator stem (6) from the stem (3) is a two-step procedure. Be aware of the valve's stroke length as indicated on the nameplate (40) before beginning disengagement. During the disengagement, measure the distance extended, and stay at least 1/8" (3 mm) away from the full stroke length. Count and record the number of revolutions for each step in the box below:*

No. of revolutions to disengage plug/stem from actuator stem:

Step A. _____ Step B. _____

TOTAL: _____

5. For ATO-FC Reverse Action Units:

- a. **(Note PA.)**
- b. Step A. Rotate stem (3) CW (viewed from above) to disengage the actuator

stem (6) from the plug/stem (3), while holding the actuator stem (6). Record the number of plug/stem revolutions for Step A above. When the disengagement reaches about 50% of full stroke travel Step A is completed. **(Note RP).**

- c. **Step B.** Support the actuator assembly (AA) from above. Fully loosen yoke nut (8). Lift the actuator assembly (AA) upwards approximately 1/4"-3/8" (6-8 mm). Again, rotate plug/stem (3) CW (viewed from above) to disengage the actuator stem (6) from the plug/stem (3) while holding the actuator stem (6). Record the number of plug/stem revolutions for Step B above. This should allow the stems (6) (3) to fully disengage.

NOTE: Take notice of the parts "dangling loosely" about the stem (3), the order of their location and their proper orientation.

- d. Fully raise the actuator assembly (AA) from the valve body assembly (BA). Remove cautiously to prevent dangling parts - indicating washer (16), accessory plate ((AP)), yoke nut (8) - from falling.

6. **For ATC-FO Direct Action Units:**

- a. **Step A.** Rotate plug/stem (3) CW (viewed from above) to disengage the actuator stem (6). Do not rotate the plug (3) into the seat (11). Record the number of stem (3) revolutions for Step A. When the disengagement reaches about 75% of full stroke travel, Step A. is completed.
- b. **Step B.** Support the actuator assembly (AA) from above. Fully loosen yoke nut (8) and remove. Lift the actuator assembly (AA) upwards approximately 1/4" - 3/8" (6-8 mm). Again, rotate plug/stem (3) CW (viewed from above) to disengage the actuator stem (6) from the plug/stem, while holding the actuator stem. Record the number of plug/stem revolutions for Step B. This should allow the stems (6) (3) to fully disengage.

NOTE: Take notice of the parts "dangling loosely" about the stem (3), the order of their location and their proper orientation.

- c. Fully raise actuator assembly (AA) from the valve body assembly (BA). Remove

cautiously to prevent dangling parts – indicating washer (16), accessory plate ((AP)), yoke nut (8) - from falling.

C. Separation of Body/Actuator with Opt-68 Quick Disconnect Stem:

1. Place body assembly (BA) into a vise with the actuator assembly (AA) in the upwards position.
2. Place matchmarks between the yoke (3), bonnet (2), Tri-Clamp® (4), and body (1) to assist during re-assembly.
3. Using an overhead hoist, rig the actuator assembly (AA) for a vertical lift. Remove slack from rigging.
4. Rotate yoke nut (8), (turning CCW viewed from above actuator) until fully dis-engaged.

For ATO-FC (Reverse) Action Units Only:

Connect a temporary air supply hose that has an adjustable airset with gauge to the actuator inlet to allow pressurization. Pressurize the actuator to upper limit of the bench range specified on the name plate (40). **(NOTE: Pressure will lift the plug/stem (10) away from the body's (1) integral seat until the plug is 100% open.)**

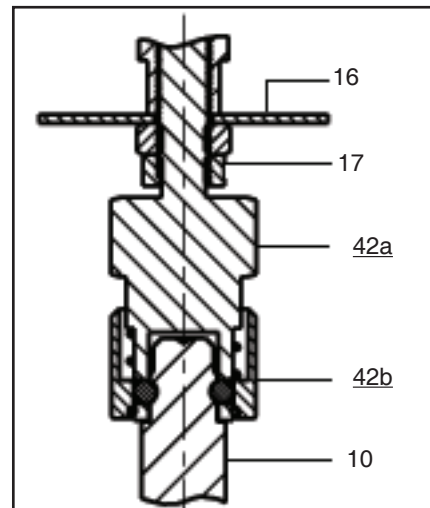


Figure 2: Opt.-68 Quick Disconnect

5. The valve stem (10)-to-actuator stem (6) assembly is a quick disconnect joint. Grasp stem (10) 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 (10) and (6) should uncouple and separate.

