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W265 / W285 FD HTST Divert Valves

WITH THE W-SERIES 2-PIECE CONTROL MODULE

FORM NO.: 95-03088 REVISION: 03/2013

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.

Waukesha Cherry-Burrell

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Revision Date: 03/2013

Publication: 95-03088

Warranty

Seller warrants its products to be free from defect 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 attorney's 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.

Shipping Damage or Loss

If equipment is damaged or lost in transit, file a claim at once with the delivering carrier. The carrier has signed the Bill of Lading acknowledging that the shipment has been received from SPX Flow Technology in good condition. SPX Flow Technology is not responsible for the collection of claims or replacement of materials due to transit shortages or damages.

Warranty Claim

Warranty claims must have a **Returned Goods Authorization (RGA)** from the Seller before returns will be accepted.

Claims for shortages or other errors, exclusive of transit shortages or damages, must be made in writing to Seller within ten (10) days after delivery. Failure to give such notice shall constitute acceptance and waiver of all such claims by Buyer.

Safety

READ AND UNDERSTAND THIS MANUAL PRIOR TO INSTALLING, OPERATING, OR SERVICING THIS EQUIPMENT

Waukesha Cherry-Burrell recommends users of our equipment and designs follow the latest Industrial Safety Standards. At a minimum, these should include the industrial safety requirements established by:

1. Occupational Safety and Health Administration (OSHA), Title 29 of the CFR
   Section 1910.212- General Requirements for all Machines
2. National Fire Protection Association, ANSI/NFPA 79
   ANSI/NFPA 79- Electrical Standards for Industrial Machinery
3. National Electrical Code, ANSI/NFPA 70
   ANSI/NFPA 70- National Electrical Code
   ANSI/NFPA 70E- Electrical Safety Requirement for Employee Workplaces
4. American National Standards Institute, Section B11

Attention: Servicing energized industrial equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Recommended practice is to disconnect and lockout industrial equipment from power sources, and release stored energy, if present. Refer to the National Fire Protection Association Standard No. NFPA70E, Part II and (as applicable) OSHA rules for Control of Hazardous Energy Sources (Lockout-Tagout) and OSHA Electrical Safety Related Work Practices, including procedural requirements for:

- Lockout-tagout
- Personnel qualifications and training requirements
- When it is not feasible to de-energize and lockout-tagout electrical circuits and equipment before working on or near exposed circuit parts

Locking and Interlocking Devices: These devices should be checked for proper working condition and capability of performing their intended functions. Make replacements only with the original manufacturer's renewal parts or kits. Adjust or repair in accordance with the manufacturer's instructions.

Periodic Inspection: Industrial equipment should be inspected periodically. Inspection intervals should be based on environmental and operating conditions and adjusted as indicated by experience. At a minimum, an initial inspection within 3 to 4 months after installation is recommended. Inspection of the electrical control systems should meet the recommendations as specified in the National Electrical Manufacturers Association (NEMA) Standard No. ICS 1.3, Preventative Maintenance of Industrial Control and Systems Equipment, for the general guidelines for setting-up a periodic maintenance program.

Replacement Equipment: Use only replacement parts and devices recommended by the manufacturer to maintain the integrity of the equipment. Make sure the parts are properly matched to the equipment series, model, serial number, and revision level of the equipment.

Warnings and cautions are provided in this manual to help avoid serious injury and/or possible damage to equipment:

DANGER: *marked with a stop sign.*
Immediate hazards which WILL result in severe personal injury or death.

WARNING: *marked with a warning triangle.*
Hazards or unsafe practices which COULD result in severe personal injury or death.

CAUTION: *marked with a warning triangle.*
Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

Care of Stainless Steel

NOTE: *SPX recommends the use of an FDA-approved anti-seize compound on all threaded connections.*

Stainless Steel Corrosion

Corrosion resistance is greatest when a layer of oxide film is formed on the surface of stainless steel. If film is disturbed or destroyed, stainless steel becomes much less resistant to corrosion and may rust, pit or crack.

Corrosion pitting, rusting and stress cracks may occur due to chemical attack. Use only cleaning chemicals specified by a reputable chemical manufacturer for use with 300 series stainless steel. Do not use excessive concentrations, temperatures or exposure times. Avoid contact with highly corrosive acids such as hydrofluoric, hydrochloric or sulfuric. Also avoid prolonged contact with chloride-containing chemicals, especially in presence of acid. If chlorine-based sanitizers are used, such as sodium hypochlorite (bleach), do not exceed concentrations of 150 ppm available chlorine, do not exceed contact time of 20 minutes, and do not exceed temperatures of 104°F (40°C).

Corrosion discoloration, deposits or pitting may occur under product deposits or under gaskets. Keep surfaces clean, including those under gaskets or in grooves or tight corners. Clean immediately after use. Do not allow equipment to set idle, exposed to air with accumulated foreign material on the surface.

Corrosion pitting may occur when stray electrical currents come in contact with moist stainless steel. Ensure all electrical devices connected to the equipment are correctly grounded.

Elastomer Seal Replacement Following Passivation

Passivation chemicals can damage product contact areas of this equipment. Elastomers (rubber components) are most likely to be affected. Always inspect all elastomer seals after passivation is completed. Replace any seals showing signs of chemical attack. Indications may include swelling, cracks, loss of elasticity or any other noticeable changes when compared with new components.

Introduction

Specifications

Models

W265 FD Standard Flow Diversion Valve Assembly

W285 FD Stem Flush Flow Diversion Valve Assembly

Sizes

1", 1-1/2", 2", 2-1/2", 3", 4"

Features

- Flush ports
- Snap on Tef-Flow™ P Seats
- Maintainable actuators (4", 5", 6")
- Use with existing control system
- Transparent control module *(with or without solenoid)*
- S- or I-clamp connections *(S is standard)*
- Two valves with interconnected bodies
- Two-position, three-way valves with independent actuators *(air-to-raise)*
- The spring in the actuator holds the valve in the Divert position
- Air pressure positions the valve in the Forward Flow position
- Valve bodies (divert valve and leak detect valve) produce one inspection mode, and three operating modes (Divert, Flush, and Forward Flow)
- High pressure adapter for sizes 1" through 2-1/2"

Effective Area of Actuators

4" AR = 12.12 in^2 (198.98 cm^2)
5" AR = 19.19 in^2 (314.47 cm^2)
6" AR = 27.50 in^2 (450.64 cm^2)

Air Supply Requirements

Minimum Air Pressure:	80 psi (5.52 bar)
Air Pressure Range:	80 psi (5.52 bar) to 110 psi (7.58 bar)
Air Volume Required:	4" AR = 12.7 in^3 (208.12 cm^3) 5" AR = 21.5 in^3 (352.32 cm^3) 6" AR = 36.1 in^3 (591.57 cm^3)

AR = Air-to-Raise

Callouts for Figure 1:

1. Divert Valve
2. Leak Detect Valve

A. Control Wire Connection
B. Control Module
C. Actuator
D. Yoke
E. Stem
F. Inlet Port
G. Divert Port (to balance tank)
H. Leak Detect Port (to balance tank)
I. Seat Ring
J. Forward Flow Port
K. Adapter
L. Air Shutoff Valve
M. Quick Exhaust Valve

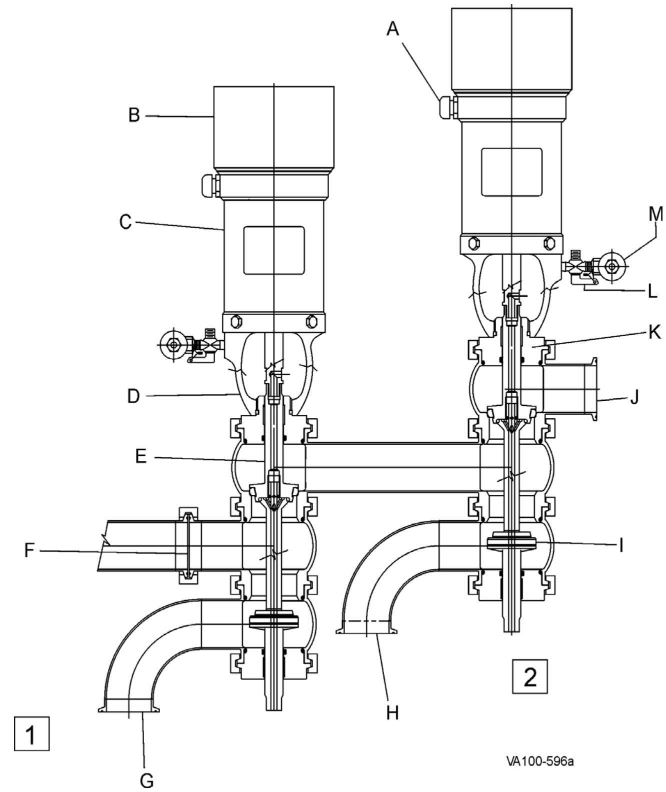

Figure 1: Flow Diversion Valve Nomenclature

Callouts for Figure 2:

A. Micro Switch Indicator Stem
C. Spring Retainer
D. Spring
E. Washer
F. Retaining Ring
G. Piston
H. O-ring
I. Quick Exhaust Valve
J. Air Shutoff Valve
K. Yoke
L. Lower Actuator Stem
M. Cap screw
N. Bearing
O. U-Cup Seal
P. Cylinder
Q. Vent Plug

