



Waukesha Cherry-Burrell

® An SPX Process Equipment Operation

Read and understand this manual prior to installing,
operating or maintaining this valve.



Effective Date
February 15, 2000

**SENTINEL IV
DOUBLE BLOCK
& VENT VALVES**

**OPERATION
MAINTENANCE
& PARTS LIST**

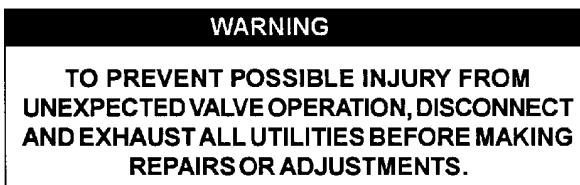
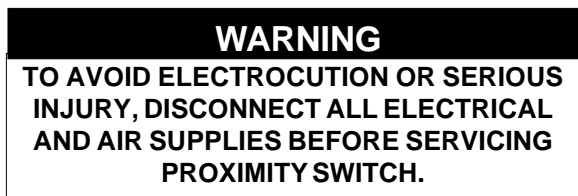
SAFETY

Warnings, cautions and notes are contained in this manual. To avoid serious injury and/or possible damage to equipment, pay attention to these messages.

WARNING Hazards or unsafe practices which COULD result in severe personal injury or death and how to avoid it.

CAUTION Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

NOTE Important information pertaining directly to the subject.



REPLACEMENT LABEL



REPLACEMENT LABEL

Read and understand this manual prior to installing, operating or maintaining this valve.

WAUKESHA CHERRY-BURRELL WARRANTY

Seller warrants its products to be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. This warranty shall not apply to products which require repair or replacement due to normal wear and tear or to products which are subjected to accident, misuse or improper maintenance. This warranty extends only to the original Buyer. Products manufactured by others but furnished by Seller are exempted from this warranty and are limited to the original manufacturer's warranty.

Seller's sole obligation under this warranty shall be to repair or replace any products that Seller determines, in its discretion, to be defective. Seller reserves the right either to inspect the products in the field or to request their prepaid return to Seller. Seller shall not be responsible for any transportation charges, duty, taxes, freight, labor or other costs. The cost of removing and/or installing products which have been repaired or replaced shall be at Buyer's expense.

Seller expressly disclaims all other warranties, express or implied, including without limitation any warranty of merchantability of fitness for a particular purpose. The foregoing sets forth Seller's entire and exclusive liability, and Buyer's exclusive and sole remedy, for any claim of damages in connection with the sale of products. In no event shall Seller be liable for any special consequential incidental or indirect damages (including without limitation attorneys' fees and expenses), nor shall Seller be liable for any loss of profit or material arising out of or relating to the sale or operation of the products based on contract, tort (including negligence), strict liability or otherwise.

GENERAL INFORMATION

SHIPPING DAMAGE

Inspect your shipment immediately. If damage is found, note it on the drivers copy (packing slip) and request the driver to ask the Inspector to call. You are responsible for initiating shipping damage claims.

HIDDEN DAMAGE OR WARRANTY CLAIM

If during installation, you discover damage, contact the Shipper immediately and ask for an Inspector to call. Notify your Distributor of the problem. In warranty claims you must have a returned goods authorization from the manufacturer before any returns will be accepted. Your Distributor will help you with a warranty problem. (See WARRANTY.)

ORDERING /RETURNING PARTS

See page 33 for complete information on ordering and returning parts.

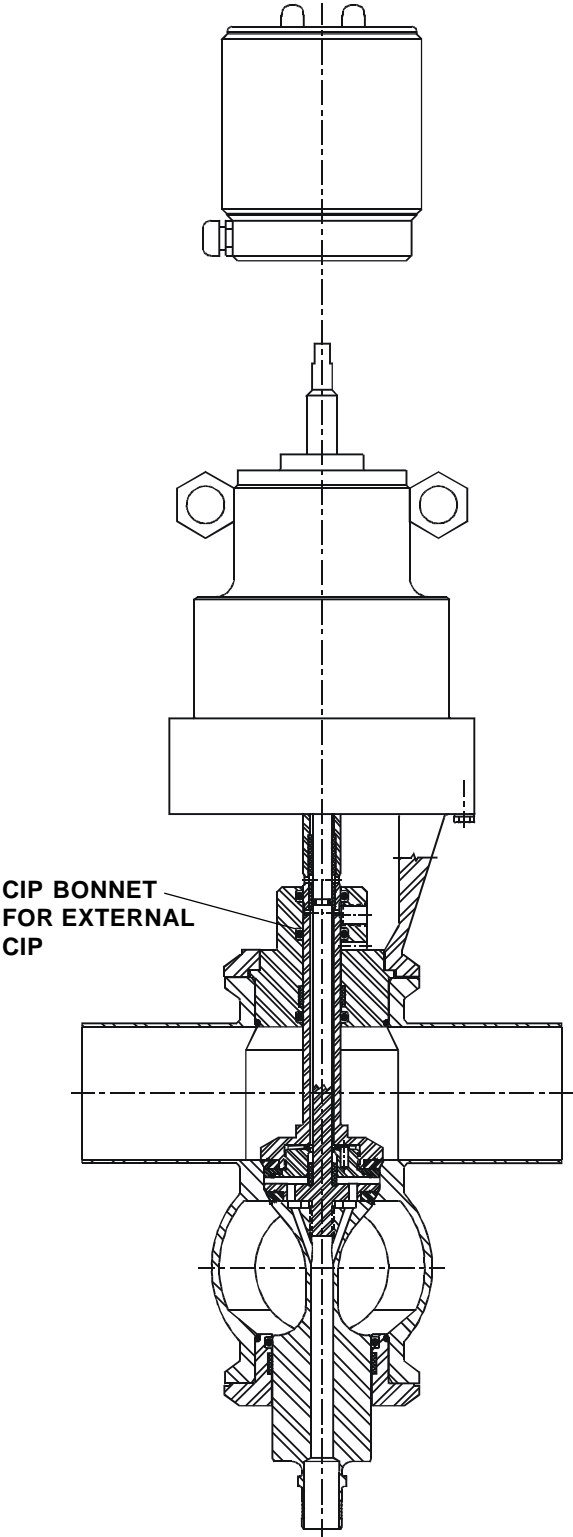
MANUAL FORMAT

This manual is laid out in sections. Each section addresses a specific subject. Familiarize yourself with the subjects by scanning through the manual. Whether installing, operating, troubleshooting, maintaining or ordering parts, read through that section and follow instructions.

Table of Contents

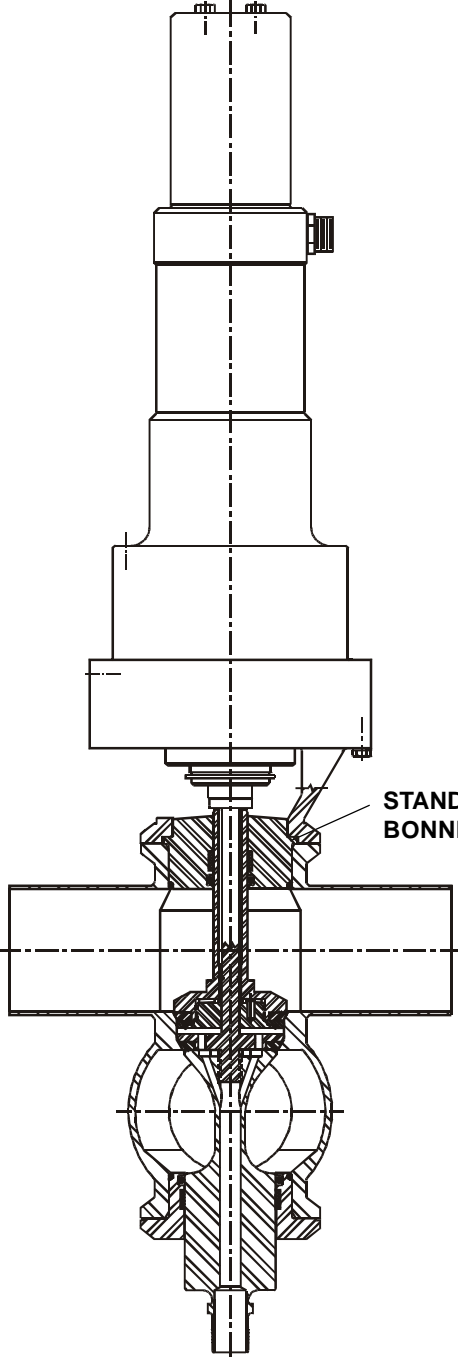
SAFETY	3
WARNING	3
GENERAL INFORMATION	4
SHIPPING DAMAGE	4
HIDDEN DAMAGE OR WARRANTY CLAIM	4
ORDERING /RETURNING PARTS	4
MANUAL FORMAT	4
WAUKESHA CHERRY-BURRELL WARRANTY	4
INTRODUCTION	6
Non-seat lifting model	6
Seat lifting model	6
ACTUATORS	8
VALVE ASSEMBLIES	9-10
BODY TYPE DESIGNATION	11
OPERATION THEORY	
Seat Lifting Model	
Air Chamber Pressure	12
Air Inlet Ports and Chambers	12
Spring Loading	13
Valve Operating Conditions	14
Solenoid Valve Port Conditions	15
Switch Operation	16
INSTALLATION	
BASIC VALVE DIMENSIONS	17
Seat Lifting Models	18
Non-Seat Lifting Models	19
Manifold Installation	20
MAINTENANCE	
Seat Lift Adjustment	20
INSPECTION	21
CLEANING	21
LUBRICATION	21
TROUBLESHOOTING	22
CARE OF STAINLESS STEEL	23
SERVICE MAINTENANCE	
VALVE DISASSEMBLY AND ASSEMBLY	
Preparation Procedures	24
Valve Removal	24
Disassembly	24-25
Upper Stem Service	26
Assembly Tool Fixtures	26
Lower Stem Service	27
ASSEMBLY OF VALVE ACTUATOR AND STEM ASSEMBLIES	
Actuator Yoke and Upper Seat Lifting Piston	28
Install Valve	29
SEAT LIFT ADJUSTMENTS	30
Replacing Upper Switch No. 2	30
Lower Switch No. 1.	30
Setting and Adjusting Switches	30
NOTES	33
ACTUATORS	
Stem Flush Double Seat W/Lift	34-35
Double Seat W/Lift	36-37
Without Seat Lift	38-39
VALVE ASSEMBLIES	
Double Seat W/Lift Teflon Seat	40-41
Stem Flush Double Seat W/Lift Teflon Seat	42-43
Without Lift Teflon Seat	44-45
Double Seat W/Lift Tri-ring Seat	46-47
Tri-ring Seat Replacement	47
CONTROL MODULES Without Seat Lift	
Control Module With Solenoid	48-49
Control Module Without Solenoid	50-51
Wiring Detail	52
Control Module Solenoid Arrangements	53
PARTS ORDERING	52

INTRODUCTION



CIP BONNET
FOR EXTERNAL
CIP

NON-SEAT LIFTING MODEL



STANDARD
BONNET

SEAT LIFTING MODEL



INTRODUCTION

Sentinel IV valves are designed to isolate fluids in the upper chamber of the valve from fluids in the lower chamber of the valve by providing a leak detecting vent between the seats.

1. Balanced lower stem distributes product pressure to protect upper line during sudden pressure surges in the lower line.
2. No valve body joints; solid, cylindrical body; no sanitation problems associated with alignment or pockets.
3. A single actuator, equipped with three pistons, opens and closes the valve and independently lifts upper and lower plugs (*Seat Lifting model*).
4. A large diameter, air-loaded piston holds down the upper plug during cleaning of lower seat. (*Seat Lifting model*).
5. A non-seat lifting actuator equipped with single piston opens and closes the valve.
6. Plug lift distance adjustable externally; no disassembly required. (*Seat Lifting model*).
7. Moving parts guided with bearings.
8. Position-indicating switches are visible through clear control module housing.
9. Open yoke between actuator and valve body.
10. Able to open and close against 150 psig product pressure with only 60 psig air supply.
11. Fail-Safe: air or electrical power failure closes the valve automatically.
12. Optional external seat CIP connection. (*Seat Lifting model*).
13. Optional metal-to-metal seats.
14. Rugged, compact, all stainless steel construction. All wetted parts 316L stainless steel.
15. Optional proximity switches or micro switches available for detecting valve positions.
16. Minimum downtime for maintenance; stem removes easily for plug seal replacement.
17. Durable TFM seal rings standard for better temperature and chemical resistance. Other seal materials, such as Viton and EPDM, available upon request.

Additional options available on request.

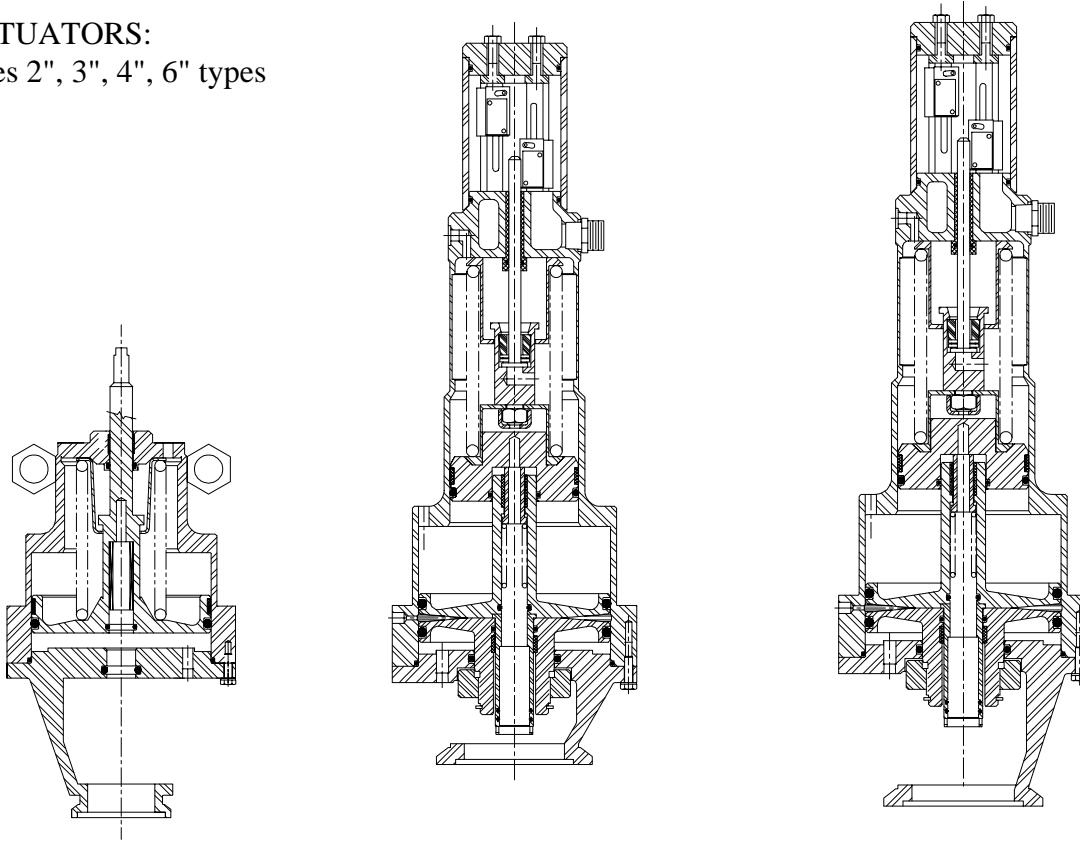
INTRODUCTION

Sentinel IV valves are available in various configurations. All are double seats (two body design) of which seat lifting or non-lifting seats and external CIP or non-external CIP features are optional.

All bodies (10 styles) are available with removable inserts and spherical shape bodies (in most sizes). Control tops are available with proximity or micro switches, solenoid for non-seat lifting model or non-solenoid with two types of electrical receptacles.

ACTUATORS:

Sizes 2", 3", 4", 6" types



Non-lift With or Without
Stem flush

Double seats with lift

Double seats with lift and
with stem flush

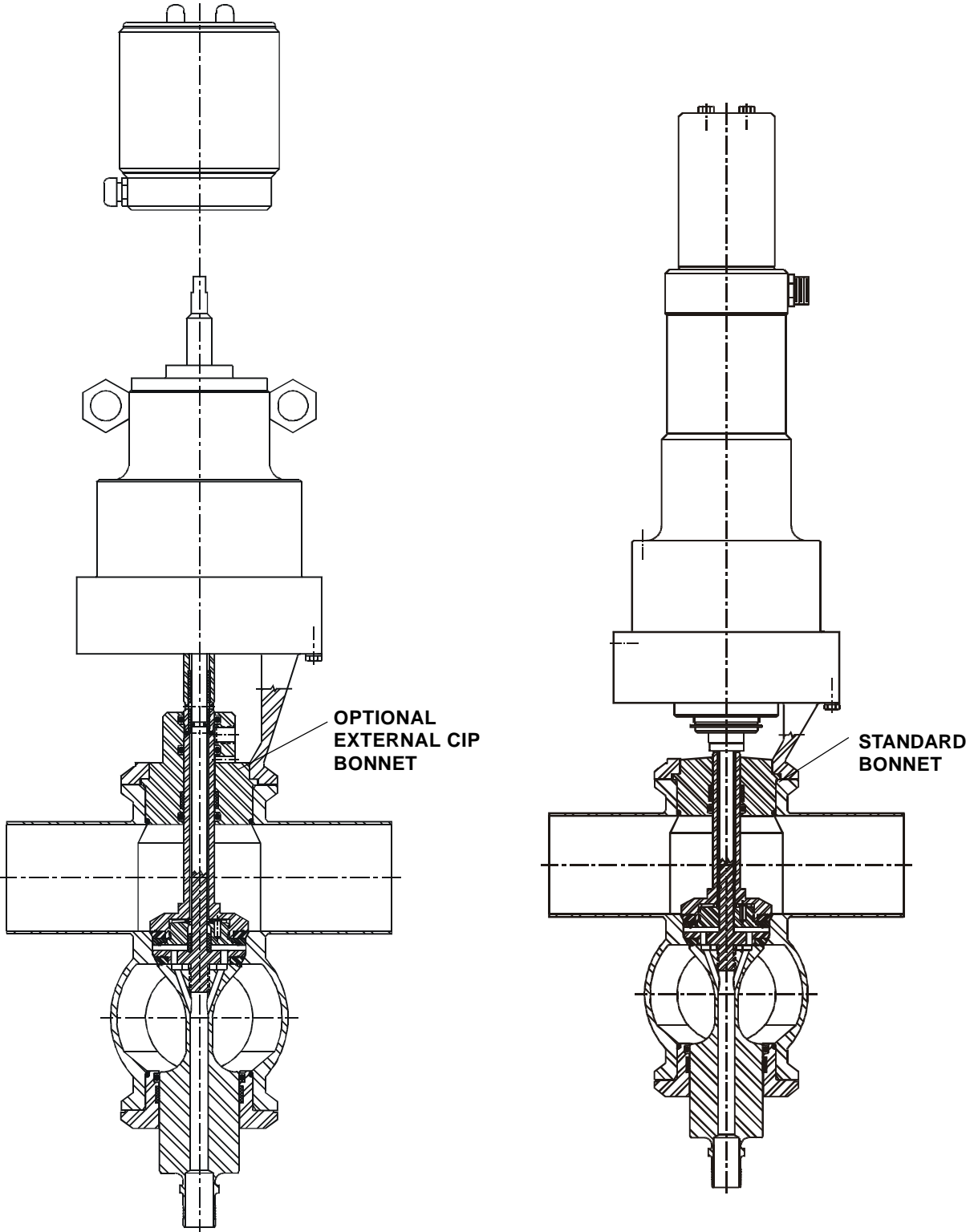
Seat lifting valves

Double seats have three pistons, one to raise the lower seat, one to raise the upper seat and one to raise entire plug, thereby allowing product to flow between upper and lower bodies.

With seat lifting CIP operation, cleaning solution enters thru the upper or lower port and exits through the space between the seats into the drain passage. When cleaning upper or lower seats, the CIP solution will flow out the drain. (During operation this space allows any leakage to be drained off.)

Seat lift refers to lifting a plug to allow flow thru the drain tube from the body or to allow flushing the seals of the plug.

