DL49 PNEUMATIC ACTUATOR TECHNICAL INSTRUCTIONS

The Warren multiple-spring diaphragm actuators are powerful and compact devices designed to operate control valves. The actuators can provide either direct Air-to-Extend action (ATE) or reverse Air-to-Retract (ATR). When an ATE actuator is installed on a typical Warren valve, it provides an Air-to-Close (ATC) or fail-open function. When an ATR actuator is installed, it provides an Air-to-Open (ATO) or fail-closed function. The design features exceptionally low hysteresis due to the absence of side loads imposed by misalignment of single coiled springs. The use of multiple springs also offers a substantially lower profile. The units include zinc plated, epoxy-coated steel diaphragm cases and epoxy-coated ductile-iron yokes. All remaining parts are made of either stainless or zinc plated steel for optimum corrosion resistance.

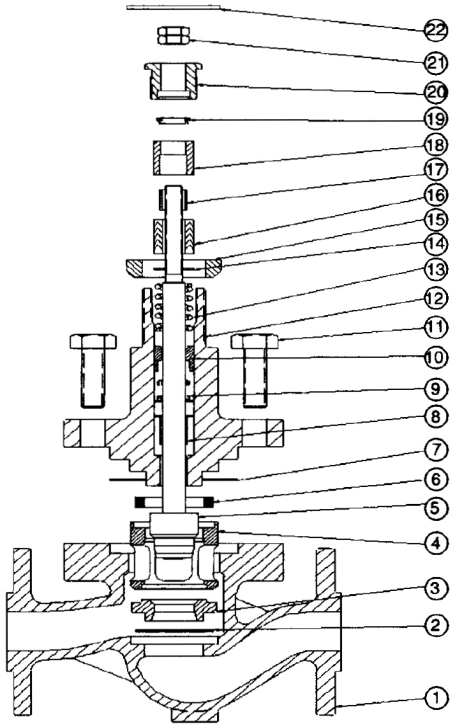

Figure 1 - Typical Valve Components

DESIGN NOTES

Signal pressures listed in Spring Tables produce the rated stroke lengths when the actuator is not loaded. The signal air connections use ¼ NPT fittings, and are located in both the lower (43) and upper (44) diaphragm cases. Use the lower connection for an "Air-to-Retract" (ATR) actuator and the upper connection for an "Air-to-Extend" (ATE) actuator. The signal air pressure should not exceed 35 psi or diaphragm damage may occur.

CAUTION!

Often, these types of actuators are attached to valves which include a stainless steel stem, plug and valve seat. When assembling or adjusting the actuators, never turn the valve stem when the plug is touching the valve seat. If the two stainless steel parts rotate while they are touching, they can be damaged very easily.

When adjusting the valve stem (5), do not grip the stem directly with pliers or a wrench. This will damage the surface of the stem, and cause damage to the packing in the valve. Instead, counter-tighten the two jamnuts (21) on the stem together, this will allow you to turn the stem by turning the jamnuts with a wrench.

ATTACHING AN AIR-TO-RETRACT (ATR) ACTUATOR TO A VALVE – PART 1

Follow these instructions when assembling the actuator to a valve which provides a positive stop in one direction:

1. Before starting, identify some of the parts on the valve assembly. **See Figure 1**, or refer to the assembly instructions for the appropriate Warren control valve. Locate these parts: stem jamnuts (21), travel indicator (22), bonnet (12), yoke locknut (15), and plug and stem assembly (5).

2. Place the body of the valve (1) in a vise. Clamp the flat end faces of the valve. Do not try to clamp the sides of the valve. This may distort the shape of the casting, and may ruin the valve.

3. Begin to attach the actuator to the valve body. The yoke locknut (15) must be removed from the body assembly. The hole at the bottom of the yoke (17) should fit over the top of the valve stem (5). Tilt the top of the actuator back at an angle so you can access the top of the valve stem (5)

4. Position the locknut (15) over the valve stem with the flat sides facing up. (The chamfered side should face down, toward the top surface of the yoke.)

5. Thread the two jamnuts (21) onto the valve stem (5). Turn both nuts down as far as possible. Lock the nuts together using two wrenches to counter-tighten them. By turning the locked nuts with a wrench, you can turn the valve stem without damaging the surface of the stem.

6. Place the travel indicator (22) over the valve stem (5).

7. If applicable, loosen shaft collar (25) and turn clockwise until it reaches the bottom of the actuator stem (26).

8. Apply anti-seize compound to the first few threads of the valve stem (5).

9. Apply 15 psi (1 bar) to the signal air port in the lower diaphragm case (43). The bottom of the yoke will drop down and touch the top of the valve bonnet (12).

10. By hand, tighten the locknut (15).

11. Lift the valve stem (5) up and turn it so that the threads begin to catch in the lower end of the actuator stem (26). Using a wrench placed on the counter-tightened nuts (21), turn the stem (5) up until you feel a resistance.