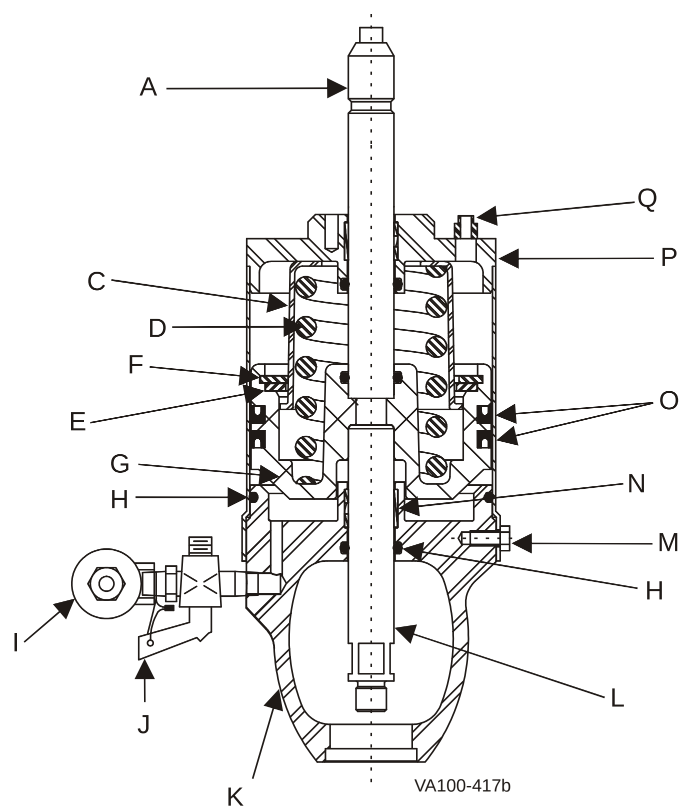

Figure 2: Actuator Components

Installation

Dimensions

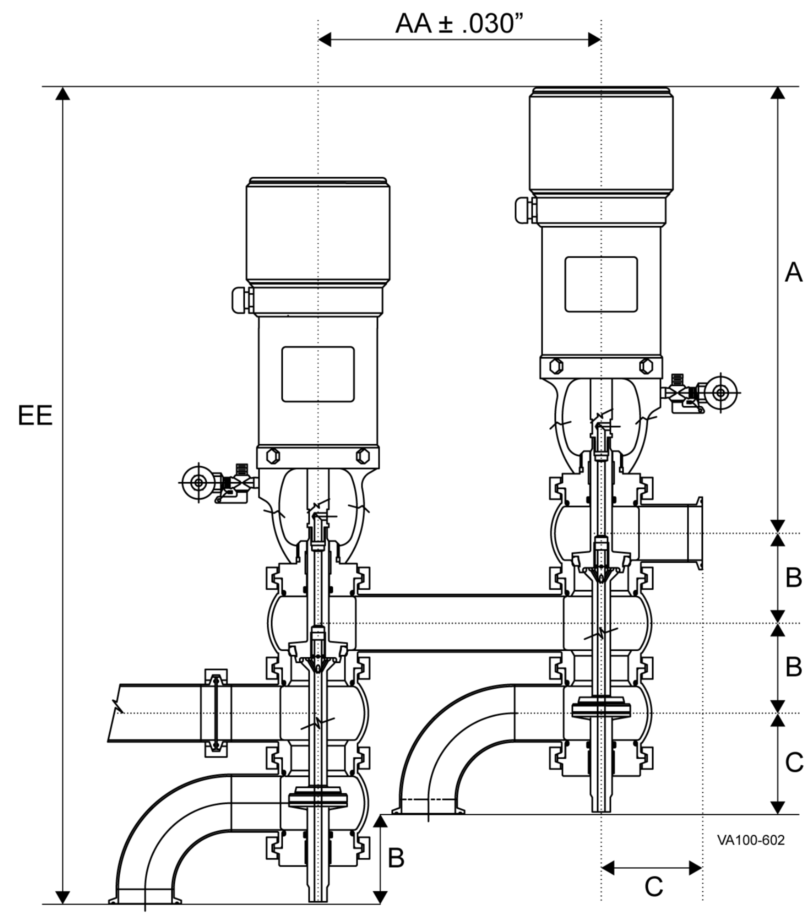

Figure 3: Valve Dimensions

Valve Size	A		A		A		B		C		C	
	4" Actuator		5" Actuator		6" Actuator				I-Line		S-Line	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1"	16.60	422	17.91	455	19.67	500	2.63	67	3.75	95	3.12	79
1-1/2"	16.60	422	17.91	455	19.67	500	2.63	67	3.19	81	2.75	70
2"	16.85	428	18.16	461	19.92	506	3.13	79	4.03	102	3.5	89
2-1/2"	-	-	18.41	468	20.17	512	3.63	92	4.16	106	3.5	89
3"	-	-	-	-	20.42	519	4.13	105	4.47	113	3.75	95
4"	-	-	-	-	20.90	531	5.11	130	5.22	132	4.5	114

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Valve Size	Actuator		AA		EE		EE	
					I-Line		S-Line	
	in	mm	in	mm	in	mm	in	mm
1"	4	102	7.76	197	28.24	717	27.61	701
1-1/2"	4	102	8.76	222	27.68	703	27.24	692
2"	4	102	9.85	250	30.27	769	29.74	755
2-1/2"	5	127	11.23	285	33.46	850	32.80	833
3"	6	152	12.87	327	37.28	947	36.56	929
4"	6	152	16.11	409	41.45	1053	40.73	1035

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Control Module Routing for Compressed Air, Vent and Wiring

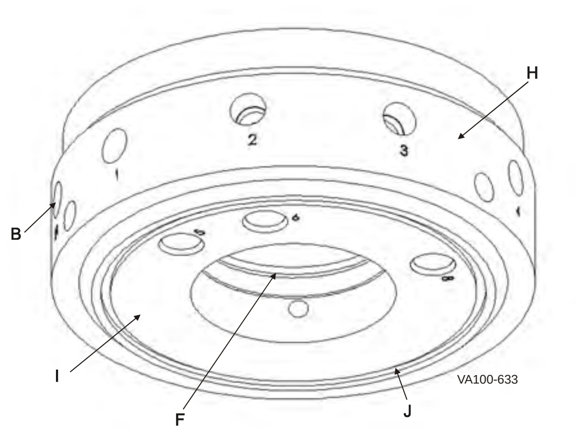


Figure 4: Base Underside View

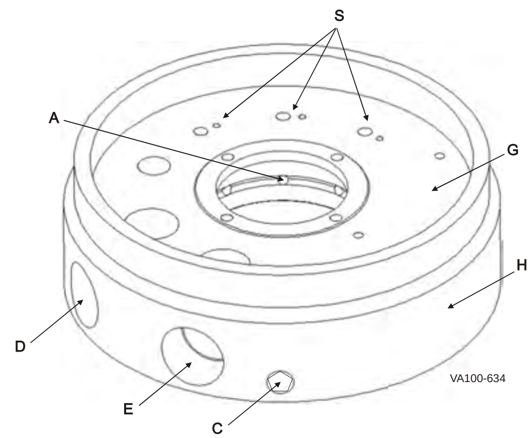


Figure 5: Base Top View

- A. V-Groove Plenum with air supply channels
- B. Air-In
- C. Setscrew
- D. Vent
- E. Wire
- F. Inside Diameter
- G. Top
- H. Side
- I. Underside
- J. O-Ring
- S. Solenoid Mount

Compressed air is routed through the base from **Air-In** (item B) to a V-groove air-plenum (item A) in the inside diameter (item F). Supply channels from the plenum feed each of three (3) threaded solenoid mounts (item S) on top. An energized solenoid passes air to the non-threaded outlet hole, feeding the corresponding side (item H) and underside (item I) air ports.

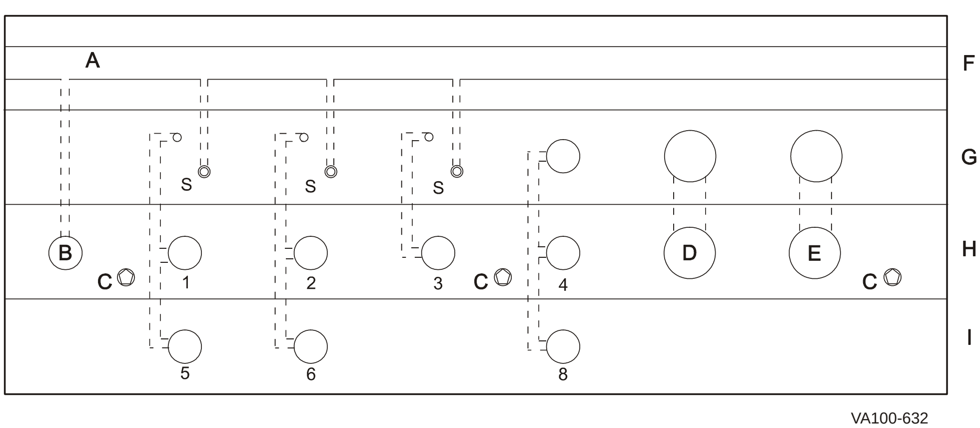
For air routed to the yoke area, i.e., W265/W285 Air-to-Raise, the underside port is plugged and the side port is open.

For unused solenoid ports, both the side and underside ports are plugged, and the top threaded mount is plugged.

Vent air from the top of the actuator is routed through the control module base via underside port no. 8. A venting plug and o-ring are used to connect the actuator port to port no. 8. Vent air passes through the module to the side vent plug (item D) in the base.

Wiring is routed inside the control module from the side port (item H) to the joined top port. A cable strain relief or optional pin-connector is used on the side port.

Installation of the top is secured using three (3) setscrews (item C) in the side of the base.



- A. V-Groove Air Plenum
- B. Air-In
- C. Setscrew
- D. Vent
- E. Wire
- F. Inside Diameter View
- G. Top View
- H. Side View
- I. Underside View
- S. Solenoid Mount

Figure 6: Routing for Compressed Air, Vent and Wiring

Solenoids Operation

Barrel-Type Solenoid

- 24VDC (5-25VDC) typically used on all valves
- Typically one (1) solenoid used
- Ports in the base are numbered
- 120VAC (50-60Hz) solenoid is available

Solenoid Operation

Solenoids direct compressed air through the ports in the base of the control module to drive the motion of the valve. For the solenoid to work correctly and achieve the required valve condition, specific ports must be open or plugged. Many configurations are possible. Figure 7 lists the appropriate configurations for W265/ W285 valves. Prior to startup, perform a functional test on each valve by applying compressed air.

W265 / W285 Single Seat Solenoid and Port Arrangements

Valve Configuration	Solenoid Location 1	Solenoid Location 2	Solenoid Location 3	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 8	Top Port	In Port
Single Seat - No Solenoid - AR	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Plug	Vent	Open	Plug
Single Seat - 1 Solenoid - AR	Solenoid	Plug	Plug	Open	Plug	Plug	Plug	Plug	Plug	Vent	Open	Open

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Note: AR = Air to raise actuator

Figure 7: Single Seat Solenoid Arrangements W265/W285

NOTE: *When the solenoid is used in the control module, a 1/4 inch diameter poly-flo tube is used to connect port 1 to the air inlet in the yoke area of the actuator.*

Control Module Wiring

Use the electrical schematic (Figure 8) for connecting control modules with or without an optional solenoid. The cable connected to the terminal block in the control modules should connect directly to the terminal block in the controller, without any splices.

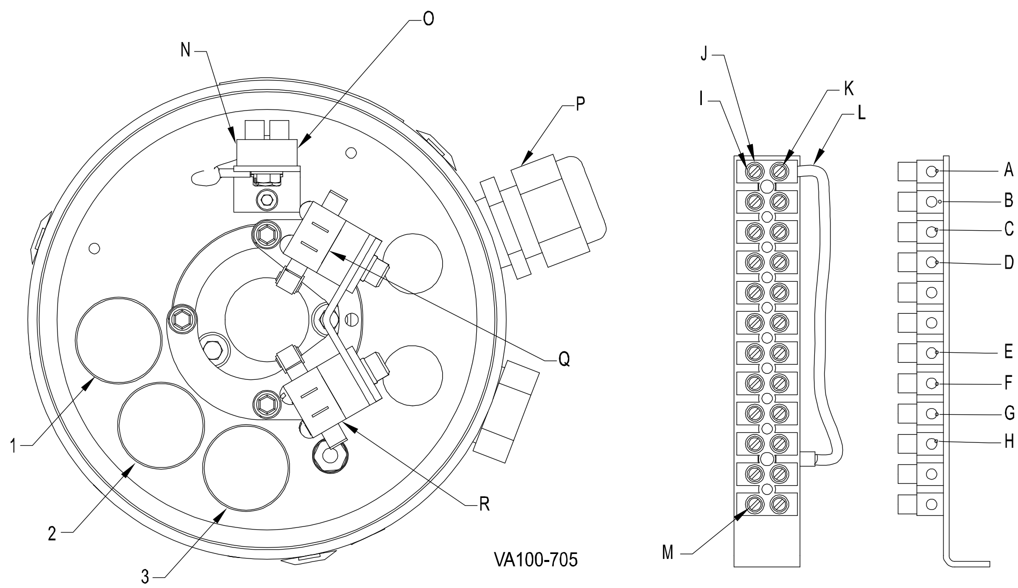

Figure 8: Control Module Wiring

A. Ground Wire (not shown for clarity)
B. Black Wire (Switch Common; Lower, Upper)
C. Red Wire (Lower Switch, Normally Closed)
D. White Wire (Upper Switch, Normally Open)
E. Black Wire (Solenoid 1,2,3)
F. Black Wire (Solenoid 1)
G. Black Wire (Solenoid 2)
H. Black Wire (Solenoid 3)
I. Pole #1 ID on this side
J. Pin Connector Side
K. Switch/Solenoid Side
L. Ground Wire
M. Pole # 12 ID on this side
N. Switch and Solenoid Wires this side of Terminal Block
O. Pin Connector Wires this side of Terminal Block
P. Cable Strain Relief or Optional Pin Connector
Q. Upper Switch (Normally Open)
R. Lower Switch (Normally Closed)

1. Solenoid Location 1
2. Solenoid Location 2
3. Solenoid Location 3

***NOTE:** Use the lower switch position for the W265 Valve; use the upper switch position for the W262 Valve.*

Device	Wire Color	Pole Number
Ground	Green	1
Switch Common; Lower, Upper	Black	2
Lower Switch, Normally Closed	Red	3
Upper Switch, Normally Open	White	4
Not Used	-	5
Not Used	-	6
Solenoid Common: 1, 2, 3	Black	7
Solenoid 1	Black	8
Solenoid 2	Black	9
Solenoid 3	Black	10
Not Used	-	11
Not Used	-	12

Operation

Operating Modes

The Flow Diversion device consists of two (2) valves. Each is a two-position, three-way valve connected by a common body. This common body is the upper body of the Divert Valve and the middle body of the Leak Detect Valve. The air-to-raise actuators of the two valves are connected to independent air supplies which cycle the valves to the three operating modes; Divert, Flush and Forward Flow. A description of the three modes follows:

Divert Mode

Divert is the first mode of operation assumed by the Flow Diversion Valve in the start-up procedure. Until a legal product temperature is reached and normal system operation is established, the product is diverted to the Balance Tank. *In Divert Mode, the stems of both valves are in the lowered position.* This can be seen by checking the indicator stem in the control module. The roller arm of the Micro Switch, in both valves, will be positioned as shown in Figure 9, below.

