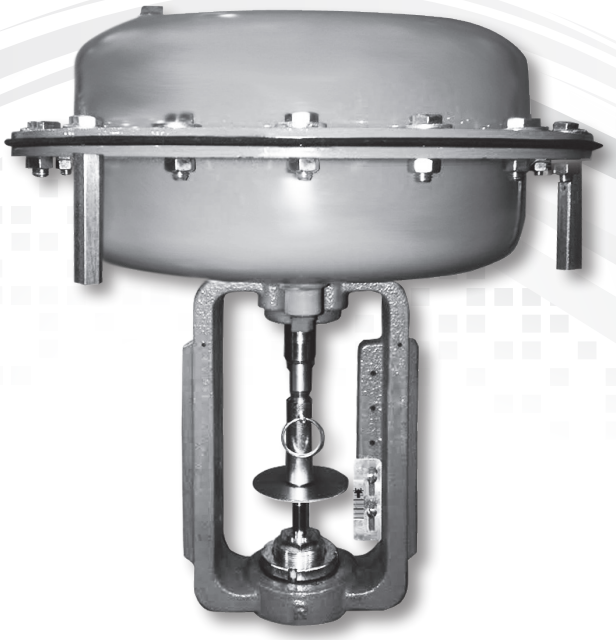
COMMERCIAL 84 IOM

COMMERCIAL 84
DIAPHRAGM ACTUATORS
Installation Operation and Maintenance Instructions



WARREN CONTROLS

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PRODUCT OVERVIEW

This document covers the installation, operation and maintenance of Commercial 84 Diaphragm Actuators installed on Building Automation Control (HVAC/BAC) Valves. Commercial 84 actuators are powerful and compact featuring a multiple-spring, rolling-diaphragm, low hysteresis design. The actuator is available direct acting (air-to-extend) only.

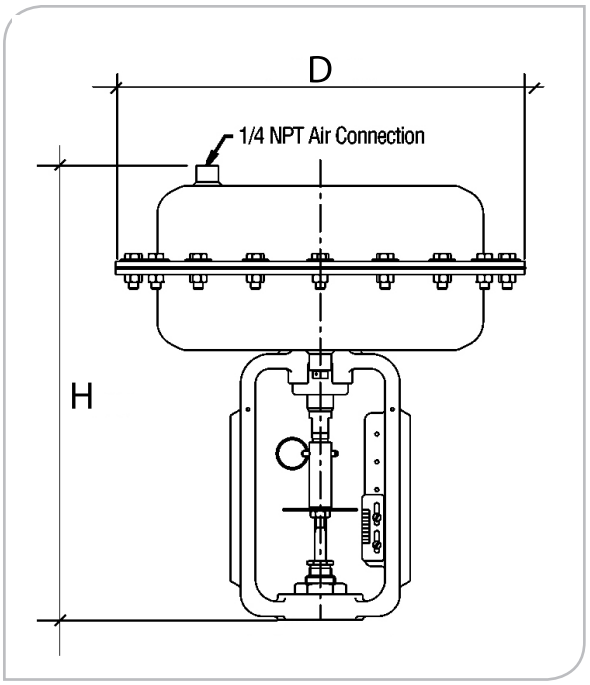
Steel diaphragm chambers and a ductile iron yoke with an acrylic enamel finish along with a stainless steel shaft make this actuator durable and rugged. The spring range of factory installed actuators is pre-set.

ACTUATOR SPECIFICATIONS

EFFECTIVE AREA:
84 SQ IN
TRAVEL:
9/16, 3/4, 1-1/4, 1-3/8 & 1-1/2 In
SPRINGS:
Multiple
MAX AIR SUPPLY:
30PSIG
AIR CONNECTIONS:
1/4 NPT
DIAPHRAGM:
Buna-N Fabric Reinforced
DIAPHRAGM CHAMBERS:
Steel
YOKE:
Ductile Iron
ACTUATOR SHAFT:
300 Series Stainless Steel
STEM CONNECTOR:
Threaded/Pinned
FINISH:
Acrylic Enamel
AMBIENT TEMPERATURE:
+32 to 180°F
MOUNTING:
Vertical above (preferred) (See page 3 for details)
REVERSIBLE:
No
POSITION INDICATION:
Travel Indicator Plate (On Valve Stem) Travel Scale (On Yoke) (See diagram on page 6)

	Spring Ranges (PSI)			
Action	**Low**	**Full**	**High**	**Xtra-High**
Direct	3-9	3-15	9-15	12-15