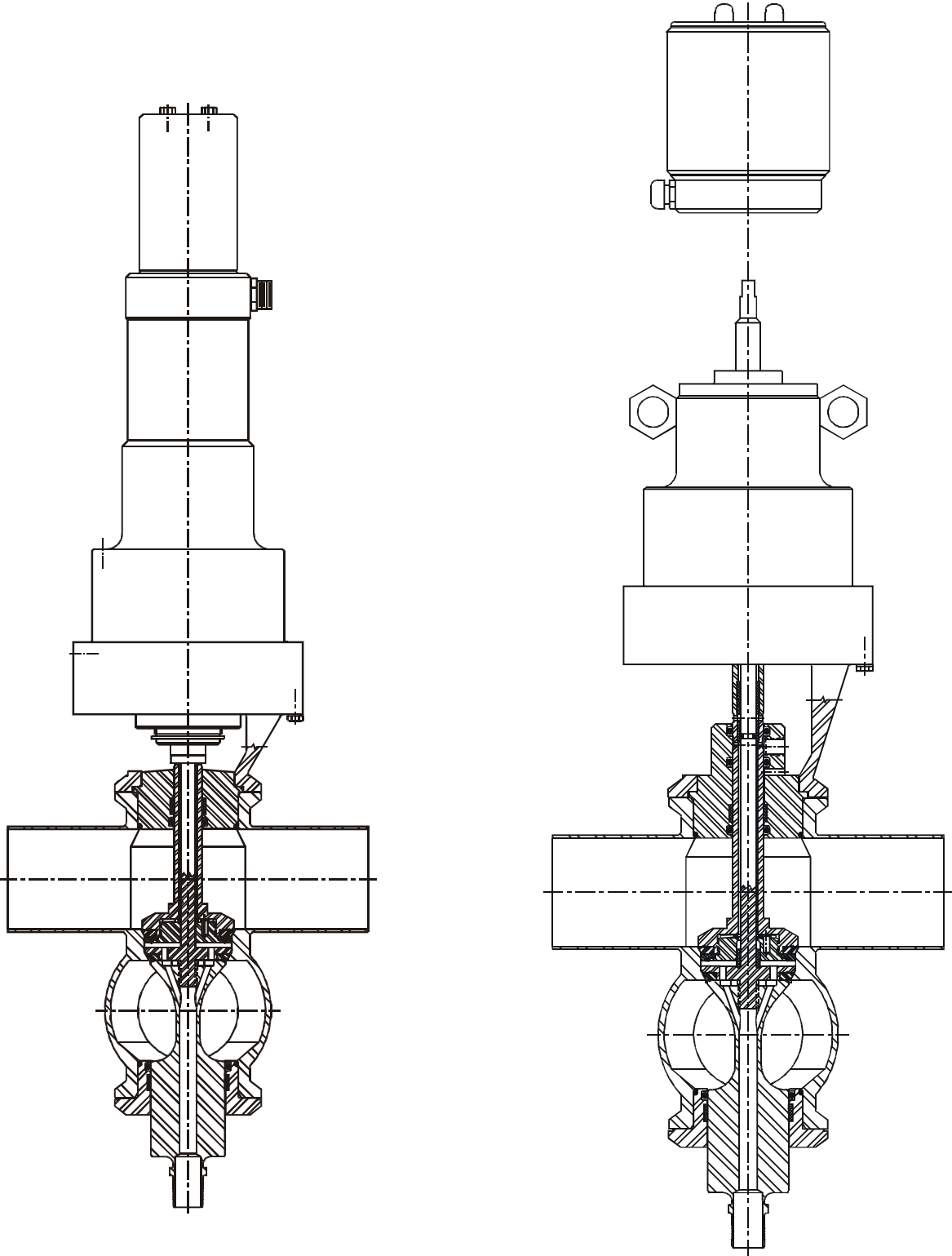
VALVE ASSEMBLIES



Seat lifting valve, W/stem flush-Teflon® seats

Seat lifting valve-Teflon® seats

VALVE ASSEMBLIES

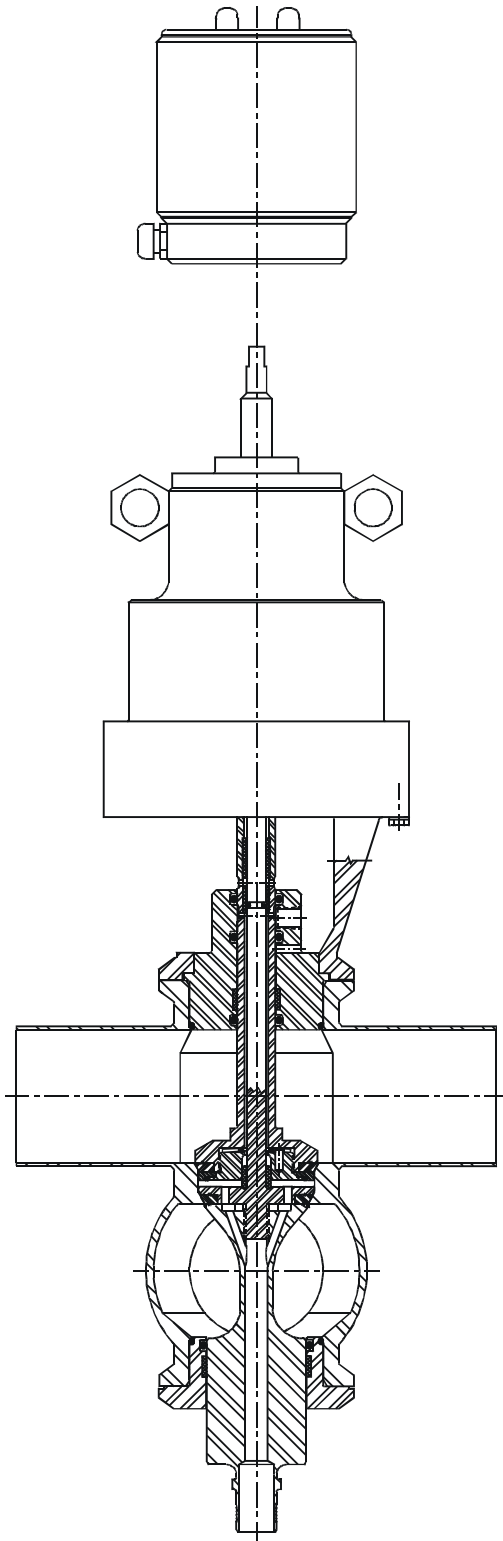


Seat lifting valve, Tri-ring seats

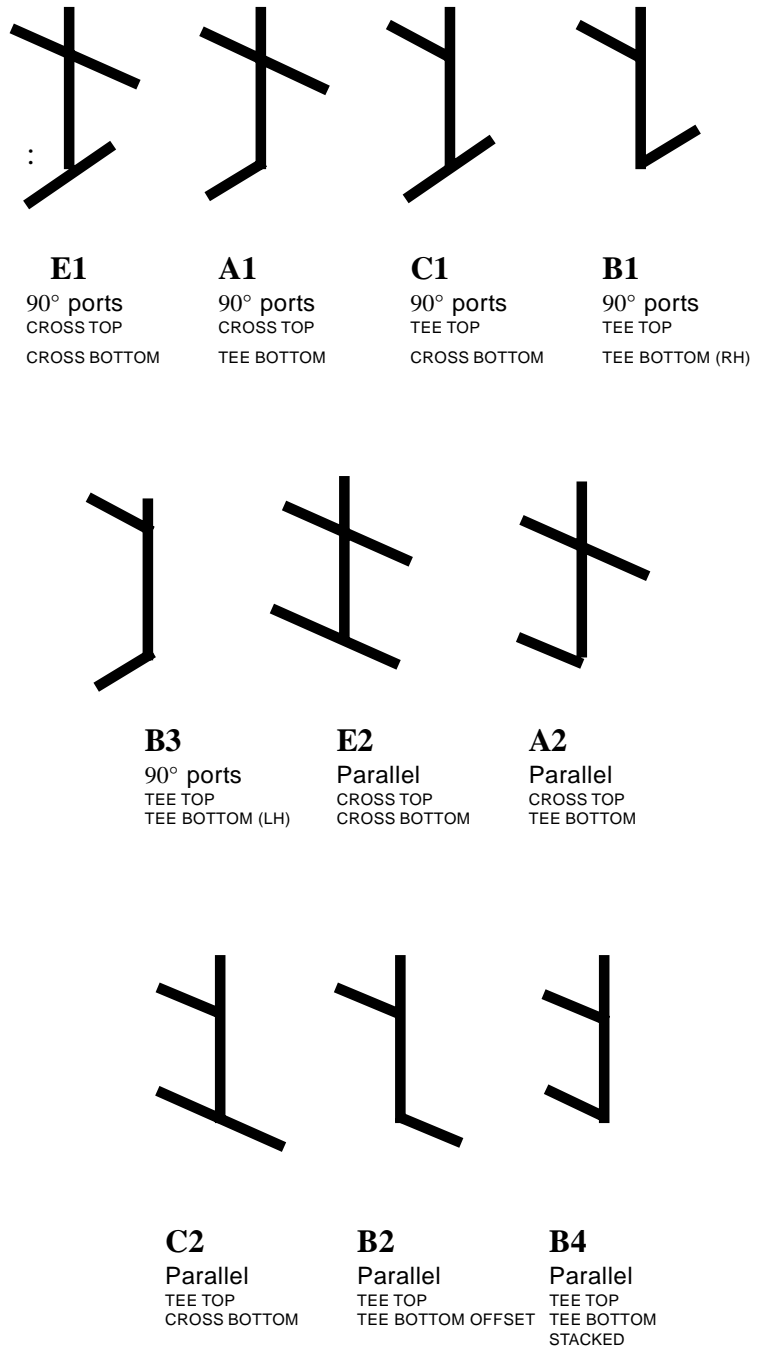
Non-seat lifting valve with stem flush, Teflon® seats

VALVE ASSEMBLIES

BODY TYPE DESIGNATIONS



Non-Seat lifting valve, Teflon® seats



REFERENCE:
Round Bodies refer to Spherical Bodies.

OPERATION

Sentinel IV Seat Lifting Model

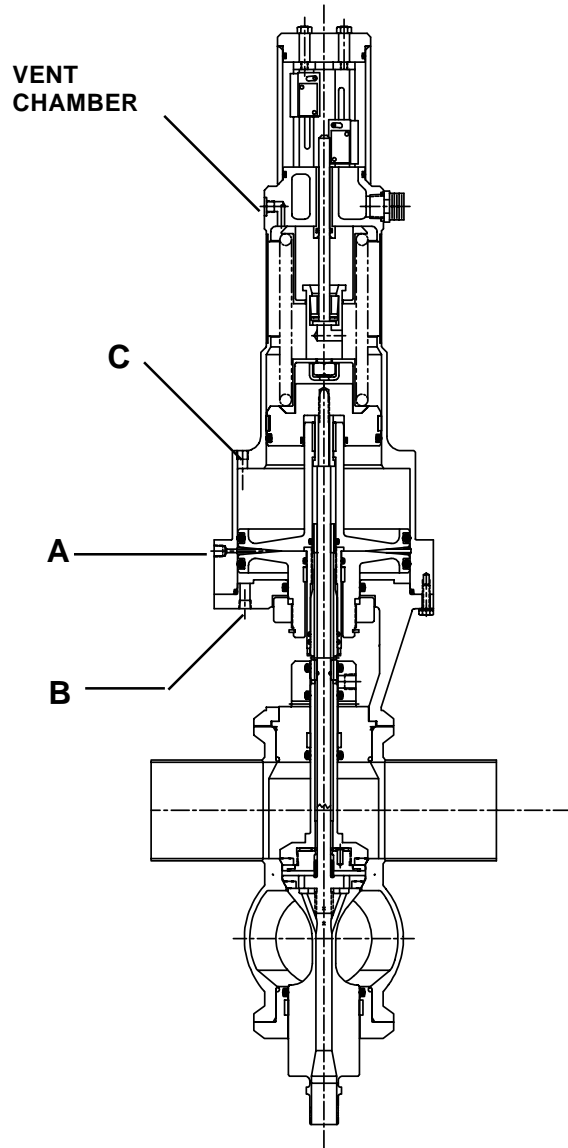
All functions of the Sentinel IV Valves are pneumatically controlled. 60-150 PSI clean air supply is required. For the purpose of identification of a particular valve function, the air chambers of the valve are designated as follows:

Air Chamber A: Air pressure applied to this port (large diameter piston) raises both inner and outer stem assembly. The valve is then open. *Air port is approximately 1" from the top of the yoke.*

Air Chamber B: When air pressure is applied to the inlet port *in the top of the yoke*, the piston raises the outer stem (upper seat) for cleaning.

Air Chamber C: When the inlet port *in the top of the large diameter cylinder* is pressurized, the small diameter piston raises the inner stem (lower seat) for cleaning, while holding the outer stem (upper seat) piston closed..

A **Vent** at the top of the small diameter cylinder can be pressurized to hold the lower seat closed. **NOTE:** *This chamber is normally vented. (For most applications air boost is not required with a balanced lower plug. When air boost is required this port can be used to supply the boost air.)*



OPERATION

SPRING LOADING

AIR INLET PORTS AND CHAMBERS

Seat Lifting Model

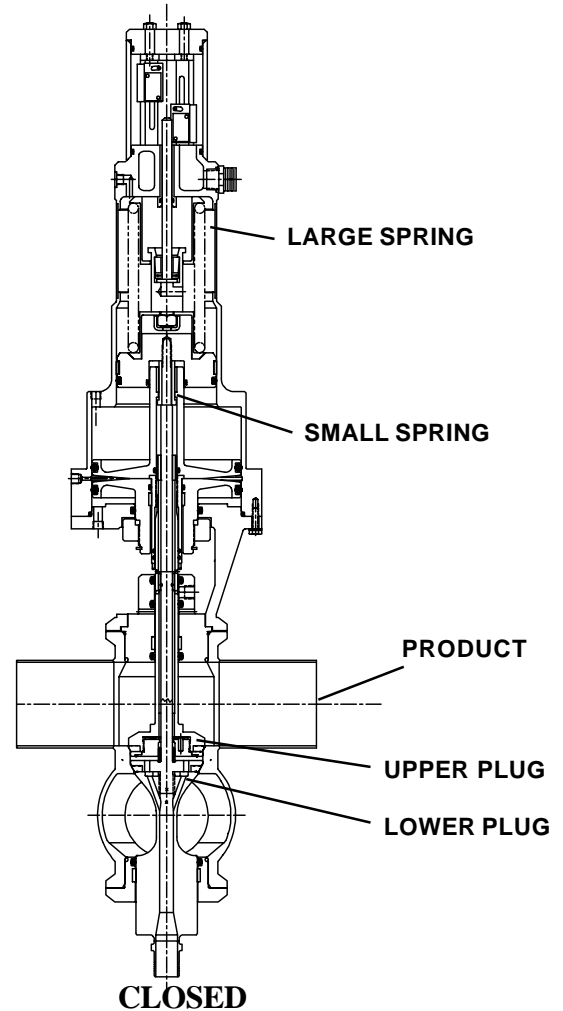
The large and small spring in the valve actuator act to hold the valve seats in the closed position. *The large spring is located in the top air chamber of the small diameter cylinder. The small spring is located in the extended hub of the primary/hold-down piston.* The small spring acts only on the **upper seat stem** to hold the upper and lower plugs together when valve is open and to hold the upper plug in the closed position when the valve is closed. The large spring works to hold the plug in the closed position

SMALL SPRING

- Holds upper and lower plugs together when valve is OPEN.
- Holds upper plug in closed position when valve is CLOSED

LARGE SPRING

- The large spring acts to hold the lower plug in the CLOSED position.



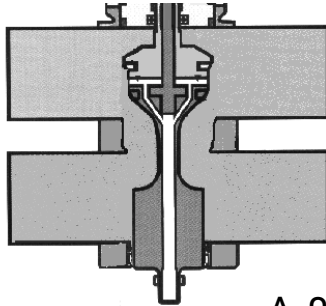
OPERATION

VALVE OPERATING CONDITIONS

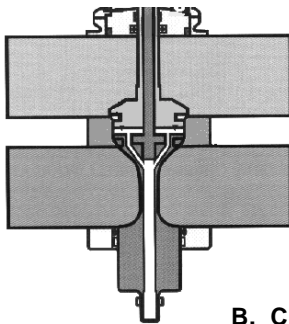
Seat Lifting Model

A. Valve OPEN

- (1) Chamber A is pressurized.
- (2) Chambers B and C are vented.



A. OPEN



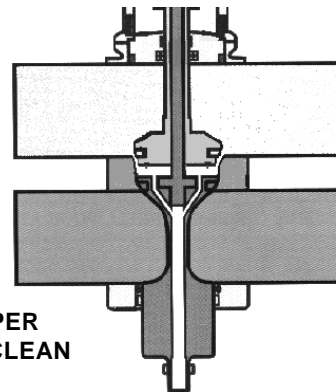
B. CLOSED

B. Valve CLOSED

- (1) Chambers A, B, C are vented. The large spring closes the valve to fail safe the position.

C. Valve closed, UPPER SEAT LIFTED for cleaning. (Seat lifting model only)

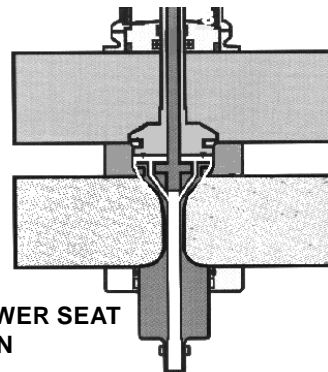
- (1) Chamber B is pressurized.
- (2) Chambers A and C are vented.



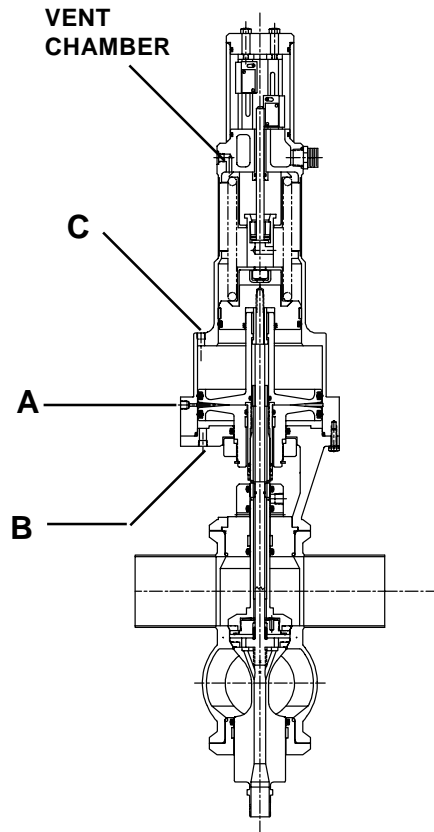
C. UPPER SEAT CLEAN

D. Valve closed, LOWER SEAT LIFTED for cleaning

- (1) Chamber C is pressurized.
- (2) Chambers A and B are vented.



D. LOWER SEAT CLEAN



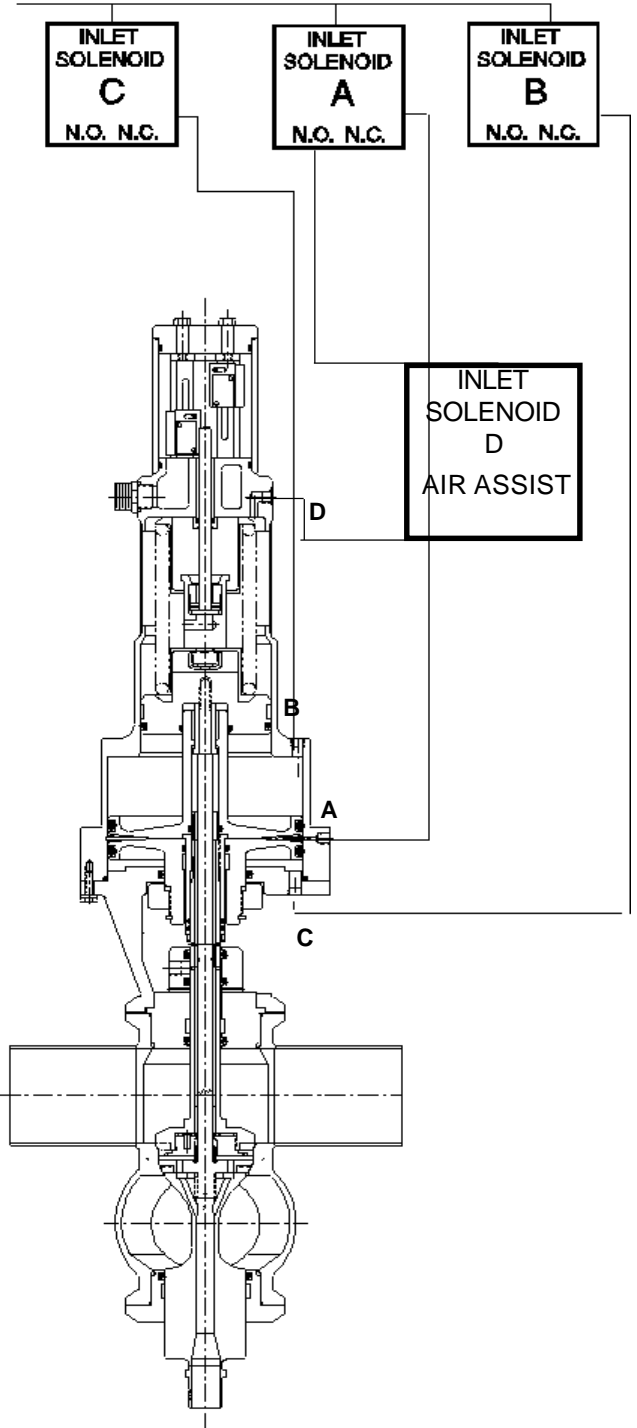
OPERATION

SOLENOID VALVE PORT CONNECTIONS.

Seat Lifting Model

A typical method for supplying air to the valve actuator is with three solenoid valves. The following chart shows the solenoid valve port connections.