The Divert Valve should be in the Divert position when:

- The control panel selector switch is in the Divert Position
- The control panel selector switch is in the “off” position.
- The power supply is interrupted.
- The air supply is interrupted.

Callouts for Figure 9:

1. Divert Valve
2. Leak Detect Valve

A. Product Inlet
B. To Balance Tank
C. Stems Lowered

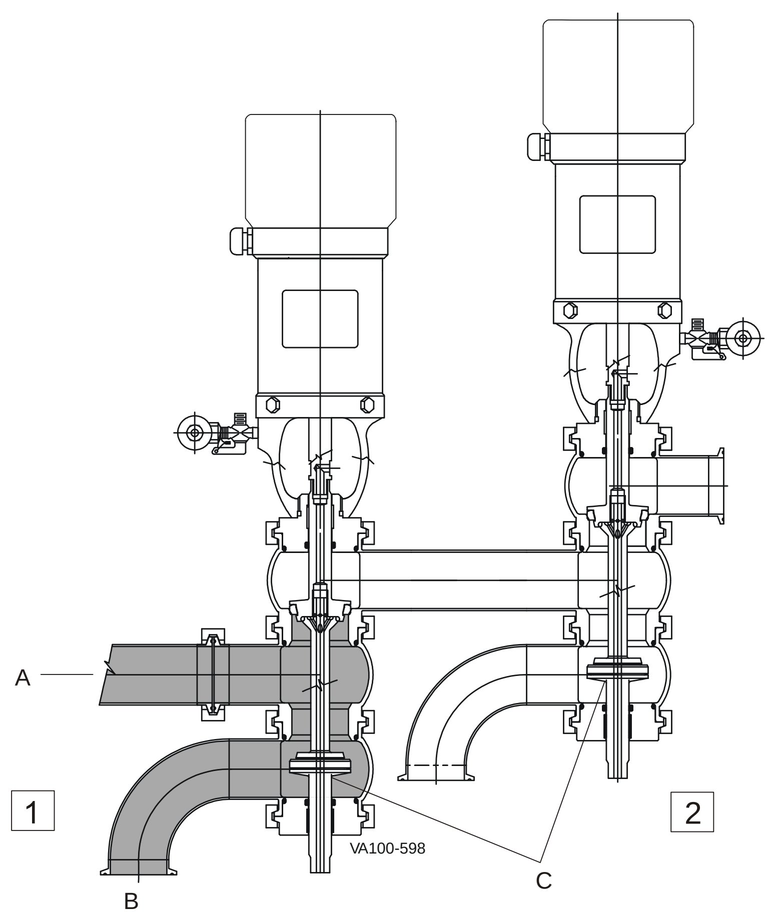

Figure 9: Divert Mode

Flush Mode

In this mode, correctly pasteurized product flushes and clears the common body between the Divert Valves and the Leak Detect Valve, prior to initiating product Forward Flow.

The flush time is controlled by a Flow Divert Valve Controller. This control system is separate from the Divert Valves, but works in conjunction with them. **The control system can be from several sources and of several designs but must be approved by the FDA prior to use.**

Product that flows through the valves in the Flush mode is returned to the Balance Tank through the Leak Detect Valve and the Return Line. This line must be separate from the Divert Product Return Line, but both of these lines return the product to the Balance Tank.

In the Flush mode, the stem of the Divert Valve will be raised, as seen in the control module. The Leak Detect stem will be in the lowered position, which is the same as when in the Divert mode. The roller arm of the Micro Switch, in both valves, will be positioned as shown in Figure 10, below.

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Callouts for Figure 10:

1. Divert Valve
2. Leak Detect Valve

A. Product Inlet
B. To Balance Tank

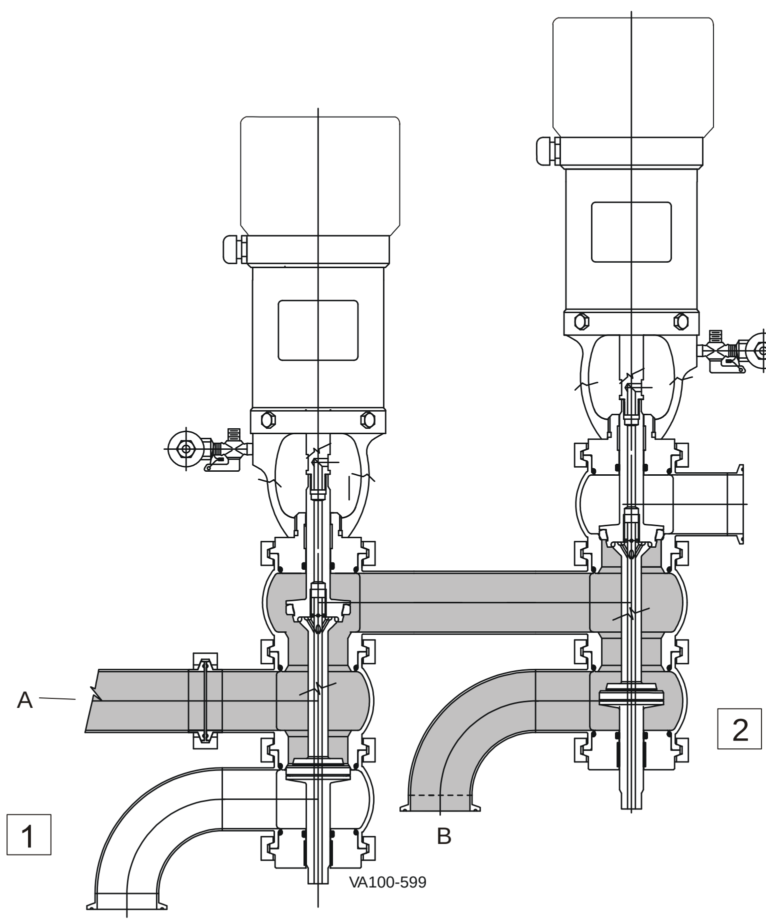


Figure 10: Flush Mode

Forward Flow Mode

Forward Flow is the final operating mode of the Flow Diversion Valve. Product flows through both valves to the cooling sections of the pasteurization system. The stems of both valves are raised, as seen in the control module. In both valves, the roller arm of the Micro Switch will be positioned as shown in Figure 11, below.

For the Forward Flow mode to be maintained:

- The legal set temperature must be maintained.
- The power supply and air supply must be maintained.

Callouts for Figure 11:

1. Divert Valve
2. Leak Detect Valve

A. Product Inlet
B. Stems Raised
C. Forward Flow

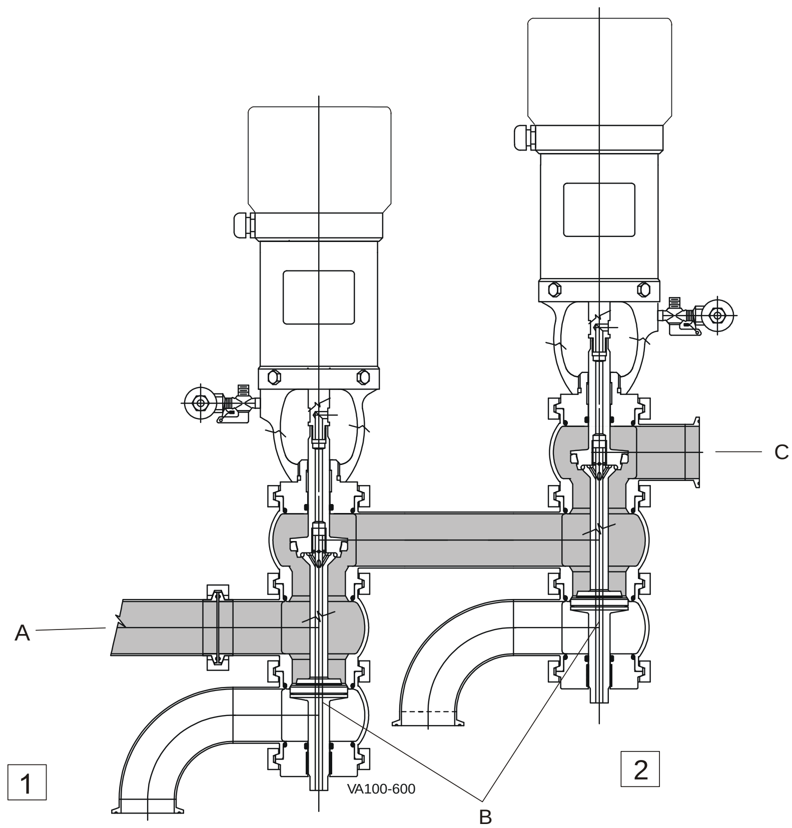


Figure 11: Forward Flow Mode

Maintenance

Maintenance Intervals

Maintain adequate stock of replacement parts. See the items in bold beginning on page 33 for recommended spare parts.

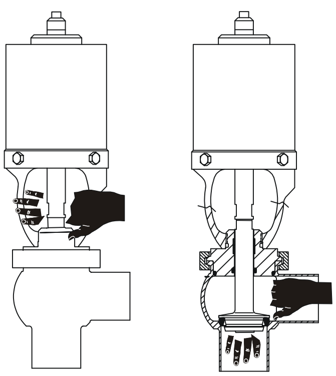
Maintenance intervals should be determined by the user and specific application, based on the following conditions:

- Daily operation period
- Switching frequency
- Application parameters such as temperature, pressure, and flow
- Product type

Inspection

Inspect the following on a regular basis:

DANGER: *Do not put a hand into the yoke or body of a pneumatically actuated valve.*



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- Actuator connections for air leaks
- Valve body and stem o-rings
- Valve seats (If leakage occurs, see "Troubleshooting" on page 38)
- Pneumatic connections:
    - Air pressure at supply connection
    - Air lines for kinks and leaks
    - Threaded connections for tight fit
    - Threaded stress relief for tight fit
- Electrical connections secure on the control module:
    - Wire connections tight on the terminal strip
    - Clean air filter at regular intervals.

Lubrication

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

Apply Bostik Never-Seez® White Food Grade with PTFE or equivalent to all bolts and threaded stem parts.

Cleaning

CAUTION: *Avoid splashing any liquid into the air vent of the actuator during clean up.*

Cleaning-In-Place (CIP)

NOTE: *Actuate each valve a minimum of twice each cycle to ensure effective cleaning and sanitizing.*

CIP methods can be used to clean installed automatic valves without disassembly. Select methods based on the specific requirements of sanitarians and each application. Check with local chemical suppliers for the most effective cleaning agents and procedures.

Micro Switch

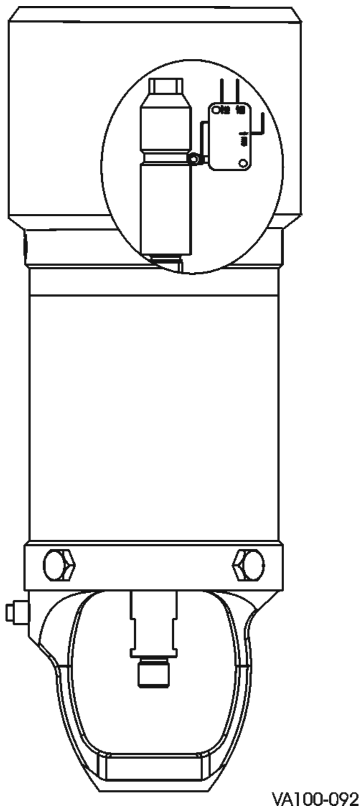


Figure 12: Micro Switch

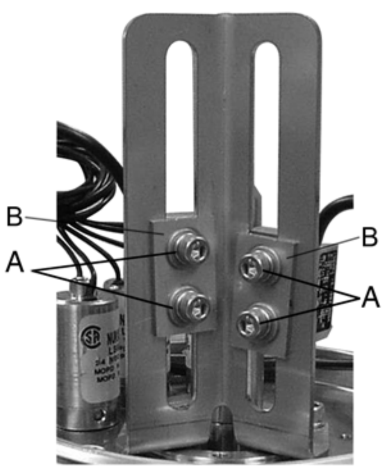


Figure 13: Control Module Detail

NOTE: *The sensitivity of the switch is increased by moving the switch* ***toward*** *the stem and decreased by moving the switch* ***away*** *from the stem*

Figure 12 shows the correct position of the Micro Switch when the valve is in Divert mode. This position allows the switch to give a signal when the valve opens and the roller moves out of the groove, and also gives an indication if the valve seat is worn excessively (the stem moves down and the roller is out of the groove).