ACTUATOR DIMENSIONS & WEIGHT



D (IN) ACTUATOR	H MAX (IN)	WEIGHT (LB)
13-7/8	16-1/4	46

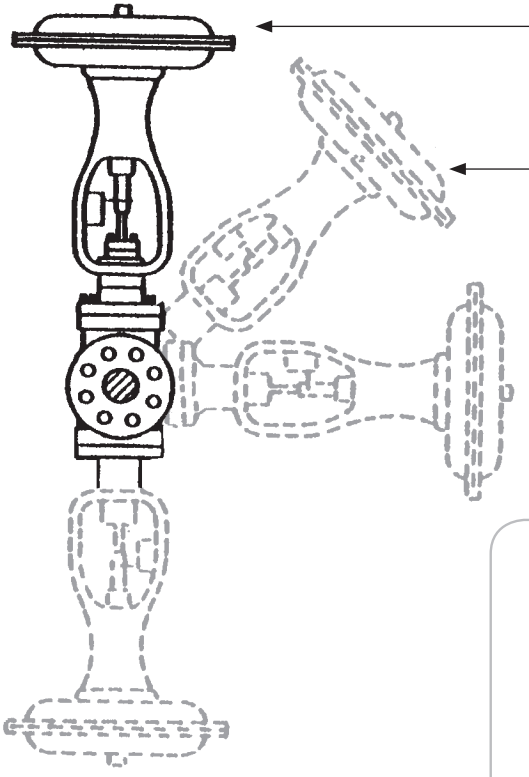
* Includes 7/8 inch for air fitting

Exceeding the maximum air supply pressure of 30 PSIG may damage the actuator and valve and void the warranty. Rotating the valve stem while the plug is in contact with the seat will damage the seating surfaces and voids the warranty. Recommended actuator mounting is vertical above or below the valve.

Ambient temperature must be kept within the actuator's limits of +32 to 180F.
Do not insulate actuator.

See separate valve installation operation & maintenance manual for:

- Additional control valve roughing dimensions and weights
- Actuator removal clearance.
- Additional installation guidelines.



VERTICAL ABOVE PIPING IS CORRECT MOUNTING POSITION.

All other positions reduce service life of equipment.

NEXT BEST POSITION

45º from vertical above piping on either side.
Valve must have an 8 Bolt Flange.

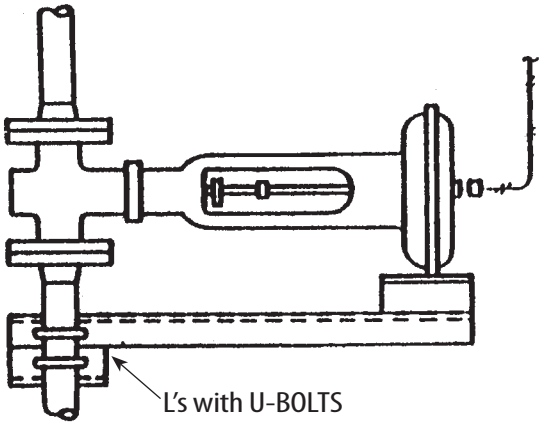
A non-vertical mounting position may be necessary to protect actuator in high temperature applications, but may reduce packing life.

WORST POSITION (Horizontal on either side).

VERTICAL BELOW PIPING

Position is suitable for gases,
but **NOT** for liquids or steam.

Actuators mounted in any position other than vertical **MUST** be supported independent of the valve.



L's with U-BOLTS

Method for supporting actuator mounted in non-vertical position.

OPERATION

Commercial 84 actuators feature a multiple-spring, rolling-diaphragm, low hysteresis design. The spring range is fixed when the actuator is installed on a valve and cannot be adjusted while the actuator shaft is connected to the valve stem. The actuator does not have an adjustable travel limit stop. A NAMUR mounting boss for accessories is present on each leg of the actuator yoke. The actuator is securely connected to the valve by a yoke locknut and a pinned stem connector. Commercial 84 actuators are not reversible.

Commercial 84 actuators are direct acting **(air-to-extend actuators).** On direct acting 2-way (stem-in to close) valves they provide air-to-close operation and fail open on loss of air supply. On reverse acting 2-way (stem-in to open) valves they provide air-to-open operation and fail closed on loss of air supply. On 3-way valves operation is air-to-close the lower port, and the upper port fails closed on loss of air supply.

CAUTION!
Exceeding the maximum air supply pressure of 30 PSIG will damage the actuator and void the warranty.

MAINTENANCE

Commercial 84 actuators are, for the most part, maintenance free when properly selected and installed. Rebuilding of the actuator should not be necessary under normal operating conditions. For best operation, maintain the ambient temperature within the limits of +32F to 180F; maintain a clean dry oil-free air supply; maintain the stem free of deposits, dirt, and scratches.