AIR SUPPLY
80-150 PSI



SOLENOID #B CHAMBER C	INLET PORT
SOLENOID #C CHAMBER B	INLET PORT
SOLENOID #A CHAMBER A	INLET PORT

CONDITION	SOL. A	SOL. B	SOL. C	SOL. D
CLOSED	OFF	OFF	OFF	ON
OPEN	ON	OFF	OFF	OFF
UPPER SEAT CLEANING	OFF	ON	OFF	OFF
LOWER SEAT CLEANING	OFF	OFF	ON	OFF

ON = Solenoid energized (OPEN)
 OFF = Solenoid de-energized (CLOSED)
 Solenoids are normally closed

Air connections are 1/8 NPT

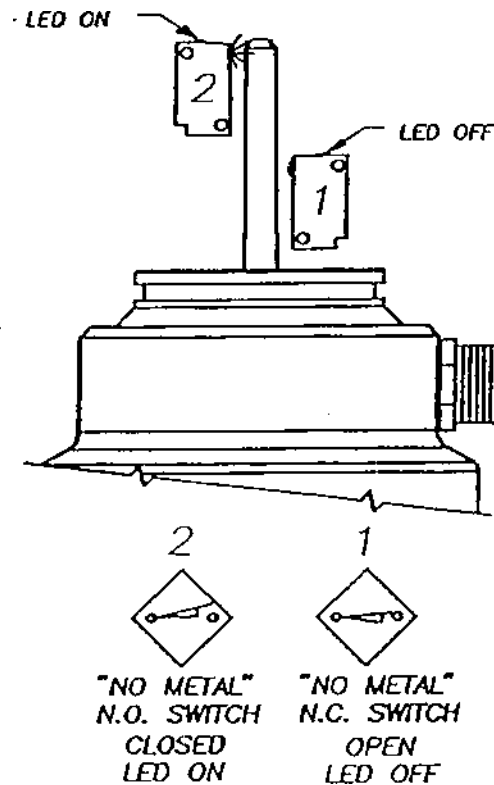
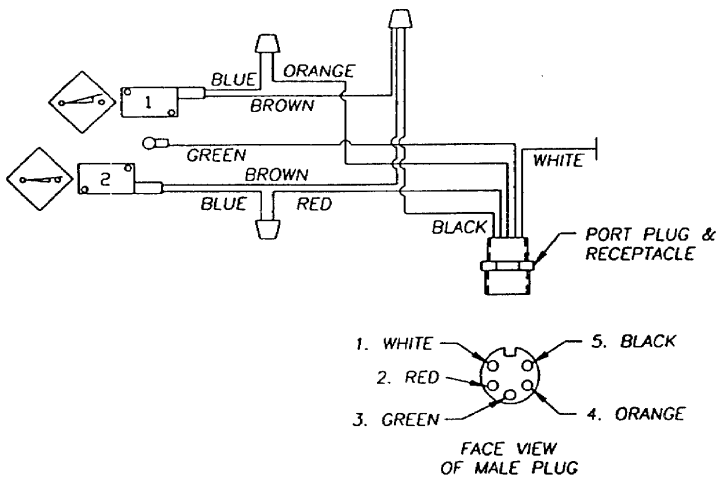
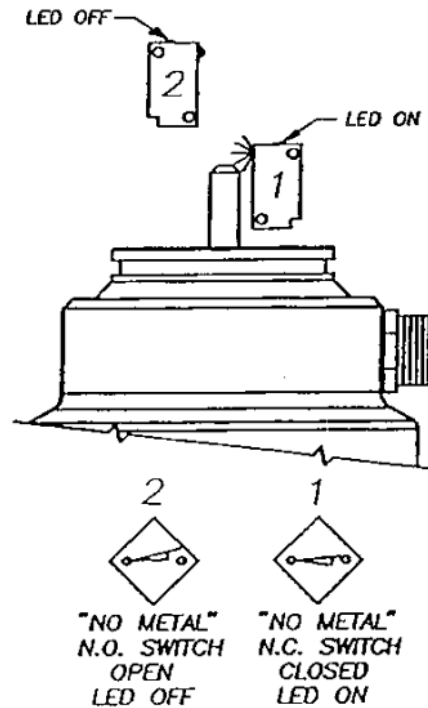
OPERATION

SWITCHES

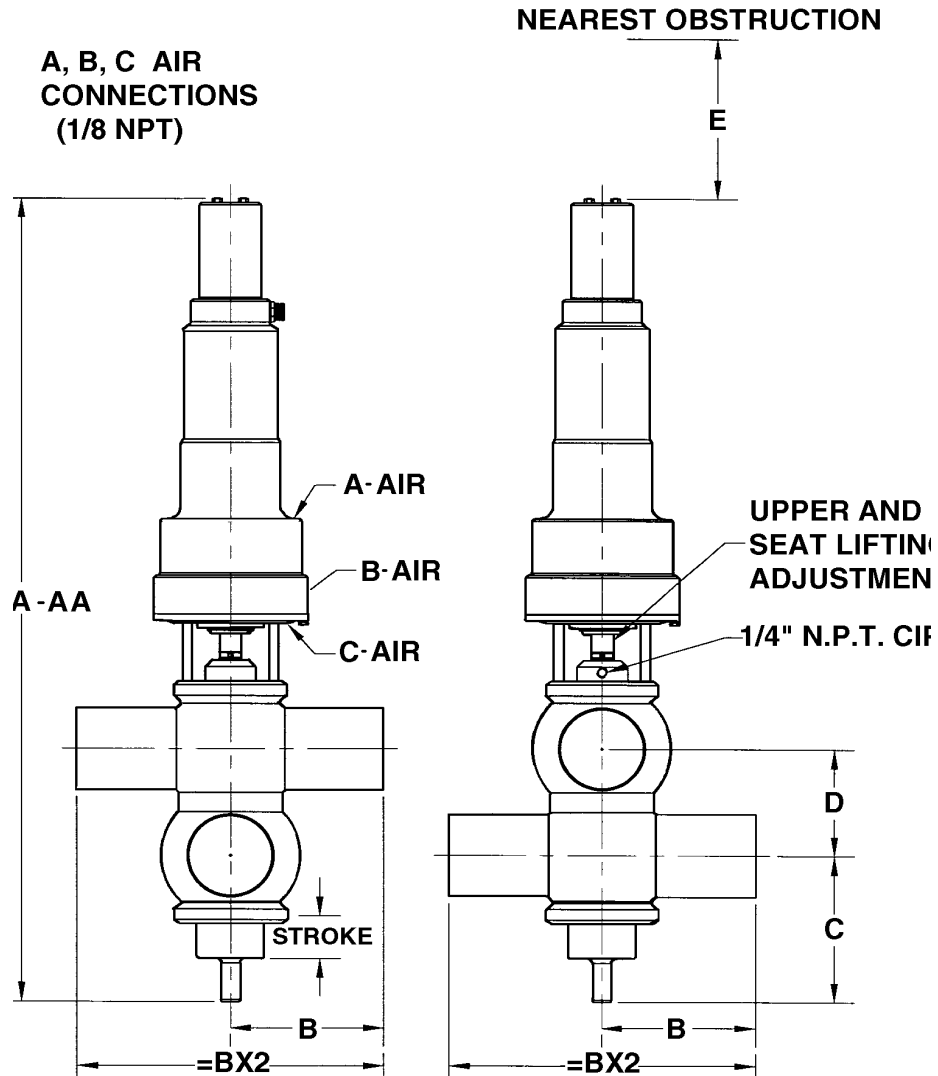
Seat Lifting Model

The Sentinel IV Series Valves contain two (2) stem location switches in the transparent housing at the top of the valve actuator. Switches can be proximity type units with individual LED (lights) that indicate if the switch is open or closed, or micro switches.

- When the lower seat is lifted, the indicator stem extends into the detection zone of switch #1. This causes the "normally closed" contacts to open.
- When the valve is *stroked OPEN, the indicator stem extends through the detection zone of switch #1 and into the detection zone of switch #2 causing "normally open" contacts to close.



INSTALLATION



DIMENSION AA REPRESENTS NON-SEAT LIFTING VALVES

ALL DIMENSIONS IN INCHES

BODY SIZE		DIMENSIONS						
UPPER	LOWER	AA	A	B	C	D	E	STROKE
2	2	29.5	34.9	6.00	5.13	3.39	10.65	1.3
2	3	30.6	36.0	6.00	5.67	3.94	11.73	1.3
2	4	31.6	37.0	6.00	6.17	4.44	12.73	1.3
2	6	33.7	39.1	6.00	7.21	5.47	14.81	1.3
3	2	30.6	36.0	6.00	5.13	3.94	11.73	1.3
3	3	32.9	38.1	6.00	6.45	4.44	13.79	2.0
3	4	33.9	39.1	6.00	6.95	4.94	14.79	2.0
3	6	36.0	41.2	6.00	7.99	5.98	16.86	2.0
4	2	31.6	37.0	6.00	5.13	4.44	12.73	1.3
4	3	33.9	39.1	6.00	6.45	4.94	14.79	2.0
4	4	38.1	43.6	6.00	7.97	5.81	17.00	2.3
4	6	40.6	46.1	6.00	7.97	6.85	19.07	2.3
6	2	33.7	39.1	6.00	5.13	5.47	14.81	1.3
6	3	36.0	41.2	6.00	6.45	5.98	16.86	2.0
6	4	40.6	46.1	6.00	9.01	6.85	19.07	2.3
6	6	48.8	56.2	6.00	10.59	7.91	22.81	3.9

INSTALLATION

SEAT LIFTING MODEL

1. Mount body into position, then weld or clamp accordingly.
2. Using extreme caution, lift the actuator assembly, *using lift hooks attached to actuator lugs*, and set into body assembly. .
3. Connect an air line to inlet port **A** (at 60-150 PSI) and open valve. With valve in OPEN position, attach clamp.
4. Connect air lines to inlet ports **B** and **C** for "Clean-In-Place" operation.
5. Attach pre-wired electrical control cord into connector on valve
6. Cycle valve through all four of these conditions:

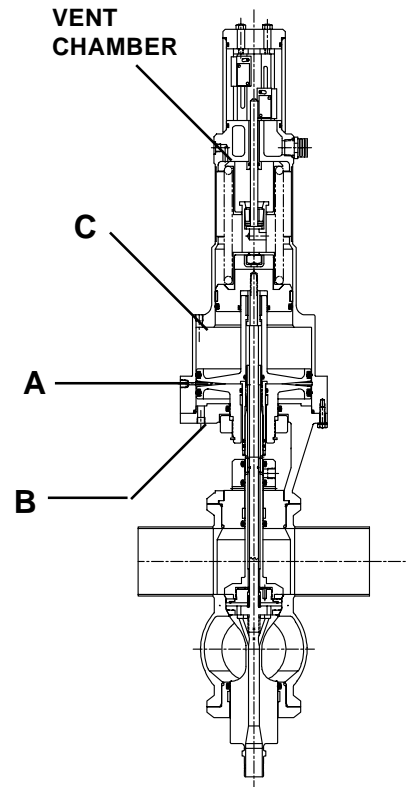
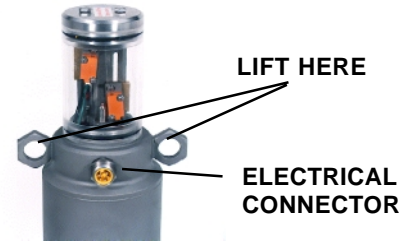
Closed

Open

Lower seat clean. *Observe indicator stem movement at top of valve.*

Upper seat clean. *Observe indicator stem movement at top of valve.*

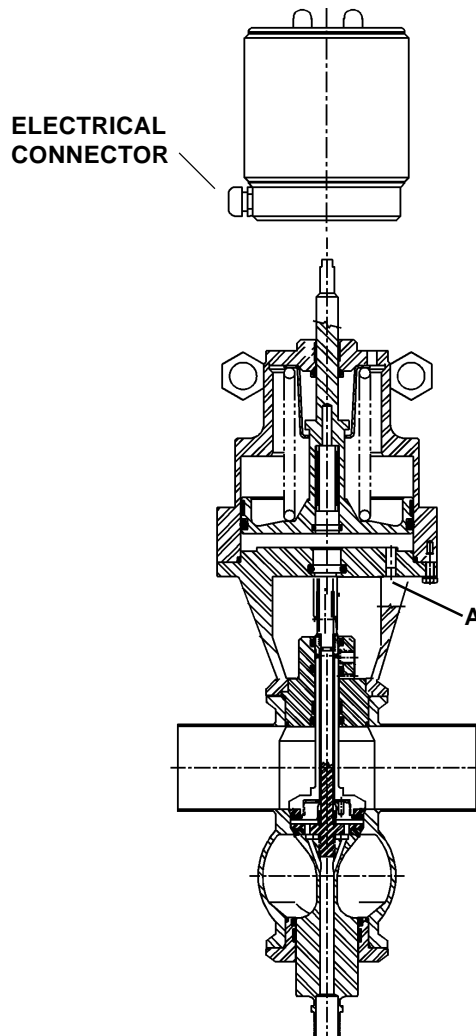
NOTE: Opening distance of both upper and lower seat is adjustable. See Page 21



NON-SEAT LIFTING MODELS

1. Mount body into position, then weld or clamp accordingly.
2. Using extreme caution, lift the actuator assembly, using lift hooks attached to actuator lugs, and set into body assembly.
3. Connect an air line to inlet port **A** (at 60-150 PSI) and open valve. With valve in OPEN position, attach body-to-bonnet clamp and tighten.
4. Attach pre-wired electrical control cord into connector on valve
6. Cycle valve through both conditions: **Closed and Open**

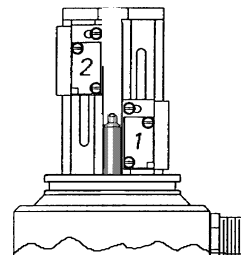
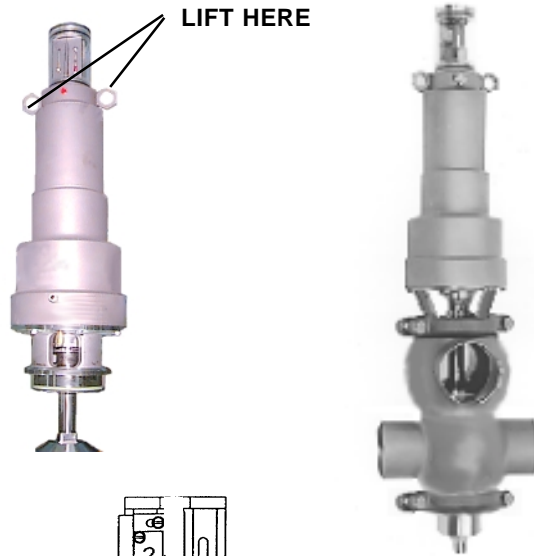
LIFT HERE



INSTALLATION

INSTALL VALVE (IN MANIFOLD)

1. Connect Air Lines to Ports A (*Non-seat lifting models*) or A, B and C. (*Seat lifting models*) Switch controls to **open** condition.
2. Using extreme caution, lift the actuator assembly, *using lift hooks attached to actuator lugs*, and set into body assembly. Lower valve slowly into body and make sure lower stem enters lower guide/balance piston bearing.
4. Assemble clamp to yoke/body flange and tighten bolts.
5. Connect electrical control cord to valve.
6. Operate valve through all four (4) conditions:
 - a. Closed.
 - b. Open.
 - c. Lower seat clean. (*seat lifting model*)
 - d. Upper seat clean (*seat lifting model*)



ELECTRICAL CORD
(SEE PAGE 18 FOR
WIRING LIST)

SEAT CLEANING ADJUSTMENT

(*Seat lifting models only*)

Lower seat

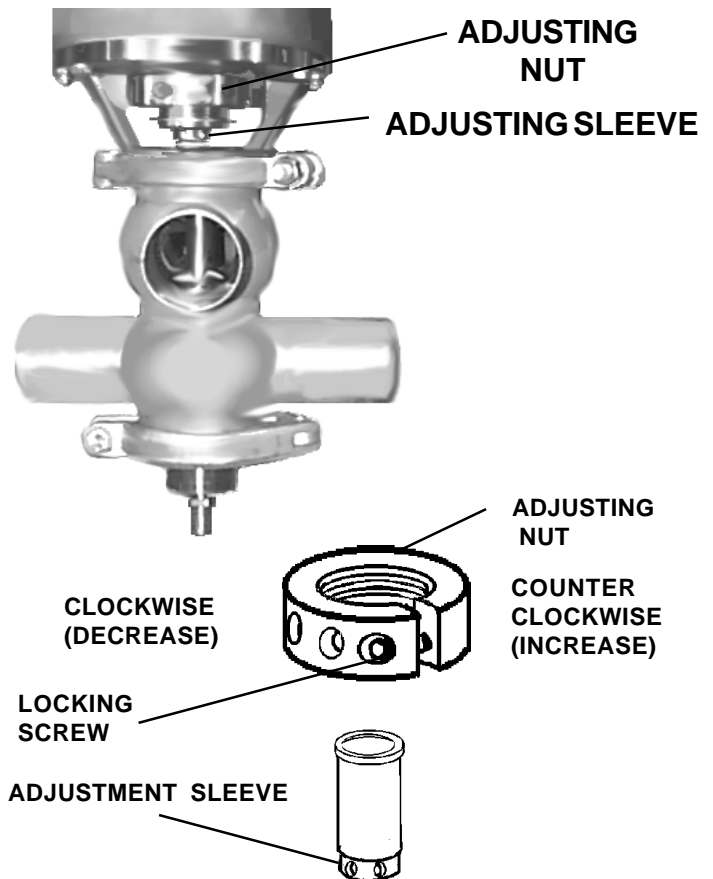
Operate lower seat clean cycle. Observe indicator stem movement at the top of the valve or at balancer on bottom of valve. 0.04" - 0.100" movement is correct.

NOTE: TO ADJUST THE MOVEMENT OF LOWER SEAT FOR CLEANING USE A 3/16 SPANNER WRENCH TO ROTATE THE ADJUSTING SLEEVE IN THE YOKE. (CLOCKWISE TO INCREASE, COUNTER CLOCKWISE TO DECREASE)

Upper seat

Operate upper seat clean cycle three times. Observe outer stem movement by watching groove in the outer stem at the yoke. 0.040" - 0.100" movement is correct.

NOTE: To adjust movement of upper seat, loosen locking screw and rotate the adjusting nut with spanner wrench. (clockwise to decrease, counterclockwise to increase).



ALWAYS ADJUST THE LOWER SEAT FIRST.

TURN ADJUSTMENT SLEEVE CLOCKWISE TO INCREASE, COUNTERCLOCKWISE TO DECREASE

MAINTENANCE

INSPECTION

Perform routine inspections frequently. If leakage occurs, see TROUBLESHOOTING on page 22. Maintain an adequate stock of replacement parts and kits and setup specific inspection and servicing schedules to maintain valve efficiency and avoid unexpected shut-downs.

CLEANING

Clean-in-place (CIP) methods work well for installed Sentinel valves without disassembly, subject to specific requirements of individual customers and sanitary engineers. Check local chemical suppliers for the most effective CIP cleaning agents and procedures. Read “Care of Stainless Steel” on page 23 for general information and cleaning precautions.

LUBRICATION

No lubrication is required other than noted in the disassembly and assembly procedures. (Use food grade non-petroleum grease on seals and O-rings)

Apply anti-seize (LOCKTITE ANTI-SEIZE #767 or equal) to all bolts, threaded stem parts and bellville washers.

NOTE: In cold environments some leaking occurs in the Sentinel IV valves during startups. This leakage is usually short term and tends to stop when the PTFE seal material has set with respect to time and temperature. If necessary, an air boost (assist) can be used to shorten this setting time. In some cases, other gasket material, such as EPDM or FKM (Viton) can be used as plug seals. However, depending on the application, these alternate gaskets wear-out faster and need more frequent replacement.