12. Using a hammer and punch, tighten the locknut (15).

13. Next, make the bench range adjustment. **See the next section.**

BENCH RANGE ADJUSTMENT AIR-TO-RETRACT (ATR) ACTUATOR

This adjustment sets the valve so that it opens and closes at the correct signal air pressures. On an Air-to-Retract actuator, when the pressure reaches the low end of the range, the valve should just begin to open. Once the bench range has been set correctly, the valve should be completely open when it receives full signal air pressure, and the valve travel should also be correct. The Spring Tables list the possible pressure ranges for different valve configurations. The signal pressure at the low end of the range is dependent on the springs used in the actuator. In order to make this adjustment, you will need an adjustable source of compressed air ranging from 0 to 20 psi (0-1.4 bar) with a ¼ NPT male connector.

CAUTION!

Remember that the valve plug (5) cannot be allowed to turn against the valve seat when the two parts are touching. Before you make any adjustment, apply 15 psi (1 bar) to the actuator. This will lift the valve stem away from the seat, and prevent any chance of damage.

1. Connect the air source to the signal air port in the lower diaphragm case (43). Begin at 0 psi (0 bar) and gradually increase the pressure. Notice the pressure at the point when the valve stem (5) just begins to move.

   - If the pressure at this point is too low (lower than the recommended bench initials shown in the Spring Tables), the actuator and stem assembly should be longer. Turn the valve stem (5) out of the actuator stem (26) ½ turn.

   - If the pressure at this point is too high, the actuator and stem assembly should be shorter. Turn the valve stem (5) into the actuator stem (26) ½ turn.

2. Adjust the length of the valve stem (5) as described above. Always turn the valve stem (5) using a wrench on the two counter-tightened nuts (21). Never turn stems while the plug is on the seat.

3. You may have to repeat steps 1 and 2 several times to get the correct setting.

4. Continue with final assembly. **See the next section.**

ATTACHING AN AIR-TO-RETRACT (ATR) ACTUATOR TO A VALVE – PART 2

1. Once the bench range has been adjusted correctly, you can complete the assembly. Apply 15 psi (1 bar) to the signal port on the actuator.

2. Using two wrenches, unlock the two counter-tightened nuts (21). There are flats on the actuator stem (26). Hold these flats with a wrench and, one at a time, turn each nut up as far as possible. Tighten the first nut against actuator stem. Then, tighten the second nut against first.

3. Reduce the air pressure to 0 psi (0 bar). Loosen the screws (57) which hold the travel indicator scale (56) in place. Set the scale so the lowest line matches the level of the travel indicator washer.

4. Set the air pressure to the high end of the valve's operating pressure range. The travel indicator should move through the full rated travel of ¾ in (19.1 mm).

Note: Shaft collar (25), if applicable, can be set at intermediate positions to provide a maximum opening valve travel stop following calibration.

ATTACHING AN AIR-TO-EXTEND (ATE) ACTUATOR TO A VALVE – PART 1

Follow these instructions when assembling the actuator to a valve which provides a positive stop in one direction.

1. Before starting, identify some of the parts on the valve assembly. See Valve Body Assembly Figure, or refer to the assembly instructions for the appropriate Warren control valve. Locate these parts: stem jamnuts (21), travel indicator (22), bonnet (12), yoke locknut (15), and plug and stem assembly (5).

2. Place the valve body (1) in a vise. Clamp the flat end faces of the valve. Do not clamp on the sides of the valve. This may distort the shape of the casting and may ruin the valve.

3. Begin to attach the actuator to the valve body. The yoke locknut (15) must be removed from the body assembly. The hole at the bottom of the yoke (17) should fit over the top of the valve stem (5). Tilt the top of the actuator back at an angle so you can access the top of the valve stem (5).

4. Position the locknut (15) over the valve stem with the flat side facing up. (The chamfered side should face down, toward the top surface of the yoke.)

5. Thread the two jamnuts (21) onto the valve stem (5). Turn both nuts down as far as possible. Lock the nuts together using two wrenches to counter-tighten them. By turning the locked nuts with a wrench, you can turn the valve stem without damaging the surface of the stem.

6. Place the travel indicator (22) over the valve stem (5).

7. By hand, tighten the locknut (15).

8. Loosen shaft collar (25) and turn clockwise until it reaches the bottom of the actuator stem (26).

9. Lift the valve stem (5) up and turn it so that the threads begin to catch in the lower end of the actuator stem (26). Using a wrench placed on the counter-tightened nuts (21), turn the valve stem (5) up until you feel a resistance. Next, turn the valve stem down again about one turn.

10. Using a hammer and punch, tighten the locknut (15).

11. Next, make the bench range adjustment. **See the next section.**

BENCH RANGE ADJUSTMENT AIR-TO-EXTEND (ATE) ACTUATOR

This adjustment sets the valve so that it opens and closes at the correct signal air pressures. On an Air-to-Extend actuator, when the pressure reaches the high end of the range, the valve should be completely closed. Once the bench range has been set correctly, the valve should be completely open when it receives the low reading for the signal air pressure, and the valve travel should also be correct. The Spring Tables list the possible pressure ranges for different valve configurations. The signal pressure at the high end of the range is dependent on the springs used in the actuator. In order to make this adjustment, you will need an adjustable source of compressed air ranging from 0-20 psi (0-1.4 bar) with a ¼ NPT male connector.