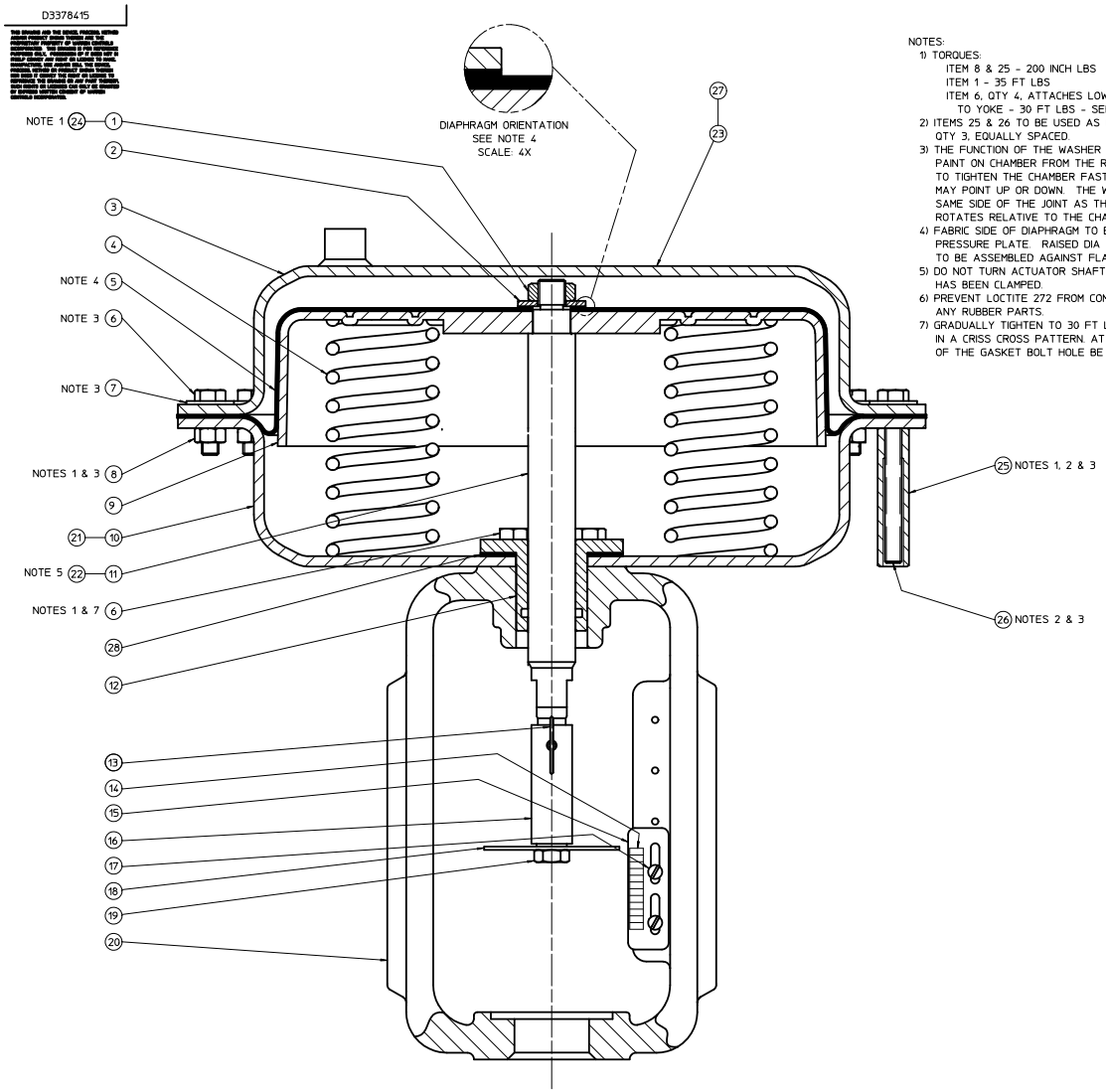
A worn or damaged diaphragm can cause poor response to the air signal, and increase hysteresis, by allowing air pressure to leak from the actuator. Should the diaiphragm become worn or damaged, a diaphragm kit is available. The actuator shaft and bushing are not included in the diaphragm kit and must be obtained separately. Inspect the shaft for damage before disassembling the actuator. If damaged, replace the shaft and bushing. To ensure getting the correct parts, please provide the valve's serial number.

CAUTION!
Exceeding the maximum air supply pressure of 30 PSIG will damage the actuator and void the warranty.

PARTS KIT

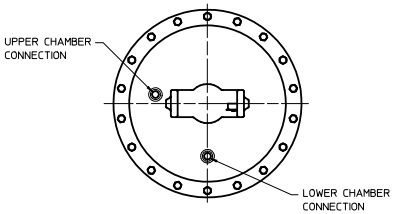
Parts Kit (Contact factory with valve serial number)

DIAPHRAGM KIT FOR COMMERCIAL 84 ACTUATORS KIT P/N K5D084DXX0100 SEE ASSEMBLY DRAWING D3378415 ON PAGE 5					
KIT INCLUDES					
ITEM	**QTY**	**DESCRIPTION**	**ITEM**	**QTY**	**DESCRIPTION**
5	1	DIAPHRAGM	22	1	TUBE STEM LUBE
13	1	QUICK RELEASE PIN	28	1	GASKET
Instructions for Kit P/N K5D084DXX0100: See Page 6 for Actuator Removal See Page 7 & 8 for Actuator Disassembly/Re-assembly See Page 9-11 for Actuator Installation on Valve					