When the roller is out of the groove, the timing pump will not start. The width of the groove in the stem is manufactured to be 1/16th inch wider than the roller to compensate for vibration and heat expansion.

The switch roller should be positioned against the lower shoulder of the groove.

Micro Switch Adjustment

1. With the valve in Divert Position (stem lowered), adjust the switch up or down so the roller on the switch arm is in the groove against the lower shoulder on the indicator stem. Adjust the switch position using the two cap screws (Figure 13, item A) on the switch plate (Figure 13, item B).
2. Hand-tighten the cap screws to lock the switch in position.
3. Open the valve by applying air to the actuator. This will raise the stem.
4. Move the switch toward the indicator stem until the switch clicks.

NOTE: *The position where the switch clicks or makes the circuit can be confirmed by using a volt ohm meter connected to the common and normally open contacts on switch.*

5. The correct adjustment is the point at which the switch just clicks.
6. When the adjustment point is found, tighten the cap screws to secure the position.
7. Remove the air from the actuator to the lower stem. The roller should be in the groove.

The circuit should be open when the roller is in the groove and closed when the stem is raised. If this is not the case, confirm that the roller is in the groove when the stem is down; then repeat steps 3 through 6.

Callouts for Figure 14:

A - Groove width: 0.241
B - Groove Depth: 0.050
C - Stem
D - Roller Travel: 0.063
(to allow cold flow of the Tef-Flow™ P seat ring)

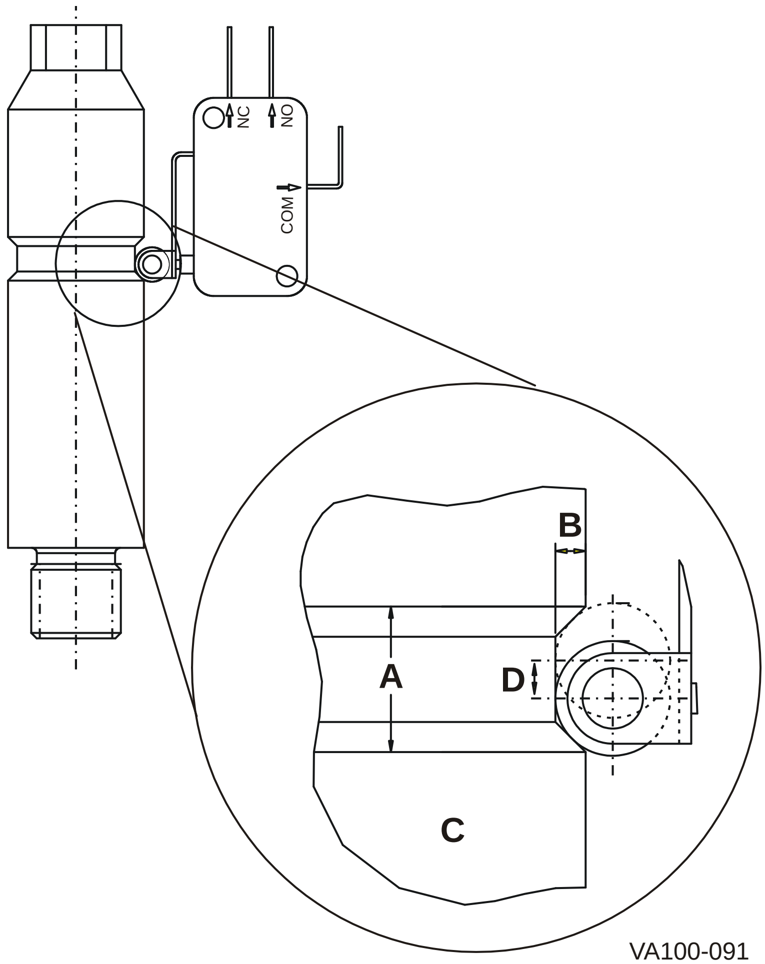


Figure 14: Detail of the Micro Switch Position for Divert Mode

Lower Body Disassembly

1. Drain the water or product from the system.
2. Disconnect the two return lines to the Balance Tank at the clamp connection on the lower body (Figure 15, item A).
3. Remove the body clamp connection (Figure 15, item B).
4. Pull the lower body down to separate it from the two upper bodies.

Callouts for Figure 15:

1. Divert Valve
2. Leak Detect Valve

A. Lower Body
B. Body Clamp Connection
C. Air Inlet
D. Yoke
E. Lower Bearing Retainer
F. Body O-Ring Seal
G. Top Adapter/Bonnet
H. Stem, Upper
I. Stem, Lower
J. Actuator

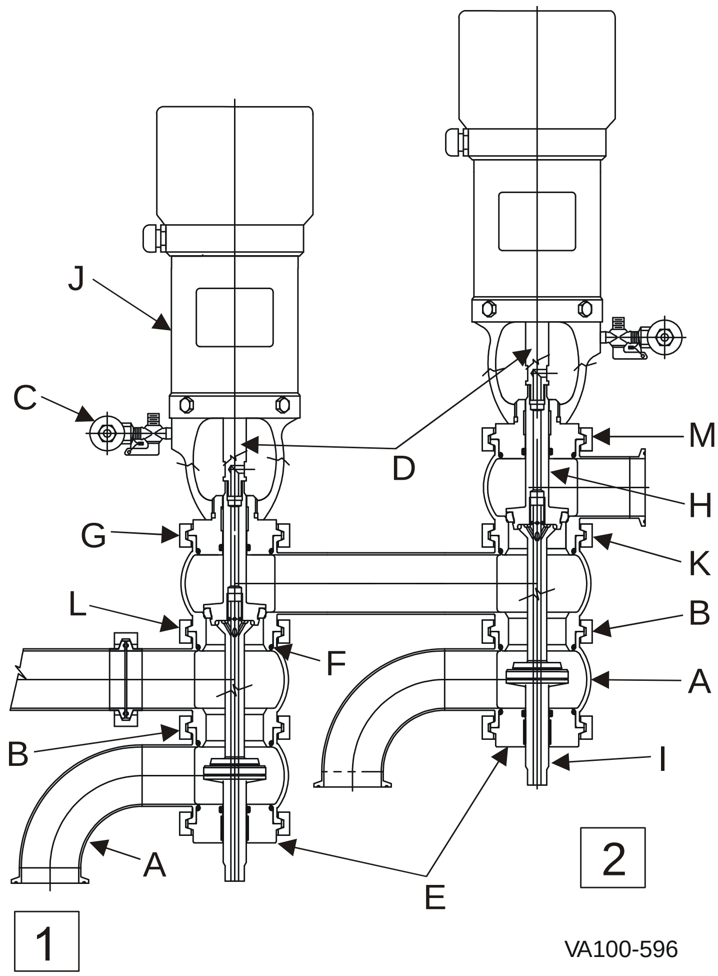


Figure 15: Inspection and Disassembly Steps

Inspection

1. Inspect the body o-ring seal (Figure 15, item, item F) between the bottom body and the middle body. Replace it if it is damaged or worn.
2. Using two 5/8-inch open-end wrenches, unscrew the upper stem from the lower stem. Place one wrench on the upper stem just above the adapter in the yoke area (Figure 15, item D). Place the other wrench on the bottom of the lower stem (Figure 15, item I).
3. The lower stem has an o-ring in the attachment area where the two stems connect (Figure 16, item C). This should be removed and replaced with a new o-ring at each inspection interval.
4. Inspect the stem attachment area (Figure 16, Item E). If soils are present, hand-clean the upper and lower stems.

5. Inspect the seat insert (Figure 16, item D). Remove and replace if it is nicked or damaged.
6. The frequency of inspection is recommended as per Appendix I in the Pasteurized Milk Ordinance, test 5; upon installation, at least once each three (3) months thereafter; or when the regulatory seal has been broken.

Reassemble in reverse order of the instructions above.

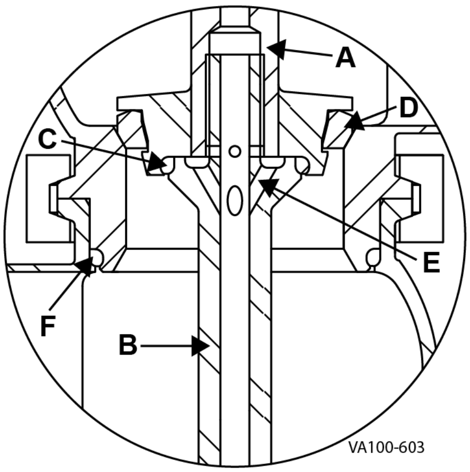


Figure 16: Inspection and Disassembly Steps

Corrective Action:

1. If leakage from the lower stem is observed during production, determine if the leakage is from the lower stem seal (item 4a on page 32) or from inside the lower stem.
2. The lower and upper valve stems are hollow to provide a clear path to the atmosphere for any leakage exiting the valve from the inside.
3. Upon disassembly, inspect for scratches, debris or damage to the stems, repair or replace as required. Replace the lower stem o-ring (Figure 16, item C). Clean all parts before reinstallation.
4. Ensure that the stems are correctly assembled.

Lubricate all o-rings with Dow® Corning #7 Silicone lubricant (or equivalent) and apply an anti-seize compound with Teflon® *(for stainless steel)* to all threads. The upper stem and lower stem should be tightened with 5/8-inch open-end wrenches. Do not use long wrenches or the wrench handles to tighten the stems. Over-tightening will damage the stems.

Adapter Seal Inspection

It is necessary to completely disassemble the valve.

Complete Disassembly

1. Disconnect the product lines, air connections, and electrical connections to the valves.
2. Open both mounting brackets.
3. Lift the valve assembly from the brackets and place it on a bench where the parts can be inspected and set aside during the disassembly process.
4. Disassemble the lower part of the valve as described in “Lower Body Disassembly” on page 19.
5. Using 5/8-inch wrench flats on the stem, unscrew and remove the lower valve stem (Figure 15, item I on page 19)

Actuator Removal - Divert Valve

1. Remove the body clamp (Figure 15, item L on page 19) and remove the middle body of the Divert Valve.
2. Raise the valve stem on the Divert Valve by connecting an air line to the air inlet.
3. Remove the body clamp around the upper body and adapter (Figure 15, item G).
4. Remove the air supply to the actuator.
5. Remove the upper stem/adapter/actuator assembly from the upper body.

6. Unscrew and remove the upper valve stem from the actuator lower stem by using two 5/8-inch open-end wrenches in the yoke area (Figure 15, item D).
7. Inspect the o-ring and Teflon® bearing in the adapter.

Actuator Removal - Leak Detect Valve

1. Remove the clamp (Figure 15, Item K) between the middle and upper body of the Leak Detect Valve.
2. Remove the middle body of the Leak Detect Valve.
3. Open the Leak Detect Valve by connecting pressurized air to the actuator.
4. Remove the clamp (Figure 15, item M) around the top of the upper body and adapter.
5. Remove the air pressure from the actuator.
6. Remove the upper body from the stem/adapter/actuator assembly.
7. Unscrew and remove the upper valve stem from the actuator lower stem by using two 5/8-inch open-end wrenches in the yoke area (Figure 15, item D).
8. Inspect the o-ring and Teflon® bearing in the adapter.

Reassemble in reverse order of the instructions above.

CAUTION: *Remove the actuator from the valve before starting any service work on the actuator.*

Lubricate all o-rings with Dow® Corning #7 Silicone lubricant (or equivalent) and apply an anti-seize compound with Teflon® *(for stainless steel)* to all threads. The upper stem and lower stem should be tightened with 5/8-inch open-end wrenches. Do not use long wrenches or the wrench handles to tighten the stems. Over-tightening will damage the stems.

4" and 5" Actuator Stem O-ring Replacement

1. Remove the cap screws and pull off the cylinder.
2. Using an open-end wrench, remove the actuator stem located in the center of the yoke.
3. Remove the o-ring from the yoke, being careful not to score or nick grooves in the yoke during removal.
4. Coat a new o-ring with Dow® Corning #7 Silicone lubricant (or equivalent), and install it in the yoke groove.
5. Carefully install the actuator stem in the yoke, being careful not to cut the o-ring.
6. Apply Locktite® 242 to the stem threads in the actuator, as per the manufacturer’s specifications.
7. Torque the stems to 200 in-lbs.
8. Assemble the actuator in reverse order.