CAUTION!

Remember that the valve plug (5) cannot be allowed to turn against the valve seat when the two parts are touching. Before you make any adjustment, be certain that there is no air signal to the actuator.

1. Connect the air source to the signal air port in the upper diaphragm case (44). Gradually increase the pressure toward the high rating listed in appropriate row of Spring Table 1. Notice the pressure at the point when the valve is fully seated, and the valve stem (5) stops moving.

   - If the pressure at this point is too high, the actuator and stem assembly should be longer. Turn the valve stem (5) out of the actuator stem (26) ½ turn.

   - If the pressure at this point is too low, the actuator and stem assembly should be shorter. Turn the valve stem (5) into the actuator stem (26) ½ turn.

2. Adjust the length of the valve stem (5) as described in the last step. Always turn the valve stem (5) using a wrench on the two counter-tightened nuts (21).

3. You may have to repeat steps 1 and 2 several times to get the correct setting.

4. Continue with final assembly. **See the next section.**

ATTACHING AN AIR-TO-EXTEND (ATE) ACTUATOR TO A VALVE – PART 2

1. Once the bench range has been adjusted correctly, you can complete the assembly. Apply 0 psi (0 bar) to the signal port on the actuator.

2. Using two wrenches, unlock the two counter-tightened nuts (21). There are flats on the actuator stem (26). Hold these flats with a wrench and, one at a time, turn each nut up as far as possible. Tighten the first nut against actuator stem. Then, tighten the second nut against first.

3. Apply 15 psi (1 bar) to the signal port. Loosen the screws (57) which hold the travel indicator scale in place (56). Set the scale so the lowest line matches the level of the travel indicator (22).

4. Apply 0 psi (0 bar). The travel indicator (22) should move through the full rated travel of ¾ inches (19.1 mm).

REMOVING THE ACTUATOR FROM THE VALVE

1. **For an Air-to-Retract (ATR) Actuator**
   Apply 20 psi (1.4 bar) to the signal air inlet located in the lower diaphragm case (43). This will lift the plug and stem (5) away from the valve seat.

   For an Air-to-Extend (ATE) Actuator
   Disconnect the signal air line connected to the upper diaphragm case (44). This will ensure that the actuator is vented and that the valve plug and stem (5) are fully lifted from the valve seat.

2. **For Both Types**
   Place a wrench on the flats of the actuator stem. With an additional wrench, engage the upper locknut (21) on the stem and back out the stem about ¼" (6.4 mm). (This procedure will prevent the actuator stem from turning and causing damage to the diaphragm.

3. Loosen the yoke locknut (15).

4. Using the wrench to work against one of the counter tightened nuts, turn the valve stem (5) completely down until the end unthreads from the actuator stem (26).

5. Remove the travel indicator (22) from the valve stem (5). Loosen the jamnuts (21) and remove them.

6. Lift the actuator assembly off of the valve bonnet (12).

7. For **ATR**: Remove 20 psi from signal air inlet.

SPRING REPLACEMENT, CHANGING BENCH RANGE

The springs inside the actuator can be replaced or changed if necessary. This is necessary if you want to change the "bench range" – the range of pressures over which the actuator is designed to operate. (See Table 1).

Figures 2 and 3 show the correct assembly order for Air-to-Retract and Air-to-Extend valves. Notice that both types include the same parts, but they are arranged differently. The following sections detail the disassembly and assembly instructions.

FIELD CONVERSION – ATE TO ATR OR ATR TO ATE

These actuators can be changed in the field from "Air-to-Extend" (ATE) operation to "Air-to-Retract" (ATR) operation, or from ATR to ATE operation. If you are making this change without changing the bench range, you can reuse the same parts. The parts are simply assembled in a different way. This is described in more detail in the following sections. The following sections list the disassembly and reassembly instructions.

DISASSEMBLING THE ACTUATOR

1. Remove the actuator from the valve as described earlier.

2. Remove the cap screws (45) and nuts (46). Loosen the nuts from the cap screws gradually and evenly. Some units may have a combination of longer and shorter screws. After removing the shorter screws, the remaining longer screws must be loosened evenly. The springs put a lot of force on the diaphragm cases (43/44). It is important to release the spring tension gradually before you try to open them.

3. Remove the upper diaphragm case (44) and note the position of the parts inside.

4. Lift out the actuator stem (26) with the diaphragm plate (40) and the diaphragm (39).

5. The lower part of the actuator stem (26) has flats. Use these flats to clamp the lower end of the stem into a vise. Unscrew the capscrew (49). On an ATE unit, remove the spacer (51), diaphragm (39), diaphragm plate (40), washers (112, 116) and stop collar (115). (An ATR unit has the same parts, but they are attached in a different order.)