TROUBLESHOOTING

PROBLEM (all valves) LEAKAGE	POSSIBLE CAUSES	SUGGESTED ACTION
Leaks inside the drain tube with the valve closed	<ol style="list-style-type: none"> 1. Upper or lower seat ring failure service. 2. Debris trapped, upper seat or lower seat. 3. Upper or lower seat not closed. 4. Upper or lower seat clean activated 	<ol style="list-style-type: none"> 1. Remove valve Replace seat rings. 2. Inspect, change cleaning regime to correct 3. Inspect inner and outer stems for galling and burrs. 4. Check control sequence.
Leaks inside the outer drain tube with the valve open	<ol style="list-style-type: none"> 1. Tri-ring failed 	<ol style="list-style-type: none"> 1. Replace seal. Inspect inner and stems for galling and burrs.
Leaks around the yoke	<ol style="list-style-type: none"> 1. Internal bonnet O-ring failure. 2. External Bonnet O-ring failure. 	<ol style="list-style-type: none"> 1. Replace 2. Replace
Leaks through outer stem	<ol style="list-style-type: none"> 1. Inner stem O-ring failure 	<ol style="list-style-type: none"> 1. Replace O-ring
OPERATION (All valves)		
Valve fails to open	<ol style="list-style-type: none"> 1. Insufficient air 2. Controls failed 	<ol style="list-style-type: none"> 1. Set air pressure to 60-80 psi. 2. Check control sequence
Valve fails to close	<ol style="list-style-type: none"> 1. Controls failed 	<ol style="list-style-type: none"> 1. Check control sequence
Upper seat fails to open	<ol style="list-style-type: none"> 1. Lifting piston not adjusted correctly 	<ol style="list-style-type: none"> 1. Outer stem should move .040 - .100. ADJUST STOP NUT. See pages 20-21
Lower seat fails to open (Sentinel IV & IIR)	<ol style="list-style-type: none"> 1. Stop sleeve not adjusted correctly 	<ol style="list-style-type: none"> 1. Inner stem should move .040 - .100. ADJUST STOP SLEEVE. See pages 20-21
Valve moves when operated	<ol style="list-style-type: none"> 1. Clamp loose 	<ol style="list-style-type: none"> 1. Tighten clamp with valve open
ELECTRICAL (All Valves)		
No valve closed or lower lift indication	<ol style="list-style-type: none"> 1. Lower switch not adjusted 	<ol style="list-style-type: none"> 1. Refer to SWITCH ADJUSTMENT Pages 31-32
No valve open signal	<ol style="list-style-type: none"> 1. Upper switch not adjusted 	<ol style="list-style-type: none"> 1. Refer to SWITCH ADJUSTMENT Pages 31-32
Moisture in switch housing	<ol style="list-style-type: none"> 1. Missing and/or damaged gaskets 	<ol style="list-style-type: none"> 1. Replace See Pages 31-32

CARE OF STAINLESS STEEL

The stainless steel components in Waukesha Cherry-Burrell equipment are machined, welded and assembled by skilled craftsmen using manufacturing methods that preserve the corrosion-resistant quality of the stainless steel.

Retention of corrosion-resistant qualities under processing conditions requires regular attention to the precautions listed below.

(Note: Corrosion resistance is greatest when a layer of oxide film is formed on the surface of stainless steel; should this film be disturbed or destroyed, stainless steel becomes active and much less resistant to corrosion.)

1. Regularly check all electrical devices connected to the equipment in any way for stray currents caused by improper grounding, damaged insulation or other defects.

Corrosion: "Pitting" often occurs when stray currents come in contact with moist stainless steel.

2. Never leave rubber mats, fittings, wrenches, etc. in contact with stainless steel.

Corrosion: Pitting or galvanic action. Objects retard complete drying, preventing air from reforming the protective oxide film. Galvanic corrosion occurs when two dissimilar metals touch when wet.

3. Use water conditioner when the water supply contains foreign matter which may cause discoloration or deposits.

Corrosion: Pitting, deposits, discoloration. Deposits counteract the best cleaning practices and cause corrosion of the best quality stainless steel.

4. Immediately rinse equipment after use with warm water until the rinse water is clear. Clean the equipment (manual or CIP) as soon as possible after rinsing.

Corrosion: Discoloration, deposits, pitting. Product deposits often cause Pitting beneath the particles.

5. Use only re-commended cleaning compounds. Purchase (chemicals from reputable and responsible chemical manufacturers familiar with stainless steel processing, equipment. They continuously check the effects of their products on stainless steel.

6. Use cleaning chemicals exactly as specified by the manufacturer. Do not use excessive concentrations, temperatures or exposure times.

Corrosion: Pitting, discoloration, stress- cracks. Permanent damage often occurs from excessive chemical concentrations, temperatures, or exposure times.

7. For manual cleaning, use only soft non metallic brushes, sponges or pads. Brush with the grain on polished surfaces; avoid scratching the surface.

Corrosion: Pitting, scratches. Metal brushes or sponges will scratch the surface and promote (corrosion over a period of time. metal particles allowed to remain on a stainless steel surface will cause pitting.

8. Use chemical bactericides exactly as prescribed by the chemical manufacturer in concurrence with local health authority. Use the lowest permissible concentration, temperature and exposure time possible. Flush immediately after bactericidal treatment. In no case should the solution be in contact with stainless steel more than 20 minutes.

Corrosion: Protective film destroyed. Chlorine and other halogen bactericides can destroy the protective film. A few degrees increase in temperature greatly increases chemical activity and accelerates corrosion.

9. Regularly inspect the joints in pipelines. Be sure all connections are tight fitting without binding.

Corrosion: Crevice corrosion. Small crevices caused by improperly seated gaskets will promote crevice corrosion. Stainless steel under stress will develop stress cracking especially in the presence of bactericides containing chlorine.

10. Regularly inspect equipment for surface corrosion (i.e. pitting, deposits, stress cracks, etc.). If deposit or color corrosion is detected, remove it immediately using mild scouring powder and detergents. Rinse thoroughly and allow to air dry. Review production and cleaning procedures to determine the cause.

Note: If corrosion is not removed, the protective film cannot be restored and corrosion will continue at an accelerated rate.

MAINTENANCE

VALVE DISASSEMBLY

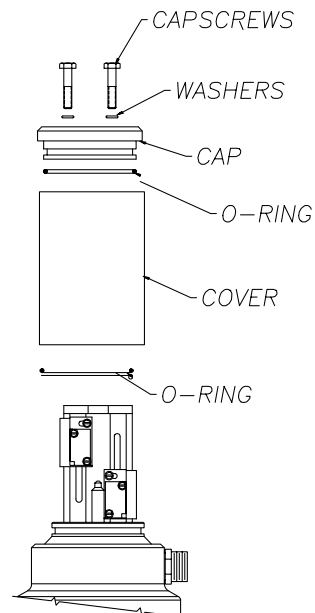
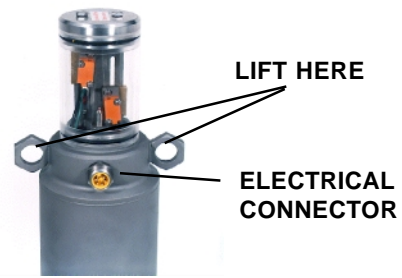
VALVE DISASSEMBLY AND ASSEMBLY PROCEDURES

Prior to servicing valve, have all necessary O-rings, seat rings and lubrication ready to complete the job. Fixture Assemblies for servicing the upper and lower stem are required. (See Table at bottom of page for proper fixture for your valve.)

All product should be drained from the valve body.

VALVE REMOVAL AND DISASSEMBLY FOR SERVICE

1. Open the valve. (Visual indicator in control top will show valve open.)
2. Remove bolts from clamp holding actuator to pipeline (manifold). Remove clamp. Remove air lines to air chambers **B** and **C**.
3. Switch valve controls to closed condition and disconnect remaining air and electrical connections.
4. Use a hoist and harness or chain to carefully lift the valve actuator and stem assembly out of the valve body. (Lifting lugs are at the top of the actuator.)
5. Remove the two capscrews at the top of the actuator and lift off the switch cap and transparent cover.



MAINTENANCE

VALVE DISASSEMBLY

6. Connect air pressure to the **A** actuator chamber. Invert the actuator and stem assembly. Loosen the lower stem by turning counterclockwise (do not remove). Release the air pressure on **A** actuator chamber.

7. Hold the upper stem and continue to turn the lower stem Counterclockwise until it is loose, then remove it from the actuator assembly.

8. Mark the location of the sleeve on the upper stem inside the yoke. Use a 3/16 spanner wrench on the sleeve inside the yoke of the actuator to hold adjusting sleeve and turn the upper stem counterclockwise and remove it.

9. Lift the bonnet from the yoke.

NOTE: ALL PRODUCT ZONE ELASTOMERS AND BEARINGS ARE ACCESSIBLE FOR REPLACEMENT AT THIS TIME. IF SERVICE TO THE ACTUATOR IS REQUIRED CONTINUE WITH THE DISMANTLING PROCEDURE.

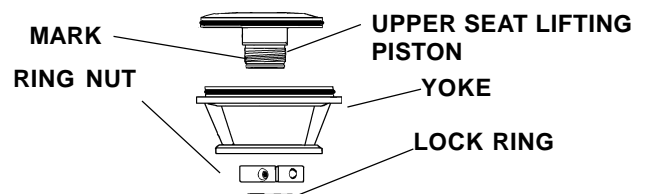
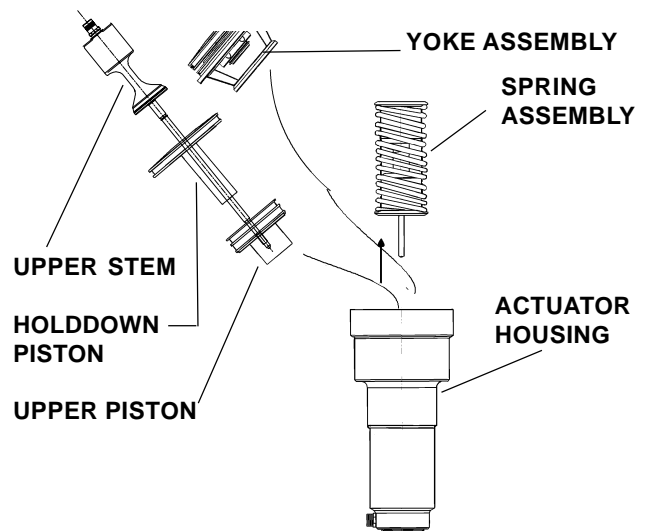
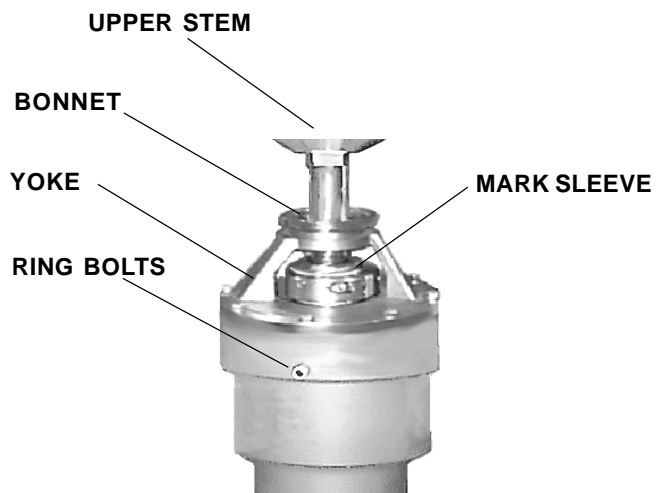
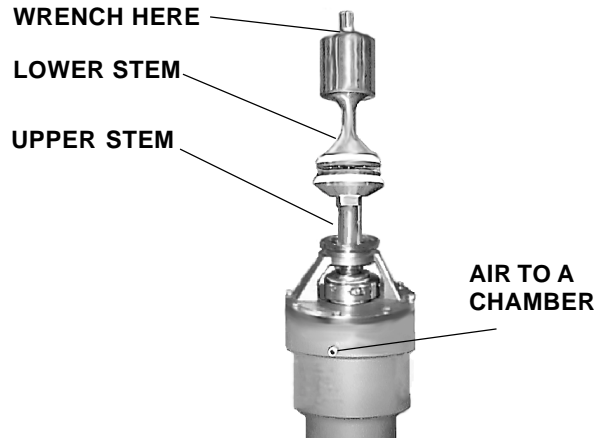
10. Remove the ring of bolts holding the yoke to the actuator.

11. Lift out the yoke with the upper seat lifting piston assembly.

12. Insert the lower stem into the center of the pistons that remain in the actuator housing. Turn it clockwise to engage the thread in the upper piston. Pull on the lower stem to remove the actuator pistons.

13. Lift the spring assembly out of the actuator housing.

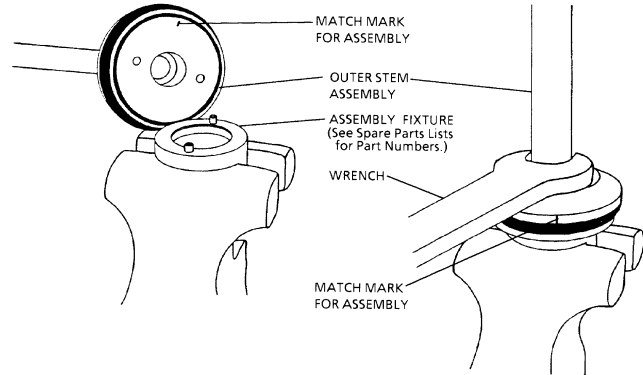
14. Push the upper seat lifting piston down into the yoke and mark the position of the ring nut on the piston threads. Remove the lock ring and upper seat lifting piston stop nut. Lift the upper seat lifting piston out of the yoke.



MAINTENANCE

UPPER STEM ASSEMBLY SERVICE

1. Place upper stem assembly fixture in vise. Place stem over dowel pins on fixture.
2. Hold stem in place and loosen with a wrench on the stem flats.
3. Turn stem over and remove seat ring.
4. Remove the bellville washer, ring, tri-ring and stem gasket from the retaining nut. (*Discard tri-ring and gasket.*)



NOTE: 2" does not have stem gasket. Clean all metal parts.

5. Place stem back on retainer nut and hand tighten. Scribe match marks on retaining nut and stem for assembly purposes.
6. Lubricate new tri-ring and set down over retaining nut.
7. Apply anti-seize to bellville washer surfaces and nut threads.

ASSEMBLY TOOL FIXTURES				
SIZE	2"	3"	4"	6"
LOWER STEM	101991	101994	101992	101993
UPPER STEM	7122688	7028349	7028112	

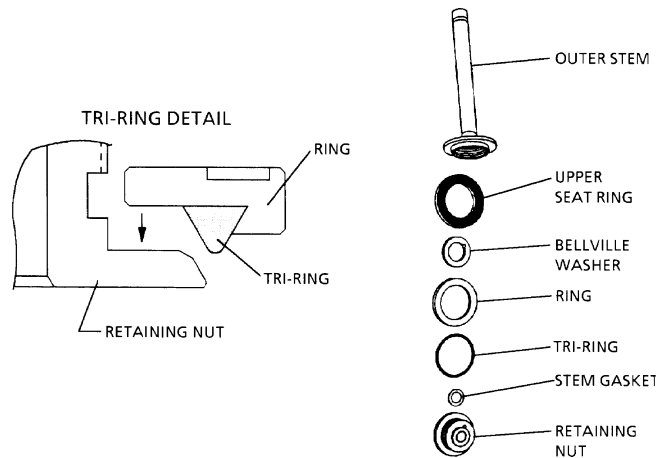
8. Place the bellville washer on the retaining nut (curved edge up), matching the locating pin to the hole in the washer.

9. Replace the stem gasket on the retaining nut. (2" does not use stem gasket.)

10. Install new seat ring on outer stem. (Do not lubricate to install.)

11. Screw stem on retaining nut, hand tighten, then back off 1-1/2 turns.

12. Re-tighten to match marks. Check tri-ring for proper fit.



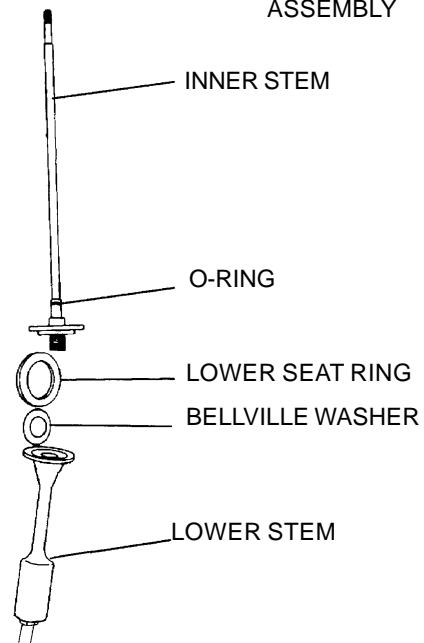
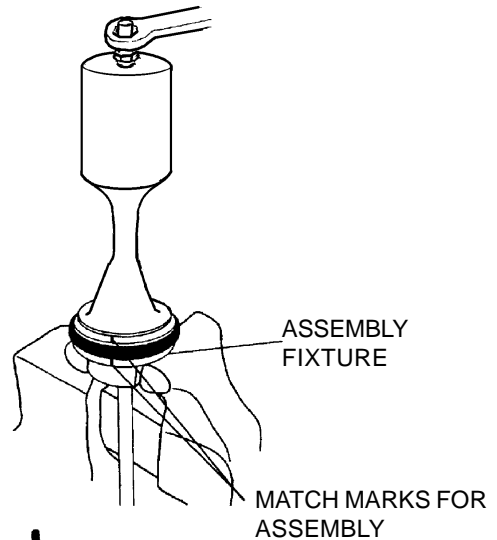
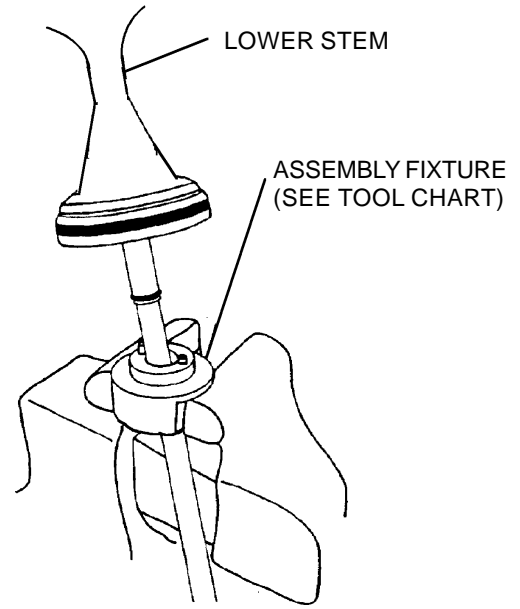
MAINTENANCE

LOWER STEM ASSEMBLY SERVICE

1. Place lower stem fixture in vise.
2. Invert lower stem assembly and slide down through fixture and align on the dowel pins.
3. Remove lower stem by turning counter-clock-wise with a wrench on the flats.
4. Remove the bellville washer.
5. Remove and discard the seat ring.
6. Remove (lift) the inner stem from the fixture.
7. Remove O-ring #7120688 from the inner stem and discard.

Clean all metal parts.

8. Thread the inner stem onto the lower stem assembly and hand tighten. Scribe match marks on the stems for assembly purposes.
9. Remove the inner stem from the lower stem.
10. Apply anti-seize to the bellville washer surfaces and the stem threads.
11. Place the bellville washer on the lower stem.
12. Place a new lower seat ring on the inner stem.
13. Thread the inner stem onto the lower stem assembly and hand tighten.
14. Invert the stem assembly onto the fixture over the dowel pins. Tighten to match marks.
15. Remove the assembly. Lubricate and install O-ring #7120688 onto the inner stem.



MAINTENANCE

ASSEMBLY OF VALVE ACUTATOR AND STEM ASSEMBLIES

Actuator Yoke and Upper Seat Lifting Piston

1. Inspect bearing and install O-ring in piston. Install O-ring on outside of upper seat lifting piston and on yoke. (Lubricate O-rings with food grade, non-petroleum grease) Insert piston hub into yoke and screw on adjusting nut. (set to mark made during dismanteling) Lock adjusting nut in place using allen wrench and replace retainer ring.

2. Install O-rings (Lubricate with food grade, non-petroleum grease) in adjusting sleeve, apply anti-seize to the thread. Insert the sleeve into the upper plug lifting piston.

3. Insert spring assembly into the actuator housing.

4. Install upper piston bearing and O-rings (Lubricate with food grade, non-petroleum grease). Insert the upper piston into the actuator housing.

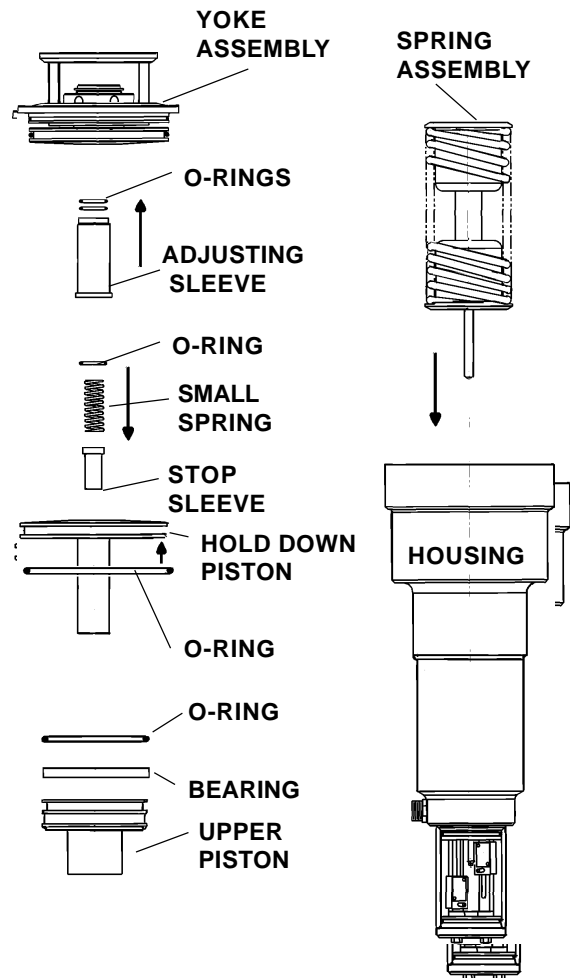
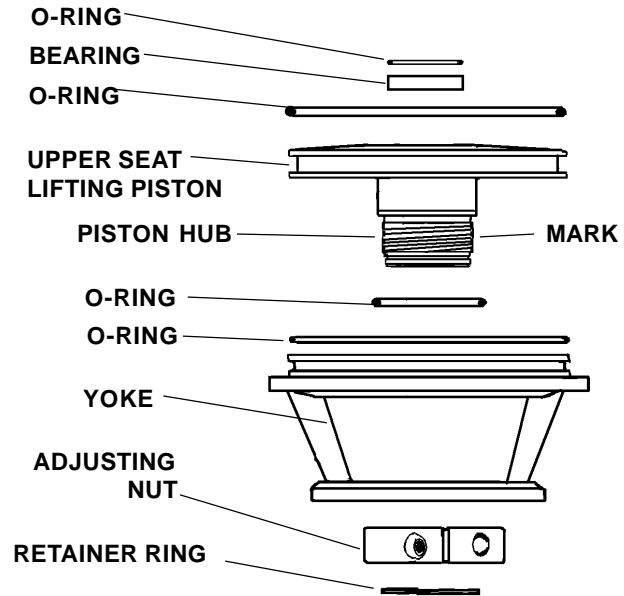
5. Install primary/hold-down piston O-ring (Lubricate with food grade, non-petroleum grease). Insert the primary/hold-down piston into the actuator housing.