4" and 5" Actuator Stem Bearing Replacement

1. Remove the cap screws and pull off the cylinder.
2. Using an open-end wrench, remove the actuator stem located in the center of the yoke.
3. Remove the actuator stem bearing from the yoke. *The bearing has a split along its length to allow its removal from the groove.*

4. Install a new bearing in the yoke and carefully assemble the actuator stem in the yoke, being careful not to cut the o-ring.
5. Apply Locktite® 242 to the stem threads in the actuator, as per the manufacturer's specifications.
6. Torque the stems to 200 in-lbs.
7. Assemble the actuator in reverse order.

***NOTE:** The bearing and o-ring in the actuator cylinder are replaced the same way as the bearing and o-ring in the yoke.*

4" and 5" Actuator U-Cup Replacement

***NOTE:** U-cup seals are flared slightly at the outer edges when properly installed.*

1. Remove the cap screws and pull off the cylinder.
2. Remove the worn U-cup, being careful not to score or nick grooves in the piston.
3. Coat a new U-cup with Dow® Corning #7 Silicone lubricant (or equivalent).
4. Stretch the lubricated seals lightly to fit over the piston as shown in Figure 17. Install the lower seal first with the "U" pointing down. Install the upper seal with the "U" pointing up.

Callouts for Figure 17:

A. Micro Switch Indicator Stem
C. Spring Retainer
D. Spring
E. Washer
F. Retaining Ring
G. Piston
H. O-ring
I. Quick Exhaust Valve
J. Air Shutoff Valve
K. Yoke
L. Lower Actuator Stem
M. Cap screw
N. Bearing
O. U-Cup Seal
P. Cylinder
Q.Vent Plug

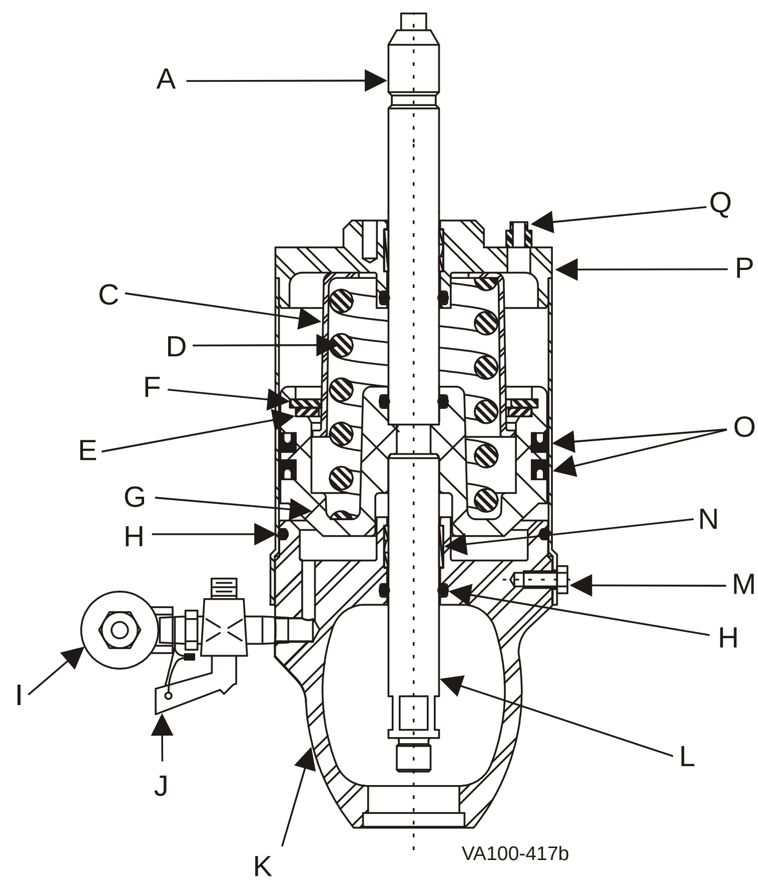


Figure 17: 4" and 5" Actuator O-ring, Bearing and U-Cup Replacement

***CAUTION:** Remove the actuator from the valve before starting any service work on the actuator.*

6" Actuator Stem O-ring Replacement

1. Remove the cap screws and pull off the cylinder.
2. Using an open-end wrench, remove the actuator stem located in the center of the yoke.
3. Remove the o-ring from the yoke, being careful not to score or nick grooves in the yoke during removal.
4. Coat a new o-ring with Dow® Corning #7 Silicone lubricant (or equivalent), and install it in the yoke groove.

NOTE: *The o-ring in the actuator cylinder is replaced the same way as o-ring in the yoke.*

5. Carefully install the actuator stem in the yoke, being careful not to cut the o-ring.
6. Apply Locktite® 242 to the stem threads in the actuator, as per the manufacturer's specifications.
7. Torque the stems to 400 in-lbs.
8. Assemble the actuator in reverse order.

6" Actuator Stem Bearing Replacement

1. Remove the cap screws and pull off the cylinder.
2. Using an open-end wrench, remove the actuator stem located in the center of the yoke.
3. Remove the actuator stem bearing from the yoke. *The bearing has a split along its length to allow its removal from the groove.*

NOTE: *The bearing and o-ring in the actuator cylinder are replaced the same way as the bearing and o-ring in the yoke.*

4. Install a new bearing in the yoke and carefully assemble the actuator stem in the yoke, being careful not to cut the o-ring.
5. Apply Locktite® 242 to the stem threads in the actuator, as per the manufacturer's specifications.
6. Torque the stems to 400 in-lbs.
7. Assemble the actuator in reverse order.

Callouts for Figure 18:

A. Micro Switch Indicator Stem
C. Spring Piston Assembly
H. O-ring
I. Quick Exhaust Valve
J. Air Shutoff Valve
K. Yoke
L. Lower Actuator Stem
M. Cap screw
N. Bearing
O. Elbow Connector
P. Cylinder
Q.Vent Plug

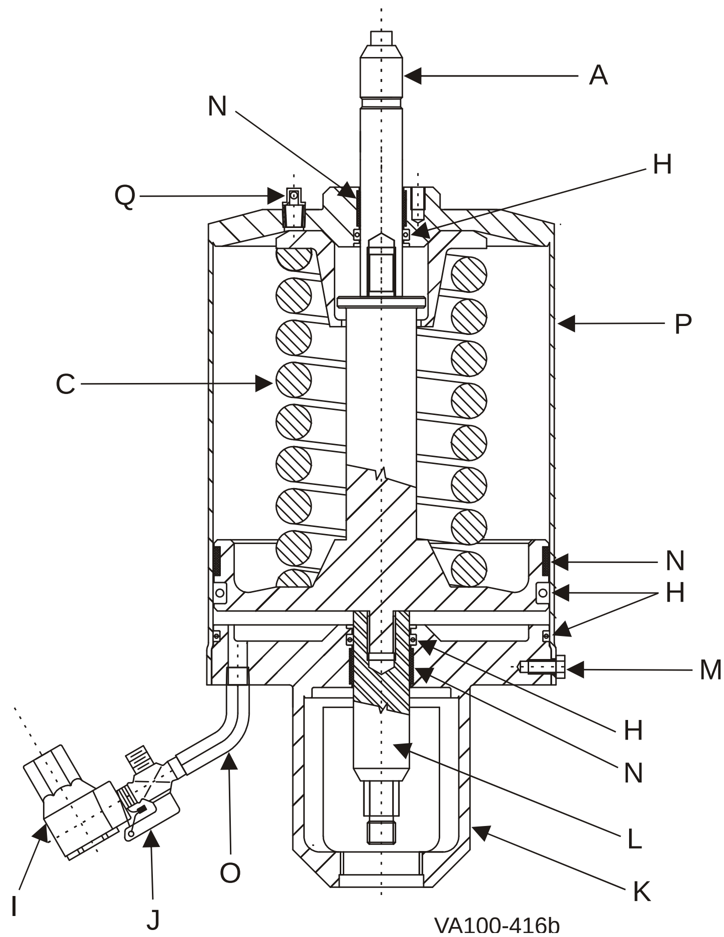


Figure 18: 6" O-ring and Bearing Replacement

Removal and Installation of Tef-Flow™ P Seat Rings

Tef-Flow™ P seats are gray and must be melted through for proper removal.

1. Melt through the seat ring using a clean plastic cutting tip on a heavy-duty soldering iron capable of maintaining a 700°F (371°C) tip temperature.

CAUTION: *Do not use a knife to cut the seat ring from the stem to avoid personal injury and/or damage to the stem.*

2. To install a new seat, place the installation tool base onto a table or bench with a 1.0" (25 mm) hole (Figure 19, item B). For tool part numbers, see “Optional Tools” on page 37.
3. Place the stem through the hole in the base.
4. Place a new seat ring (item C) onto the stem with the seat angle (item D) and flat side facing away from the base as shown in Figure 19.
5. Place the seat ring tool (Figure 19, item A) over the seat ring. For tool part numbers, see “Optional Tools” on page 37.
6. Using an arbor press, apply a constant steady pressure to the seat ring tool, snapping the seat ring into place.

CAUTION: *DO NOT use a hammer to install.*

7. The valve seat will spin freely when properly installed.

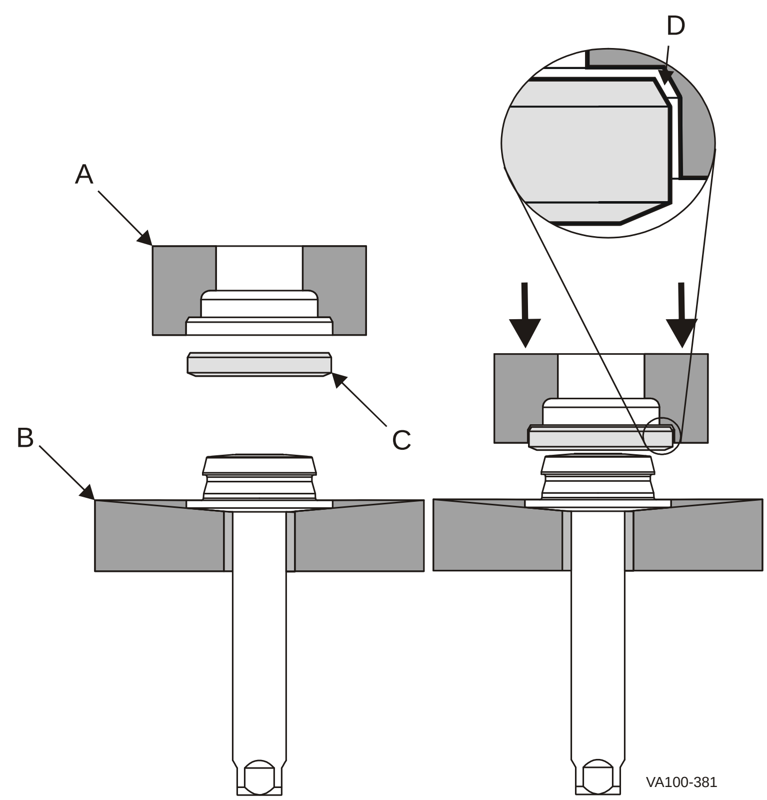
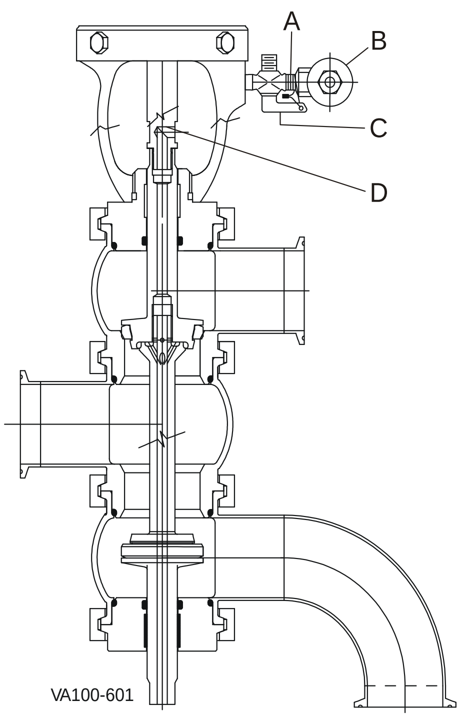


Figure 19: Seat Ring Installation

Inspection Test Procedures

These procedures are used to check the assembly and operating condition of the Flow Diversion Device. As positive test results are obtained, attach the required ***seal wire*** (Figure 20, item A) in the locations specified by the procedure. Suggested corrective actions are presented at the end of each procedure in the event of test failure

Test 1 - Device Assembled Correctly



A. Seal Wire
B. Quick Exhaust Valve
C. Air Shutoff Valve
D. Separate Here

Figure 20: Inspection Test Procedures

Perform this test to verify that the Flow Diversion Device is properly assembled and adjusted. Check each valve independently, as follows, *beginning* with the Divert Valve.