6. Replace the diaphragm (39) and the o-ring (50) if these parts are damaged.

REASSEMBLING THE ACTUATOR-ATE TYPE

1. Use the flats on the actuator stem (26) to grip the lower end of the stem in a vise.

2. Place washer (116) and washer (112) on the upper end of the stem (26).

3. Place the diaphragm plate (40) on top of washer (112). The opening in the plate should face downward.

4. Place the diaphragm (39) in position. The curved part of the diaphragm should open downward.

5. Place the spacer (51) over the opening in the diaphragm plate.

6. Thread the capscrew (49) into the end of the stem (26) and tighten it.

7. Turn the assembly upside-down.

8. Place the springs (22) on the diaphragm plate (40). Each spring should be centered on one of the raised "bosses" on the plate.

9. Slide the stop collar (115) over the free end of the actuator stem (26).

10. Check to see that the o-ring (50) is in position on the actuator stem (26).

11. Apply some light grease to the o-ring (50) and to the surface of the actuator stem (26).

12. Slide the lower diaphragm case (43) with the yoke (17) attached, over the actuator stem (26). Make sure that the outer bolt holes of the lower diaphragm case (43) line up with the holes in the diaphragm (39). If there is interference with any of the springs, rotate the case into another position.

13. Press in on the diaphragm assembly a bit to compress the springs. Flip over the assembly and reattach the upper diaphragm case (44). As you do this, be sure that all of the springs are upright, and none of them are sitting on one of the bolt heads. Insert the cap screws (45) and tighten the nuts (46). It may be necessary to compress the springs slightly to start the nuts. Tighten the nuts evenly, and cross from one side of the assembly to the other as you tighten. This will guarantee that the spring tension is taken up evenly.

14. Apply air pressure to the actuator and check for friction or leakage. The actuator should travel smoothly through the entire travel range. Apply leak detection fluid to the area around the guide busing (54). Also check for leaks around the outer edge of the diaphragm (39).

15. Make the adjustments described in the section on "Bench Range Adjustment – Air-to-Extend (ATE) Valve".

REASSEMBLING THE ACTUATOR – ATR TYPE

1. Use the flats on the actuator stem (26) to grip this part in a vise.

2. Place the spacer (51) on the upper end of the actuator stem (26),

3. Place the diaphragm (39) in position. The curved part of the diaphragm should open upward.

4. Place the diaphragm plate (40) on top of the diaphragm (39), also facing up.

5. Place the washers (112, 116) on top of the diaphragm plate (40).

6. Thread the capscrew (49) into the end of the stem (26) and tighten it.

7. Remove stem and diaphragm assembly from vise and slide the stop collar (115) over the free end of the actuator stem (26).

8. Check to see that the o-ring (50) is in position on the actuator stem (26).

9. Apply some light grease to the o-ring (50), and to the surface of the actuator stem (26).

10. Slide the actuator stem into the lower diaphragm case (43) with the yoke (17) attached. Turn the assembly so the holes in the diaphragm (39) line up with the holes in the diaphragm case (43).

11. Place the springs (22) on the diaphragm plate (40). Each spring should be centered on one of the raised "bosses" on the plate.

12. Reattach the upper diaphragm case (44). As you do this, be sure that each of the springs is upright. Insert the cap screws (45) and tighten the nuts (46). It may be necessary to press down on the upper diaphragm case (44) a bit to compress the springs slightly and start the nuts. Tighten the nuts evenly, and cross from one side of the assembly to the other as you tighten. This will guarantee that the spring tension is taken up evenly.

13. Apply air pressure to the actuator and check for friction or leakage. The actuator stem should travel smoothly through the entire travel range. Apply leak detection fluid to the area around the guide bushing (54). Also check for leaks around the outer edge of the diaphragm.

14. Make the adjustments described in the section on "Bench Range Adjustment – Air-to-Retract (ATR) Valve.

ACTUATOR MAINTENANCE

A routine maintenance schedule might call for regular replacement of the o-ring (50) or the diaphragm (39). Follow the disassembly and reassembly instructions listed earlier.

Table 1. **Size DL49 Actuator Spring Ranges**

ACTION	STROKE		NOMINAL BENCH RANGE	SPRING P/N (Item 22)	QTY	CAP SCREWS (Item 45)	QTY	CAP SCREWS COVERS	QTY
	INCHES	MM	PSI						
Direct, ATE	3/4	19.1	3-9	25915	4	25913-1	8		
Direct, ATE	3/4	19.1	4-13	25915	6	25913-1	8		
Direct, ATE	3/4	19.1	8-12	41825	6	24783 25913-1	2 6	24900	2
Reverse, ATR	3/4	19.1	5-14	25915	6	25913-1	8		
Reverse, ATR	3/4	19.1	10-14	41825	6	24783 25913-1	2 6	24900	2