NOTE: USE THE UPPER STEM AS A TOOL TO LINE UP THE PISTON WITH THE UPPER PISTON.

6. Insert the stop sleeve and small spring into the center of the primary/hold-down piston.

7. Install the yoke and upper seat lifting piston assembly into the bottom of the actuator housing.

NOTE: BE SURE TO LINE UP THE AIR PORT ON THE YOKE WITH THE AIR PORTS ON THE ACTUATOR HOUSING.

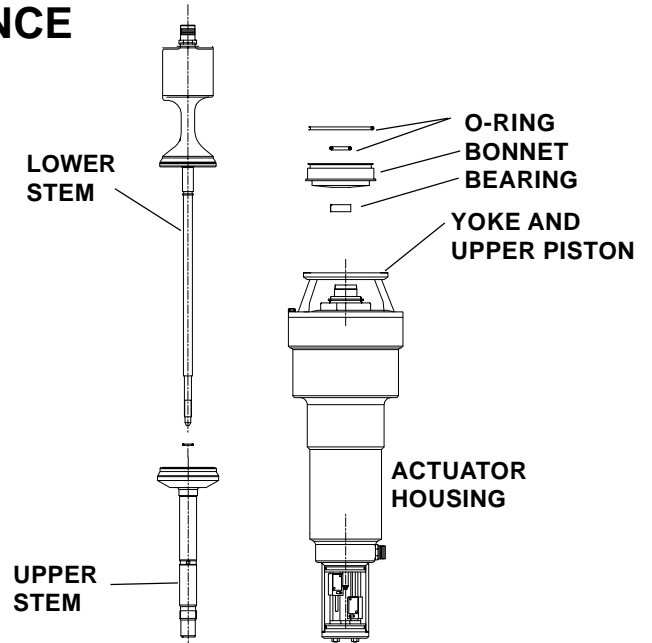


MAINTENANCE

8. Lubricate and install O-rings and bearing in bonnet and insert upper stem in bonnet.

9. Wipe lubricant off of the top of the upper stem. Wet the upper stem with water and insert into the bonnet plug and then into the actuator. Push down on stem while turning clockwise to engage the adjusting sleeve thread. Hold sleeve from turning using 3/16 spanner wrench and turn stem in until the mark made during dismantling is reached.

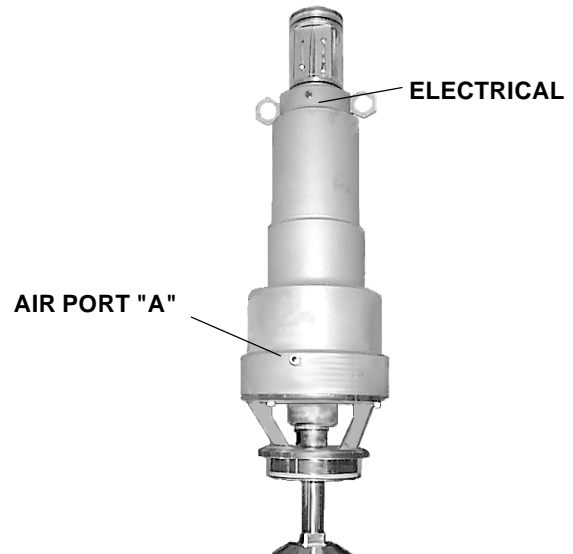
10. Insert lower stem assembly into the actuator and turn clockwise to engage upper piston thread. Continue to turn until the stem is tight.



INSTALL VALVE

1. Connect air line to Port **A**. Switch controls to **open** condition.

2. Replace O-ring in lower bearing carrier, and check and replace split bearing if required.

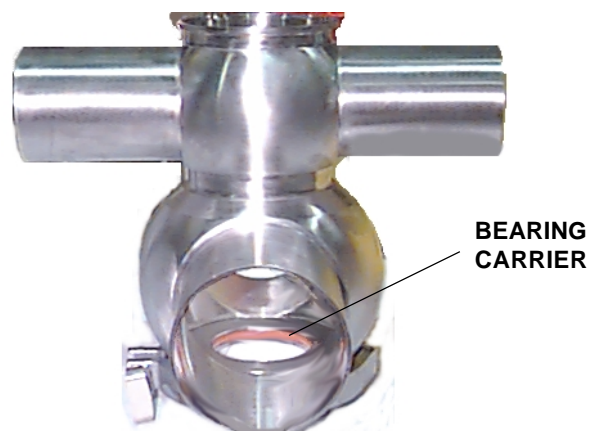


3. Lower valve slowly into body and make sure lower stem enters bearing carrier.

4. Assemble clamp to yoke/body flange and tighten bolts.

5. Connect electrical control cord to valve.

6. Operate valve through all conditions:



MAINTENANCE

Seat Lifting Models

- a. Closed.
- b. Open.

c. Lower seat clean.

Operate lower seat clean cycle. Observe outer stem movement at top of valve
0.040" - 0.100" movement is correct.

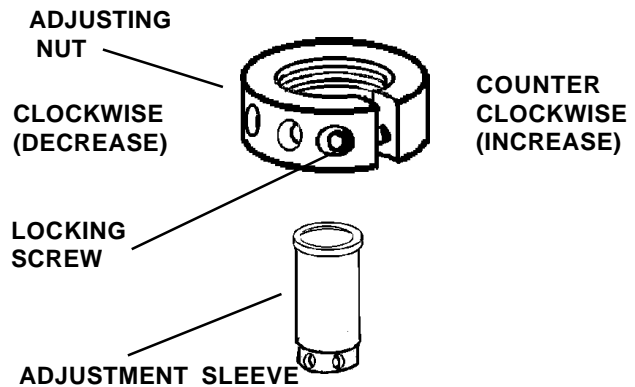
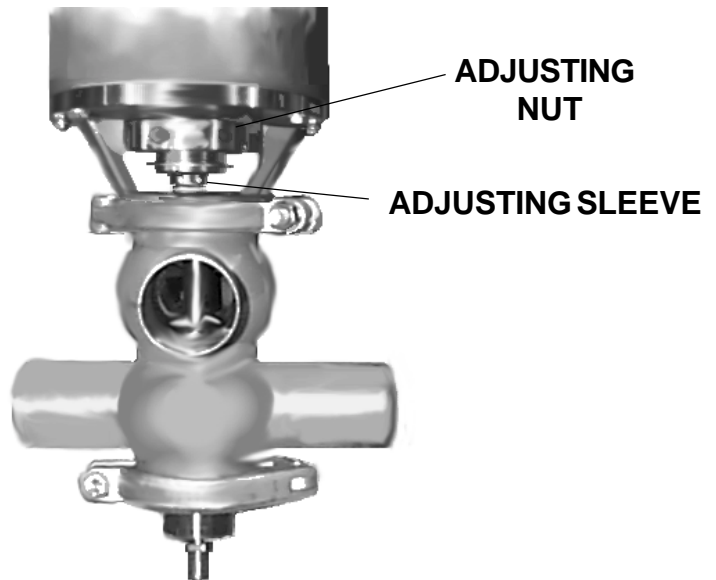
NOTE: Adjust movement of lower seat for cleaning. Use a 3/16" spanner wrench to rotate sleeve. (clockwise to increase, counterclockwise to decrease)

d. Upper seat clean.

Operate upper seat clean cycle. Observe outer stem movement by watching groove in the outer stem at the yoke.
0.040" - 0.100" movement is correct.

NOTE: To adjust movement of upper seat, loosen locking screw and rotate the split ring nut with spanner wrench. (clockwise to decrease, counterclockwise to increase.)

ALWAYS ADJUST THE LOWER SEAT FIRST.



Non-Seat Lifting Models

- a. Closed. (Stem down)
- b. Open. (Stem up)

There is no adjustment. The valve is OPEN or CLOSED. The indicator stem at the top of the valve is up when valve is open.

TURN ADJUSTMENT SLEEVE CLOCKWISE TO INCREASE, COUNTERCLOCKWISE TO DECREASE

MAINTENANCE

SEAT LIFTING MODELS

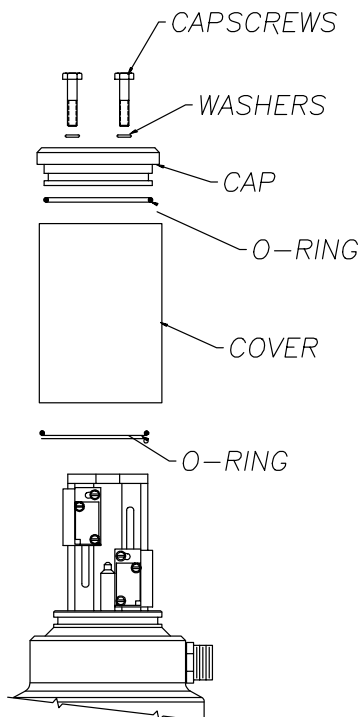
REPLACING EITHER UPPER SWITCH NO. 2 OR LOWER SWITCH NO. 1.

1. Refer to step 5 of dismantling procedure and Figure #8 for cover removal.
2. Remove wire connectors from the leads and round head screws of the non-functioning switch.
3. Install the new switch(es) by reversing the above steps and tighten the screws.

NOTE: SEE INSTALL VALVE STEM ADJUST PROCEDURES TO CONFIRM STROKE OF CLEANING CONDITIONS IS CORRECT BEFORE ADJUSTING SWITCHES.

TO SET THE SWITCHES

A. When the lower seat is stroked for cleaning, the rod extends upward and the chamfer's crest activates Switch #1. This causes the "Normally closed" contact to open. This will be indicated by the LED (light) on top of the switch.



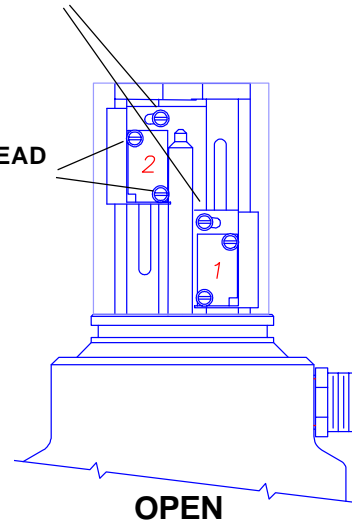
B. When the valve is stroked open the rod extends to the top position and Switch #2 closes. This will be indicated by the LED (light) on top of the switch.

ADJUST SWITCHES

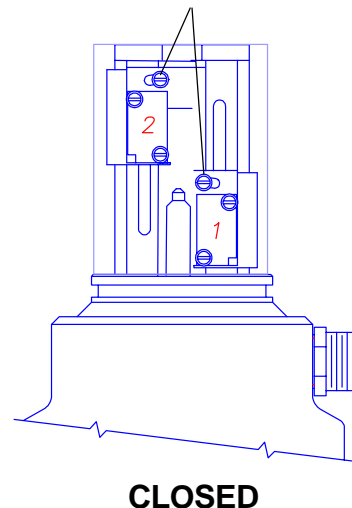
c. If side-to-side adjustment is necessary, loosen the screws that hold the switch blocks. Adjust the switch then tighten the screws.

ADJUSTMENT SCREWS

ROUND HEAD SCREWS



ADJUSTMENT SCREWS



MAINTENANCE

NON-SEAT LIFTING MODELS

REPLACING UPPER SWITCH NO. 2 OR LOWER SWITCH NO. 1.

1. Remove two nuts on top of the Control Module. Lift cover and shield
2. Remove wire connectors from the leads and round head screws of the non-functioning switch.
3. Install the new switch(es) by reversing the above steps and tighten the screws.

NOTE: SEE "INSTALL VALVE STEM ADJUST PROCEDURES" TO CONFIRM STROKE OF CLEANING CONDITIONS IS CORRECT BEFORE ADJUSTING SWITCHES.

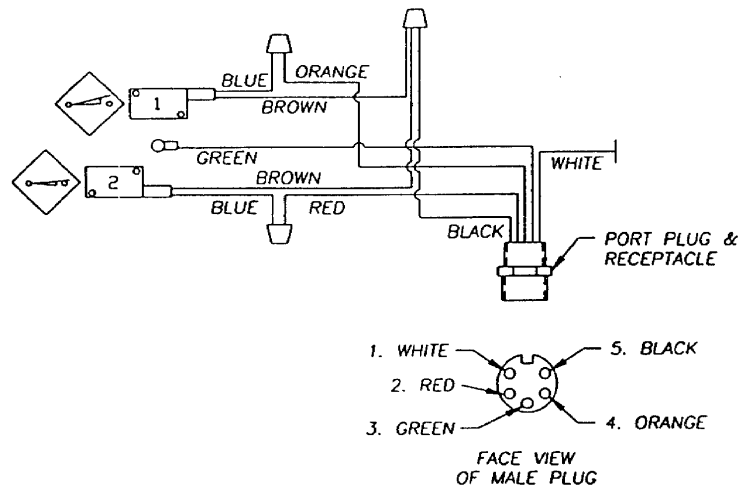
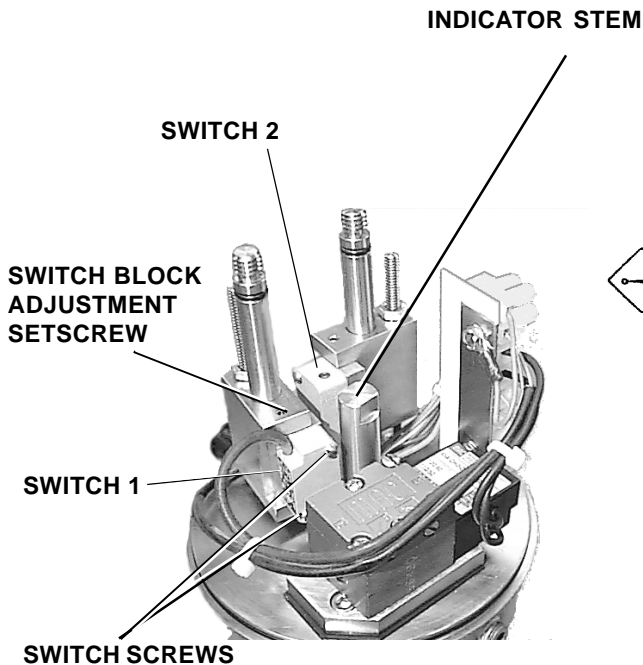
TO SET THE SWITCHES

- A. When the valve is closed, Switch #1, "Normally closed" contact is open. This will be indicated by the LED (light) on top of the switch.
- B. When the valve is stroked open, the indicator stem extends to the top position and Switch #2 closes. This will be indicated by the LED (light) on top of the switch.

ADJUST SWITCHES

- c. If side-to-side adjustment is necessary, loosen the setscrews that hold the switch blocks. Adjust the switch then tighten the screws.

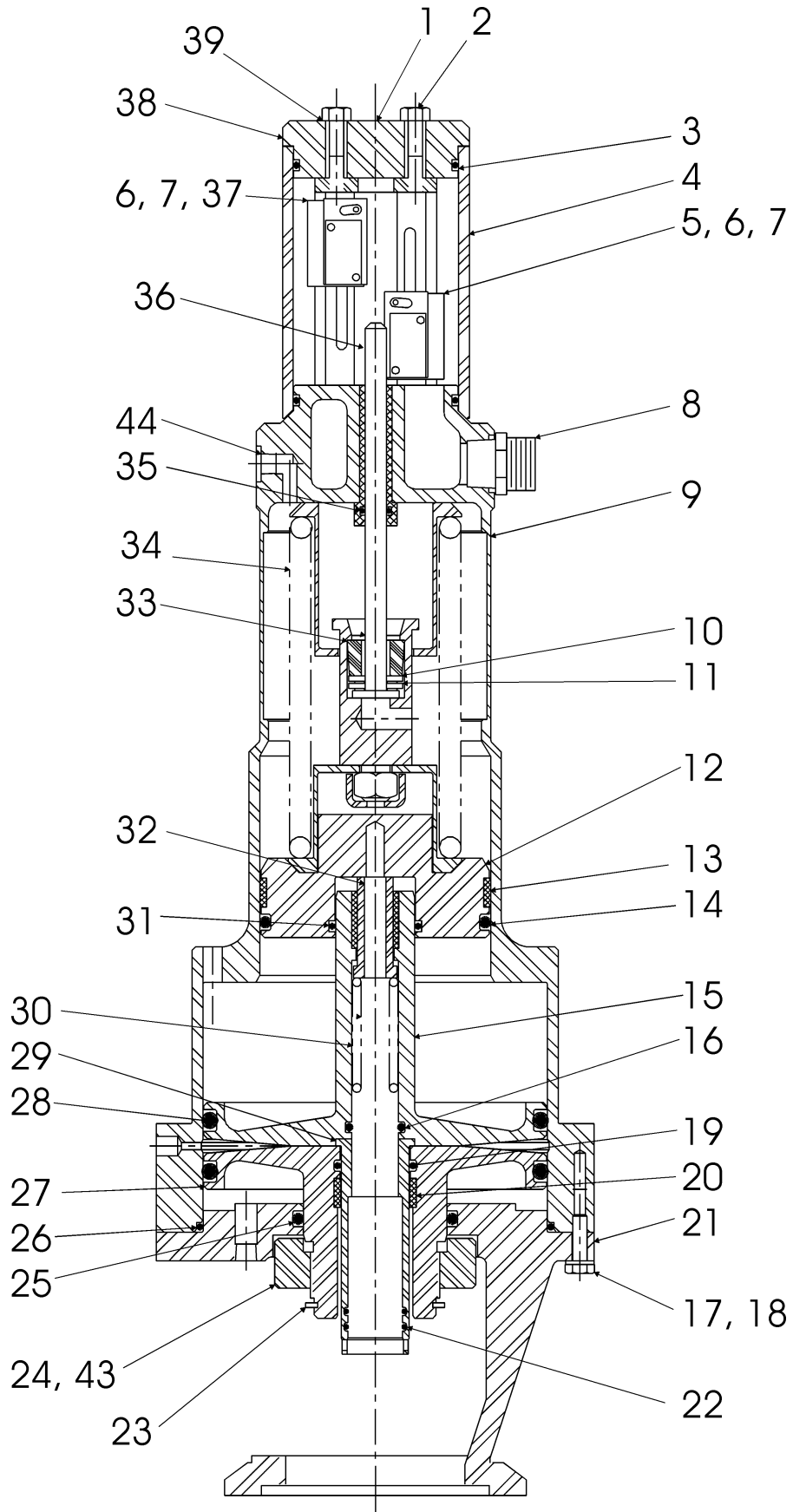
SEE PAGES 48-53 FOR COMPLETE CONTROL MODULE PARTS LISTING, PORT CONNECTIONS AND WIRING DETAILS