NOTES:
1) TORQUES:
   ITEM 8 & 25 - 200 INCH LBS
   ITEM 1 - 35 FT LBS
   ITEM 6, QTY 4, ATTACHES LOWER CHAMBER TO YOKE - 30 FT LBS - SEE NOTE 7
2) ITEMS 25 & 26 TO BE USED AS REQD PER B/M, QTY 3, EQUALLY SPACED.
3) THE FUNCTION OF THE WASHER IS TO PROTECT THE PAINT ON CHAMBER FROM THE ROTATING TOOL USED TO TIGHTEN THE CHAMBER FASTENERS. THE CAPSCREWS MAY POINT UP OR DOWN. THE WASHER SHALL BE ON THE SAME SIDE OF THE JOINT AS THE FASTENER THAT ROTATES RELATIVE TO THE CHAMBER DURING ASSEMBLY.
4) FABRIC SIDE OF DIAPHRAGM TO BE ASSEMBLED AGAINST PRESSURE PLATE. RAISED DIA IN CENTER OF DIAPHRAGM TO BE ASSEMBLED AGAINST FLAT WASHER, ITEM 2.
5) DO NOT TURN ACTUATOR SHAFT AFTER THE DIAPHRAGM HAS BEEN CLAMPED.
6) PREVENT LOCTITE 272 FROM COMING IN CONTACT WITH ANY RUBBER PARTS.
7) GRADUALLY TIGHTEN TO 30 FT LBS IN 5 FT LB INCREMENTS IN A CRISS CROSS PATTERN. AT NO POINT SHOULD A PORTION OF THE GASKET BOLT HOLE BE SQUEEZED PAST THE BUSHING FLG OD.

REV	DESCRIPTION	DATE	APPROVED
B	REDRAWN WITH CHANGES ECN 2495	DGS 3-11-10	



1/4 NPT AIR CONNECTION ORIENTATIONS

ITEM	QTY	PART NO	DESCRIPTION	MATL SPEC
28	1	B1568430-01	GASKET	BUNA-N 80 DURO
27	A/R	A1670000	WARNING LABEL "CAUTION-PRELOADED SPRING"	PAPER W/ ADHESIVE
26	A/R	01105899	5/16-18 x 3 FULL THD HEX HEAD CAPSCREW	STEEL PLATED
25	A/R	B1918432-01	PRELOAD NUT	300 SERIES ST STL
24	A/R	A0940027	LOCTITE 272 (SEE NOTE 6)	
23	1	B1670007	WARNING LABEL "DO NOT EXCEED 30 PSIG AIR PRESSURE"	PAPER W/ ADHESIVE
22	A/R	A0940021	STEM LUBE DC111	
21	1	087-128	1/4 NPT VENT PLUG	PLASTIC
20	1	D1898430-01	YOKE	DUCTILE IRON ASTM A536 GR 65-45-12
19	1	01806709	3/8-24 HEX JAMNUT	18-8 ST STL
18	1	B1590050	TRAVEL INDICATOR PLATE	ALUMINUM
17	2	01602804	#6 x 1/4 SELF TAPPING SCREW	STEEL PLATED
16	1	B1900053	STEM CONNECTOR	STEEL PLATED
15	1	A1590020	BLANK TRAVEL SCALE	ALUMINUM
14	1	B1670026	TRAVEL SCALE STICKER	ALUM FOIL WITH ADHESIVE
13	1	B1630001	QUICK RELEASE PIN	303 ST STL
12	1	C1068430-01	BUSHING	CAST BRONZE ASTM B584 905
11	1	PER B/M	SHAFT	ST STL ASTM A582 303
10	1	C1348431-01	LOWER DIAPHRAGM CHAMBER	PAINTED STEEL
9	1	C1768436-01	PRESSURE PLATE	PAINTED STEEL
8	A/R	02305808	5/16-18 HEX NUT	STEEL PLATED
7	18	07005814	5/16 FLAT WASHER TYPE B REGULAR	STEEL PLATED
6	A/R	01105816	5/16-18 x 1 HEX HEAD CAPSCREW	STEEL PLATED ASTM A449
5	1	D1338430	DIAPHRAGM	NITRILE & POLYESTER
4	6	PER B/M	SPRING	
3	1	C1358431-01	UPPER DIAPHRAGM CHAMBER	PAINTED STEEL
2	1	07008820	1/2 FLAT WASHER TYPE B REGULAR	STEEL PLATED
1	1	01808812	1/2-20 HEX JAMNUT	STEEL PLATED

REMOVE ALL SHARP EDGES AND BURRS
ENGINEERED PER ASME Y14.5M-1994
THIRD ANGLE PROJECTION
NEXT ASSEMBLY
UNLESS OTHERWISE SPECIFIED:
DECIMAL XX ±01 DECIMAL XXX ±005
FRACTION ± 1/64 ANGLE ± 1°
ALL FILLET RADII 1/32 MAX
FINISH ON ALL MACHINED SURFACES
ALL DIMENSIONS ARE IN INCHES
MATERIAL: SEE TABLE
TREATMENT
FINISH
DRAWN: BLB 1/30/03
CHECKED
APPROVED

