



Series BV Stainless Steel Ball Valve

Specifications - Installation and Operating Instructions

The Series BV combines a durable full port, stainless steel ball valve with a NEMA 4 electric actuator to provide a compact, low cost, automated package. The stainless ball valve utilizes Teflon seats and body seals for broad chemical compatibility and bubble-tight shutoff. Double o-ring stems provide leak free operation without the need for adjustment. A polished stainless steel ball reduces friction allowing for a lower torque actuator. Full port design offers high Cv's with minimal pressure drop. ISO mounting pads allow direct mounting of actuator. Actuators are available in either two-position or 4 to 20 mA proportional control for infinite valve positioning. Actuators feature standard manual override, in case of power loss.

3 PIECE NPT BALL VALVES

Size	Cv	Double Acting Pneumatic	Spring Return Pneumatic	Two Position Electric	Modulating Electric
		Model	Model	Model	Model
1/4"	10	BV3DA100	BV3SR200	BV3U1100	BV3V1200
3/8"	10	BV3DA101	BV3SR201	BV3U1101	BV3V1201
1/2"	18	BV3DA102	BV3SR202	BV3U1102	BV3V1202
3/4"	40	BV3DA103	BV3SR203	BV3U1103	BV3V1203
1"	70	BV3DA204	BV3SR304	BV3U1204	BV3V1204
1-1/4"	120	BV3DA205	BV3SR305	BV3U1205	BV3V1205
1-1/2"	210	BV3DA306	BV3SR406	BV3U1206	BV3V1206
2"	340	BV3DA307	BV3SR507	BV3U1307	BV3V1307
2-1/2"	400	BV3DA508	BV3SR608	BV3U1508	BV3V1508
3"	675	BV3DA509	BV3SR709	BV3U1609	BV3V1609

3 PIECE TRI-CLAMP BALL VALVES

Size	Cv	Double Acting Pneumatic	Spring Return Pneumatic	Two Position Electric	Modulating Electric
		Model	Model	Model	Model
1/2"	12	BV3DA102TC	BV3SR202TC	BV3U1102TC	BV3V1202TC
3/4"	30	BV3DA203TC	BV3SR303TC	BV3U1203TC	BV3V1203TC
1"	65	BV3DA204TC	BV3SR304TC	BV3U1204TC	BV3V1204TC
1-1/2"	205	BV3DA406TC	BV3SR606TC	BV3U1406TC	BV3V1406TC
2"	380	BV3DA407TC	BV3SR607TC	BV3U1507TC	BV3V1507TC
2-1/2"	430	BV3DA608TC	BV3SR708TC	BV3U1608TC	BV3V1608TC
3"	675	BV3DA509TC	BV3SR809TC	BV3U1609TC	BV3V1609TC
4"	1110	BV3DA710TC	BV3SR910TC	BV3U1810TC	BV3V1810TC

2 PIECE FLANGED BALL VALVE

Size	Cv	Double Acting Pneumatic	Spring Return Pneumatic	Two Position Electric	Modulating Electric
		Model	Model	Model	Model
1/2"	15	BV2DA202F1	BV2SR202F1	BV2U1102F1	BV2V1202F1
3/4"	40	BV2DA203F1	BV2SR303F1	BV2U1203F1	BV2V1203F1
1"	70	BV2DA204F1	BV2SR404F1	BV2U1204F1	BV2V1204F1
1-1/2"	240	BV2DA306F1	BV2SR406F1	BV2U1306F1	BV2V1306F1
2"	400	BV2DA407F1	BV2SR507F1	BV2U1507F1	BV2V1507F1
2-1/2"	700	BV2DA508F1	BV2SR708F1	BV2U1508F1	BV2V1508F1
3"	980	BV2DA509F1	BV2SR809F1	BV2U1609F1	BV2V1609F1
4"	1700	BV2DA710F1	BV2SR910F1	BV2U1710F1	BV2V1710F1

SPECIFICATIONS

Body: 3 and 2 piece.

Line Size: 1/2" to 4".

End Connections: Tri-Clamp, NPT, and Flange.

Pressure Limit:

Tri-Clamp: 1/2" to 4" 1000 psi (69 bar) WOG.

Flange: 150 PSI (10.3 bar).

NPT: 1/4" to 2" 1000 psi (69 bar) WOG, 2-1/2" to 3" 800 psi (55 bar) WOG.

Wetted Materials:

Body, End Cap, Stem: Stainless Steel.

Ball: Stainless Steel.