NOTE: Take care to not "drop" the plug/stem (10) downwards into the body's (1) integral seat; lower slowly to this position.

6. Release temporary air pressure.
7. Lift actuator assembly (AA) upwards until able to swing out of the way and set down onto work surface.

D. Body Disassembly:

1. Remove actuator assembly (AA) per Section V.B.1-6 or V.C.1-7.
2. Remove clamp nuts (4.3), washers (4.4), bolts (4.2), and clamps (4.1).

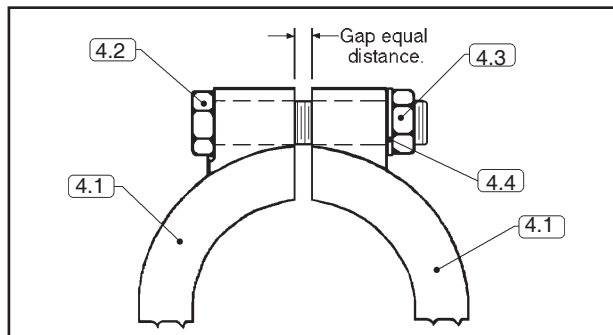


Figure 3 : Clamp Orientation

3. Hold stem (3,10) securely, pull upwards, lifting bonnet (2) away from body (1).
4. Slide bonnet (2) up over end of plug/stem (3,10) and set both aside.
5. Remove gasket (7) from body (1) -to-bonnet (2) joint. Discard gasket (7).

E. Trim Inspection and Replacement:

1. Inspect body (1), bonnet (2) and stem plug (3) or seat disc (13) for wear. If seating surfaces show signs of wear, proceed as follows:
 - a. For metal seated plug construction, place lapping compound on seating surfaces, reassemble body assembly (BA), and hand-lap the plug/stem (3) to remove minor seat wear. If hand-lapped, both the body (1) and plug/stem (3) head will require careful mechanical polishing and mechanical buffing; chemical electro-polishing may be required.
 - b. For composition seated construction, secure stem/plug assembly (10) in a soft-jawed vise (plug end down) using the flats on the nut (12). Rotate stem CCW to remove. Insert flat blade screwdriver into the slot in the end of the plug and rotate CW to remove plug (15) and seat

disc(13). Place new seat disc on threaded end of plug and re-install in nut. Place stem on threaded end of plug and secure tight. **Special care must be exhibited when rotating the stem to not mar that portion of the surface of the stem where it contacts with the seal o-rings (9).** Inspect the body (1) seating surface. If seating surface shows wear, replace the body.

2. Pick up bonnet (2) and using a thin-edged tool, remove both upper and lower stem seal rings (9) and discard used seal rings.
3. Clean all parts per owner's procedures. A final rinse with ultra-clean water is recommended.

⚠ CAUTION

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

F. Body Reassembly:

1. Place body (1) into vise oriented for vertical plug/stem position.
2. Place new gasket (7) onto body (1) flange.
3. Lubricate O.D. of stem seals (9) and carefully insert new spring-assisted stem seal rings (9) back into the bonnet's (2) grooves. "Open" face of both seal rings oriented downwards towards the plug head. (Detail "A")

⚠ CAUTION

Do not use any sharp-edged tool to install the lower and upper stem seal rings (9).

4. Lubricate I.D. of stem seals (9). Insert the upper end of the stem (3,10) through the bonnet (2) and through both stem seal rings (9).
5. Set bonnet (2) with inserted plug/stem onto the flange of the body (1). Lower plug/stem until it touches the body seat. Press down firmly on the stem (3, 10) upper end.
6. Re-position clamps (4.1), bolts (4.2), washers (4.4), and nuts (4.3) around the body (1) to-bonnet (2) joint. Rotate clamp nuts (4.3) a few revolutions in an alternating pattern to hold clamp assembly. Align matchmarks. Position both hands around the outside of the Tri-Clamp®, push the clamp towards the valve's center. Ensure proper alignment of body (1)

with bonnet (2) by checking OD of flanges. Finger-tighten clamp nuts (4.3). **NOTE:** *Gap between clamp (4.1) halves should be equal in size. See Figure 3.*

7. Wrench-tighten each clamp nut (4.3) in alternate one-half revolution increments. Final tighten clamp bolting (4.2)(4.3) to a 20 Ft-lbs (27 N-m) torque value.
8. Reinstall actuator assembly (AA) to body assembly (BA) per Section V.G. or V.H.