NON-SEAT LIFTING CONTROL MODULE

NOTES

SENTINEL IV ACTUATOR W/ STEM FLUSH DOUBLE SEAT W/ LIFT



SENTINEL IV ACTUATOR W/ STEM FLUSH DOUBLE SEAT W/ LIFT

ITEM	DESCRIPTION	*ACTUATOR SIZES			
		2"	3"	4"	6"
1	LABEL	5902473	5902473	5902473	5902473
2	HHCS(2)	30-312	30-312	30-312	30-479
3	O-RING (2)	N70231	N70231	N70231	N70231
4	COVER	7123991	7123991	7123991	7123991
5	RH-SWITCH	3029531A	3029531A	3029531A	3029531A
6	SCREW (2)	30-143	30-143	30-143	30-143
7	WASHER (12)	43-26	43-26	43-26	43-26
8	RECEPTACLE	104009	104009	104009	104009
9	CYLINDER	102844	102845	102022	102023
10	WASHER (2)	43-154	43-154	43-154	43-154
11	WASHER SPRING (2)	7123382	7123382	7123382	7123382
12	PISTON-UPPER	101943	101943	102024	102025
13	BEARING-SPLIT	101995	101995	102051	102052
14	O-RING	N70342	N70342	N70425	N70433
15	PISTON-HOLDDOWN	101953	101953	102026	102027
16	O-RING	N70211	N70211	N70215	N70217
17	HHCS (81)	30-206	30-206	30-206	30-30
18	WASHER (8)	43-144	43-144	43-144	43-154
19	O-RING	N70217	N70217	N70326	N70326
20	BEARING-SPLIT	101947	107947	101999	102000
21	YOKE	SEE YOKE CHART - SIZED FOR SPHERICAL BODY STYLES			
22	O-RING (2)	N90119	N90119	N90123	N90125
23	RETAINER RING	43-160	43-160	43-160	43-160
24	NUT-ADJUSTING	101948	101948	101948	101948
25	O-RING	N70333	N70333	N70333	N70333
26	O-RING	N70258	N70258	N70261	N70269
27	PISTON-LIFTING	101951	101951	102044	102045
28	O-RING (2)	N70433	N70433	N70439	N70446
29	SLEEVE-ADJUSTING	102848	102848	102047	102048
30	SPRING	101946	101946	5901106	102084
31	O-RING	N70220	N70220	N70325	N70326
32	SLEEVE-STOP	101944	101944	102049	102050
33	BUSHING	7123404	7123404	7123404	7123404
34	SPRING CAGE	7028600	7027822	7027635	7027944
35	O-RING	N70110	N70110	N70110	N70110
36	INDICATING STEM	102054	102054	102054	102055
37	LH SWITCH	3029530	3029530	3029530	3029530
38	COVER	7123992	7123992	7723992	7123998
39	WASHER (2)	108124	108124	108124	108124
40	SRHMS #6-32 X.375	30-184	30-184	30-184	30-184
41	LOCK WASHER #6	43-163	43-163	43-163	43-163
42	WIRE NUTS (3)	17-100	17-100	17-100	17-100
43	SHCS 5-16-24X 1.0	30-268	30-268	30-268	30-268
44	VENT PLUG	3023957	3023957	3023957	3023957

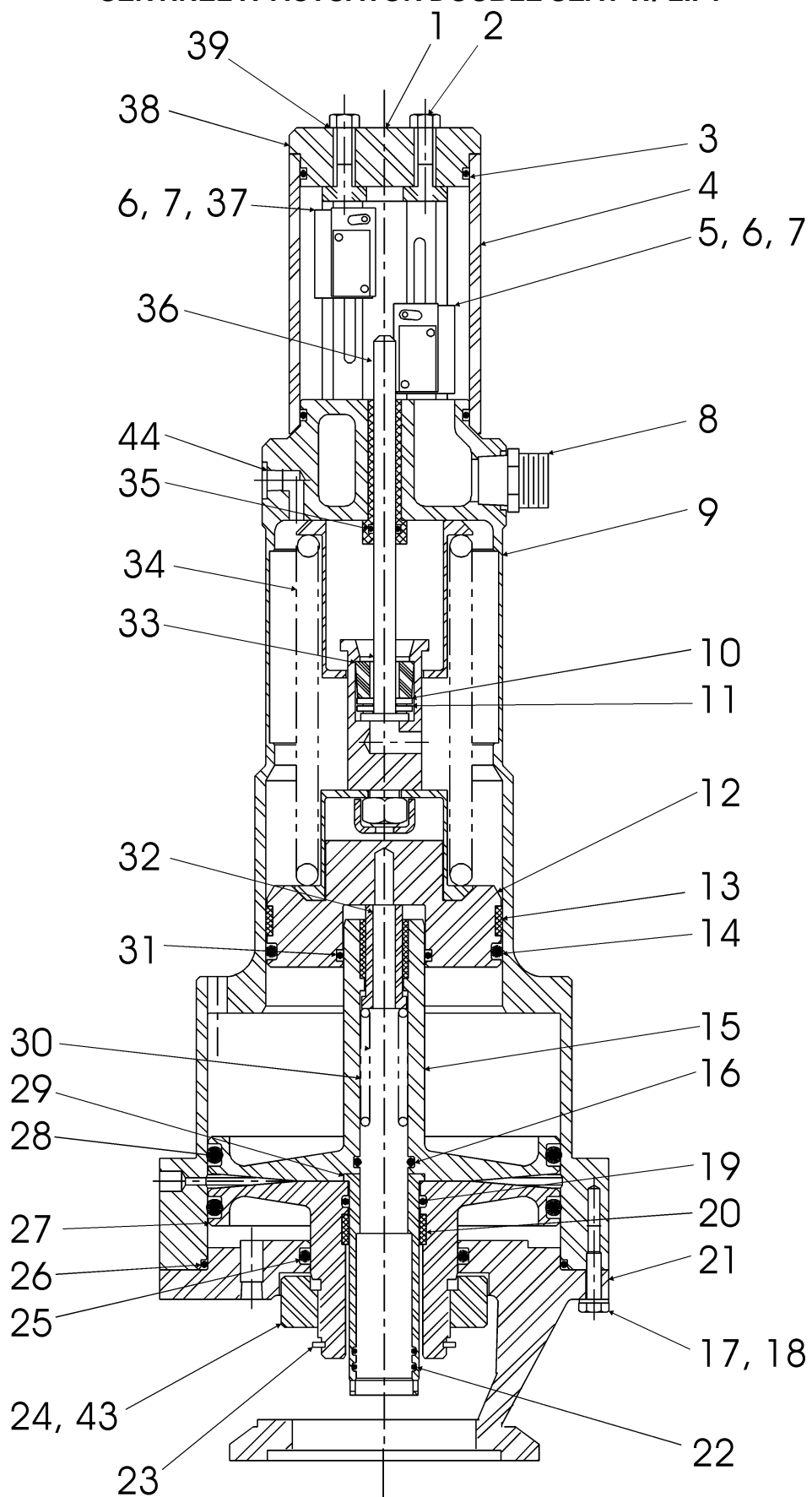
* CORRECT ACTUATOR SIZE MATCHES SMALLEST BODY PORT

YOKE CHART

BODY SIZE	ACTUATOR PART NO. SPHERICAL BODY	ITEM 21 YOKE
2"x 2"	103068	103072
2"x 3"		
2"x 4"		
2"x 6"		
3"x 2"	108820	103073
4"x 2"	110959	110947
6"x 2"	110960	110948

BODY SIZE	ACTUATOR PART NO. SPHERICAL BODY	ITEM 21 YOKE
3"x 3"	103069	103073
3"x 4"		
3"x 6"		
4"x 3"		
4"x 3"	108821	108897
6"x 3"	110961	110949
4"x 4"	103070	102877
4"x 6"	108886	108800
6"x 4"		
6"x 6"		
6"x 6"	103071	103074

SENTINEL IV ACTUATOR DOUBLE SEAT W/ LIFT



SENTINEL IV ACTUATOR DOUBLE SEAT W/ LIFT

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3	O-RING {2}	N70231	N70231	N70231	N70231
4	COVER	7123991	7123991	7123991	7123991
5	RH-SWITCH	3029531A	3029531A	3029531A	3029531A
6	SCREW (2)	30-143	30-143	30-143	30-143
7	WASHER (12)	43-26	43-26	43-26	43-26
8	RECEPTACLE	104009	104009	104009	104009
9	CYLINDER	102844	102845	102022	102023
10	WASHER (2)	43-154	43-154	43-154	43-154
11	WASHER SPRING (2)	7123382	7123382	7123382	7123382
12	PISTON-UPPER	101943	101943	102024	102025
13	BEARING~SPLIT	101995	101995	102051	102052
14	O-RING	N70342	N70342	N70425	N70433
15	PISTON-HOLDDOWN	101953	101953	102026	102027
16	O-RING	N70211	N70211	N70215	N70217
17	HHCS (81	30-206	30-206	30-206	30-30
18	WASHER (8)	43-144	43-144	43-144	43-154
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20	BEARING-SPLIT	101947	107947	101999	102000
21	YOKE	SEE YOKE CHART - SIZED FOR SPHERICAL BODY STYLES			
22	O-RING (2)	N90119	N90119	N90123	N90125
23	RETAINER RING	43-160	43-160	43-160	43-160
24	NUT-ADJUSTING	101948	101948	101948	101948
25	O-RING	N70333	N70333	N70333	N70333
26	O-RING	N70258	N70258	N70261	N70269
27	PISTON-LIFTING	101951	101951	102044	102045
28	O-RING (2)	N70433	N70433	N70439	N70446
29	SLEEVE-ADJUSTING	102848	102848	102047	102048
30	SPRING	101946	101946	N70325	102084
31	O-RING	N70220	N70220	5901106	N70326
32	SLEEVE-STOP	101944	101944	102049	102050
33	BUSHING	7123404	7123404	7123404	7123404
34	SPRING CAGE	7028600	7027822	7027635	7027944
35	O-RING	N70110	N70110	N70110	N70110
36	INDICATING STEM	102054	102054	102054	102055
37	LH SWITCH	3029530	3029530	3029530	3029530
38	COVER	7123992	7123992	7123992	7123998
39	WASHER {2}	108124	108124	108124	108124
40	SRHMS #6-32 X.375	30-184	30-184	30-184	30-184
41	LOCK WASHER #6	43-163	43-163	43-163	43-163
42	WIRE NUTS (3)	17-100	17-100	17-100	17-100
43	SHCS 5-16-24X 1.0	30-268	30-268	30-268	30-268
44	VENT PLUG	3023957	3023957	3023957	3023957

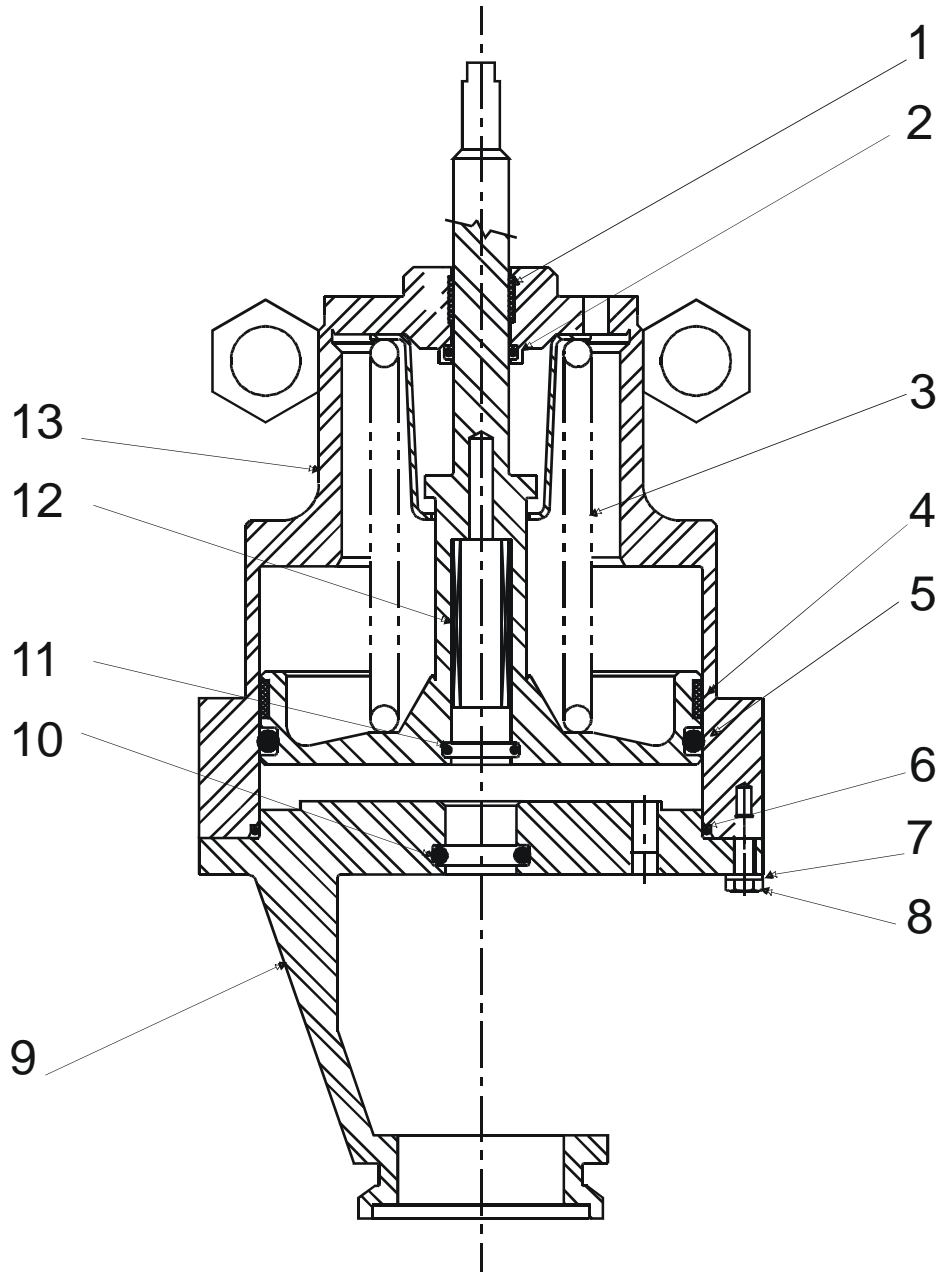
*CORRECT ACTUATOR MATCHES SMALLEST BODY PORT

YOKE CHART

BODY SIZE	ACTUATOR PART NO SPHERICAL BODY	ITEM 21 YOKE
2"x 2"	102849	102842
2"x 3"		
2"x 4"		
2"x 6"	108819	102843
3"x 2"		
4"x 2"		
6"x 2"	110955	110943
	110956	110944

BODY SIZE	ACTUATOR PART NO. SPHERICAL BODY	ITEM 21 YOKE
3"x 3"	102850	102843
3"x 4"		
3"x 6"		
4"x 3"	110957	110942
6"x 3"	110958	110946
4"x 4"	102851	102029
4"x 6"		
6"x 4"	108521	108253
6"x 6"	102852	102030

SENTINEL IV ACTUATOR W/O SEAT LIFTING



SENTINEL IV ACTUATOR W/O SEAT LIFTING

ITEM	DESCRIPTION	<i>USE SIZE THAT MATCHES LOWEST BODY SIZE (UPPER OR LOWER)</i>		
		2"	3"	4"
1	BEARING	102757	102757	102757
2	O-RING	N70210	N70210	N70210
3	PISTON WELDMENT	106128	106129	107054
4	BEARING	102052	102052	107055
5	O-RING	N70433	N70433	N70439
6	O-RING	N70258	N70258	N70261
7	WASHER (8)	43-144	43-144	43-144
8	HHCS	30-206	30-206	30-206
9	YOKE SEE YOKE CHART - SIZED FOR SPHERICAL BODY STYLES			
10	O-RING	N70317	N70317	N70317
11	O-RING	N70211	N70211	N70215
12	SPRING	101946	101946	5901106
13	CYLINDER	106146	106147	107053

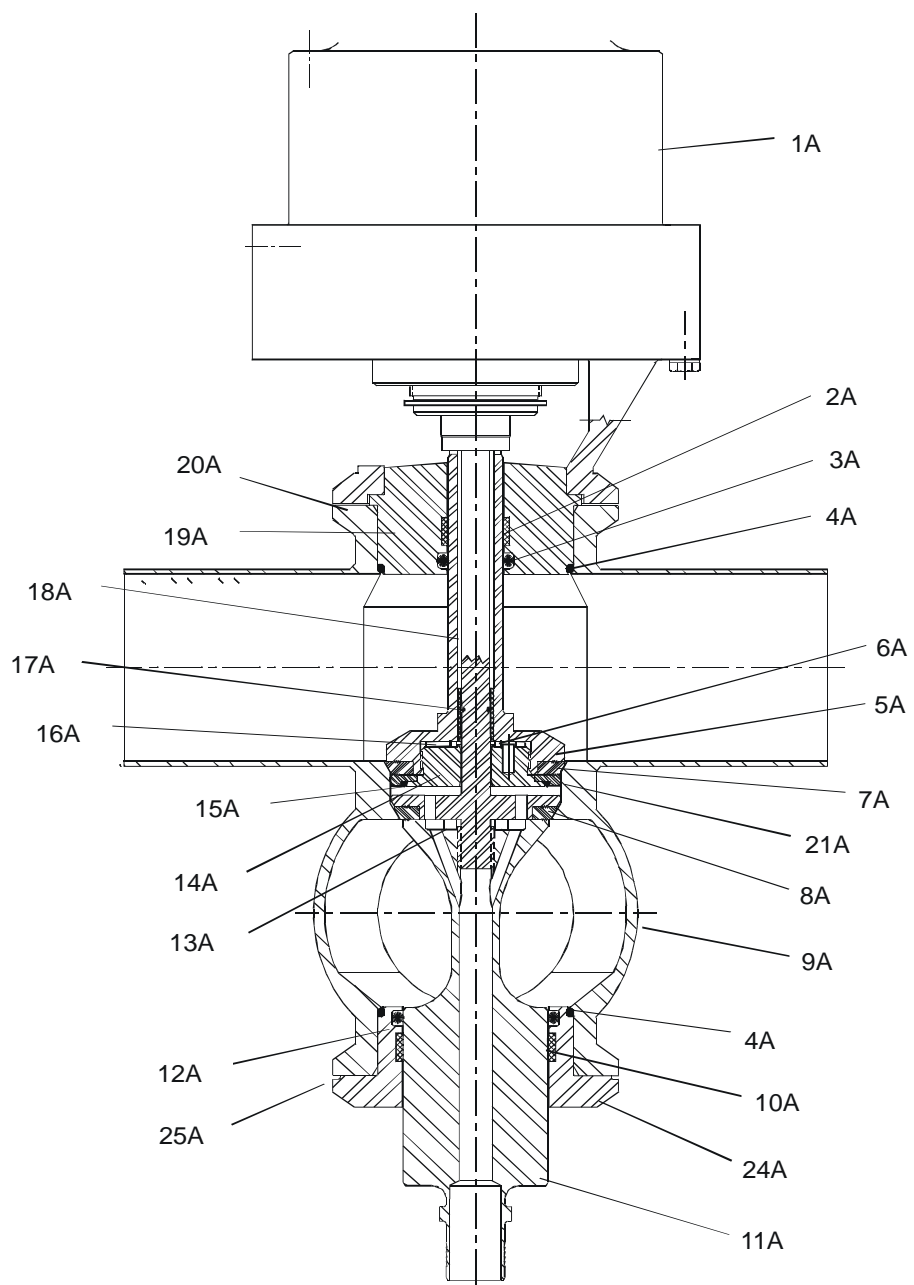
YOKE CHART

BODY SIZE	ACTUATOR PART NO. SPHERICAL BODY	ITEM 9 YOKE
2"x 2"	107410	106157
2"x 3"		
2"x 4"		
2"x 6"		
3"x 2"	108822	106158
4"x 2"	110950	110938
6"x 2"	110951	110939

BODY SIZE	ACTUATOR PART NO. SPHERICAL BODY	ITEM 9 YOKE
3"x 3"	107411	106158
3"x 4"		
3"x 6"		
4"x 3"	109185	109176
6"x 3"	110952	110940
4"x 4"	107412	107125
4"x 6"	110953	110941
6"x 4"		

SEE PAGES 48-51 FOR CONTROL MODULES

Valve Assembly Double Seat w/Lift Teflon Seat



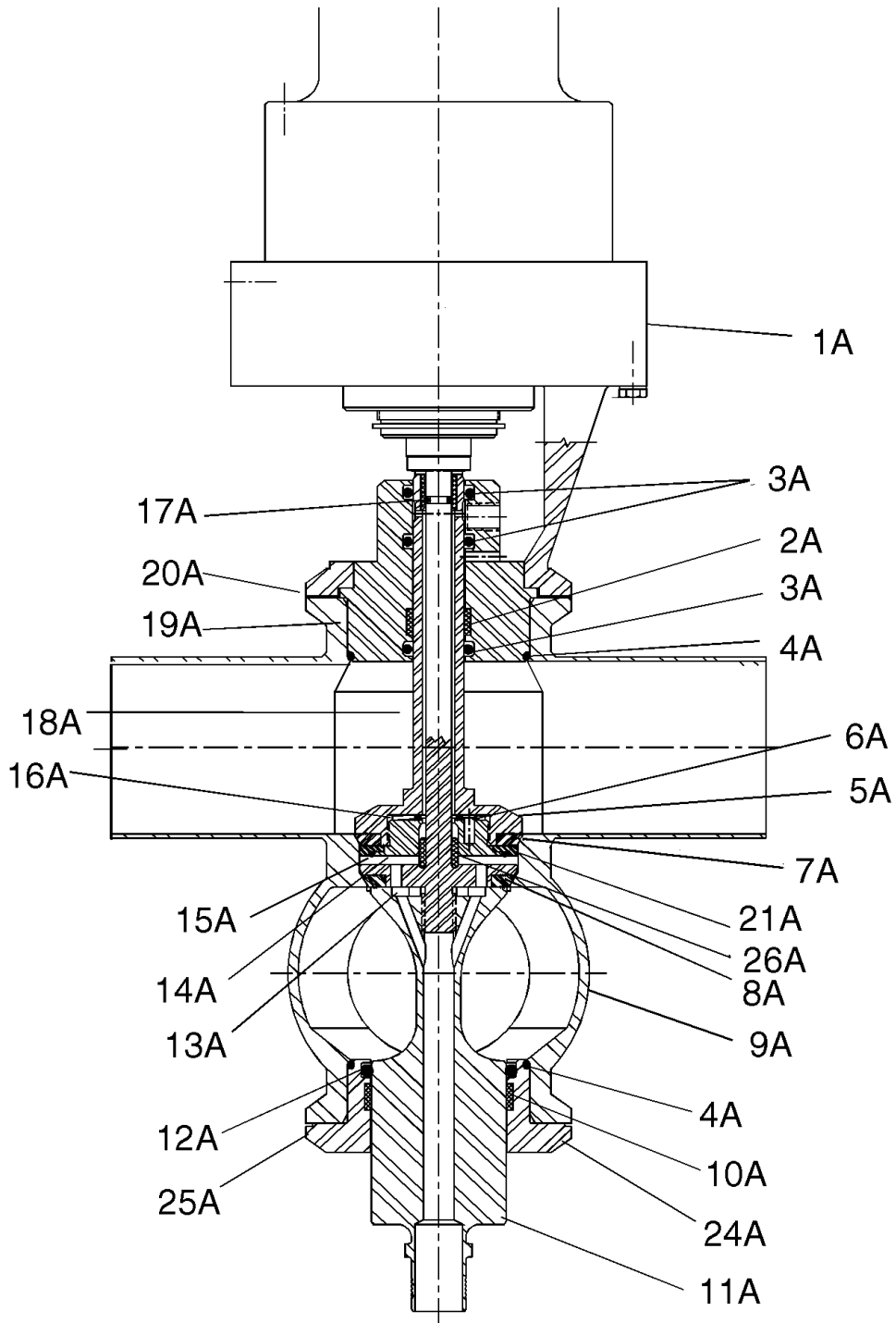
Valve Assembly Double Seat w/Lift Teflon Seat