Seat, Stem Seal: PTFE.

Temperature Limit: -40 to 450°F (-40 to 240°C).

Other Materials: Body Seal, Thrust Washer: PTFE.

ACTUATORS

Electric

Power Requirements: 120 VAC, 50/60 HZ, single phase. Optional 220 VAC, 24 VAC, 12 VDC, and 24 VDC.

Power Consumption (Locked Rotor Current): Two position: 1/2": 0.55A, 3/4" to 2": 0.75A, 2-1/2" and 3": 1.1A, 4": 1.5A. Modulating: 1/4" to 3/4": 0.55A, 1" to 1-1/2": 0.75A, 2": 0.75A, 2-1/2": 0.75A, 3": 1.1A, 4": 1.5A.

Cycle Time (per 90°): Two position: U11: 2.5 sec., U12 and U13: 5 sec., U14: 10 sec., U15 to U16: 15 sec., U17: 12 sec.

Duty Cycle: Electric Two Position: 25%. Modulating 75%.

Enclosure Rating: NEMA 4. Optional NEMA 7.

Housing Material: Aluminum with thermal bonding polyester powder finish.

Temperature Limit: 0 to 150°F (-18 to 65°C).

Electrical Connection: 1/2" female NPT.

Modulating Input: 4 to 20 mA.

Standard Features: Manual override and position indicator, except modulating units.

Pneumatic "DA" and "SR" Series

Type: DA Series is double acting and SR Series is spring return (rack and pinion).

Normal Supply Pressure: 80 psi (5.5 bar).

Maximum Supply Pressure: 130 psig (8.0 bar).

Air Connections: 1/4" female NPT.

Air Consumption (per stroke): DA1: 1.71 cu. in.; DA2, SR2: 9.34 cu. in.; DA3, SR3: 17.21 cu. in.; DA4, SR4: 20.5 cu. in.; DA6, SR6: 66.75 cu. in.; DA7, SR7: 103.74 cu. in.; SR8: 122.05 cu. in.; SR9: 215.11 cu. in.

Cycle Time (per 90°): DA1: .03 sec.; DA2: .05 sec.; DA3: .06 sec.; DA5: .08 sec.; DA6: .15 sec.; SR2: .07 sec.; SR3: .13 sec.; SR4: .17 sec.; SR5: .28 sec.; SR6: .39 sec.; SR7: .60 sec.; SR8: .90 sec.; SR9: 1.75 sec.

Housing Material: Anodized aluminum body and epoxy coated aluminum end caps.

Temperature Limit: -4 to 180°F (-20 to 82°C).

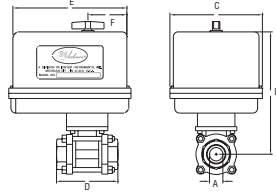
Accessory Mounting: NAMUR standard.

Standard Features: Position indicator.

3 PIECE NPT BALL VALVES

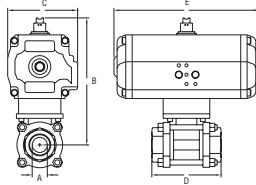


CLEARANCE REQUIRED FOR COVER REMOVAL: 3.000"



ELECTRIC										
A	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
B	6.274	6.274	6.274	6.432	7.427	7.663	8.057	8.411	12.570*	12.970*
C	4.000	4.000	4.000	4.000	4.250	4.250	4.250	4.250	7.000	7.000
D	2.362	2.362	2.582	3.149	3.543	4.330	4.724	5.511	6.540	7.400
E	5.600	5.600	5.600	5.600	6.880	6.880	6.880	6.880	7.000	7.000
F	2.300	2.300	2.300	2.300	2.430	2.430	2.430	2.430	2.380	2.380
ACT.	U11, V12	U11, V12	U11, V12	U11, V12	U12, V12	U12, V12	U12, V12	U13, V13	U15, V15	U16, V16

*INCLUDES DECLUTCHABLE MANUAL OVERRIDE AND HANDWHEEL



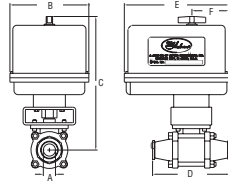
PNEUMATIC DOUBLE ACTING										
A	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
B	4.524	4.524	4.524	4.882	5.887	6.103	6.497	7.281	8.860	9.280
C	1.770	1.770	1.770	1.770	2.800	2.800	2.800	3.170	4.170	4.170
D	2.362	2.362	2.952	3.149	3.543	4.330	4.724	5.511	6.540	7.400
E	4.330	4.330	4.330	4.330	6.810	6.810	6.810	7.720	9.840	9.840
ACT.	DA1	DA1	DA1	DA1	DA2	DA2	DA3	DA3	DA5	DA5

