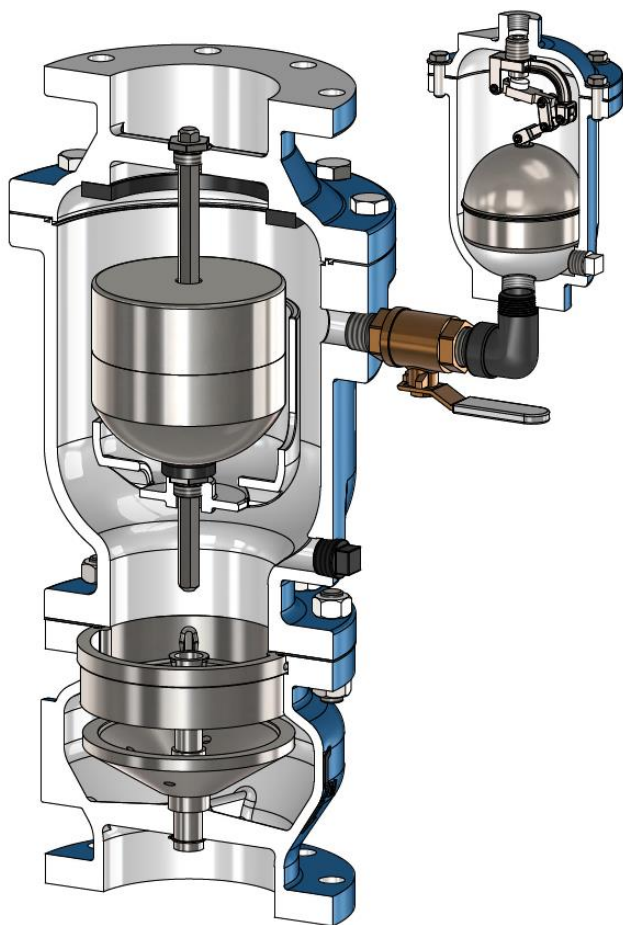


APCO AVV-1800/1800K DUAL BODY COMBINATION AIR VALVES WITH CSV SURGE CHECK VALVE



Instruction **D12025**
March 2023

Instructions

These instructions are for use by personnel who are responsible for the installation, operation and maintenance of DeZURIK valves, actuators or accessories.

Safety Messages

All safety messages in the instructions are identified by a general warning sign and the signal word CAUTION, WARNING or DANGER. These messages indicate procedures to avoid injury or death.

Safety label(s) on the product indicate hazards that can cause injury or death. If a safety label becomes difficult to see or read, or if a label has been removed, please contact DeZURIK for replacement label(s).

⚠WARNING

Personnel involved in the installation or maintenance of valves should be constantly alert to potential emission of pipeline material and take appropriate safety precautions. Always wear suitable protection when dealing with hazardous pipeline materials. Handle valves which have been removed from service with suitable protection for any potential pipeline material in the valve.

Inspection

Your DeZURIK product has been packaged to provide protection during shipment; however, items can be damaged in transport. Carefully inspect the unit for damage upon arrival and file a claim with the carrier if damage is apparent.

Parts

Replaceable wear parts are listed on the assembly drawing. These parts can be stocked to minimize downtime. Order parts from your local DeZURIK sales representative or directly from DeZURIK. When ordering parts please provide the following information:

If the valve has a data plate: please include the 7-digit part number with either 4-digit revision number (example: 9999999R000) or 8-digit serial number (example: S1900001) whichever is applicable. The data plate will be attached to the valve assembly. Also, include the part name, the assembly drawing number, the balloon number and the quantity stated on the assembly drawing.

If there isn't any data plate visible on the valve: please include valve model number, part name, and item number from the assembly drawing. You may contact your local DeZURIK Representative to help you identify your valve.

DeZURIK Service

DeZURIK service personnel are available to maintain and repair all DeZURIK products. DeZURIK also offers customized training programs and consultation services. For more information, contact your local DeZURIK sales representative or visit our website at DeZURIK.com.

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Description

The APCO AVV-1800 Dual Body Combination Air Valve with CSV Surge Check Valve consists of an Air/Vacuum Valve piped to an Air Release Valve and mounted on top of a Surge Check Valve.

The AVV-1800 and AVV-1800K are functionally the same. The AVV-1800 with optional CSV Surge Check ships fully assembled from the factory. The AVV-1800K with optional CSV Surge Check ships with the Air/Vacuum Valve assembled with the Surge Check Valve and a separate Air Release Valve and piping kit. The customer will pipe the Air Release Valve to the Air/Vacuum Valve.