1. With the system temperature sub-legal, set FDV Switch to INSPECT.
2. All Flow Promoting Devices (Timing Pumps) must be de-energized and stopped.
3. The Divert Valve shifts to Forward Flow position (See Figure 11 on page 15). Break the *seal wire* (Figure 20, item A) on the Air Shutoff Valve handle (Figure 20, item C). Turn the handle 90 degrees to trap air in the actuator. The actuator will remain in the raised position.
4. Set the FDV Switch to PROCESS (product/run) and the Mode Switch to AUTO. The Flow Promoting Device (Timing Pump) shall not run.
5. Set the Mode Switch to OFF. Slowly open the Air Shutoff Valve (Figure 20, item C) until the valve stem moves down approximately 1/2 inch, then close the Air Shutoff Valve.
6. Using two 5/8-inch open-end wrenches, unscrew the valve stem from the lower actuator stem about 1/8 inch (Figure 20, item D ("Separate Here"). Open the Air Shutoff Valve (item C) again. The stem will lower to the Divert position.
7. Set the Mode Switch to PROCESS. The Flow Promoting Device (Timing Pump) shall not run.
8. Repeat steps 1, 2, 3, and 4. Tighten the valve stem to lower the actuator stem, using two 5/8-inch open-end wrenches. Return the Air Shutoff Valve (Figure 20, item C) to its normally open position. Attach a new *seal wire* (item A) through the handle of the Air Shutoff Valve (item C).
9. Repeat steps 1 through 8 for the Leak Detect Valve.

Corrective Action - If the Flow Promoting Device (Timing Pump) fails to respond as indicated in the procedure above, immediately check the Flow Diversion Device assembly and wiring to locate and correct the cause. *Check the Micro Switch adjustment first* (see page 17). See "APC Control Panel Switch Adjustment for W265 and W285" on page 28.

Test 2 - Time Delay Interlock with Metering Pump

Method - Determine that the device does not assume a manually induced Forward Flow position while the metering pump is running.

Procedure - With the system running in Forward Flow, move the control switch to the INSPECT position and observe that the following events automatically occur in sequence:

1. The device immediately moves to the Divert position and the metering pump is turned off.
2. The device remains in the Divert position while the metering pump is running down.
3. After the metering pump stops turning, the device assumes the Forward Flow position.
4. Repeat the above procedure by moving the control switch to the Clean-in-Place (CIP) position.
5. Record the test results and seal the control enclosure.

Corrective Action - If the above sequence of events does not occur, either a timer adjustment or a wiring change is required.

Test 3 - CIP Time Delay Relay

Application - For all high-temperature, short-time pasteurizer systems in which it is desired to run the timing pump and/or other Flow Promoting devices during the CIP cycle.

Frequency - Upon installation and semi-annually thereafter, or whenever the seal on the Time Delay Relay is broken.

Criteria - When the mode switch on the Flow Diversion Device is moved from Process Product to CIP, the Flow Diversion Device shall move immediately to the Divert Flow position and remain in the Divert Flow position for at least 10 minutes before starting its normal cycling in the CIP mode. Simultaneously, the booster pump shall be turned off and shall not run during the 10 minute time delay.

APC Control Panel Switch Adjustment for W265 and W285

The APC control panel is designed to work with two switches in each control head. The control panel originally moved the valve stem down to go to Forward Flow.

The Waukesha Cherry-Burrell W265 raises the stem to go to Forward Flow.

Therefore, the switches shown as MS1 and MS3 in the APC manual are the lower switches in the W265 and MS2 and MS4 are the upper switches in the control head. The lower switches are the indication of seat wear and correct assembly of the valve. These switches should be adjusted first, with the upper switches moved so they do not contact the stem.

Micro Switch indicator stem replacements are required with the APC control panel to allow use of two (2) switches:

4" Actuator - Part number 118942+
5" Actuator - Part number 118943+
6" Actuator - Part number 110901+

Use the electrical schematic shown in Figure 8 on page 12 for connecting control modules to the APC control panel.

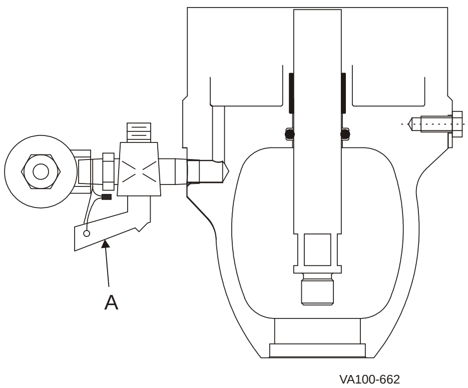


Figure 21: Air Shutoff Valve

NOTE: *Fine adjustment of the up and down position of the switch is made so the test for correct assembly (page 26) can be performed as described.*

Lower Switch Adjustment

1. Actuate the valve to raise the stem
2. Turn the “Air Shutoff Valve” (Figure 21, item A) to lock air in the actuator.
3. Loosen the cap screw (Figure 22, item A) that holds the switch mounting block in position.
4. Move the switch toward the stem until the switch roller is close to breaking the circuit (Figure 23 on page 29).
5. Hand-tighten the cap screw to hold the mounting block and switch in this position.
6. Open the Air Shutoff Valve to release air from the actuator.
7. Move the switch up or down until the roller is in the groove marked “A” (Figure 23 on page 29).
8. Move the switch down in the groove until it is close to breaking the circuit. Tighten the cap screws (Figure 22, item A).

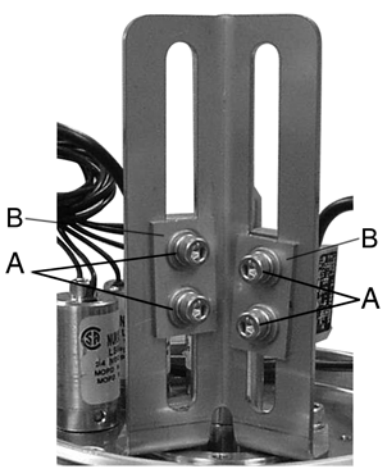


Figure 22: Control Module Detail

Upper Switch Adjustment - Divert Valve

This switch is used to indicate the flush mode. The switch opens the circuit to the divert light. In the Flush mode there will be no divert light and no Forward Flow light. The “no light” condition should exist for only a few seconds while the valve is in Flush mode.

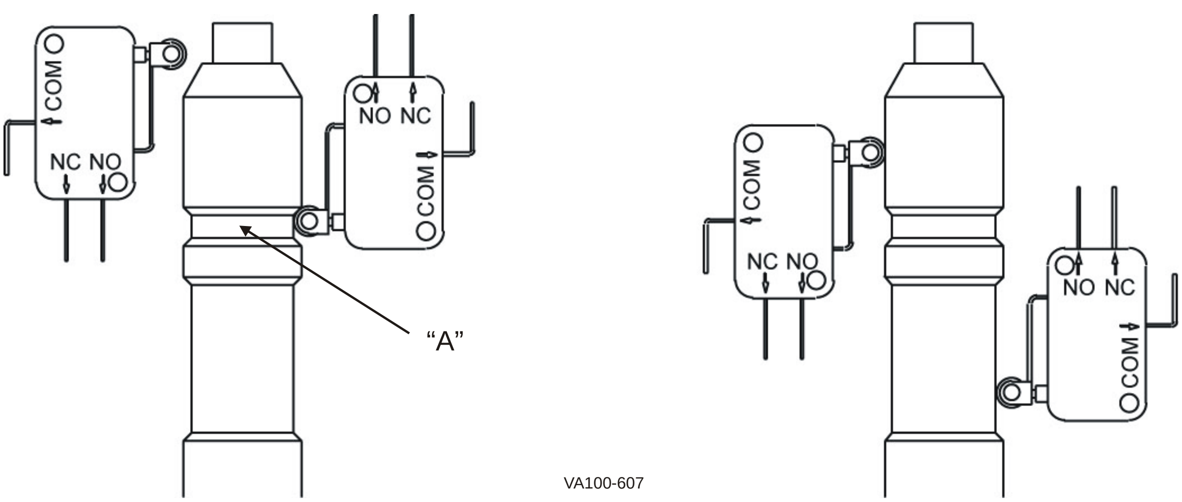
1. Put the valve in Forward Flow mode, stem raised.
2. Loosen the cap screw that holds the switch mounting and block.
3. Move the switch up or down until the switch is just above the notch in the stem (Figure 23 on page 29).

4. Move the switch until the circuit breaks (clicks). Tighten the cap screws to hold the switch in position.
5. Put the valve in Divert mode, stem lowered. Check that the switch roller is resting on or slightly above the 45 degree bevel on top of stem (Figure 23 on page 29).
6. Confirm that the switch is completing the circuit.

Upper Switch Adjustment - Leak Detect Valve

This switch confirms the valve is correctly in the Divert position and also indicates when the valve is in the Forward Flow mode.

1. Put the valve in Forward Flow mode, stem raised. Adjust the switch up or down so the roller rests on the upper part of the stem (Figure 23).
2. Loosen the cap screw which holds the switch mounting block.
3. Move the switch toward the stem until it clicks. *A green light should indicate Forward Flow. Hand-tighten cap screws.*
4. Put the valve in Divert mode, stem lowered.
5. Adjust the switch up or down so the roller is resting on or slightly above the 45 degree bevel on top of stem (Figure 23).
6. Tighten the cap screws to secure the position.