PNEUMATIC SPRING RETURN										
A	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
B	5.394	5.394	5.394	5.552	6.297	6.533	6.927	8.271	10.190	10.580
C	2.800	2.800	2.800	2.800	3.170	3.170	3.170	4.170	5.390	5.390
D	2.362	2.362	2.952	3.149	3.543	4.330	4.724	5.511	6.540	7.400
E	6.810	6.810	6.810	6.810	7.720	7.720	9.550	9.550	13.580	13.580
ACT.	SR2	SR2	SR2	SR2	SR3	SR3	SR4	SR5	SR7	SR7

3 PIECE TRI-CLAMP BALL VALVES

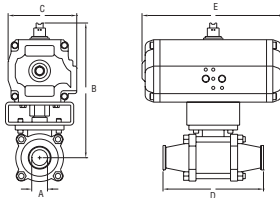


CLEARANCE REQUIRED FOR COVER REMOVAL: 3.000"



ELECTRIC								
A	1/2"	3/4"	1"	1-1/2"	2"	2-1/2"	3"	4"
B	7.840	8.000	8.758	13.040*	13.390*	14.060*	15.360*	18.390*
C	4.000	4.000	4.250	7.000	7.000	7.000	7.000	10.000
D	3.500	3.980	4.490	5.510	6.140	7.760	9.020	9.490
E	5.600	5.600	6.880	7.000	7.000	7.000	7.000	10.000
F	2.300	2.300	2.430	2.380	2.380	2.380	2.380	6.750
ACT.	U11, V12	U12, V12	U12, V12	U14, V15	U15, V15	U16, V16	U16, V16	U18, V18

*INCLUDES DECLUTCHABLE MANUAL OVERRIDE AND HANDWHEEL



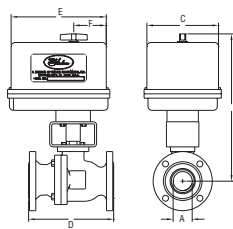
PNEUMATIC DOUBLE ACTING								
A	1/2"	3/4"	1"	1-1/2"	2"	2-1/2"	3"	4"
B	6.091	7.109	7.187	8.336	8.880	10.340	11.210	12.900
C	1.770	2.800	2.800	3.170	3.170	4.170	4.840	5.390
D	3.500	3.980	4.490	5.510	6.140	7.760	9.020	9.490
E	4.330	6.810	6.810	9.550	9.550	9.840	11.690	13.580
ACT.	DA1	DA2	DA2	DA4	DA4	DA5	DA5	DA7

PNEUMATIC SPRING RETURN								
A	1/2"	3/4"	1"	1-1/2"	2"	2-1/2"	3"	4"
B	6.951	7.549	7.827	9.826	10.180	11.680	12.590	15.468
C	2.800	3.170	3.170	4.840	4.840	5.390	5.830	7.360
D	3.500	3.980	4.490	5.510	6.140	7.760	9.020	9.490
E	6.810	7.720	7.720	11.690	11.690	13.580	15.910	20.550
ACT.	SR2	SR3	SR3	SR6	SR6	SR7	SR8	SR8

2 PIECE FLANGED BALL VALVES

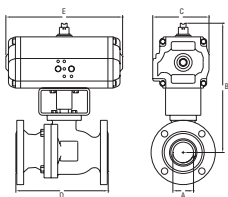


CLEARANCE REQUIRED FOR COVER REMOVAL: 3.000"



ELECTRIC								
A	1/2"	3/4"	1"	1-1/2"	2"	2-1/2"	3"	4"
B	8.210	9.010	9.340	13.060*	13.900*	14.970*	15.880*	18.900*
C	4.000	4.250	4.250	7.000	7.000	7.000	7.000	10.000
D	4.250	4.820	5.000	6.500	7.000	7.500	7.500	9.000
E	5.830	6.880	6.880	7.000	7.000	7.000	7.000	10.000
F	2.310	2.430	2.430	2.380	2.380	2.380	2.380	3.750
ACT.	U11, V12	U12, V12	U12, V12	U13, V13	U15, V15	U15, V15	U16, V16	U17, V17