The CSV Surge Check Valve is designed to eliminate critical shock conditions occurring in installations where the operating conditions cause a regular air valve to slam closed. This slow closing feature protects the Air/Vacuum valve and also prevents the Air/Vacuum valve from creating a surge in the pipeline by slamming shut.

The APCO AVV-1800 Dual Body Combination Air Valve should always be installed in a vertical position. An isolation valve between this unit and the transmission (pipeline) system is recommended. Where to use:

- High points in pipelines where the hydraulic gradient and flow conditions are such that a negative pressure can possibly occur.
- High points on sections of pipeline having water velocities in excess of 10 ft/s (3.1 m/s).
- Adjacent to any quick closing valve in a pipeline such as a check or gate valve where vacuum can occur upon closure.
- On the discharge of larger deep well turbine pumps between the pump and the check valve.
- If an Air/Vacuum Valve is to be installed inside a pump house, use threaded or flanged connections and pipe back into the well or to outside. This will greatly muffle the high noise level caused by the air being discharged and provide for drainage of any small amount of water or water vapor that may accumulate.

Handling and Storage

NOTICE

Lifting the valve improperly may damage it. Do not fasten lifting devices to piping, or attached components. Lift the valve with slings, chains, or cables fastened around the valve body, or fastened to bolts or rods through bolt holes in the flanges.

If installation will be delayed, refer to **Form 1454 – Recommended Long & Short-Term Storage Procedures**

Installation

- Before installation, remove foreign material such as weld spatter, oil, grease, and dirt from the pipeline.
- Prepare pipe ends and install valves in accordance with the pipe manufacturer's instructions for the joint used.
- Tighten the flange bolts or studs in a crisscross pattern and minimum of four stages.

Fusion Bonded Epoxy Coated Valves

NOTICE

Valves with fusion bonded epoxy coated exterior paint require flat washers to be installed under the flange nuts when installing the valve to the pipeline flange to prevent the coating from cracking or chipping.

AVV-1800K Assembly

⚠WARNING

Assembling the Combination Valve incorrectly or while not wearing appropriate Personal Protective Equipment (PPE) can cause personal injury. In addition, when lifting, use appropriate lifting hooks/straps to avoid personal injury.

NOTICE

Do not deflect the piping joints. While applying torque to tighten components, minimize bending stresses in the piping kit components.

For the AVV-1800K, assemble the valves together as stated below:

1. Place the fully assembled AVV (Air/Vacuum Valve) on a flat surface.
2. Locate piping kit shipped with the valves.
3. **For 1-3" (25-80mm) AVV-140/140H Only:**

See Figures 1, 2, and 3 for part identification.

- a. Remove **ONLY** the pipe plug (A25) in the side of body (A01) if applicable.
 - i. **DO NOT remove pipe plug (A25) in the cover (A02).**
- b. Apply thread sealant to the threads in the port on the side of the body (A01).
- c. Apply Teflon tape to the threads on the nipple (P6).
- d. Thread the nipple (P6) into the side port of the body (A01).
- e. Apply thread sealant to the threads in the elbow (P7).
- f. Thread the elbow (P7) onto the nipple (P6).
- g. Using a wrench, tighten the elbow (P7) until secure and until the elbow is orientated vertically with the exposed threads toward the top.
- h. Apply Teflon tape to the threads on the outside of the elbow (P7).
- i. Apply thread sealant to the threaded inlet of the Air Release Valve.
- j. Thread the inlet of the fully assembled Air Release Valve onto the elbow (P7).
- k. Using a chain wrench, tighten the Air Release Valve until secure.

AVV-1800K Assembly (Continued)**4. For 4-18" (100-450mm) AVV Only:**

See Figures 1, 4, 5, 6, and 7 for part identification.

For information regarding larger Air/Vacuum Valves, contact your local DeZURIK sales representative.