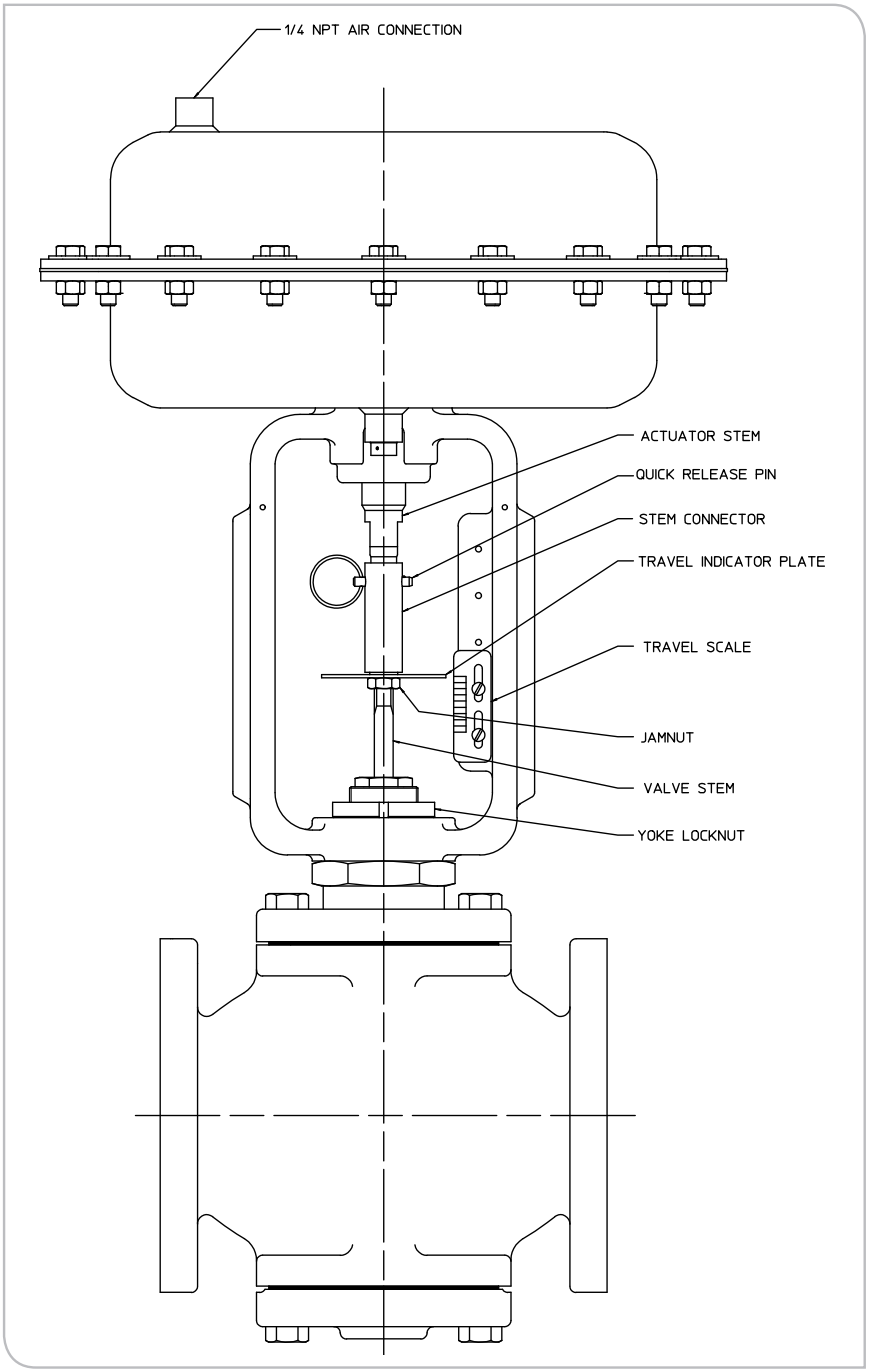
WARREN CONTROLS INCORPORATED
BETHLEHEM, PENNSYLVANIA 18020-8010

84 DA ACTUATOR ASSEMBLY WITH PINNED CONNECTOR Ø1 3/8 BONNET

SIZE	PROD NO	DWG NO	REV
D	03847	D3378415	B

SCALE: FULL WT: SHEET:

CHANGING THE ACTUATOR ORIENTATION



Looking down on the valve stem, the actuator can be rotated 360º to change its orientation with respect to the centerline of the valve. Changing the actuator's orientation changes the position of the travel scale, air connections, and accessories and may be necessary for clearance and accessibility in the piping.

1) Isolate valve body if already installed in piping.

2) Temporarily install a flexible air hose directly to the actuator air connection so the actuator may be turned freely in Step 5.

3) Apply air pressure to actuator so plug is off seat(s) or travel stop in valve. The valve stem should never be turned while the plug is in contact with the seat otherwise the seating surfaces will be damaged.

4) Use a blunt chisel and hammer to loosen yoke locknut.

5) Rotate actuator to desired orientation. Rotating the actuator shaft will damage the diaphragm, can cause springs to fall over and voids the warranty.

6) Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.

7) Restore fixed air connection to the actuator air connection.

8) If isolated, return line pressure to valve and check operation.

COMMERCIAL 84 ACTUATOR REMOVAL FROM VALVE

1. Isolate valve body if already installed in piping.

2. Apply air pressure to actuator so plug is off seat(s) or travel stop in valve.

3. Loosen the jam nut on the valve stem while preventing the actuator stem from rotating with another wrench. **Rotating the actuator stem will damage the diaphragm, can cause springs to fall over and voids the warranty.**

4. Remove quick release pin.

5. Remove yoke locknut from valve body assembly.

6. Remove pinned stem connector and travel indicator plate from valve stem. **Do not turn the valve stem while the plug is in contact with the seat. Doing so will destroy the seating surfaces of the plug and seat ring and void the warranty.** You may have to lift the actuator up and slip the stem connector onto the actuator shaft in order to do this.