Table 2. Size DL49 Actuator Common Parts

KEY NO.	DESCRIPTION	DL49 PNEUMATIC ACTUATOR 3/4 in TRAVEL (19.1 mm) PART NUMBER	QTY
17	Yoke	24184-17	1
19*	Gasket (Standard)	009191-445-883	1
22*	Actuator Spring	See Spring Table	
25	Shaft Collar	24732-2	1
26	Actuator Stem	24295-1	1
39*	Diaphragm (Standard)	24698	1
40	Diaphragm Plate	0.330-0420	1
43	Diaphragm Case (Lower)	24294	1
44	Diaphragm Case (Upper)	25989	1
45	Cap Screw (Short)	See Spring Table	
46	Nut	971511-011-250	8
49	Cap Screw	41863	1
50*	O-Ring (Viton)	971886-009-697	1
51*	Spacer	24724	1
54*	Guide Bushings	007695-158-485	1
56	Travel Indicator Scale	983674-001-250	1
57	Machine Screw	971302-003-250	2
62	Serial Plate	B1670036	1
64	Cap Screw	971000-007-250	6
92*	Seal Washer	009191-446-426	1
112	Washer	20056-1	1
113	Vent Plug	24147	1
115	Stop Collar	24297-1	1
116	Washer	25861-24	1
119	Drive Screw	24686	2

*Recommended Spares

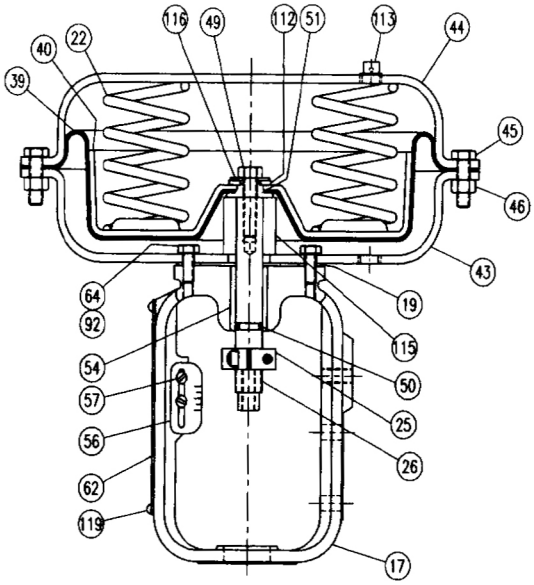

Figure 2
Size DL49 Actuator
Air-to-Retract (ATR)

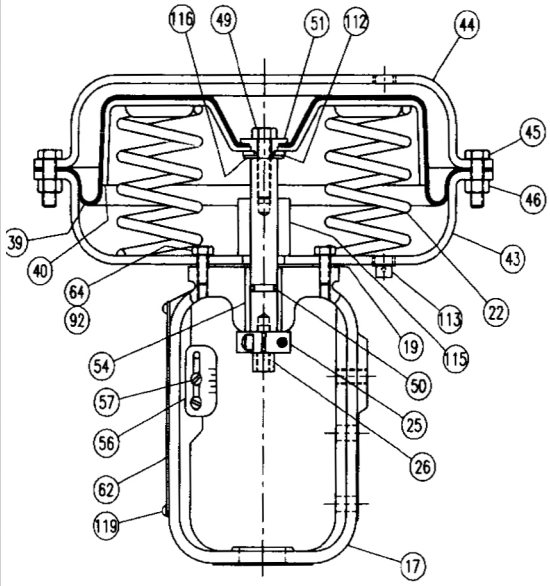

Figure 3
Size DL49 Actuator
Air-to-Extend (ATE)

UNCONTROLLED

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REV	DESCRIPTION	DATE	APPROVED
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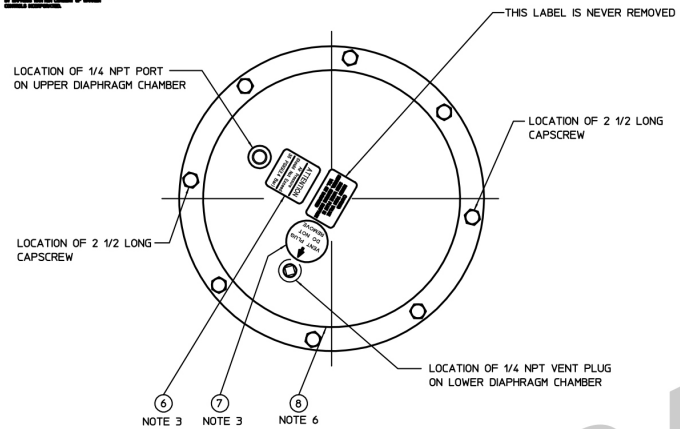
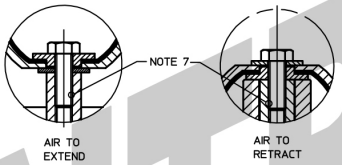
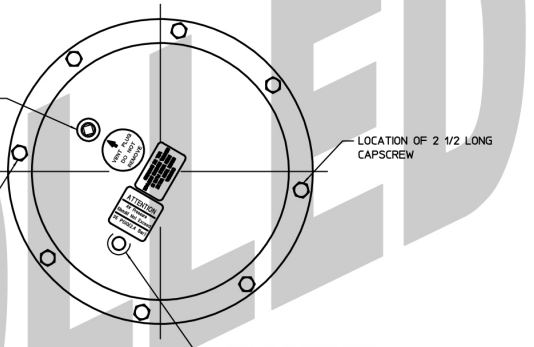
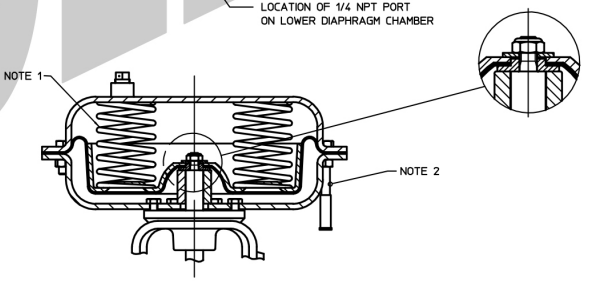