- a. Remove **ONLY** the upper pipe plug (A44) in the side of the body (A01) if applicable.
 - i. **DO NOT remove the lower pipe plug (A44) in the side of the body (A01).**
 - b. Apply thread sealant to the threads in the upper port on the side of the body (A01).
 - c. Apply Teflon tape to the threads on the nipple (P5).
 - d. Thread the nipple (P5) into the side port of the body (A01).
 - e. Apply thread sealant to the threads in the ball valve (P8).
 - f. Thread the ball valve (P8) onto the nipple (P5).
 - g. Using a wrench, tighten the ball valve (P8) until secure and until the handle is positioned toward the side or bottom (**NOTE: The handle will be in the way if it is on top.**)
 - h. Apply Teflon tape to the threads on the nipple (P6).
 - i. Thread the nipple (P6) into the ball valve (P8).
 - j. Apply thread sealant to the threads in the elbow (P7).
 - k. Thread the elbow (P7) onto the nipple (P6).
 - l. Using a wrench, tighten the elbow (P7) until secure and until the elbow is orientated vertical with the exposed threads toward the top.
 - m. Apply Teflon tape to the threads on the outside of the elbow (P7).
 - n. Apply thread sealant to the threaded inlet of the ARV Air Release Valve.
 - o. **For the ARV-200 Air Release Valve Only:**
 - i. Apply Teflon tape to the threads on the outside of the reducer bushing (P9).
 - ii. Thread the reducer bushing (P9) into the inlet of the ARV 200.
 - iii. Using a wrench, tighten the reducer bushing (P9) until secure.
 - iv. Apply thread sealant to the threads on the inside of the reducer bushing (P9).
 - p. Thread the inlet of the fully assembled ARV Air Release Valve onto the elbow (P7).
 - q. Using a chain wrench, tighten the ARV Air Release Valve until secure.
5. Test the unit according to number 9 of the assembly procedure in the Maintenance section.

Maintenance

The APCO AVV-1800/1800K Dual Body Combination Air Valve with optional CSV Surge Check Valve is automatic in operation and requires very little maintenance. It should always be installed in a vertical position.

A semi-annual visual inspection for leakage is recommended. A malfunction of the Air/Vacuum Valve and Air Release Valve can be identified by the seepage of water through the exhaust port, while malfunction of the Surge Check Valve would be a substantial amount of spillage through the Air/Vacuum exhaust port during pump start-up. Should a malfunction occur, the following steps should be taken to repair the valve.

Disassembly Procedure

AVV- 140 and 140H Valve 1-3" (25-80mm)

See Figure 1 and Figure 2 for part identification.

▲WARNING

Servicing the Air Valve while the pipeline is under pressure can cause personal injury or equipment damage. Relieve pipeline pressure or shut off isolation valve before servicing the Air Valve.

1. Relieve pipeline pressure or shut off isolation valve on inlet pipe.
-

▲WARNING

Do not completely remove pipe plug or cover screws while the valve is under pressure.

2. Loosen pipe plug in cover (A02) to relieve internal pressure. Do not completely remove pipe plug (A02) while the valve is under pressure.
3. Inspect exhaust port on top. If any foreign matter or dirt is preventing float (A14) from seating properly against the seat (A06), clean or replace as necessary.
4. Perform a seat test: Replace pipe plug or tighten cover screws (A04) diagonally on size ½" and slowly fill valve chamber by cracking open isolation valve on inlet pipe. If seepage persists, repeat steps 1 and 2 and proceed as follows:
5. Remove cover screws (A04) and cover (A02) with all the internal components together from the valve body (A01).

Maintenance (Continued)**AVV-150 Air/Vacuum Valve 4-18" (100-450mm) Disassembly**

See Figure 4 for part identification.

▲WARNING

Servicing the Air/Vacuum Valve while the pipeline is under pressure can cause personal injury or equipment damage. Relieve pipeline pressure or shut off isolation valve before servicing the Air/Vacuum Valve.

-
1. Relieve pipeline pressure or shut off isolation valve at inlet to Air/Vacuum Valve before servicing the Air Valve.

▲WARNING

Do not completely remove pipe plugs or cover bolts while the valve is under pressure.

-
2. Slowly remove pipe plug near inlet of valve body (A01) to relieve internal pressure and to drain the unit.
 3. Check to see if foreign matter or dirt is preventing float (A14) from seating properly against seat (A06). Clean as necessary.
 4. Perform a seat test. Replace pipe plug and slowly fill valve chamber by cracking open isolation valve on inlet pipe. If seepage persists, repeat Steps 1 and 2 and proceed as follows:
 5. Remove cover bolts (A04) and cover (A02).
 6. Remove seat screws (A16/A34) and remove seat (A06) from cover (A02).
 7. Inspect seat (A06) and float (A14) seating surfaces for damage. Replace if necessary.
 8. Inspect all other parts of the valve such as guide bushings (A26 & A43), bumper (A40), and float guide (A33) if applicable. Replace if necessary.