*INCLUDES DECLUTCHABLE MANUAL OVERRIDE AND HANDWHEEL



PNEUMATIC DOUBLE ACTING								
A	1/2"	3/4"	1"	1-1/2"	2"	2-1/2"	3"	4"
B	7.390	7.450	7.780	8.860	9.200	11.760	12.960	13.560
C	2.800	2.800	2.800	3.170	3.170	4.170	4.840	4.840
D	4.250	4.820	5.000	6.500	7.000	7.500	8.000	9.000
E	6.810	6.810	6.810	9.550	9.550	9.840	11.690	11.690
ACT.	DA2	DA2	DA2	DA3	DA4	DA5	DA5	DA7

PNEUMATIC SPRING RETURN								
A	1/2"	3/4"	1"	1-1/2"	2"	2-1/2"	3"	4"
B	7.760	7.880	8.210	10.360	10.700	13.530	15.810	16.420
C	3.170	3.170	3.170	4.840	4.840	5.830	7.360	7.360
D	4.250	4.820	5.000	6.500	7.000	7.500	8.000	9.000
E	7.720	7.720	9.550	11.690	11.690	15.910	20.550	20.550
ACT.	SR2	SR3	SR4	SR4	SR6	SR7	SR8	SR8

I. BASIC INSTALLATION

1. Operate valve manually and place in the open position. (NOTE: ALL ELECTRIC ACTUATORS ARE SHIPPED IN THE OPEN POSITION.)
2. Remove any mechanical stops the valve might have. (DO NOT REMOVE ANY PARTS NECESSARY FOR THE PROPER OPERATION OF THE VALVE, SUCH AS THE PACKING GLAND, PACKING NUT, ETC.)
3. Ensure that the actuator output shaft and valve stem are aligned properly. If they are not, operate the valve manually until they are correct.
4. Mount actuator to valve. Do not tighten nuts and bolts at this time.
5. Remove actuator cover.
6. Bring power to the actuator. CAUTION: Make sure power is OFF at the main box.
7. Wire the actuator per the diagram attached to the inside of the cover. Special actuators (those with positioner boards, etc.) will have diagrams enclosed inside the cover.
8. Securely tighten bolts used to mount the actuator to a mounting bracket or directly to the valve mounting pad if it is ISO5211 compliant.
9. Cycle the unit several times and check the open and closed positions of the valve. Cams are pre-adjusted at the factory; due to the variety of valve designs and types, however, slight adjustments might be required. (SEE II and III).
10. Replace cover and tighten screws.

II. TO SET THE OPEN POSITION

1. Cycle the valve to the open position by applying power to terminals #1 and #2. The top cam and switch control this position. In the open position, the set screw in the top cam will be accessible.
2. If the valve is not open completely:
 - A. Slightly loosen the 8-32 x 1/4" set screw on the top cam.
 - B. Rotate the cam clockwise (CW) by hand until the switch makes contact. Contact is made when a slight click can be heard. By making incremental CW movements of the top cam, the valve can be positioned precisely in the desired position.
 - C. When the top cam is set, tighten the set screw securely.
3. If the valve opens too far:
 - A. Apply power to terminals #1 and #3. This will begin to rotate valve CW. When valve is full open and in the exact position desired, remove power from actuator.
 - B. Loosen the set screw in the top cam.
 - C. Rotate the top cam counterclockwise (CCW) until the switch arm drops off the round portion of the cam onto the flat section. A slight click can be heard as the switch changes state.
 - D. Continue applying power to terminals #1 and #3 until valve is in the desired position.

III. TO SET THE CLOSED POSITION

1. Apply power to terminals #1 and #3 to move the valve toward the closed position. The bottom cam and switch control the closed position. In the closed position, the set screw in the bottom cam will be accessible.
2. If the valve is not closed completely:
 - A. Slightly loosen the 8-32 x 1/4" set screw on the bottom cam.
 - B. Rotate the cam counter-clockwise (CCW) by hand until the switch makes contact. Contact is made when a slight click can be heard. By making incremental CCW movements of the bottom cam, the valve can be positioned precisely in the desired position.
 - C. When the top cam is set, tighten the set screw securely.
3. If the valve closes too far:
 - A. Apply power to terminals #1 and #2. This will begin to rotate valve CCW. When valve is fully closed and in the exact position desired, remove power from actuator.
 - B. Loosen the set screw in the top cam.
 - C. Rotate the top cam clockwise (CW) until the switch arm drops off the round portion of the cam onto the flat section. A slight click can be heard as the switch is no longer making contact with the round part of the cam.
 - D. Continue applying power to terminals #1 and #3 until valve is in the desired position.