G. Mounting - Actuator to Body Std Threaded Stem:

1. Place body assembly (BA) into a vise securely with the stem (3, 10) directed upwards.
2. Install jam nuts (17) on stem (3), rotate CW down to base of threads and secure together tight.
3. Using an overhead hoist, rig and lift actuator assembly (AA) above body assembly (BA). Lower actuator assembly (AA) down and over stem (3), so the upper end of the stem passes through lower opening of the yoke (3) and through yoke nut (8).
4. Reposition indicating washer (16) or accessory plate ((AP)) over end of stem.

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.

5. 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.1 previous. Place yoke nut (8) onto bonnet threads and hand tighten.
6. With hand, grasp and lift plug/stem (3) up to connect with actuator stem (6). Rotate valve stem CCW (viewed from above) to engage w/ actuator stem (6). Use the total number of revs engagement recorded in Step V.B.5. or Step V.B.6. as the guide to control engagement of the stems (6) (3.1). **NOTE:** *For ATO-FC Action may need to slowly decrease actuator pressure to allow stem and collar to engage.*

7. Rotate upper jam nut (17) up underneath indicating washer (16) or accessory plate ((AP)) and secure tight. Rotate lower jam nut up underneath upper jam nut - snug.

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

For ATO-FC (Reverse) Action Units Only:

Release all pressure from the actuator.

H. Mounting - Actuator to Body Opt-68 QDS:

1. Place body into a vise securely with the plug/ stem (10) 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 (10), so the upper end of the valve stem 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.1 previous. Place yoke nut (8) onto bonnet threads and hand tighten.
4. Grasp stem (10) between thumb and forefinger of one hand. Grasp collar (42b) between thumb and forefinger of the other hand. Lift stem up and into the opening of the lower collar (42b). Slide/push the collar (42b) upwards while simultaneously lifting the plug/stem 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 (10) 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 Only:

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 (3,10) begins to lift out of the seat, touch the stem 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 (3,10 & 6) length is too short.

For Std Threaded Stem:

- a. Rotate both jam nuts (17) down to base of threads on stem (3) and tighten together.
- b. Increase pressure in the actuator to approximately mid range of the bench setting.
- c. Rotate upper jam nut CW to increase the combined stem length. **DO NOT** allow actuator stem (6) to rotate in the actuator.

- d. Rotate upper jam nut CCW to hold indicating washer (16) up against stem (6).
- e. Release all pressure from the actuator and repeat Step 4 previous.

For Opt-68 QDS Stem:

- 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 (10, 6) length is too long.

For Std Threaded Stem:

- a. Rotate both jam nuts (17) down to base of threads on stem (3) and tighten together.
- b. Increase pressure in the actuator to approximately mid range of the bench set.
- c. Rotate lower jam nut CCW to shorten the combined stem length. **DO NOT** allow actuator stem (6) to rotate in the actuator.
- d. Rotate upper jam nut CCW to hold indicating washer (16) up against stem (6).
- e. Release all pressure from the actuator and repeat Step 4 previous.

For Opt-68 QDS Stem:

- 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 $\pm 8\%$ 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 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 benchsetting; 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, 10, & 6) length is too long.

For Std Threaded Stem:

- a. Rotate both jam nuts (17) down to base of threads on stem (3) and tighten together.
- b. Decrease pressure in the actuator to approximately mid range of the bench setting.
- c. Rotate lower jam nut CCW 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 indicating washer (16) up against stem (6).
- e. Release all pressure from the actuator and repeat Step 4 previous.

For Opt-68 QDS Stem:

- 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, 10 & 6) length is too short.