ARV-50A/200A/200 Air Release Valve Disassembly

See Figures 5, 6, and 7 for part identification.

1. Remove cover bolts (R04) and cover (R02) from the valve body (R01).
Note: All internals are attached to the cover.
2. If cover gasket (R03) is torn or damaged, clean flange surfaces of cover (R02) and body (R01).
3. Clean and inspect all components attached to the cover (R02).
4. Inspect float (R10/R14) for the presence of water inside float. Replace float if damaged.

Maintenance (Continued)

CSV Surge Check Valve Disassembly

See Figures 1, 2, 3, and 8 for part identification.

Replacement parts are not available for the 1-2" (25-50mm) CSV-1600A Surge Check Valves. It is recommended to replace the complete valve (see Figure 9 for identification).

For CSV Surge Check Valves 3" (80mm) and larger, continue onto step 5:

5. Remove studs (P2) and nuts (P3) and remove Air/Vacuum Valve body (A01) from Surge Check Valve body (S01).
6. Loosen seat retaining screw (S07), located on the face of seat (S02).
7. Remove plug (S03), retaining ring (S06) and bushing (S05) from body (S01).
8. Clean all surfaces before re-assembly. Replace all defective parts.

Assembly Procedure

CSV Surge Check Valves Assembly

See Figures 1, 2, 3, and 8 for part identification.

Replacement parts are not available for the 1-2" (25-50mm) Surge Check Valves. It is recommended to replace the complete valve.

For CSV-1600A Surge Check Valves 3" (80mm) and larger, continue onto step 1:

1. Install the parts inside the body (S01) in the following order:
 - a. Bushing (S05) at the center of the hub.
 - b. Plug (S03) with the concave side facing upward.
 - c. Seat (S02). Tighten seat retaining screw (S07) when flush with flange face.
2. If gasket (P1) is damaged, install new gasket making sure gasket fully covers the seat (S02) face.
3. Assemble Air/Vacuum Valve body (A01) to Surge Check Valve body (S01).

Maintenance (Continued)***ARV-50A/200A/200 Air Release Valve Assembly***

See Figures 5, 6, and 7 for part identification.

4. Assemble cover (R02) and attached components to body (R01), installing new gasket (R03) if necessary. Tighten bolts (R04) opposite each other in rotation.

AVV-150 Air/Vacuum Valves 4-18" (100-450mm) Assembly

See Figure 4 for part identification.

1. Clean surface of recess in cover (A02) and install seat (A06) with seat screws (A16).
2. Install bumper (A40) and float (A14) in place.
3. Assemble cover (A02) and gasket (A03) to body (A01). Tighten cover screws (A04) alternating in a crisscross pattern.
4. Install and secure pipe plug (A44) and move onto step 12 to perform a seat test.

AVV-140/140H Air/Vacuum Valves 1-3" (25-80mm) Assembly

See Figures 2 and 3 for part identification.

5. Install float (A14) and baffle plug (A41) if included with float guide (A33) to baffle (A24).

For 3" valve size: Secure float (A14) together with float guide (A33) to the baffle (A24) with float bushing (A26).

6. Install seat (A06) to cover (A02).
7. With cover (A02) lying upside down on a level work bench, set the baffle assembly created in steps 1 & 2 in cover (A02). Align and match screw holes through the baffle (A24), seat (A06), and cover (A02), by inserting and turning baffle screw (A34) with fingers.
8. Before tightening baffle screws (A34) with an open (box) wrench, position baffle (A24) by allowing float (A14) to center perfectly in the seat (A06), then tighten baffle screws (A34) alternating in a crisscross pattern.
9. If water diffuser is required, remove baffle plug (A41) with the float guide (A33) and slip the water diffuser around the baffle (A24). Then secure float (A14) and water diffuser to baffle (A24) with baffle plug (A41) and float guide (A33).

For 3" valve size: Remove float guide (A33) and slip water diffuser around the baffle (A24). Then secure float (A14) and water diffuser in place with the float guide (A33).

10. Install new cover gasket (A03) and set cover (A02) assembly to the body (A01), then tighten cover screws (A04) alternating in a crisscross pattern.
11. Install and secure pipe plug (A25) and move onto step 12 to perform a seat test.

Testing

See Figures 2-6 for part identification.

12. Perform a seat test. Restore pipeline pressure and slowly fill the Air/Vacuum valve chamber by cracking open the isolation valve below Air/Vacuum Valve. If seepage occurs once the float (A14) or needle (R07) is in contact with the seat (A06/R06), reference to the "Disassembly Procedure" and replace seat, needle, and/or float.
13. If there is no seepage during the seat test, fully open isolation valve.