7. Remove actuator from valve

Commercial 84 Actuator Disassembly Refer To Dwg D3378415

1) Remove actuator from valve. See separate actuator removal instructions.

2) Mark edge of both diaphragm chambers to aid in orienting the chambers to each other and the yoke during reassembly.

3) Alternately loosen then remove the 5/16-18 hex nuts **(Item 8),** the 5/16-18 x 1 hex head capscrews **(Item 6)**, and washers **(Item 7)** along the circumference of the diaphragm chambers.

4) If the actuator uses the three (3) preload nuts **(Item 25)** there is significant preload on the springs. Alternately loosen the preload nuts in small increments, approximately ¼ inch at a time, then remove the preload nuts, the three (3) 5/16-18 x 3 hex head capscrews **(Item 26)**, and washers **(Item 7)**.

5) Remove the upper diaphragm chamber **(Item 3)**.

6) Remove the shaft **(Item 11)**, pressure plate **(Item 9)**, diaphragm **(Item 5)**, ½ flat washer **(Item 2)**, and ½ - 20 hex jamnut **(Item 1)**, as an assembly from the lower diaphragm chamber **(Item 10)** and yoke **(Item 20)** assembly of the actuator.

7) Remove the springs **(Item 4)** from the actuator.

8) Remove the ½ - 20 hex jamnut and ½ flat washer from the shaft. Use flats provided on shaft to hold it from turning. The remainder of the shaft is a close tolerance fine finish bearing surface.

9) Remove diaphragm, and pressure plate from the shaft. Some actuators have a separate support plate under the pressure plate. If a support plate is present remove it from the shaft. Clean bearing surfaces on shaft. Inspect diaphragm and shaft, replace if damaged.

10) Remove the 5/16-18 x1 hex head capscrews **(Item 6)** from bushing **(Item 12)** and yoke.

11) Remove bushing from lower diaphragm chamber.

12) Remove lower diaphragm chamber from yoke.

13) Remove gasket **(Item 28)** from lower diaphragm chamber. Replace with **new** gasket during reassembly. Clean gasket surfaces on bushing and lower diaphrahm chamber.
Clean bushing bearing surfaces. Inspect bushing, replace if damaged or worn.

Commercial 84 Actuator Assembly Refer To Dwg D3378415

1) Place the lower diaphragm chamber **(Item 10)** on the yoke **(Item 20)** in the orientation shown on the drawing. Line up the holes in the base of the diaphragm chamber with the mounting holes in the yoke.

2) Install **new** gasket **(Item 28)** in lower diaphragm chamber. Line up holes in gasket with holes in base of lower diaphragm chamber.

3) Install bushing in lower diaphragm chamber. Line up holes in bushing with holes in gasket and lower diaphragm chamber.

4) Install four (4) 5/16-18 x 1 hex head capscrews **(Item 6)** through the bushing, gasket and lower diaphragm chamber into the yoke, then gradually tighten the capscrews to 30ft -lbs in 5 ft- lb increments in a criss cross pattern. At no point should a portion of the gasket bolt hole be squeezed past the bushing flange OD.

5) If the actuator has a separate support plate install it on the shaft.

6) Install the pressure plate **(Item 9)** on the shaft **(Item 11).**

7) Install the diaphragm **(Item 5)** on the shaft in the orientation shown on the drawing. Fabric side of diaphragm assembled against pressure plate. Raised diameter in center of diaphragm assembled against ½ flat washer **(Item 2)**.

8) Install the ½ flat washer **(Item 2)** on the shaft. The side of the washer having the rounded edge must be facing the diaphragm.

9) Apply loctite 272 **(Item 24)** to the threads on the shaft.

10) Install the ½ - 20 hex jamnut **(Item 1)** on the shaft and tighten it to 35 ft lbs torque. Use flats provided on shaft to hold it from turning. The remainder of the shaft is a close tolerance fine finish bearing surface.

11) Invert the upper diaphragm chamber **(Item 3)** and place on flat surface.

12) Invert the shaft, diaphragm, pressure plate, ½ flat washer, and ½-20 hex jamnut as an assembly and install in the upper diaphragm chamber. The flats on the shaft must be oriented so they can be accessed with a wrench when the actuator is fully assembled. Flats should be in same relation to air connection in upper chamber as before the actuator was disassembled. Refer to drawing.

13) Line up the holes in the diaphragm with the holes in the upper diaphragm chamber.

Commercial 84 Actuator Assembly Refer To Dwg D3378415 (Cont.)

14) Apply stem lube DC111 **(Item 22)** to the shaft.

15) Install the springs **(Item 4)** centered over the raised spring pilots on the pressure plate.

16) Install the lower diaphragm chamber and yoke as an assembly on the springs in the orientation shown on the drawing. Line up the marks made on the diaphragm chambers in Step 2 of the disassembly instructions. Center the shaft in the bushing. Line up the holes in the lower diaphragm chamber with the holes in the upper diaphragm chamber. Be careful not to change the orientation of the springs. The lower diaphragm chamber should not be moved sideways or rotated while resting on the springs. If the chamber must be moved to align it with the upper chamber holes, lift it up, align, then lower straight down. Springs installed tilted will eventually fall over in operation.