For Std Threaded Stem:

- a. Rotate both jam nuts (17) down to base of threads on stem (3) and tighten together.
- b. Decrease pressure in the actuator to approximately mid range of the bench setting.
- c. Rotate upper jam nut CW to increase the combined stem length. **DO NOT** allow actuator stem (6) to rotate in the actuator.
- d. Rotate upper jam nut CCW to hold indicating washer (16) up against stem (6).
- e. Release all pressure from the actuator and repeat Step 4 previous.

For Opt-68 QDS Stem:

- 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 $\pm 8\%$ 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 and inspect line for blockage.
C. Insufficient valve travel.	C1. Verify full travel. C2. Verify correct IAS pressure.

2. Unit can not control steadily at low flow rates.

Possible Cause	Remedy
A. Sizing data not correct; valve oversized.	A1. Check actual pressures, temperature and flow rates against the variables used. A2. Replace full port body with reduced port body.
B. Obstruction at inlet.	B. Remove valve from line and inspect for something causing blockage.
C. Too short of "stroke"	C. Remove unit and calibrate.
D. Excess pressure drop.	D1. Check actuator bench setting; re-calibrate as required. D2. Check design pressures against actual pressures. Replace "low" bench set range springs with higher bench set range springs.
E. Insufficient IAS pressure.	E. Provide required level of IAS pressure.
F. Incorrect flow direction.	F. Verify flow with arrow cast on body; FTO

3. Valve body leaking at clamped end 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 installation.
C. Excessive piping stress.	C. Place hanger on control valve unit.
D. Improper pipe alignment.	D. Re-do piping properly.

4. Fluid leakage at bonnet or at upper stem seal ring.

Possible Cause	Remedy
A. Gasket failure.	A1. Remove body, disassemble, remove old gasket. Install new gasket, new stem seals, reassemble and reinstall. A2. Seal ring failure.
B. Overheating	B. Ensure that max. operating temperature of 366°F (186°C) is not exceeded.
C. Stem seal failure	C1. Worn stem seals. Replace seals and gasket. C2. Pitted stem, worn stem. Replace plug/stem, seals and gasket.

5. Inadequate valve shutoff.

Possible Cause	Remedy
A. Permanent "tracks" where seating occurs.	A1. Relap body seat and plug (metal seat). A2. Replace body and plug or comp. seat disc.
B. Excess valve pressure drop.	B. Reduce valve's shutoff pressure drop.
C. Insufficient IAS pressure.	C. Provide required level of IAS pressure.
D. Obstruction at seat.	D. Remove body and inspect for obstruction.
E. Improper calibration.	E. Recalibrate positioner and valve stroke.
F. Improper actuator bench set range.	F. Disassemble actuator and change to stiffer range springs. Reinstall and increase IAS to proper level.

6. Unit will not operate.

Possible Cause	Remedy
A. IAS is "off".	A. Turn "on" the IAS and set at proper level.
B. Faulty positioner.	B. Service positioner or replace.
C. Improper positioner action.	C. Switch positioner to proper action unit.
D. Actuator has a leak.	D. Manually load actuator to test for pressure integrity. Replace diaphragm and O-ring if either is leaking.

7. Instability.

Possible Cause	Remedy
A. Insufficient dampening.	A. Recalibrate and set dampening adjustment of positioner.
B. Flow conditions.	B. Reduce disturbances in fluid flow stream.

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.

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.

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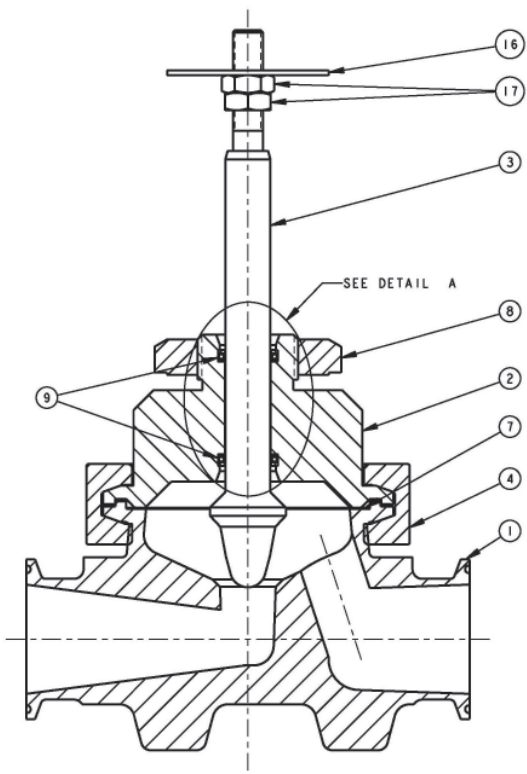
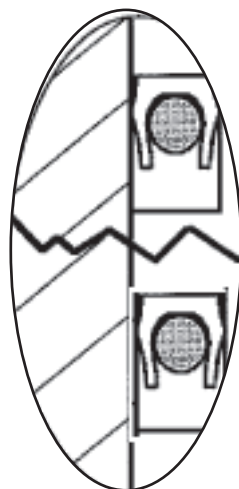