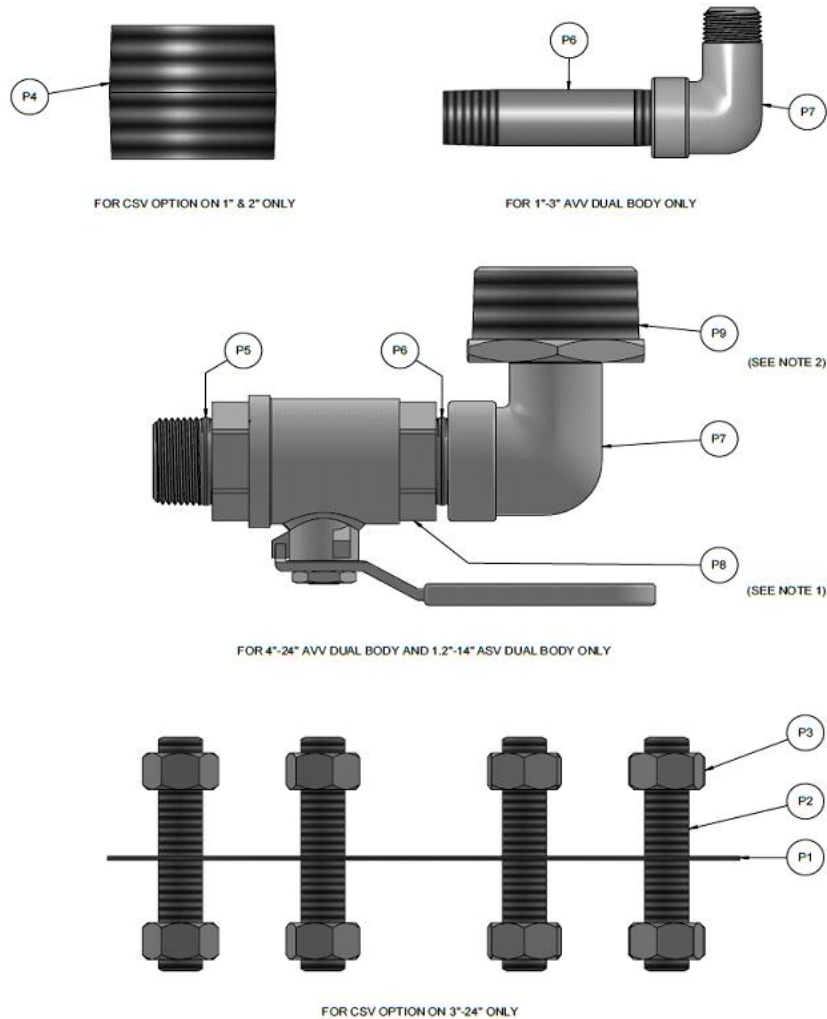
Operation

Combination Air Valves prevent accumulation of air at high points within a system by exhausting large volumes of air as the system is filled and releasing accumulated pockets of air while the system is operational and under pressure. They also prevent potentially destructive vacuums from forming by admitting large quantities of air into the system caused by power outage, water column separation or sudden rupture of the pipeline. Additionally, these valves allow the system to be easily drained because air will re-enter as needed.

The Surge Check Valve operates on the interphase between the kinetic energy in the relative velocity flows of air and water. The Surge Check is a normally open valve which air passes through unrestricted. When water rushes into the Surge Check Valve, the disc begins to close and reduces the rate of flow of water into the air valve by means of throttling holes in the disc. This ensures normal gentle closing of the Air/Vacuum Valve regardless of the initial velocity flows involved and minimizes pressure surges when the valve closes.

As soon as the Air/Vacuum Valve is closed, the pressure on both sides of the Surge Check Valve disc equalizes and the disc automatically returns to the open position. This means the Air/Vacuum Valve does not need an incipient vacuum to open, but can open at any time the water level drops and line pressure approaches atmospheric. This allows immediate full re-entry flow of air into the pipeline before a vacuum can form. The Air Release Valve is a hydro-mechanical device that automatically vents small pockets of air as they accumulate at high points in a system while operating under pressure.