IV. MAINTENANCE

Once the actuator has been properly installed, it requires no maintenance. The gear train has been permanently lubricated and in most cases will never be disturbed. In the event it becomes necessary to open the gear box for any reason, however, Shell Darina #2 grease is recommended for re-lubricating.

V. DUTY CYCLE

Most standard electric actuators are rated for 25% duty cycle at 100% ambient temperature at the rated torque.

VI. THERMAL OVERLOAD

All actuators are equipped with thermal overload protection to guard the motor against damage due to overheating.

VII. MECHANICAL OVERLOAD

All actuators are designed to withstand stall conditions. It is not recommended to subject the unit to repeated stall conditions.

VIII. SPARE PARTS

When ordering parts, please specify:

A. Model # B. Serial # C. Part Description

Recommended spare parts include:

A. Standard actuator: set of cams and switches.

B. Actuators w/positioner: set of cams and switches; 1K potentiometer; valve positioner board.

IX. NEMA 7 ELECTRIC ACTUATORS

In general, operation and maintenance of a NEMA 7 electric actuator is no different than that of a NEMA 4 actuator. However, some precautions must be followed:

1. DO NOT under any circumstances remove the cover of the actuator while in a hazardous location. Removal of the cover while in a hazardous location could cause ignition of hazardous atmospheres.
2. DO NOT under any circumstances use a NEMA 7 electric actuator in a hazardous location that does not meet the specifications for which the actuator was designed.
3. Always mount and cycle test the actuator on the valve in a non-hazardous location.
4. When removing the cover, care must be taken not to scratch, scar or deform the flame path of the cover and base of the actuator, since this will negate the NEMA rating of the enclosure.
5. When replacing the cover on actuators rated for both NEMA 4 & 7, take care that the gasket is in place to assure proper clearance after the cover is secured. After the cover screws are tightened, the clearance between the cover and the base should be checked. A .002" thick by 1/2" wide feeler gauge is used for this; it must not enter between the two mating faces more than .125"
6. All electrical connections must be in accordance with the specifications for which the unit is being used.
7. Should the unit ever require maintenance, remove from the hazardous location before attempting to work on the unit. If the actuator is in a critical application, it is advisable to have a stand-by unit in stock.

XI. TROUBLESHOOTING

SYMPTOM	PROBLEM	SOLUTION
Actuator does not respond to control signal	<ul style="list-style-type: none"> •Power is not on •Actuator wired incorrectly •Incorrect voltage •Thermal Overload •Actuator and Valve in opposite positions when actuator installed 	<ul style="list-style-type: none"> •Turn on Power •Check wiring diagram; re-wire •Bring correct supply to actuator •Allow motor to cool; resets automatically •Remove actuator; remount after 90° turn
Actuator will not open and/or close completely	<ul style="list-style-type: none"> •Travel limit switch set incorrectly •Valve torque too high •Mechanical stops not removed when installing actuator 	<ul style="list-style-type: none"> •Set cams per instructions •Install correct unit •Remove stops
Valve oscillates	<ul style="list-style-type: none"> •Torque of valve too high •Actuator without brake installed on butterfly valve •Motor brake misadjusted 	<ul style="list-style-type: none"> •Torque of valve too high •Install brake •Adjust brake; tighten screw
Actuator motor runs but output shaft does not rotate	<ul style="list-style-type: none"> •Gear damaged/sheared pin 	<ul style="list-style-type: none"> •Contact factory

PNEUMATIC ACTUATOR

NOTE: For optimal operation, BV actuators should be run with a supply of clean, lubricated air.

SPRING RETURN ACTUATORS

Air to PORT 2 (the right hand port) causes the actuator to turn CCW. Loss of air to PORT 2 causes air to exhaust and the actuator turns CW. This is the FAIL CLOSE operation.

DOUBLE ACTING ACTUATORS

Air to PORT 2 (the right hand port) causes the actuator to turn CCW. Air to PORT 1 (the left hand port) causes the actuator to turn CW.

DISASSEMBLING STANDARD ACTUATORS

IMPORTANT: Before beginning disassembly, ensure that the air supply to the actuator has been disconnected, all accessories have been removed and that the actuator has been dismantled from the valve.

1. Loosen the end cap fasteners (22) with a wrench (size varies depending on actuator model). On the spring return actuator, alternate 3 to 5 turns on each fastener until the springs are completely decompressed. Use caution in removing the cap since the springs are under load until the fasteners are fully extended.