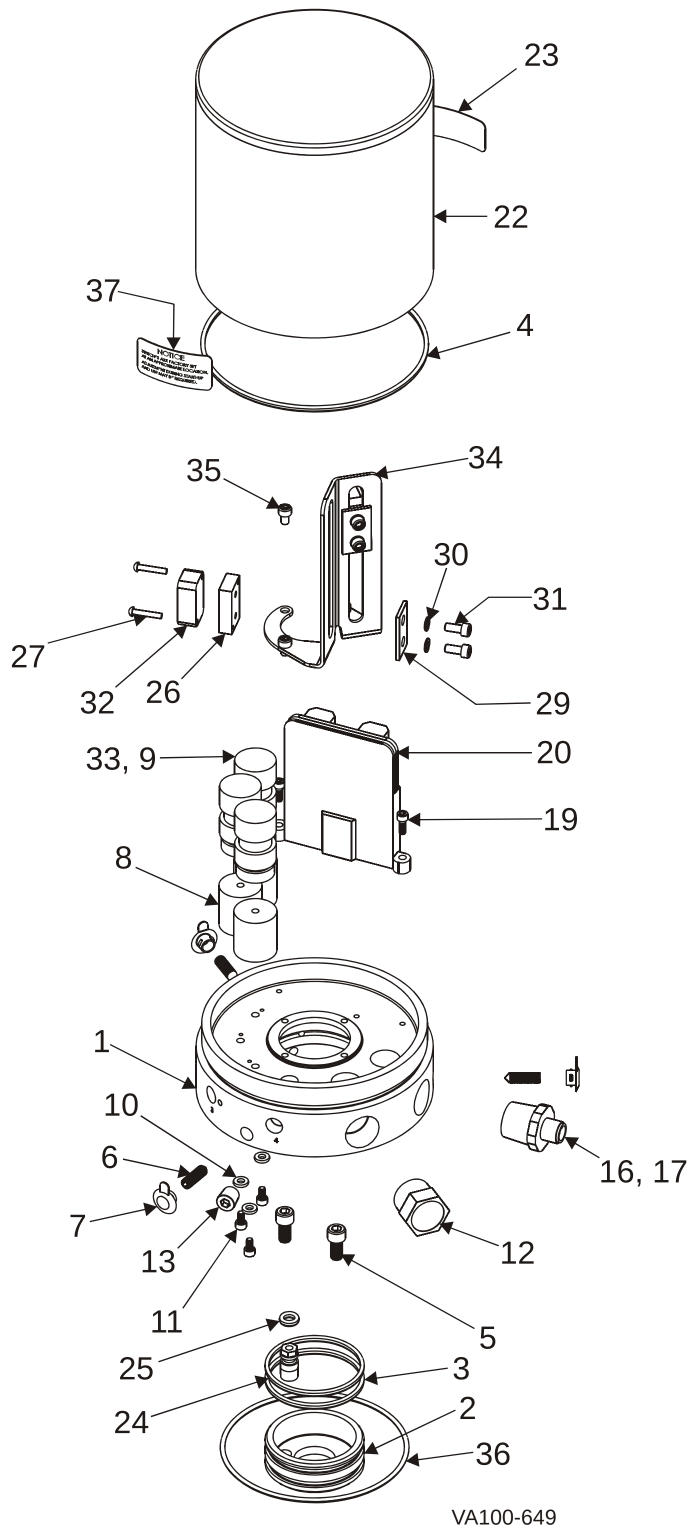


Stem Lowered **Stem Raised**

Figure 23: Groove "A" Location

Parts Lists

W-Series 2 Piece Control Module with Micro Switches



W-Series 2 Piece Control Module with Micro Switches

Item #	Part Description	Part No.	Notes
1	Base - w/ effector Clipp. Solenoid Control Module	119579+	
2	Mounting Cup - Control Module	119557+	
3	O-ring	N70134	
4	O-ring	N70157	
5	SCHS - 1/4-28 x .50", 18-8 SS	119625+	
6	Set Screw - 1/4-20 x .75", 18-8 SS, Cone Point	119624+	
7	Push in Plug w/ Tab, 3/8"	121659+	
8	Booster - Solenoid Valve, Clippard	112467+	4
9	Solenoid Valve - Clippard 24VDC	112468+	
10	Washer - #6 Nylon x .062"	120067+	
11	SHCS - 6-32 x .25", 18-8 SS	119626+	
12	Breather Plug	112470+	
13	Pipe Plug - 1/8-27 NPT	78-73	
14	Nylon Washer #10	17-111	1
15	SHCS - 10-32 x .25", 18-8 SS	30-519	1
16	Pin Connector (Optional) Refer to Wiring Schematics	Varies	
17	Cable Strain Relief	17-88	
18	Terminal Block Assembly	119645+	2
19	SHCS - 6-32 x .375", 18-8 SS	119627+	3
20	Effector AS-I Slave Card (optional)	112469+	
	Device Net Card - Interlink 4 in/4 out (optional)	123648+	
22	Cover Assembly - Standard Control Module	123779+	
	Cover - Long Stroke	119562+	
23	Warning Label ("Disconnect All Power Before Removing")	#######	
24	Vent Plug - Control Module	119599+	
25	O-ring	N70107	
26	Switch Block	116297+	
27	Screw - #4-40 RHMS x .62	30-69	
29	Switch Plate	116296+	
30	Washer Lock, # 8, 18-8 Regular	43-20	
31	SHCS 8-32 x .375 18-8 SS	125719+	
32	Micro Switch	17-9	
33	Solenoid Valve - Numatics 120VAC	122237+	
	Solenoid Valve - Numatics 24VAC	122238+	
	Solenoid Valve - Numatics 24VDC	122239+	
34	Bracket-Micro Switch Mounting	121371+	
35	SHCS 8-32 x .25 18-8 SS	30-176	
36	O-ring	N70044	
37	Label-Switch Adjustment-Rad ("Notice: Switches are factory set at an approximate location. Adjustment during start-up and use may be required.")	112094+	

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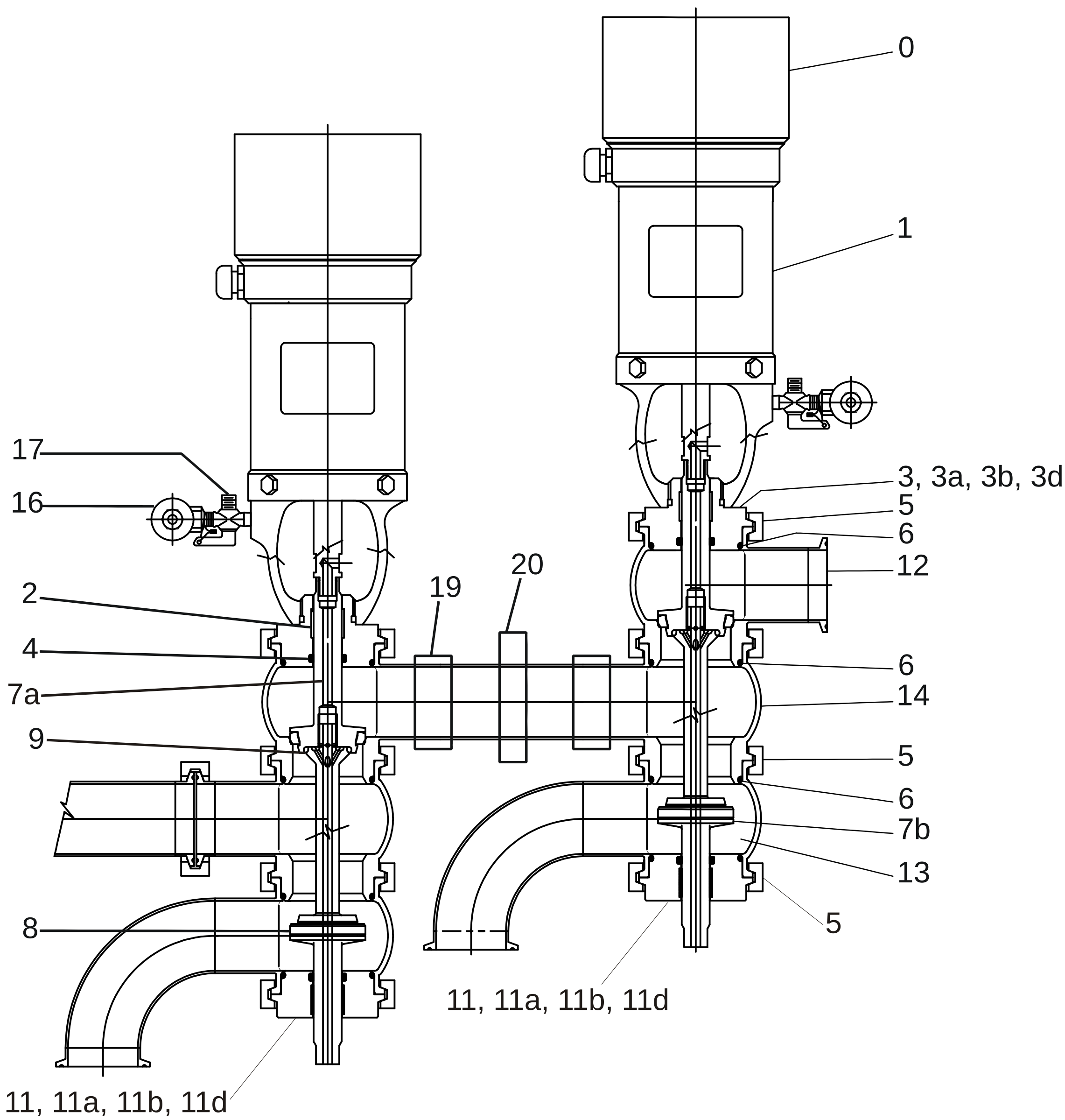
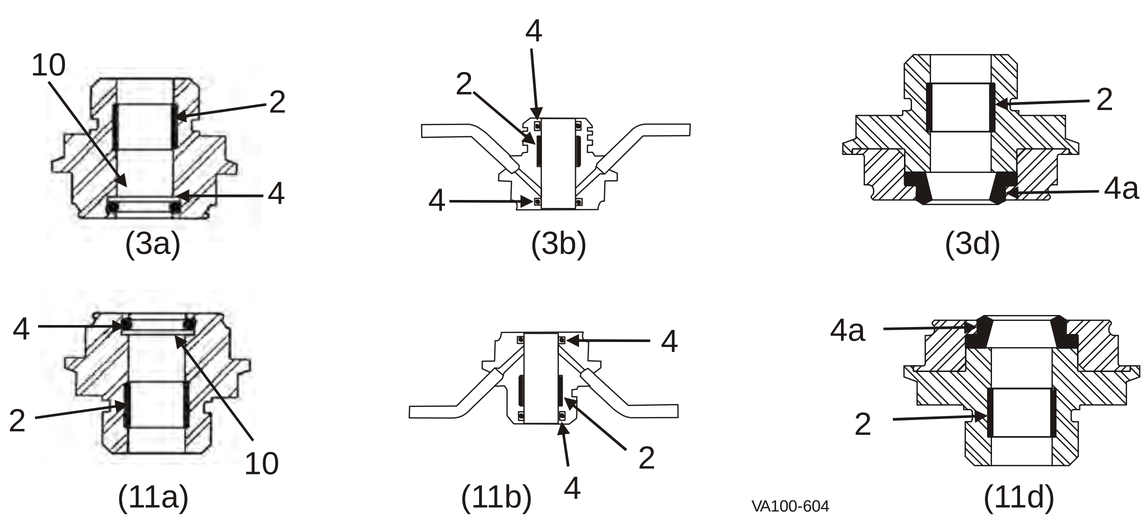
1. Not shown - used to plug hole when solenoid not used.
2. Not shown - used in place of AS-I or Device Net Card.
3. Used for both Terminal Block Assembly and Control Cards.
4. Used only with Clippard Solenoid

W265 / W285 FD HTST Divert Valves





W265 / W285 FD HTST Divert Valve

Item #	Part Description		1"	1-1/2"	2"	2-1/2"	3"	4"
0	Control Top		Contact Factory					
1	Actuator		***					
* **2**	Bearing		102757+					
3	Adapter, Upper - W265 (Std.)		102406+		102407+	102408+	102409+	102410+
3a	Adapter, High Pressure	W265	109293+		109294+	109295+	N/A	N/A
		W285	116925+		116926+	116927+	N/A	N/A
3b	Adapter, Upper - W285[2]		106291+		106292+	106293+	106294+	106295+
3d	Adapter, Upper - Wiping Stem Seal[1]		117879+		117880+	117881+	117882+	117883+
* **4**	O-ring	EPDM	E70210					
		FKM	V70210					
* **4a**	Wiping Stem Seal[1]	EPDM	116183+					
		FKM	115626+					
5	Clamp	Standard	119-30		119-33	119-34	119-51	119-87
		High Pressure[3]	119-271		119-272	119-273	N/A	N/A
* **6**	O-ring, Body	EPDM	E70223		E70228	E70232	E70236	E70244
		FKM	V70223		V70228	V70232	V70236	V70244
* 7a	Stem, Upper (less seat ring)	Tef-Flow™	121963+	121963+	121964+	121965+	121966+	121967+
*		Tri Ring	POA	128178+	127799+	124016+	128347+	128358+
		Metal	POA	POA	131663+	129233+	130984+	POA
7b	Stem, Lower (less seat ring)	Tef-Flow™	121974+	121975+	121976+	121977+	121978+	121979+
		Tef-Flow™ Long Stroke	N/A	N/A	N/A	125952+	125954+	125958+
		Tri Ring	POA	128179+	127800+	124018+	128349+	128360+
		Tri Ring, Long Stroke	N/A	N/A	N/A	POA	POA	POA
		Metal	106286+	106286+	131712+	129232+	130983+	POA
		Metal, Long Stroke	N/A	N/A	N/A	POA	POA	POA
8	Seat Ring	Tef-Flow™ P	115347+		115348+	115349+	115350+	115351+
9	O-ring, Lower Stem	EPDM	E70206		E70215			
		FKM	V70206		V70215			
10	High Pressure Backup Ring		BUR210				N/A	N/A
11	Adapter, Lower - W265 (Std.)		106329+		106240+	106241+	106242+	106243+
11a	Adapter, Lower - High Pressure	W265	103632+		103634+	103635+	N/A	N/A
		W285	116930+		116932+	116933+	N/A	N/A
11b	Adapter, Lower - W285[2]		106328+	106296+	106297+	106298+	106299+	106300+
11d	Adapter, Lower - Wiping Stem Seal[1]		117979+	117980+	117981+	117982+	117983+	117984+
12	Body, Tee	S-Line	104167+	104171+	104175+	104179+	104183+	104187+
		I-Line	104165+	104169+	104173+	104177+	104181+	104185+
13	Body, Lower	S-Line	108851+	109313+	109314+	109315+	109316+	108852+
		I-Line	121215+	121216+	121217+	121218+	121219+	121220+
14	Body, Tee - Joined Upper/Middle		111202+	111203+	111268+	111269+	111270+	111271+
16	Quick Exhaust Valve		5560525+					
17	Air Shut-off		5560639+					
18	Elbow Connector (not shown)		N/A		N/A	5552682+		
19	Hanger		109064+	109241+	109242+	109243+	109244+	109384+
20	High Pressure Clamp		119-270		N/A	N/A	N/A	N/A
21	Gasket - FKM (not shown)		20-62	20-57				