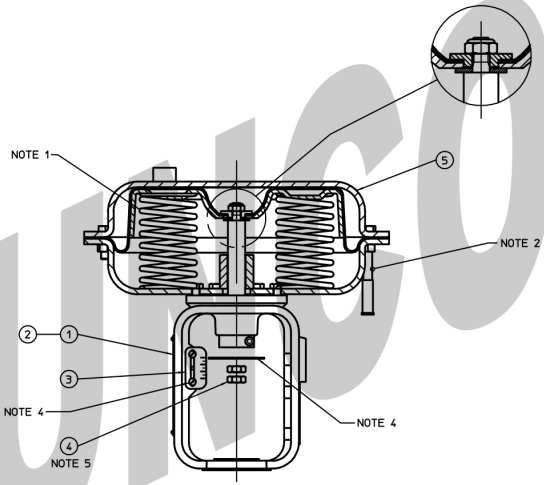


PREVIOUS CONSTRUCTION





AIR TO RETRACT ACTUATOR



AIR TO EXTEND ACTUATOR

7) WHEN IT IS NECESSARY TO REVERSE THE ACTION OF AN ACTUATOR ASSEMBLED AS SHOWN IN THE VIEWS LABELED "PREVIOUS CONSTRUCTION", APPLY LOCTITE 272 TO THE THREADS OF THE HEX HD CAPSCREW WHEN REASSEMBLING THE PRESSURE PLATE SUB-ASSEMBLY.
6) THIS LABEL IS TO BE REMOVED FROM EVERY PURCHASED ASSEMBLY AND REPLACED WITH A NEW LABEL FILLED OUT WITH INFORMATION FROM THE B/M.
5) WHENEVER IT IS NECESSARY TO TIGHTEN OR LOOSEN THE JAMNUTS, HOLD THE ACTUATOR STEM IN PLACE WITH A WRENCH ON THE FLATS ON THE END OF THE STEM. IF THE FLATS ARE HIDDEN UNDER THE STOP COLLAR, LOOSEN THE SET SCREW IN THE STOP COLLAR AND THREAD THE COLLAR UP THE ACTUATOR STEM. ON AIR TO EXTEND ACTUATORS IT WILL BE NECESSARY TO APPLY AIR PRESSURE TO THE TOP OF THE ACTUATOR TO LOWER THE ACTUATOR STEM. AFTER THE JAMNUTS ARE TIGHTENED, TURN THE STOP COLLAR BACK DOWN TO THE END OF THE ACTUATOR STEM AND TIGHTEN THE SET SCREW.
4) THESE PARTS ARE SUPPLIED WITH THE PURCHASED ACTUATOR.
3) WHEN IT IS NECESSARY TO REVERSE THE ACTION OF A PURCHASED ACTUATOR, THE FOLLOWING MUST BE DONE.
   1: MOVE THE VENT PLUG TO THE CORRECT 1/4 NPT PORT.
   2: REMOVE LABELS, ITEMS ⑥ AND ⑦ , AND REPLACE WITH NEW LABELS IN THE LOCATIONS SHOWN ON THE UPPER DIAPHRAGM CHAMBER.
2) WHENEVER IT IS NECESSARY TO REMOVE THE UPPER CHAMBER, APPLY ANTI-SIEZE LUBRICANT TO THE 2 LONG HEX HD CAPSCREWS BEFORE REMOVING THE NUTS.
1) ACTUATOR IS PURCHASED WITH 6 SPRINGS. WHEN IT IS REQUIRED TO REMOVE SPRINGS, THE REMAINING SPRINGS ARE TO BE ARRANGED SYMMETRICALLY WHEN POSSIBLE.