17) If the actuator uses three (3) 5/16-18 x 3 hex head capscrews **(Item 26)** place a washer **(Item 7**) on the three (3) 5/16-18 x 3 hex head capscrews, otherwise go to Step 19.

18) Insert the three (3) 5/16-18 x 3 hex head capscrews through the holes along the circumference of the upper diaphragm chamber, so the capscrews are equally spaced 5 holes apart, and through the holes in the diaphragm and lower diaphragm chamber.

19) Install three (3) preload nuts **(Item 25)** on the three (3) 5/16-18 x 3 hex head capscrews. Tighten the capscrews alternately in increments not exceeding ¼ inch until the upper and lower diaphragm chambers are approximately 1/16 inch apart. Be careful not to change the orientation of the springs. Not keeping the upper and lower chambers parallel while loading the springs will result in the shaft being pulled off center, the shaft binding in the bushing, and premature wear.

20) Place washers **(Item 7)** on the 5/16-18 x 1 hex head capscrews **(Item 6).**

21) Install the 5/16-18 x 1 hex head capscrews through the holes along the circumference of the upper diaphragm chamber and through the holes in the diaphragm and lower diaphragm chamber. Be careful not to change the orientation of the springs.

22) Install 5/16-18 hex nuts **(Item 8)** on the 5/16-18 x 1 hex head capscrews. Tighten all capscrews along the circumference of the upper diaphragm chamber to 200 inch lbs torque.

23) Apply air pressure to verify actuator strokes smoothly and check for air leaks.

24) Install actuator on valve. See separate instructions.

Commercial 84 Actuator Installation On Direct Acting 2-Way Valve

(See Drawing Page 6)

1. Push valve stem down until plug is seated. Note stem location.
2. Screw jam nut down to end of thread on valve stem
3. Place actuator and yoke locknut over valve stem and onto bonnet. Do not tighten yoke locknut at this time.
4. Slip travel indicator plate over valve stem.
5. Screw stem connector onto valve stem. You may have to lift the actuator up and slip the stem connector onto the actuator shaft in order to do this. **Do not turn the valve stem while the plug is in contact with the seat. Doing so will destroy the seating surfaces of the plug and seat ring and void the warranty.**
6. Rotate actuator to desired orientation. Factory default is travel scale on downstream side of valve.
7. Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.
8. Verify that the plug is against the seat. Refer to the location noted in Step 1.
9. Connect air supply to the actuator and pressurize the actuator to the high end of its bench range, 9 psig for a 3 to 9 psig actuator, 15 psig for a 3 to 15 psig or 9 to 15 psig actuator. Verify that the actuator is pressurized to the high end of its bench range.
10. With the plug on the seat, screw the stem connector up or down on the valve stem until the holes in the stem connector and actuator stem align. Check alignment using quick release pin. Then unscrew the stem connector two full turns. Reduce air pressure to actuator until the holes in the stem connector and actuator stem re-align. Install the quick release pin in the stem connector and actuator stem. **Do not turn the valve stem while the plug is in contact with the seat. Doing so will destroy the seating surfaces of the plug and seat ring and void the warranty.**
11. Apply the low end of the actuator bench range pressure and verify that the valve opens fully.
12. Increase the pressure to the high end of the bench range and verify that the plug is seated at or slightly below the high end of the bench range. If the seating pressure is above the high end of the bench range the valve will not shut off its rated pressure and the stem connection must be adjusted. Reduce pressure so the plug is off the seat, remove the quick release pin and adjust the stem connector engagement on the valve stem until the plug seats at or slightly below the high end of the bench range.
13. Remove air pressure so the plug is off the seat then tighten the jam nut while preventing the actuator stem from rotating with another wrench. **Rotating the actuator stem will damage the diaphragm, can cause springs to fall over and voids the warranty.**
14. Adjust and secure the travel scale.
15. If isolated, return line pressure to valve and check operation.

Commercial 84 Actuator Installation On Reverse Acting 2-Way Valve

(See Drawing Page 6)