ITEM	DESCRIPTION	2"	3"	4"	6"
1A	ACTUATOR ASSEMBLY	102849	102850	102851	102852
2A	BEARING, SPLIT	101996	101996	101947	101998
3A	O-RING	E70317	E70317	E70321	E70323
4A	O-RING(2)	E70228	E70234	E70245	E70433
5A	STEM OUTER	SEE CHART			
6A	GASKET STEM	5541771	7120688	7120689	7120890
7A	SEAT-UPPER	102005	102007	102009	102011
8A	SEAT-LOWER	101955	102006	102008	102010
9A	BODY ASSEMBLY	SEE CHART ON PAGE 11 FOR BODY TYPE DESIGNATIONS			
10A	BEARING, SPLIT	102001	102002	102003	102004
11A	STEM-LOWER	SEE CHART			
12A	QUAD RING	109801	109800	109441	109442
13A	WASHER	43-28	43-33	43-224	7025678
14A	RETAINER SEAT RING	7122679	7028917	7028839	103401
15A	TRI-RING	7123378	7123379	7123380	7123381
16A	WASHER	43-16	7026184	7025678	7025678
17A	O-RING	E70012	E70012	E70113	E70116
18A	STEM-INNER	SEE CHART			
19A	BONNET	102042	101940	102043	102056
20A	CLAMP 131U	0324223	0326223	0526223	3020507
21A	TRI-RING RETAINER	102435	101954	102436	102437
24A	RETAINER, LOWER SEAL	SEE CHART			
25A	CLAMP - 131U(LOWER ONLY)	0324223	0326223	0526223	302050

CHART

BODY SIZE	TYPE	ACTUATOR SIZE	ITEM 5A OUTER STEM	ITEM 11A LOWER STEM	ITEM 18A INNER STEM	ITEM 19A BONNET	ITEM 24A LOWER RETAINER	ITEM 1A ACTUATOR
2X2	TUBE PIPE	2"	102034 102031	102035 102700	102059 102039	102042	103158	102849
3X3	TUBE PIPE	3"	102057 101952	102020 101957	102058 101945	101940	102883	102850
4X4	TUBE PIPE	4"	102768 102032	102770 102038	102772 102040	102843	102884	102851
6X6	TUBE PIPE	6"	NA 102033	NA 102036	NA 102041	102056	103159	102852
2X3	TUBE PIPE	2"	102034 702031	103491 702993	102059 702039	102042	103158	102849
2X4	TUBE PIPE	2"	102034 702037	103492 702706	7020159 102039	102042	103158	102849
2X6	TUBE PIPE	2"	NA 102031	NA 103013	NA 102039	102042	103158	102849
3X2	TUBE PIPE	2"	103493 103024	102035 102700	103494 103025	101940	102883	102849
3X4	TUBE PIPE	3"	102057 102952	103095 102708	102058 701945	101940	102883	102850
3X6	TUBE PIPE	3"	NA 101952	NA 102710	NA 101945	101940	102883	102850
4X2	TUBE PIPE	2"	103496 102712	102035 102700	103497 102713	102043	102884	102849
4X3	TUBE PIPE	3"	103498 102715	102020 101957	103499 102716	102043	102884	102850
4X6	TUBE PIPE	4"	NA 102032	NA 102718	NA 102040	102043	102884	102851
6X2	TUBE PIPE	2"	NA 102720	NA 102700	NA 102721	102056	103159	102849
6X3	TUBE PIPE	3"	NA 102723	NA 101957	NA 102724	102056	103159	102850
6X4	TUBE PIPE	4"	NA 102483	NA 102038	NA 102485	102056	103159	102851

Valve Assembly W/ Stem Flush Double Seat w/Lift Teflon Seat



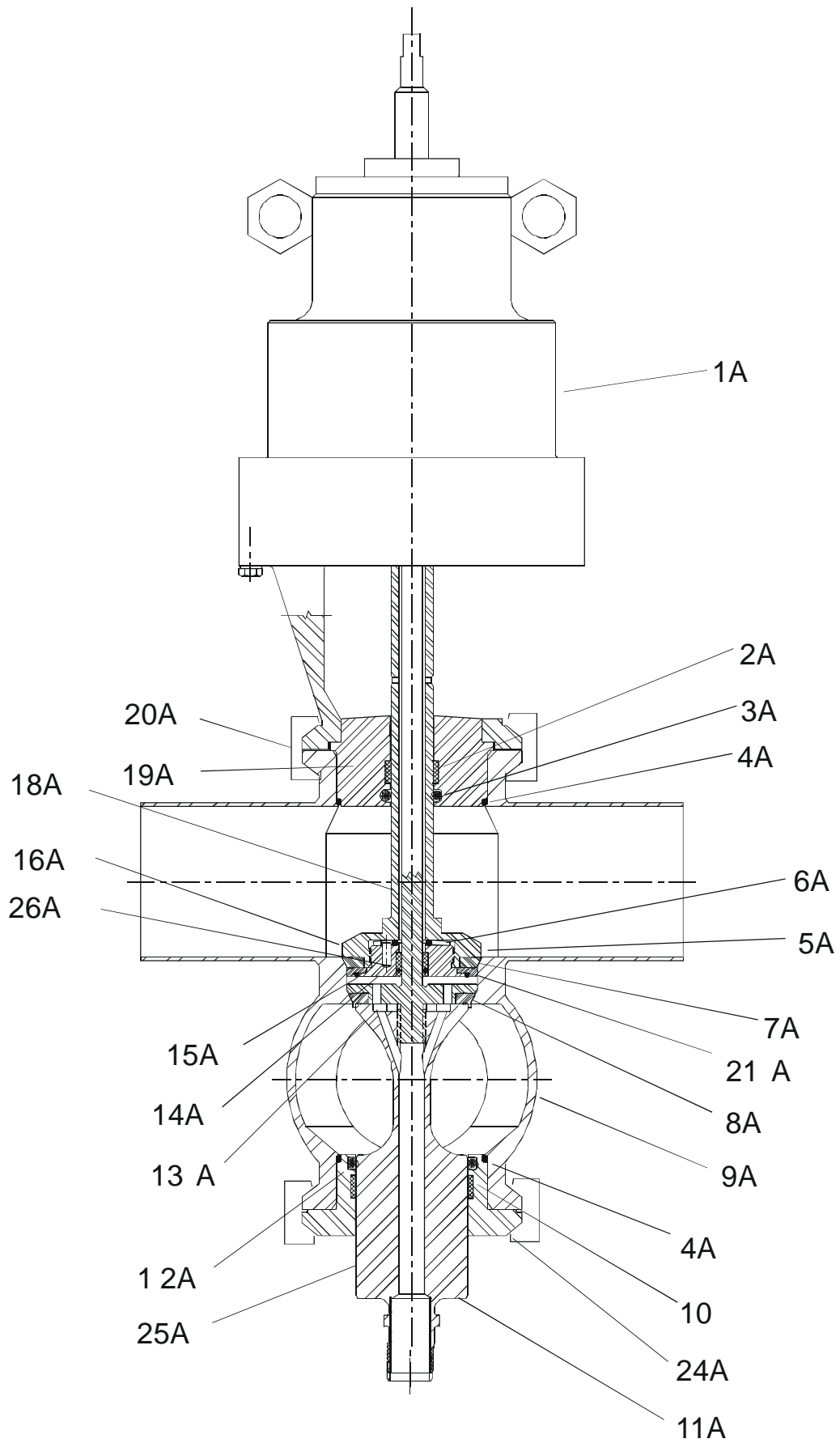
Valve Assembly W/ Stem Flush Double Seat w/Lift Teflon Seat

ITEM	DESCRIPTION	2"	3"	4"	6"
1A	ACTUATOR ASSEMBLY	103068	103069	103070	103071
2A	BEARING—SPLIT	101996	101996	101947	101998
3A	O-RING (3)	E70317	E70317	E70321	E70323
4A	O-RING (2)	E70228	E70234	E70245	E70433
5A	STEM—OUTER	SEE CHART	SEE CHART	SEE CHART	SEE CHART
6A	GASKET-STEM	E70213	7120658	7120639	7120690
7A	SEAT—UPPER	102005	102007	102009	102011
8A	SEAT-LOWER	101955	102006	102008	102010
9A	BODY ASSEMBLY	SEE CHART FOR BODY TYPE DESIGNATIONS			
10A	BEARING—SPLIT	102001	102002	102003	102004
11A	STEM—LOWER	SEE CHART	SEE CHART	SEE CHART	SEE CHART
12A	QUAD RING	109801	109800	109441	109442
13A	WASHER	43 - 28	43 - 33	43 - 224	7025678
14A	RETAINER—SEAT RING	103079	103080	103081	103082
15A	TRI-RING	7123378	7123379	7123380	7123381
16A	WASHER	43-16	7026184	7025678	7025678
17A	O-RING	E70012	E70012	E70111	E70113
18A	STEM-INNER	SEE CHART	SEE CHART	SEE CHART	SEE CHART
19A	BONNET	103083	103084	102878	103085
20A	CLAMP 13IU	0324223	0326223	0526223	3020507
21A	TRI-RING RETAINER	102435	101954	102436	102437
22	PLUG (5) 6" ONLY	-	-	-	3-292
24A	LOWER SEAL RETAINER	SEE CHART	SEE CHART	SEE CHART	SEE CHART
25A	CLAMP 13IU	SEE CHART	SEE CHART	SEE CHART	SEE CHART
26A	SPRAY BUSHING	103086	103086	103055	103087

CHART

BODY SIZE	TYPE	ACTUATOR SIZE	ITEM 5A OUTER STEM	ITEM 11A LOWER STEM	ITEM 18A INNER STEM	ITEM 19A BONNET	ITEM 24A SEAL RETAINER	ITEM 1A ACTUATOR	CLAMP 25A (LOWER SIZE ONLY)
2X2	TUBE PIPE	2"	102034 102031	102035 102700	102039 102039	103083 103083	103158 103158	103068 103068	0324223 0324223
3X3	TUBE PIPE	3"	102057 101952	102020 101957	102058 101945	103084 103084	102883 102883	103069 103069	0326223 0326223
4X4	TUBE PIPE	4"	102768 102032	102770 102038	102772 102040	102878 102878	102884 102884	103070 103070	0526223 0526223
6X6	TUBE PIPE	6"	NA 102033	NA 102036	NA 102041	103085	103159	103071	3020507
2X3	TUBE PIPE	2"	102034 702031	103491 702993	102059 102039	103083 103083	103158 103158	103068 103068	0326223 0326223
2X4	TUBE PIPE	2"	102034 702037	103492 702706	102059 102039	103083 103083	103158 103158	103068 103068	0526223 0526223
2X6	TUBE PIPE	2"	NA 102031	NA 103013	NA 102039	103083	103158	103068	3020507
3X2	TUBE PIPE	2"	103493 103024	102035 102700	103494 103025	103084 103084	102883 102883	103068 103068	0324223 0324223
3X4	TUBE PIPE	3"	102057 102952	103095 102708	102058 701945	103084 103084	102883 102883	103069 103069	0526223 0526223
3X6	TUBE PIPE	3"	NA 101952	NA 102710	NA 101945	103084	102883	103069	3020507
4X2	TUBE PIPE	2"	103496 102712	102035 102700	103497 102713	102878 102878	102884 102884	103068 103068	0324223 0324223
4X3	TUBE PIPE	3"	103498 102715	102020 101957	103499 102716	102878 102878	102884 102884	103069 103069	0326223 0326223
4X6	TUBE PIPE	4"	NA 102032	NA 102718	NA 102040	102878	102884	103070	3020507
6X2	TUBE PIPE	2"	NA 102720	NA 102700	NA 102721	103085	103159	103068	0324233
6X3	TUBE PIPE	3"	NA 102723	NA 101957	NA 102724	103085	103159	103069	0326223
6X4	TUBE PIPE	4"	NA 102483	NA 102038	NA 102485	103085	103159	103070	0526223

Valve Assembly W/O Seat Lift

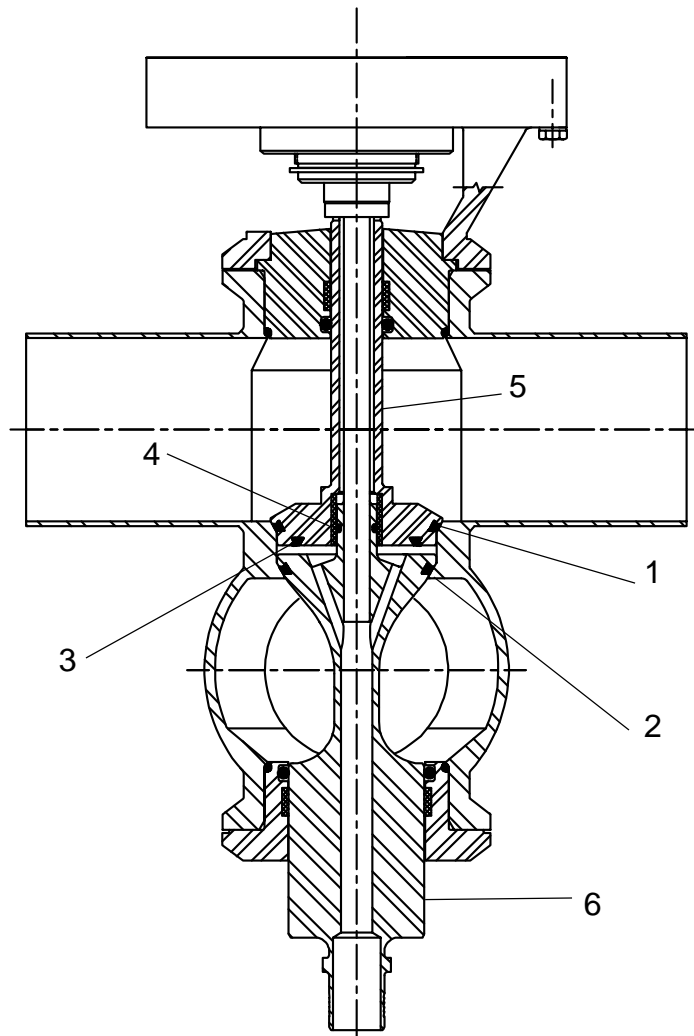


Valve Assembly W/O Seat Lift

ITEM	DESCRIPTION	2"	3"	4"	6"
1A	ACTUATOR ASSEMBLY	SEE CHART			
2A	BEARING, SPLIT	101996	101996	101947	101998
3A	O-RING (3)	E70317	E70317	E70321	E70323
4A	O-RING	E70228	E70234	E70245	E70433
5A	STEM, OUTER	SEE CHART			
6A	GASKET, STEM	5541771	7120688	7120639	7120690
7A	SEAT, UPPER	102005	102007	102009	102011
8A	SEAT, LOWER	101955	102006	102008	102010
9A	BODY ASSEMBLY	SEE CHART FOR BODY TYPE DESIGNATIONS			
10A	BEARING, SPLIT	102001	102002	102003	102004
11A	STEM, LOWER	SEE CHART			
12A	QUAD RING	109801	109800	109441	109442
13A	WASHER	43 - 28	43 - 33	43 - 224	7025678
14A	RETAINER, SEAT RING	103079	103080	103081	103082
15A	TRI-RING	7123378	7123379	7123380	7123381
16A	WASHER	43-16	7026184	7025678	7025678
17A	O-RING	E70012	E70012	E70111	E70113
18A	STEM, INNER	SEE CHART			
19A	BONNET	SEE CHART			
20A	CLAMP -13IU	0324223	0326223	0526223	3020507
21A	TRI-RING RETAINER	102435	101954	102436	102437
22A	PLUG (AR)	103086	103086	103055	103087
24A	LOWER SEAL RETAINER	SEE CHART			
25A	CLAMP - 13IU (Lower Only)	0324223	0326223	0526223	3020507
26A	SPRAY BUSHING	103086	103086	103055	103087

CHART	BODY SIZE	TYPE	ACTUATOR SIZE	ITEM 5A OUTER STEM	ITEM 11A LOWER STEM	ITEM 18A INNER STEM	ITEM 19A BONNET	ITEM 24A LOWER RETAINER	ITEM 1A ACTUATOR
	2X2	TUBE PIPE	2"	102034 102031	102035 102700	102059 102039	107416	103158	107410
3X3	TUBE PIPE	3"	102057 101952	102020 101957	102058 101945	101940	102883	107411	
4X4	TUBE PIPE	4"	102768 102032	102770 102038	102772 102040	102043	102884	107412	
6X6	TUBE PIPE	6"	NA 102033	NA 102036	NA 102041	102056	103159	-	
2X3	TUBE PIPE	2"	102034 702031	103491 702993	102059 702039	107416	103158	107410	
2X4	TUBE PIPE	2"	102034 702037	103492 702706	702059 102039	107416	103158	107410	
2X6	TUBE PIPE	2"	NA 102031	NA 103013	NA 102039	107416	103158	107410	
3X2	TUBE PIPE	2"	103493 103024	102035 102700	103494 103025	101940	102883	107411	
3X4	TUBE PIPE	3"	102057 102952	103095 102708	102058 701945	101940	102883	107411	
3X6	TUBE PIPE	3"	NA 101952	NA 102710	NA 101945	101940	102883	107411	
4X2	TUBE PIPE	2"	103496 102712	102035 102700	103497 102713	102043	102884	107410	
4X3	TUBE PIPE	3"	103498 102715	102020 101957	103499 102716	102043	102884	107411	
4X6	TUBE PIPE	4"	NA 102032	NA 102718	NA 102040	102043	102884	107412	
6X2	TUBE PIPE	2"	NA 102720	NA 102700	NA 102721	102056	103159	107410	
6X3	TUBE PIPE	3"	NA 102723	NA 101957	NA 102724	102056	103159	107411	
6X4	TUBE PIPE	4"	NA 102483	NA 102038	NA 102485	102056	103159	107412	

Valve Assembly Double Seat W/Lift Tri-ring Seat



Valve Assembly Double Seat W/Lift Tri-ring

ITEM	Seat DESCRIPTION	2"	3"	4"	6"
1	SEAT GASKET-UPPER	102487	102488	102491	102738
2	SEAT GASKET-LOWER	102736	102489	102492	102739
3	SEAT GASKET- VENT	102734	102487	102490	102737
4	O-RING	5541785	5541785	5541777	E70218AB

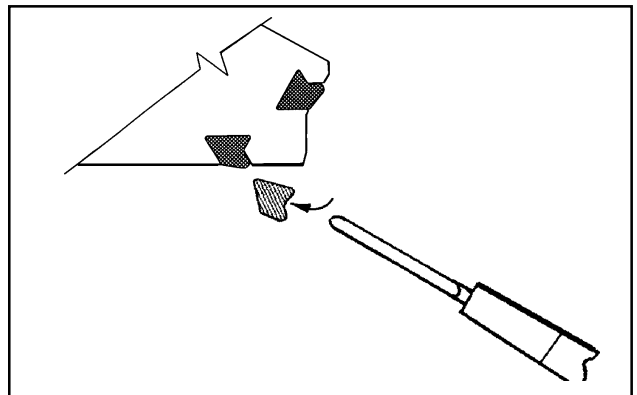
BODY SIZE	TYPE	ACTUATOR SIZE	ITEM 5 OUTER STEM	ITEM 6 LOWER STEM
2X2	TUBE	2"	103117	103129
	PIPE		103118	103130
3X3	TUBE	3"	103119	103131
	PIPE		102461	102465
4X4	TUBE	4"	103120	103132
	PIPE		102493	102496
6X6	TUBE	6"	NA	NA
	PIPE		103121	103133
2X3	TUBE	2"	103117	103830
	PIPE		103118	103134
2X4	TUBE	2"	103117	103831
	PIPE		103118	103135
2X6	TUBE	2"	NA	NA
	PIPE		103118	103136
3X2	TUBE	2"	103832	103833
	PIPE		103122	103137
3X4	TUBE	3"	103119	103834
	PIPE		102461	103138