FIGURE 4:
Straight-Globe Body Assembly (BA),
Metal Seat



Detail A

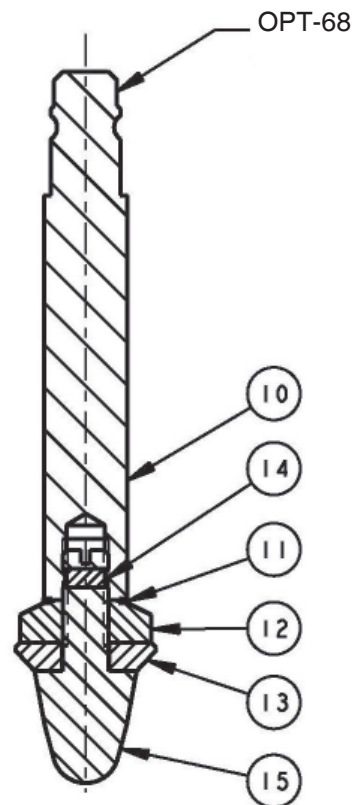


FIGURE 6:
Composition seat with
OPT-68 Quick Disconnect

ITEM NO.	DESCRIPTION	REPLACEMENT PARTS
1	Body	
2	Bonnet	
3	Stem/Metal Plug	*
4	"Tri-Clover" Clamp	
7	Gasket	*
8	Yoke Nut	
9	Seal Rings (2 req'd.)	*
10	Stem/Composition Seat	*
11	Gasket	*
12	Seat Nut	*
13	Seat Disc	*
14	Pin	*
15	Plug	*
16	Indicating Washer	
17	Stem Jam Nuts	

ITEMS NOT SHOWN

ITEM NO.	DESCRIPTION
5	Flow Arrow Tag
6	Drive Screw
42	See Figure 3

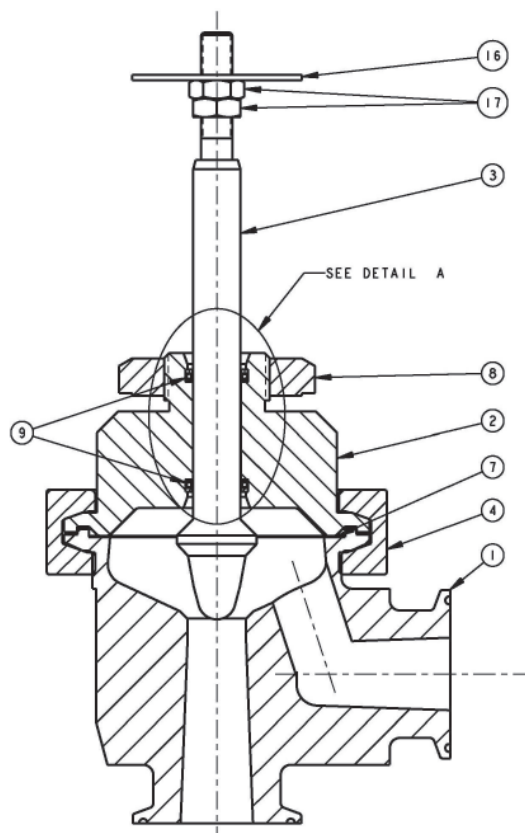


FIGURE 5:
Angle-Globe Body Assembly (BA),
Metal Seat



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

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