Drawings

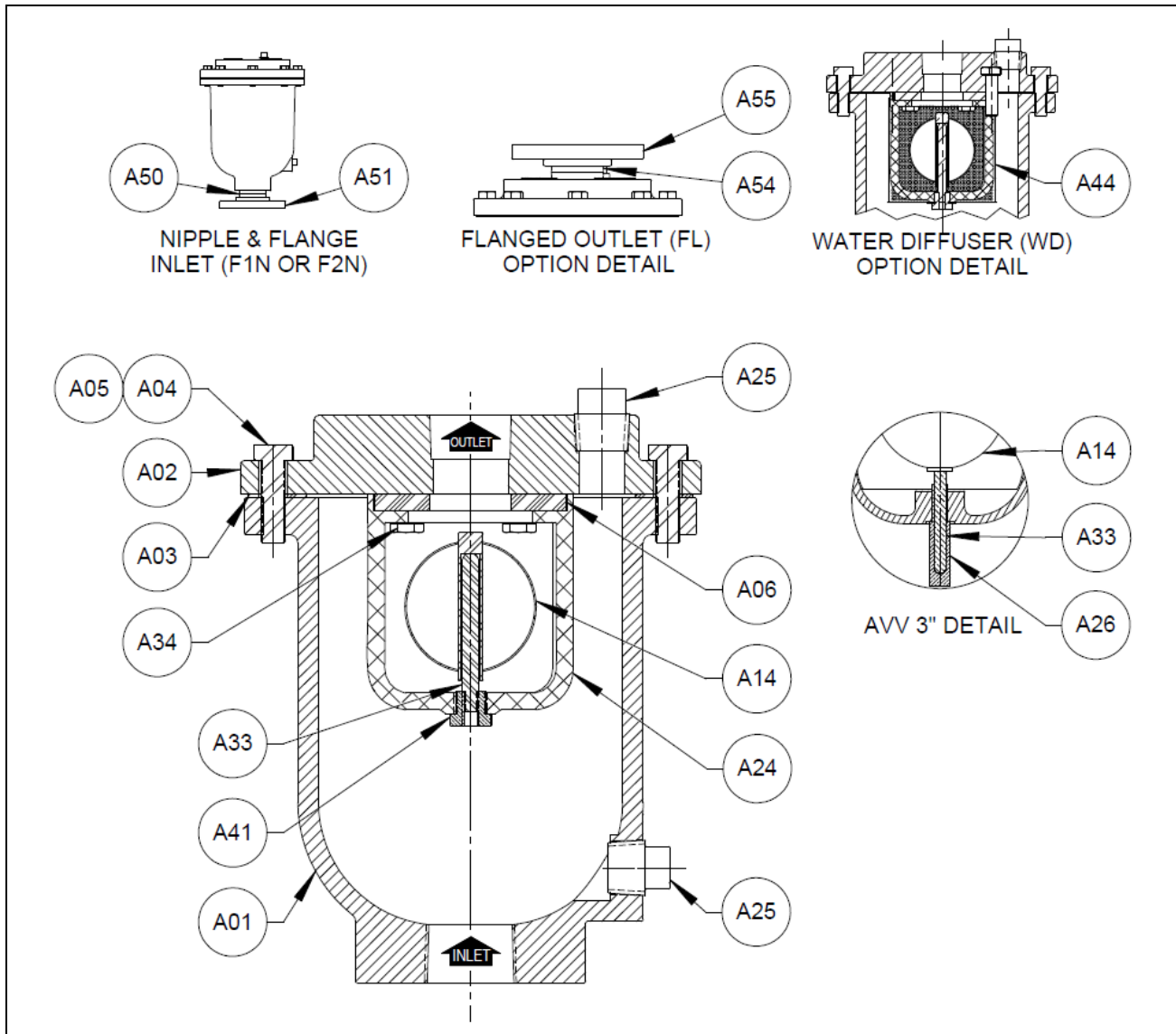


Item No.	Description
P1	Gasket
P2	Threaded Rod
P3	Nut
P4	Nipple
P5	Nipple
P6	Nipple
P7	Elbow
P8	Ball Valve or Gate Valve (See Note 1)
P9	Reducer Bushing (See Note 2)

Notes:
 1.) A ball valve is used for clean water and a gate valve is used for sewage valves.
 2.) The reducer bushing is only used when the ARV 200 is used.