NOTES:

ITEM	QTY	PART NO	DESCRIPTION	MATL SPEC
8	1	B1674902	SPRING & BENCH RANGE INFORMATION LABEL	PAPER WITH ADHESIVE
7	1	B1674901	WARNING LABEL "VENT PLUG DO NOT REMOVE"	PAPER WITH ADHESIVE
6	1	B1674900	WARNING LABEL "ATTENTION AIR PRESSURE SHOULD NOT EXCEED 35 PSIG (2.4 BARG)"	PAPER WITH ADHESIVE
5	1		54 SQ IN ACTUATOR PER SALES ORDER	
4	2	01806709	3/8-24 HEX JAMNUT	ST STL
	A/R	B1590034	9/16 TRAVEL SCALE TYPE 30 & 32 VBA	ALUM
	A/R	B1590033	3/4 TRAVEL SCALE TYPE 30 & 32 VBA	ALUM
	A/R	983674-003-250	3/4 TRAVEL SCALE DIRECT ACTING VBA - SEE NOTE 4	
3	1		TRAVEL SCALE	
2	1	B1670036	49 NAMEPLATE	ALUM
1	2	A0850204-01	#4 x 1/4 DRIVE SCREW	ST STL

REMOVE ALL SHARP EDGES AND BURRS
ENGINEERED PER ASME Y14.5M-1994
THIRD ANGLE PROJECTION
NEXT ASSEMBLY
UNLESS OTHERWISE SPECIFIED: DECIMAL .XX ±.03, 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 5/3/02
CHECKED
APPROVED

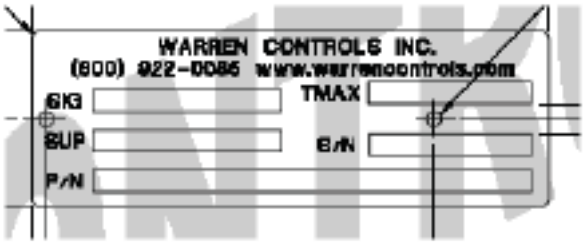
WARREN CONTROLS INCORPORATED
BETHLEHEM, PENNSYLVANIA 18020-8010

49 SQ INCH ACTUATOR ASSY

SIZE D | PROD NO 03847 | DWG NO D3374900 | REV C
SCALE 1/2 | WT | SHEET

DL 49 ACTUATOR IDENTIFICATION 042811

DL49 Actuator Nameplate (attached to leg of actuator)



Sample part numbers, P/N, Series 2800, 2900 and 5800 Control Valves.
Highlighted characters identify the actuator.

Series 2800 P/N Characters 15 thru 18
28N-20050BSESFT49RH00000000

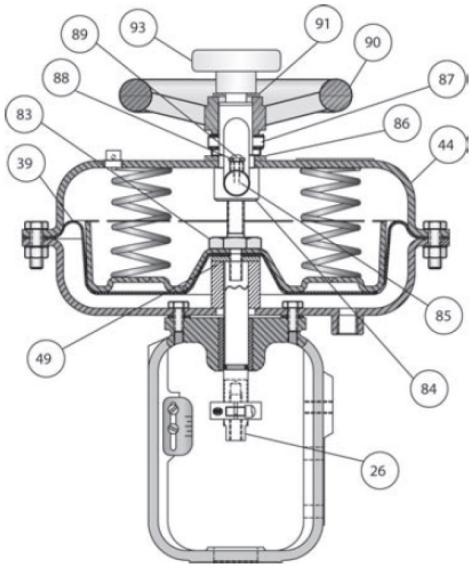
Series 2900 P/N Characters 15 thru 18
29N-20250RFEBFT49RH00000000

Series 5800 P/N Characters 16 thru 19
58N-40100WFESFTS49RH00000000

49 ACTUATORS AND SPRING RANGES								
Actuator			Action	Nominal Bench Spring Range psi (bar)	Travel Inches (mm)	Spring, Key 22 P/N (Qty)	Cap Screws Key 45 P/N (Qty)	Cap Screw Covers P/N (Qty)
49	D	L	Direct, ATE	3 - 9 (0.2 - 0.7)	3/4 (19.1)	25915 (4)	24783 (2) 25913-1 (6)	24900 (2)
49	D	F	Direct, ATE	4 - 13 (0.2 - 0.9)	3/4 (19.1)	25915 (6)	24783 (2) 25913-1 (6)	24900 (2)
49	D	H	Direct, ATE	8 - 12 (0.6 - 0.8)	3/4 (19.1)	41825 (6)	24783 (2) 25913-1 (6)	24900 (2)
49	R	L	Reverse, ATR	4 - 10 (0.2 - 0.7)	3/4 (19.1)	25915 (4)	24783 (2) 25913-1 (6)	24900 (2)
49	R	F	Reverse, ATR	5 - 14 (0.3 - 1.0)	3/4 (19.1)	25915 (6)	24783 (2) 25913-1 (6)	24900 (2)
49	R	H	Reverse, ATR	10 - 14 (0.7 - 1.0)	3/4 (19.1)	41825 (6)	24783 (2) 25913-1 (6)	24900 (2)
4X	D	X	Direct, ATE	14 - 25 (1.0 - 1.7)	3/4 (19.1)	21819 (6)	24783 (2) 25913-1 (6)	24900 (2)
4X	R	X	Reverse, ATR	14 - 25 (1.0 - 1.7)	3/4 (19.1)	21819 (6)	24783 (2) 25913-1 (6)	24900 (2)

DL REVERSE ACTING ACTUATOR HANDWHEEL OPERATION INSTRUCTIONS 073013

Important!!! Read these instructions carefully before attempting to operate the handwheel. Failure to do so may result in damage to the handwheel assembly voiding the warranty.