2. Remove the pinion snap ring (10) with a lock ring tool. The indicator (7) may now be removed.

3. Turn the pinion shaft (2) CCW until the pistons are at the full end of travel. Disengage the pistons (11) from the pinion. (NOTE: Low pressure air--3 to 5 P.S.I. MAXIMUM--might be required to force the pistons completely from the body.) Note the position of the pistons before removing them from the actuator body. The part numbers of the pistons are located on the side and should be right-side up on an actuator with a standard orientation.

4. Remove the pinion through the bottom of the actuator. The actuator is now completely disassembled. All replacement parts may now be put in. W.E. Anderson recommends that all wear parts (3, 4, 5, 6, 12, 13, 14) be replaced before reassembly.

REASSEMBLING STANDARD ACTUATORS

IMPORTANT: Be sure that the actuator surfaces are free of grit and scratches before reassembling.

1. Apply a light film of grease to all o-rings and the pinion before replacing.

2. Put the pinion (2) back through the actuator with the flats of the pinion shaft running parallel with the body.

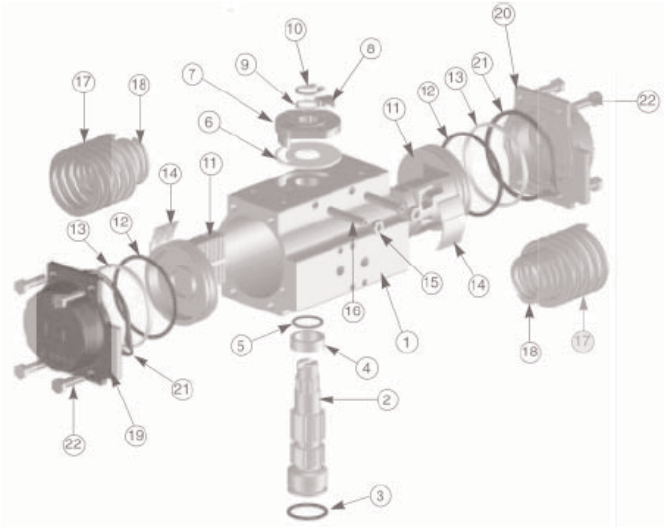
3. When reassembling the actuator, make sure that the piston racks are square to the actuator body and returned to their original orientation. (NOTE: The normal operation of all BV pneumatic actuators is FAIL CLOSED. To change the orientation to FAIL OPEN, rotate the racks 180° to create a reverse operation.)

4. When replacing springs in a spring return actuator, ensure that the springs are replaced in their identical position in the end cap from which they were removed. (NOTE: In some circumstances, you might want to change the standard 80 pound spring set to fit your application and available air pressure. Changing the spring sets on BV pneumatic actuators requires no special tools. Please refer to the spring combination torque chart in our catalog for the inner and outer spring combinations that will allow you to operate with the spring set that you desire.)

4. Seal the end caps with a petroleum lubricant and bolt to actuator body.

5. Check the seal of the actuator by covering seal areas (pinion, end caps) with soapy water and using low pressure air to the actuator to ensure that no bubbles are produced.

PNEUMATIC ACTUATOR PARTS LIST



- | | |
|--|---|
| 1. Extruded aluminum housing | 12. Piston O-ring bushing ^o |
| 2. Nickel plated steel anti-blowout pinion | 13. PTFE antifriction ring ^o |
| 3. NBR 70 lower pinion O-ring ^o | 14. PTFE piston thrust block ^o |
| 4. PTFE pinion spacer ring ^o | 15. SS stop bolt retaining nut |
| 5. NBR 70 top pinion O-ring ^o | 16. SS stop bolt |
| 6. PTFE cam spacer ring ^o | 17. External spring* |
| 7. SS indicator cam | 18. Internal spring* |
| 8. Nylon position indicator | 19. Die cast aluminum end cap (left) |
| 9. SS pinion washer | 20. Die cast aluminum end cap (right) |
| 10. Pinion snap ring | 21. NBR end cap seats |
| 11. Die cast aluminum piston | 22. SS end cap bolt |

*spring return actuators only

^oparts subject to wear. Please contact the factory of your W.E. Anderson distributor for replacement kits.

WARRANTY

W.E. Anderson warrants that for a period of twelve (12) months from the date of shipment of product it will either repair or replace, at the company's discretion, any of its products that prove to be defective in material or workmanship. The customer agrees that this warranty shall be effective so long as the goods are used solely for the normal purposes for which they are intended.