BODY SIZE	TYPE	ACTUATOR SIZE	ITEM 5 OUTER STEM	ITEM 6 LOWER STEM
3X6	TUBE	3"	NA	NA
	PIPE		102461	103139
4X2	TUBE	2"	103835	103836
	PIPE		103123	103140
4X3	TUBE	3"	103837	103838
	PIPE		103124	103141
4X6	TUBE	4"	NA	NA
	PIPE		102493	103142
6X2	TUBE	2"	NA	NA
	PIPE		103125	103143
6X3	TUBE	3"	NA	NA
	PIPE		103126	103144
6X4	TUBE	4"	NA	NA
	PIPE		103127	103145

TRI-RING REPLACEMENT

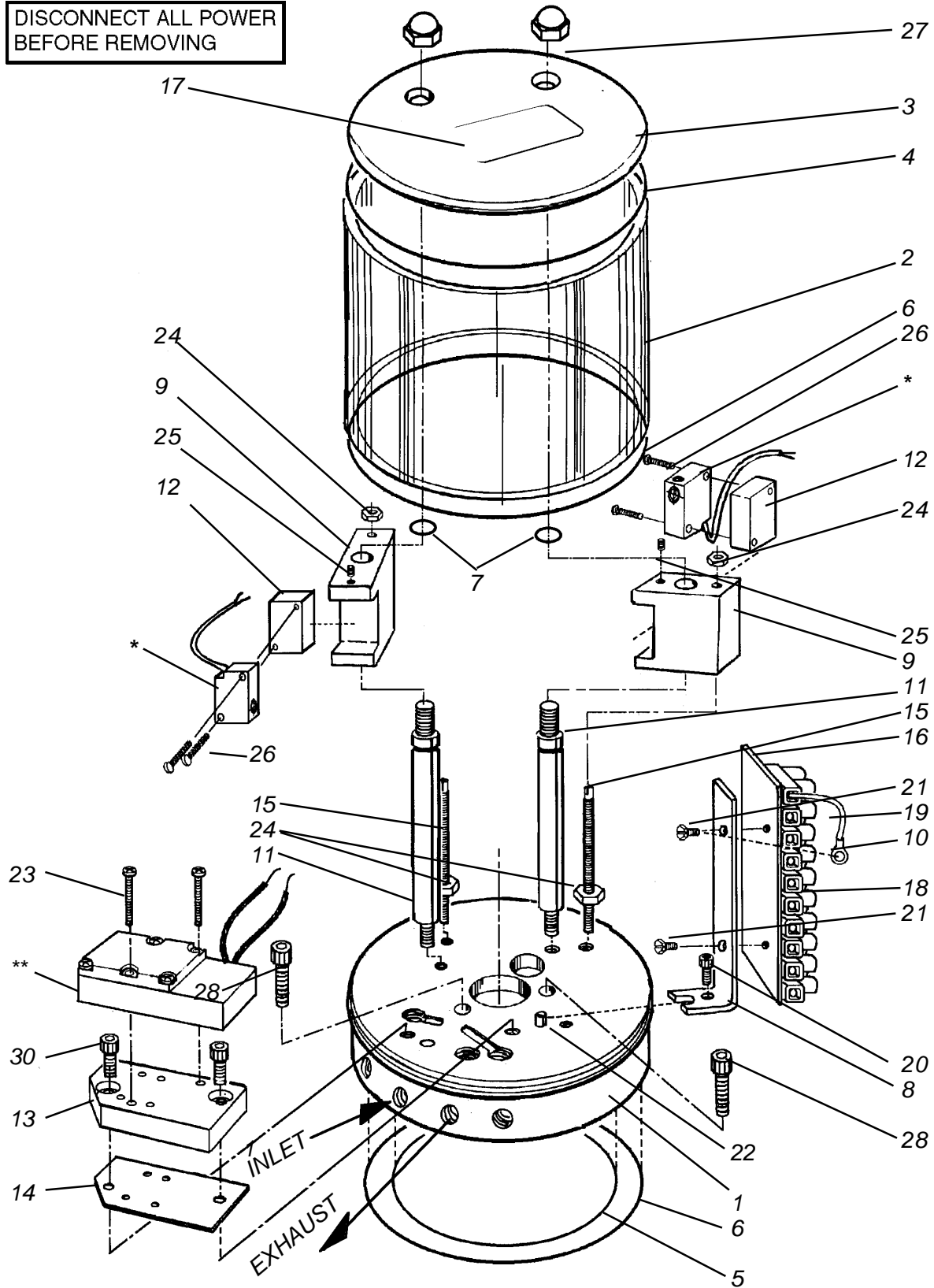
When properly installed the seal lip will protrude slightly from the seat edge.

1. See Procedures described in the MAINTENANCE section on page 24I to remove stems for service.
2. Remove the Tri-Ring seal by using an Awl-shaped tool to insert into the seal and pry it out.
3. Replace the Tri-Ring seal using #102797 Seat Assembly Tool assembled into a #4 file handle.
4. Place the Tri-Ring (Lubricated with soapy water) over the groove then push it in at places across from each other until the Tri-Ring fills the groove completely.



Control Module With Solenoid Without Seat Lift

DISCONNECT ALL POWER
BEFORE REMOVING



* SEE WIRING DETAILS PAGE 52 FOR PART NUMBERS OF MICRO SWITCHES (2) OR PROXIMITY SWITCHES (2)

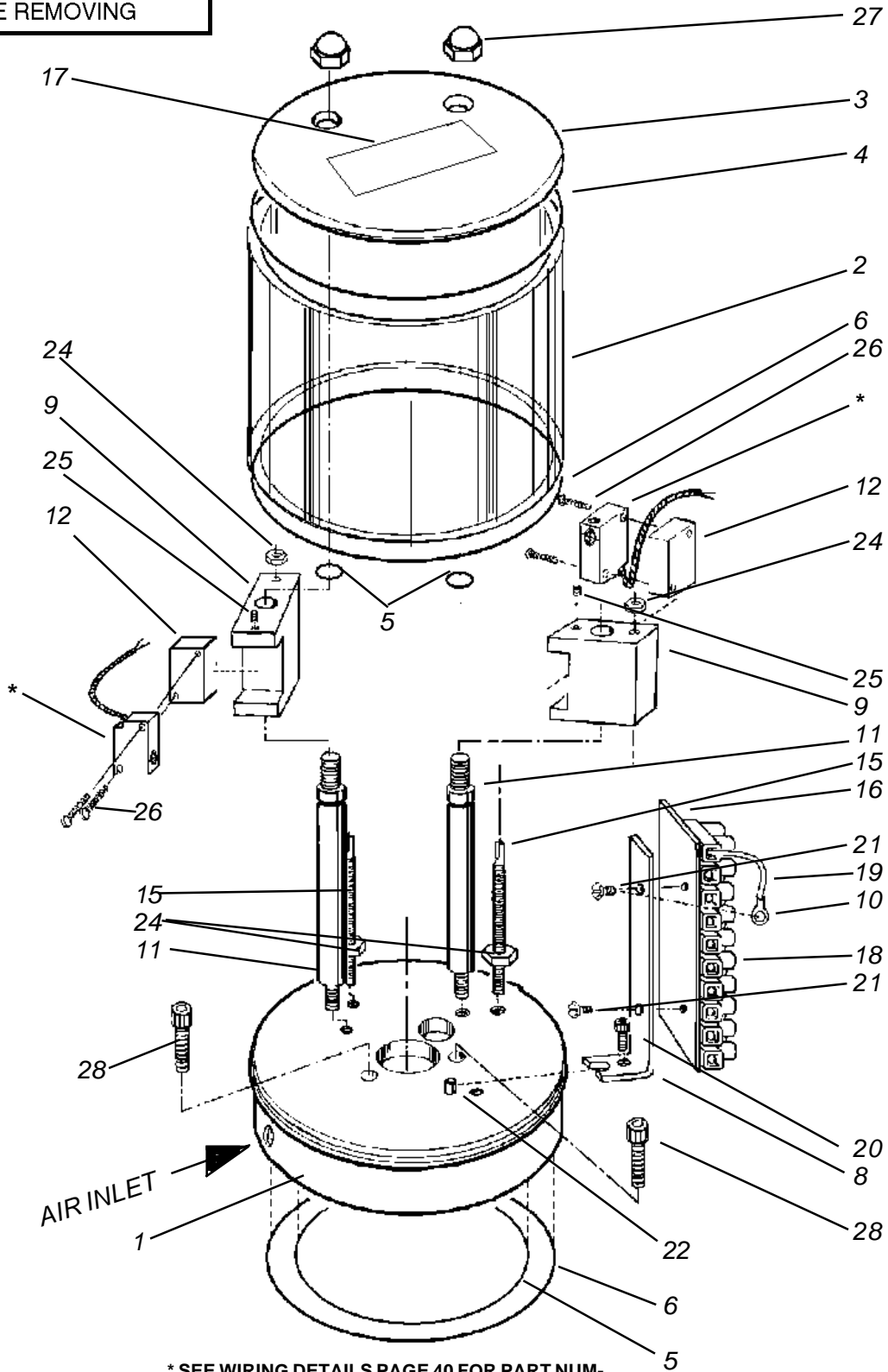
** SEE WIRING DETAILS PAGE 52 FOR PART NUMBERS OF SOLENOID VALVE

Control Module With Solenoid Without Seat Lift

ITEM	PART NO.	DESCRIPTION	QTY
1	102124	BASE, ACTUATOR SS	1
2	106001	COVER, SWITCH ACRYLIC	1
3	102126	CAP SS	1
4	H70155	O-RING NITRILE	2
5	N70035	O-RING NITRILE	1
6	N70044	O-RING NITRILE	1
7	N70010	O-RING NITRILE	2
8	102117	BRACKET, TERMINAL BLOCK SS	1
9	102118	CARRIAGE-SWITCH SS	2
10	5510146	TERMINAL 122-16 WIRE ,5 - 6 STUD	1
11	106000	POST, SWITCH SS	2
12	102119	BLOCK, SWITCH SS	2
13	102127	SOLENOID MOUNTING SS	11
14	104138	GASKET, SOLENOID MOUNTING NEOPRENE	1
15	106002	LEAD SCREW SS	2
16	104137	MARKER TERMINAL PLASTIC	1
17	5902473	LA8EL	1
18	17 - 80	BLOCK, TERMINAL	1
19	17 - 75	WIRE, 16 AWC GREEN	3
20	30-519	SOC HD CAP SCREW 10-32X .25 SS	1
21	30 - 541	HWH SLOTTED SCREW #6 X .375 SS1	2
22	30 - 363	DOWEL PIN 3/16 DIA X .50 LG SS	1
23	30 - 202	SHC SCREW #6-32 X 1.125 SS	2
24	36 - 74	HEX NUT 10 - 24 SS	4
25	30 - 540	SOC HD CUP PT SCREW 8 -32 X .25 SS	2
26	30-69	SRH MACH SCREW 4-40 X .625 SS	4
27	36-49	HEX NUT, ACORN 5/16 - 18 SS	2
28	30 - 530	SOC HD CAP SCREW 1/4 - 28 X 1.25 SS	2
29	78-73	PLUC,CS SOC HD HEX PIPE 1/8 - 27 SS	4
30	30 - 575	SHC SCREW 10-32 X.375	2

CONTROL MODULE WITHOUT SOLENOID

DISCONNECT ALL POWER
BEFORE REMOVING



* SEE WIRING DETAILS PAGE 40 FOR PART NUMBERS OF MICRO SWITCHES (2) OR PROXIMITY SWITCHES (2)

Figure 22

CONTROL MODULE WITHOUT SOLENOID

ITEM	PART NO.	DESCRIPTION	QTY
1	102869	BASE ACTUATOR SS	1
2	706001	COVER—SWITCH ACRILIC	1
3	102126	CAP SS	1
4	N70155	O-RING NITRILE	2
5	N70035	O-RING NITRILE	1
6	N70044	O-RING NITRILE	1
7	N70010	O-RING NITIRILE	2
8	102117	BRACKET, TERMINAL BLOCK SS	1
9	102118	CARRIAGE, SWITCH SS	2
10	5510146	TERMINAL #22 - 16 WIRE #5 - 6 STUD	1
11	106000	POST, SWITCH SS	2
12	102119	BLOCK, SWITCH SS	2
15	106002	LEAD SCREW SS	2
16	104137	MARKER, TERMINAL PLASTIC	1
17	5902473	LABEL	1
18	17-80	BLOCK, TERMINAL	1
19	77-75	WIRE, 16 AWG GREEN	3
20	30-519	SOC HD CAP SCREW 10-32 X .25 SS	1
21	30-541	HWH SLOTTED SCREW #6 X .375 SS	2
22	30-363	DOWEL PIN 3/16 DIA X .5 LG SS	1
24	36-74	HEX NUT ,10-24 SS	4
25	30-540	SOC HD CUP PT SCREW t8 - 32 X .25 SS	2
26	30-69	SRH MACH SCREW #4-40 X .625 SS	4
27	36-49	HEX NUT, ACORN 5/16 -18 SS	2
28	30-530	SOC HD CAP SCREW 1/4-20 X 1.25 SS	2

WIRING DETAIL

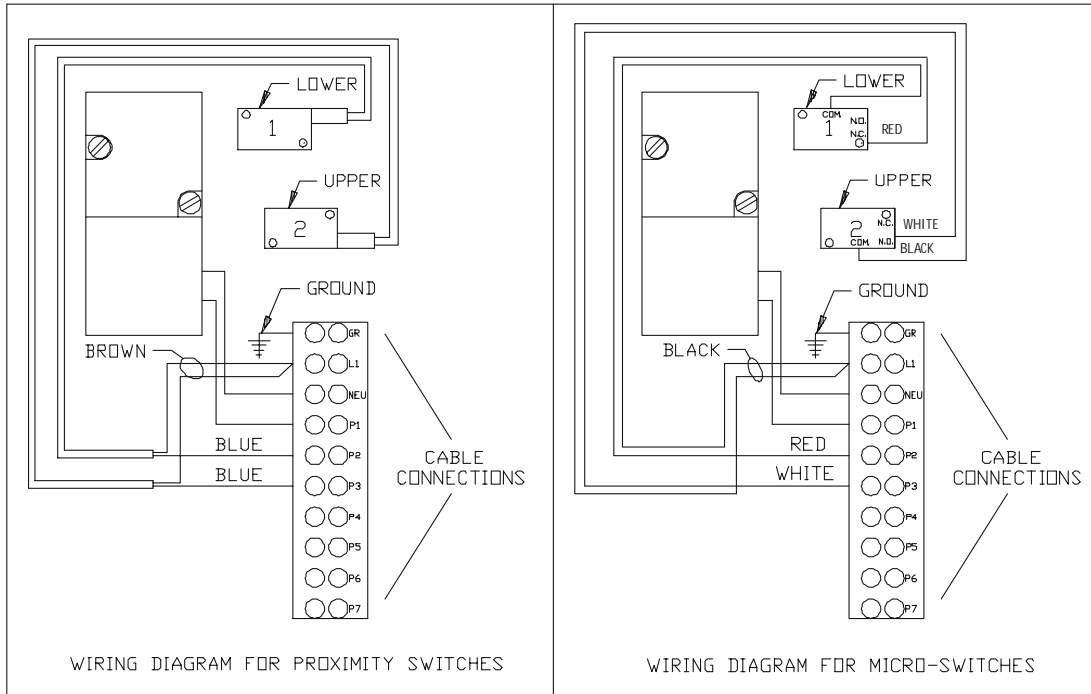


Figure 24

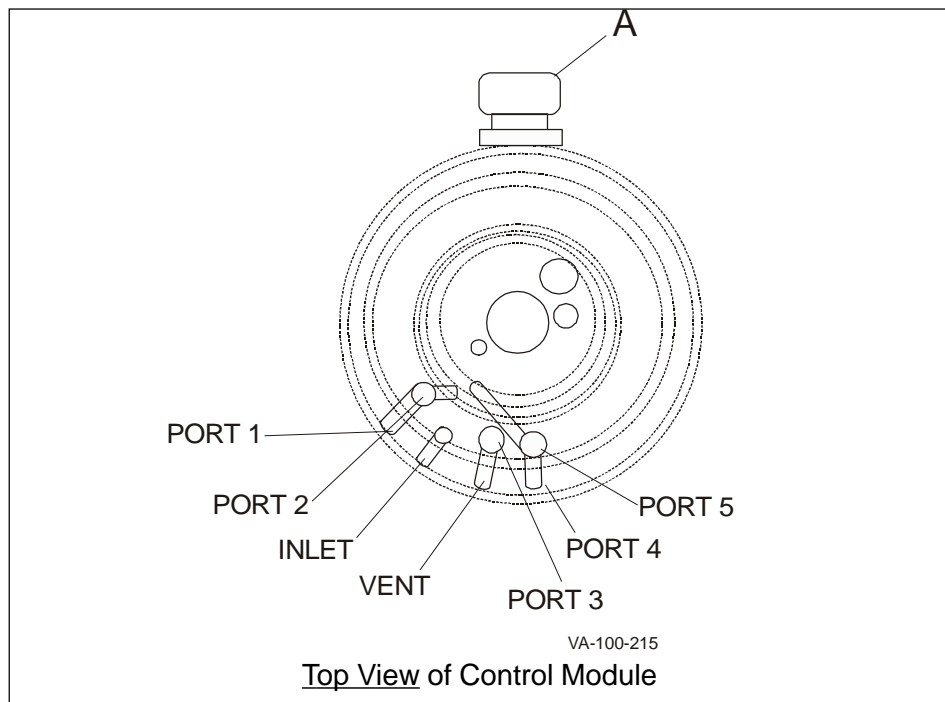
Figure 25

ITEM	DESCRIPTION	PART NO.
1	LOWER MICRO SWITCH *LOWER PROXIMITY SWITCH (Two wire normally closed-24V or 120V AC/DC)	17-9 17-79
2	UPPER MICRO SWITCH *UPPER PROXIMITY SWITCH	17-9 17-72
3	SOLENOID VALVE (110 VAC) SOLENOID VALVE (24 VDC)	17-46 17-63
4	CABLE STRAIN RELIEF AIR TUBING AIR FITTING PIPE PLUG	17-88 74-1 78-125 78-73

* Switches may be used on either DC or AC voltages

CONTROL MODULE SOLENOID ARRANGEMENTS

VALVE CONDITION*	PORT 1	PORT 2	PORT 3	PORT 4	PORT 5
No. 2 Normally open valve closes when solenoid is de-energized	Plug	Open	Plug	Plug	Plug
No. 3 Normally closed valve opens when solenoid is de-energized	Connect To Port	Plug In Yoke	Open	Plug	Plug
No. 4 Normally closed valve opens when solenoid is energized	Plug	Plug	Connect Open In Yoke	To Port	Plug
No. 5 Normally open valve closes when solenoid is energized	Plug	Plug	Plug	Plug	Open
No. 6 Normally closed valve with air boost opens or Air to Air valve opens when solenoid is energized	Plug	Open	Plug Yoke	Connect To Port	Plug
No. 7 Normally open valve with air boost closes or Air to Air valve closes when solenoid is energized	Connect To Port In Yoke	Plug	Plug	Plug	Open



PARTS ORDERING

Any correspondence concerning valves will require the following information be documented:

PRODUCT NAME/

MODEL: _____

PRODUCT SERIAL

NUMBER: _____

DATE OF PURCHASE: _____

INVOICE NUMBER: _____

INVOICE DATE: _____

HOW TO ORDER PARTS

By Phone

Telephone your repair parts or fittings order to your Distributor.

To speed your order and avoid delays, please have your **equipment model** and **serial number** and the **part numbers** from the parts list before you call your Distributor.

If you do not know your Distributors number, call Waukesha Cherry-Burrell Customer Service at:

Phone: **800-252-5200 or 262-728-1900**

Fax: **800-252-5045 or 262-728-4904**

Your call will be directed to a specialist who can provide you with Distributor information for your area.

How to Return Parts

Parts may be returned for credit, subject to the conditions of our return goods policy. To obtain authorization to return a part, contact the your Distributor.

Please give the following information:

Invoice number and date

Quantity

Part Number (from parts list)

Exact reason for return

Your Distributor will provide a Return Goods Authorization. (Returns will not be accepted without advance authorization.)

DISTRIBUTOR: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

CONTACT: _____

SPX Process Equipment

611 Sugar Creek Road • Delavan, WI 53115 USA

Tel: (800) 252-5200 or (262) 728-1900 • Fax: (800) 252-5012 or (262) 728-4904

E-mail: info@processequipment.spx.com • Web site: www.spxprocessequipment.com

Effective Date: February 15, 2000

95-03014