Figure 1: Connecting Parts for Dual Body AVV with CSV

Drawings (Continued)

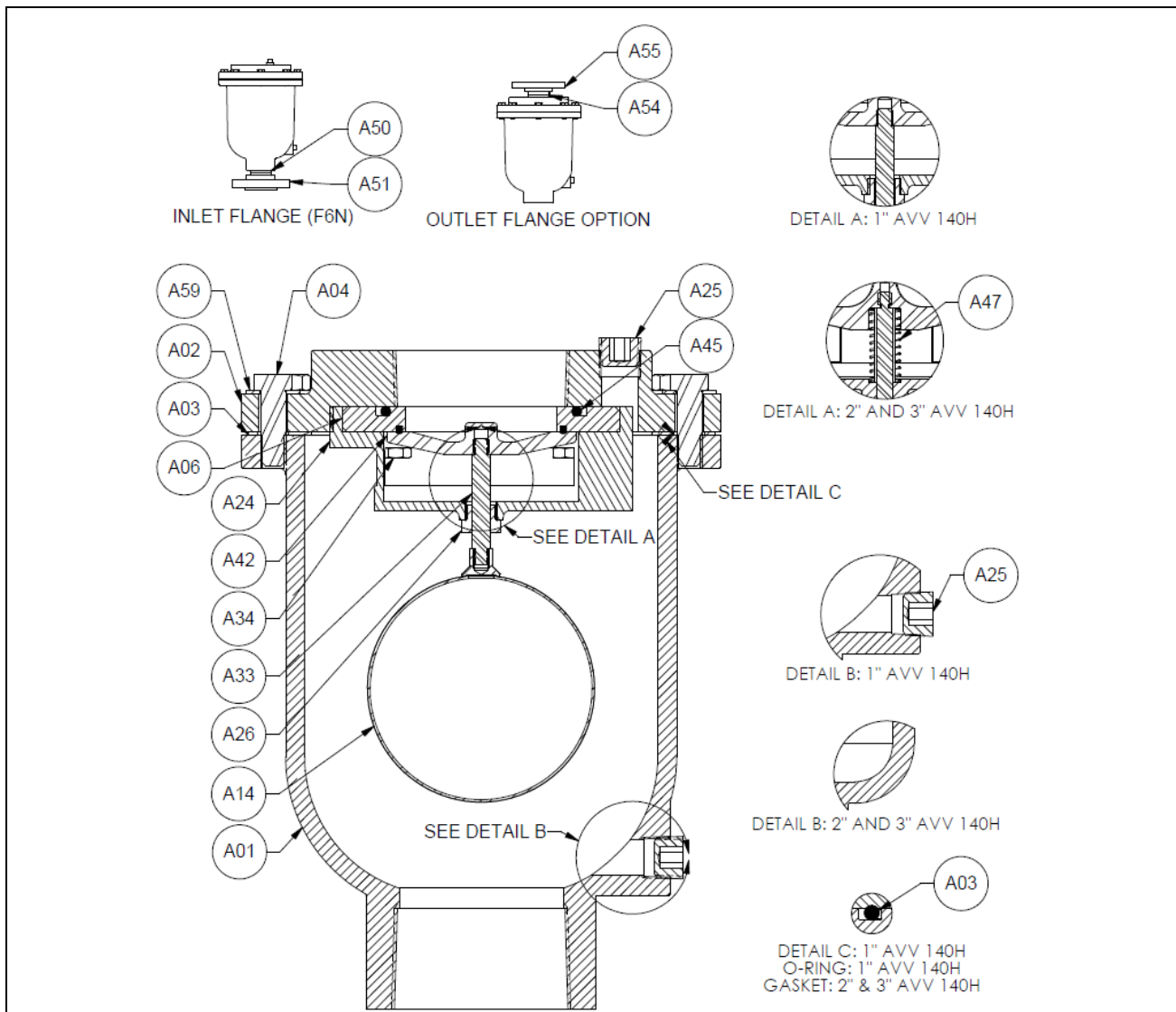


Part No.	Description
A01	Body
A02	Cover
A03	Cover Gasket
A04	Cover Bolts
A05	Washer
A06	Seat

Part No.	Description
A26	Float Bushing
A33	Float Guide
A34	Baffle Screws
A41	Baffle Plug
A44	Water Diffuser (WD Option)
A50	Inlet Nipple (F1N/F2N Only)
A51	Inlet Flange (F1N/F2N Only)
A54	Outlet Nipple (FL Only)
A55	Outlet Flange (FL Only)

Figure 2: AVV-140 0.5-3" (15-80mm) Air/Vacuum Valve

Drawings (Continued)