Item	Description	Part No.	Qty
26	Actuator Stem 3/8 Thread	GE50137X012	1
44	Diaphragm Chamber (Upper)	24608	1
49	Spacer	24726	1
83	Nut	24603-1	1
84	Clevis	24603	1
85	Nut, Round Bronze	24604	1
86	Washer	25613	1
87	Screw, Set Socket	24606	2
88	Washer, Flat	24620	1
89	Screw, Socket Head	24619	1
90	Handwheel	24605	1
91	Washer, Flat	25958	1
93	Locking Knob	24607	1

OPERATION:

DO NOT lift the valve or actuator by the handwheel (Item 90) or locking knob (Item 93). Lifting the valve or actuator by the handwheel or locking knob may damage the handwheel assembly voiding the warranty.

DO NOT insert rods or levers through the handwheel or use a wrench to turn it. Inserting rods or levers through the handwheel or using a wrench to turn it may damage the handwheel voiding the warranty.

DO NOT loosen the set screws (Item 87). Loosening the set screws may cause the handwheel assembly to separate voiding the warranty. DO NOT tighten the set screws. Tightening the set screws may cause the handwheel assembly to bind.

Locking Knob Operation:

When the locking knob (Item 93) is locked, the step on the clevis (Item 84) is pressed against the diaphragm chamber (Item 44); there is no play in the handwheel assembly and the handwheel cannot be turned. When the locking knob is unlocked and the actuator stem is not retracted by the handwheel, there is play in the handwheel assembly. If the actuator stem is retracted by the handwheel there will be no play in the handwheel assembly even when the locking knob is unlocked.

The locking knob must be unlocked for the handwheel to be turned.

To confirm if the locking knob is unlocked, apply an increase in air pressure to the actuator until the actuator stem retracts slightly. If there is play in the handwheel assembly, the locking knob is unlocked. If there is no play in the handwheel assembly, the locking knob is locked. If there is play in the handwheel assembly, looking down on the top of the actuator turn the locking knob clockwise (CW) until the play is removed from the assembly, then turn the locking knob counterclockwise (CCW) one ½ turn to unlock and restore play to the assembly. If there is no play in the handwheel assembly, turn the locking knob counterclockwise (CCW) one ½ turn to unlock and restore play to the assembly. Remove the increase in air pressure from actuator. DO NOT loosen, turn the locking knob counterclockwise (CCW), further. Loosening the locking knob further may cause the handwheel assembly to separate voiding the warranty.

To lock the locking knob, apply an increase in air pressure to the actuator until the actuator stem retracts slightly. If there is play in the handwheel assembly, the locking knob is unlocked. If there is no play in the handwheel assembly, the locking knob is locked. If there is play in the handwheel assembly, looking down on the top of the actuator turn the locking knob clockwise (CW) until the play is removed from the assembly.

Handwheel Operation:

The handwheel may be used to retract the actuator stem (Item 26).
To retract the actuator stem, confirm the locking knob is unlocked, then looking down on the top of the actuator turn the handwheel counterclockwise (CCW) to retract the stem. The handwheel may require considerable effort to turn. DO NOT loosen, turn the locking knob counterclockwise (CCW), further. Loosening the locking knob further may cause the handwheel assembly to separate voiding the warranty.

DO NOT continue to turn the handwheel counterclockwise (CCW) after the actuator stem is fully retracted. Continuing to turn the handwheel counterclockwise (CCW) after the actuator stem is fully retracted may damage the actuator voiding the warranty.

The handwheel CANNOT be used to force the actuator stem to extend against air pressure on the diaphragm.

To extend the actuator stem, remove air pressure from actuator. Confirm the locking knob is unlocked, then looking down on the top of the actuator turn the handwheel clockwise (CW) to allow the springs in the actuator to return the stem to the extended position. The handwheel may require considerable effort to turn. DO NOT loosen, turn the locking knob counterclockwise (CCW), further. Loosening the locking knob further may cause the handwheel assembly to separate voiding the warranty.

DO NOT continue to turn the handwheel clockwise (CW) after the actuator stem is fully extended. Continuing to turn the handwheel clockwise (CW) after the actuator stem is fully extended may damage the actuator voiding the warranty.

INSTRUCTIONS FOR PUR1159 TWO PIECE SHAFT COLLAR STEM HOLDING TOOL

The PUR1159 Two Piece Shaft Collar Stem Holding Tool is used to hold and turn the valve stem when two jamnuts are not present on the valve stem for that purpose. A 7/64" allen key is required to install and remove the PUR1159 Stem Holding Tool.

Read all instructions carefully before beginning.

1. Push valve stem down until plug is seated.
2. Install stem holding tool P/N PUR1159 at bottom of threads on valve stem.
3. PUR1159 must be removed from the valve stem when adjustment of valve stem is complete.

Technical Instructions

WARREN CONTROLS

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