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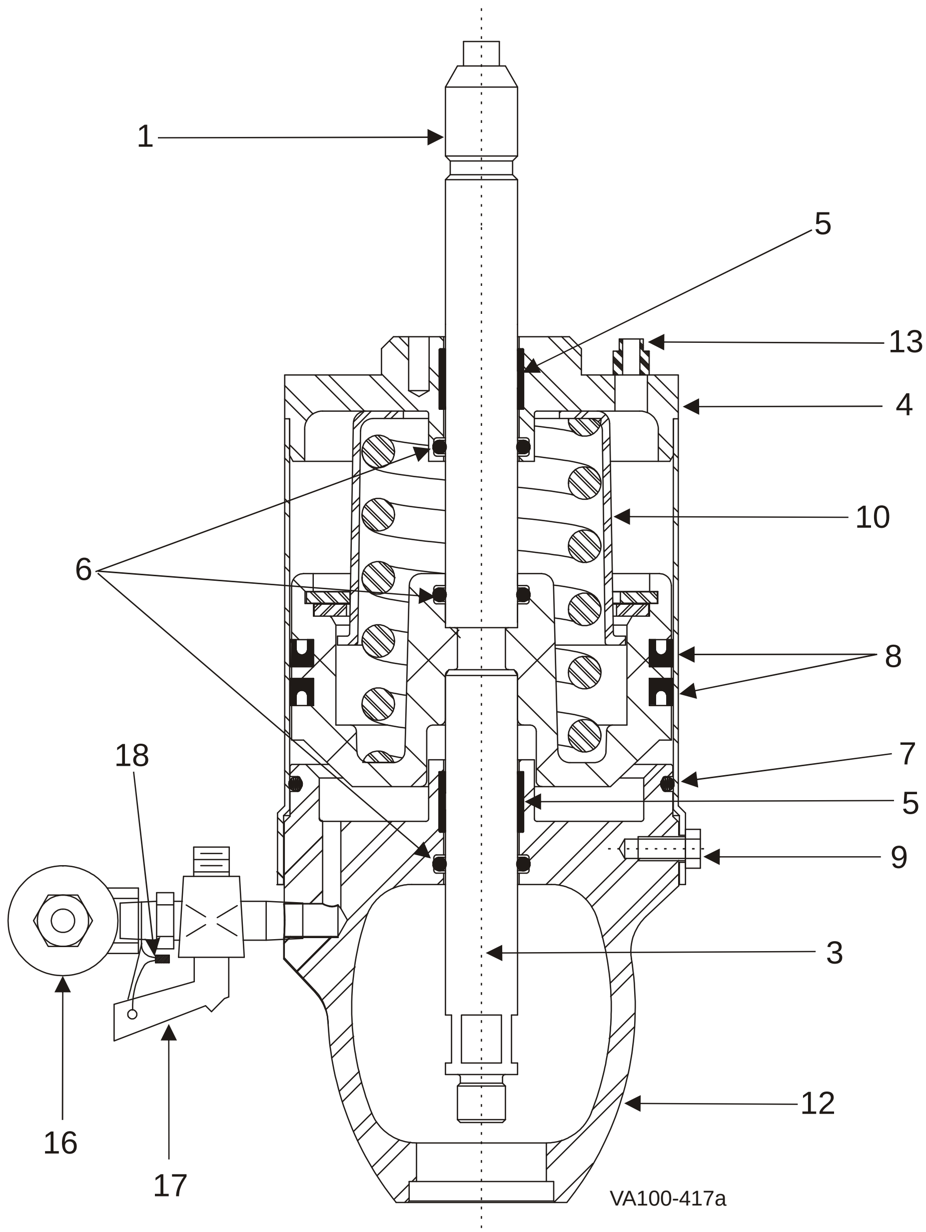
NOTES:

*** Recommended Spare Parts**

*** See actuator part lists

1. Wiping stem seal adapter and wiping stem seal options available for W265 only.
2. W285 adapter allows for liquid or steam flush of stem o-ring.
3. High pressure body clamp only required for valves equipped with high pressure adapter (item 3a).

W265 / W285 4" and 5" Actuators

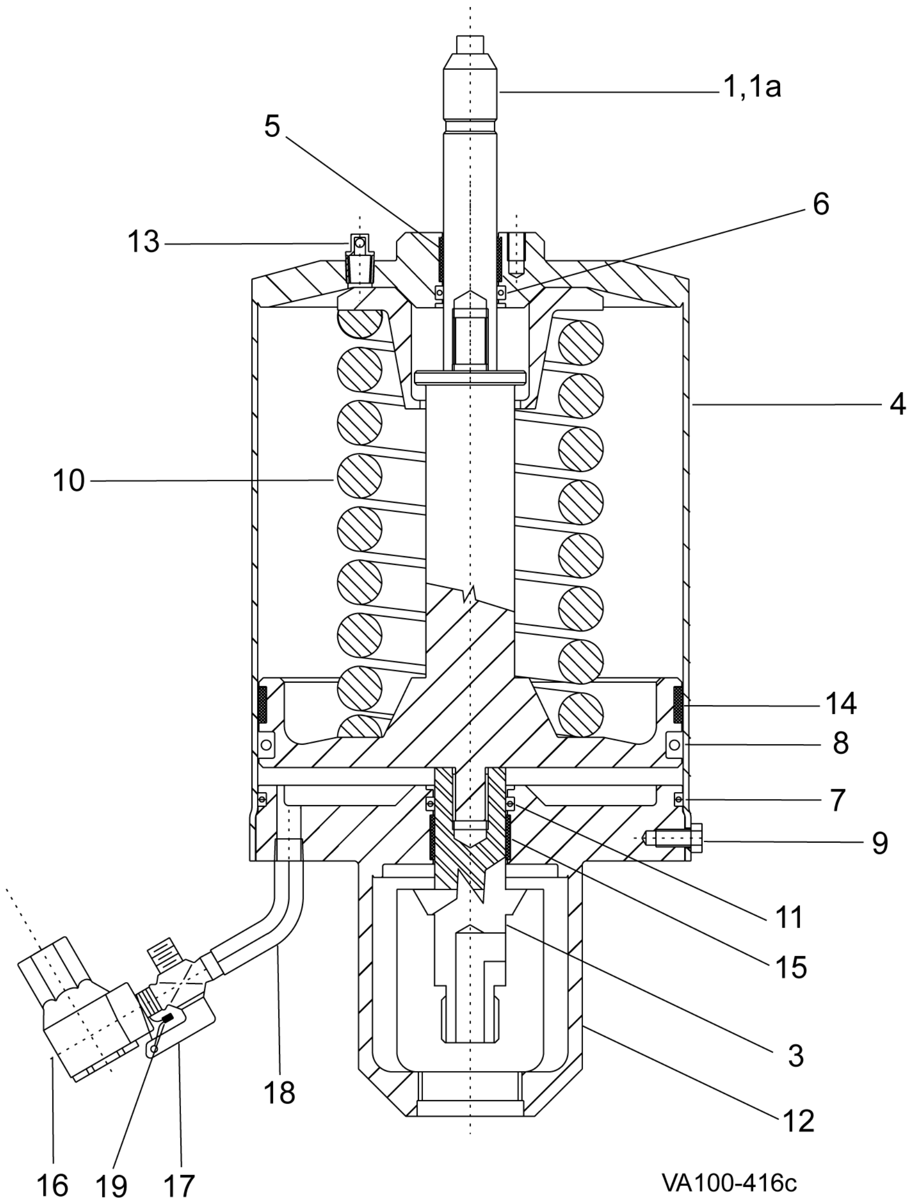


W265 / W285 4" and 5" Actuators

Item #	Part Description	4" QTY	4" Part No.	5" QTY	5" Part No.
1	Stem - Micro Switch Indicator	1	118940+	1	118941+
3	Stem - Lower	1	122529+	1	122530+
4	Cylinder	1	102136+	1	102130+
5	Bearing	2	102757+	2	102757+
6	O-ring - Stem	3	N70210	3	N70210
7	O-ring - Cylinder	1	N70240	1	N70248
8	Seal - U-cup	2	57-15	2	57-13
9	Capscrew - 1/4-20 x 3/8"	4	30-68	6	30-68
10	Piston & Spring Assembly Standard Spring	1	118144+	1	118145+
	Heavy Duty Spring	1	118146+	1	118147+
12	Yoke	1	102137+	1	102131+
13	Plug - Vent	1	3023957+	1	3023957+
16	Quick Exhaust Valve	1	5560525+	1	5560525+
17	Air Shutoff Valve	1	5560639+	1	5560639+
18	Wire-Seal	1	5512368+	1	5512368+

PL5027-CH69

W265 / W285 6" Actuator



W265 / W285 6" Actuator

Item #	Part Description	6" QTY	6" Part No.
1	Stem - Microswitch Indicator	1	110899+
3	Stem - Lower	1	122551+
4	Cylinder	1	106007+
5	Bearing - Upper Stem	1	102757+
6	O-ring - Upper Stem	1	N70210
7	O-ring - Cylinder	1	N70255
8	O-ring - Piston	1	N70433
9	Capscrew - 1/4-20 x 3/8"	8	30-68
10	Piston and Spring Assembly Light Spring	1	110288+
	Standard Spring	1	108832+
11	O-ring - Lower Stem	1	N70214
12	Yoke	1	108827+
13	Plug - Vent	1	3023957+
14	Bearing - Piston	1	102052+
15	Bearing - Lower Stem	1	106047+
16	Quick Exhaust Valve	1	5560525+
17	Air Shutoff Valve	1	5560639+
18	Elbow Connector	1	5552682+
19	Wire-Seal	1	5512368+

PL5027-CH70

Optional Tools

Tef-Flow™ P Tools		1" 25 mm	1-1/2" 40 mm	2" 50 mm	2-1/2" 65 mm	3" 80 mm	4" 100 mm	6" 150 mm
A	Seat Ring Tool	115654+	115654+	115655+	115656+	115657+	115658+	117955+
B	Base	115653+	115653+	115653+	115653+	115653+	115653+	115653+

PL5027-CH66

Troubleshooting

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Leakage		
Leakage from inside port with valve closed	Seat ring failure	Replace seat rings.
	Debris trapped in valve seats	Remove valve from service. Inspect and replace seat as needed.
	Seat ring not on valve body seat	Check actuator for function.
	Stem loose	Tighten actuator stems. Tighten valve stem to actuator stem in yoke.
	Actuator loose at adapter	Remove body and stem. Tighten adapter as needed.
Leakage around yoke	Internal stem adapter o-ring failure	Replace o-ring.
	External body adapter o-ring failure	Replace o-ring.
Operation		
Valve fails to open	Air pressure too low	For 4” (101 mm), 5” (127 mm) and 6” (152 mm) light spring actuators, set air pressure to 60 psi (4 bar). For 6” (152 mm) standard spring actuators, set air pressure to 80 psi (6 bar).
	Control failure	Check control sequence.
		Check control wiring and power source.
Valve fails to close	Control failure	Check control sequence.
		Check air supply.
		Check for loose stems.
		Check control wiring and power source.
	Debris trapped in valve seat	Remove valve from service. Inspect and replace seat as needed.
Actuator moves when valve opens	Clamp loose	Tighten clamp with valve open.
	Yoke loose	Tighten yoke to adapter by turning actuator.
Slow valve operation	Air not exhausting fast enough	Install quick exhaust.
		Move solenoid closer to valve or install in control top.
	Valve not opening fast enough	Use a bigger diameter air line.
Electrical		

For control top information, please refer to publication 95-03083 (2-piece) or 95-03077 (3-Piece (obsoleted)). For additional product information, please see our web site at www.spx.com/en/waukesha-cherry-burrell/resources/product-literature.

W265 / W285 FD
HTST Divert Valves

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