1. Pull valve stem up until plug is seated. Note stem location.
2. Screw jam nut down to end of thread on valve stem
3. Place actuator and yoke locknut over valve stem and onto bonnet. Do not tighten yoke locknut at this time.
4. Slip travel indicator plate over valve stem.
5. Screw stem connector onto valve stem. You may have to lift the actuator up and slip the stem connector onto the actuator shaft in order to do this. **Do not turn the valve stem while the plug is in contact with the seat. Doing so will destroy the seating surfaces of the plug and seat ring and void the warranty.**
6. Rotate actuator to desired orientation. Factory default is travel scale on downstream side of valve.
7. Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.
8. Verify that the plug is against the seat. Refer to the location noted in Step 1. You may have to pull the stem up until the plug is seated and hold it in that position.
9. Connect air supply to the actuator and pressurize the actuator to the low end of its bench range plus ¼ psi, 3-1/4 psig for a 3 to 9 psig or 3 to 15 psig actuator, 9-1/4 psig for a 9 to 15 psig actuator, 12-1/4 psig for a 12 to 15 psig actuator (D035 and D036 ONLY). Verify that the actuator is pressurized to the low end of its bench range.
10. With the plug on the seat, screw the stem connector up or down on the valve stem until the holes in the stem connector and actuator stem align. Check alignment using quick release pin. Then screw the stem connector onto the valve stem two more full turns. Increase air pressure to actuator until the holes in the stem connector and actuator stem realign. Install the quick release pin in the stem connector and actuator stem. **Do not turn the valve stem while the plug is in contact with the seat. Doing so will destroy the seating surfaces of the plug and seat ring and void the warranty.**
11. Apply the high end of the actuator bench range pressure and verify that the valve opens fully.
12. Reduce the pressure to the low end of the bench range and verify that the plug is seated at or slightly above the low end of the bench range. If the seating pressure is below the low end of the bench range the valve will not shut off its rated pressure and the stem connection must be adjusted. Increase pressure so the plug is off the seat, remove the quick release pin and adjust the stem connector engagement on the valve stem until the plug seats at or slightly above the low end of the bench range.
13. Apply air pressure so the plug is off the seat then tighten the jam nut while preventing the actuator stem from rotating with another wrench. **Rotating the actuator stem will damage the diaphragm, can cause springs to fall over and voids the warranty.**
14. Adjust and secure the travel scale.
15. If isolated, return line pressure to valve and check operation.

Commercial 84 Actuator Installation on 3-Way Valve

(See Drawing Page 6)

1. Pull valve stem up until plug is seated at upper port. Note stem location.
2. Screw jam nut down to end of thread on valve stem
3. Place actuator and yoke locknut over valve stem and onto bonnet. Do not tighten yoke locknut at this time.
4. Slip travel indicator plate over valve stem.
5. Screw stem connector onto valve stem. You may have to lift the actuator up and slip the stem connector onto the actuator shaft in order to do this. Do not turn the valve stem while the plug is in contact with either seat. **Doing so will destroy the seating surfaces of the plug and seat ring and void the warranty.**
6. Rotate actuator to desired orientation. For a diverting valve, the factory default is travel scale on lower port side of valve. For a mixing valve, the factory default is travel scale on common port side of valve.
7. Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.
8. Verify that the plug is against the upper seat. Refer to the location noted in Step 1. You may have to pull the stem up until the plug is seated and hold it in that position.
9. Connect air supply to the actuator and pressurize the actuator to the low end of its bench range plus ¼ psi, 3-1/4 psig for a 3 to 9 psig or 3 to 15 psig actuator, 9-1/4 psig for a 9 to 15 psig actuator. Verify that the actuator is pressurized to the low end of its bench range.
10. With the plug on the upper seat, screw the stem connector up or down on the valve stem until the holes in the stem connector and actuator stem align. Check alignment using quick release pin. Then screw the stem connector onto the valve stem two more full turns. Increase air pressure to actuator until the holes in the stem connector and actuator stem re-align. Install the quick release pin in the stem connector and actuator stem. Do not turn the valve stem while the plug is in contact with either seat. **Doing so will destroy the seating surfaces of the plug and seat ring and void the warranty.**
11. Apply the high end of the actuator bench range pressure and verify that the plug is seated at lower port.
12. Reduce the pressure to the low end of the bench range and verify that the plug is seated at the upper port at or slightly above the low end of the bench range. If the seating pressure is below the low end of the bench range the valve will not shut off its rated pressure and the stem connection must be adjusted. Increase pressure so the plug is off both seats, remove the quick release pin and adjust the stem connector engagement on the valve stem until the plug seats at or slightly above the low end of the bench range.
13. Apply air pressure so the plug is off both seats then tighten the jam nut while preventing the actuator stem from rotating with another wrench. **Rotating the actuator stem will damage the diaphragm, can cause springs to fall over and voids the warranty.**
14. Adjust and secure the travel scale.
15. If isolated, return line pressure to valve and check operation.

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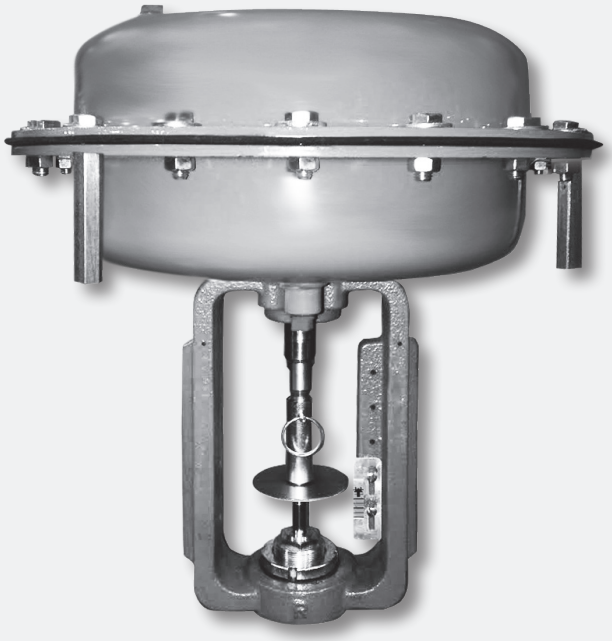
DIAPHRAGM ACTUATOR



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