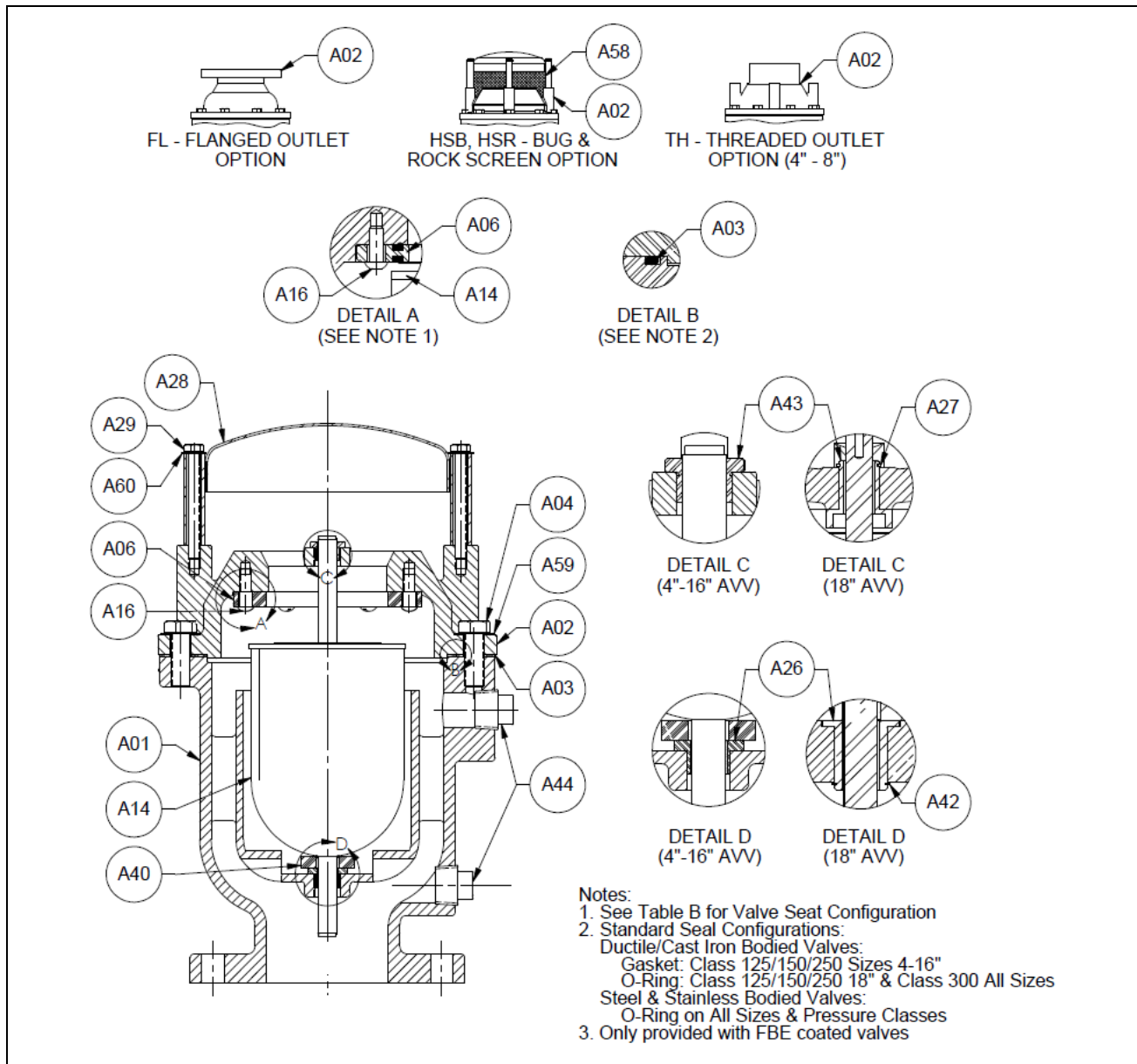


Part No.	Description
A01	Body
A02	Cover
A03	Cover Gasket / O-Ring
A04	Cover Bolt
A06	Seat
A14	Float Assembly
A24	Baffle
A25	Pipe Plug
A26	Bushing Guide
A33	Float Guide

Part No.	Description
A34	Baffle Screw
A42	Seat Plug
A45	O-Ring Seal
A47	Compression Spring (2" & 3" Only)
A50	Nipple
A51	Inlet Flange
A54	Nipple
A55	Outlet Flange
A59	Washer

Figure 3: AVV-140H 1-3" (25-80mm) Air/Vacuum Valve for High Pressure Service

Drawings (Continued)

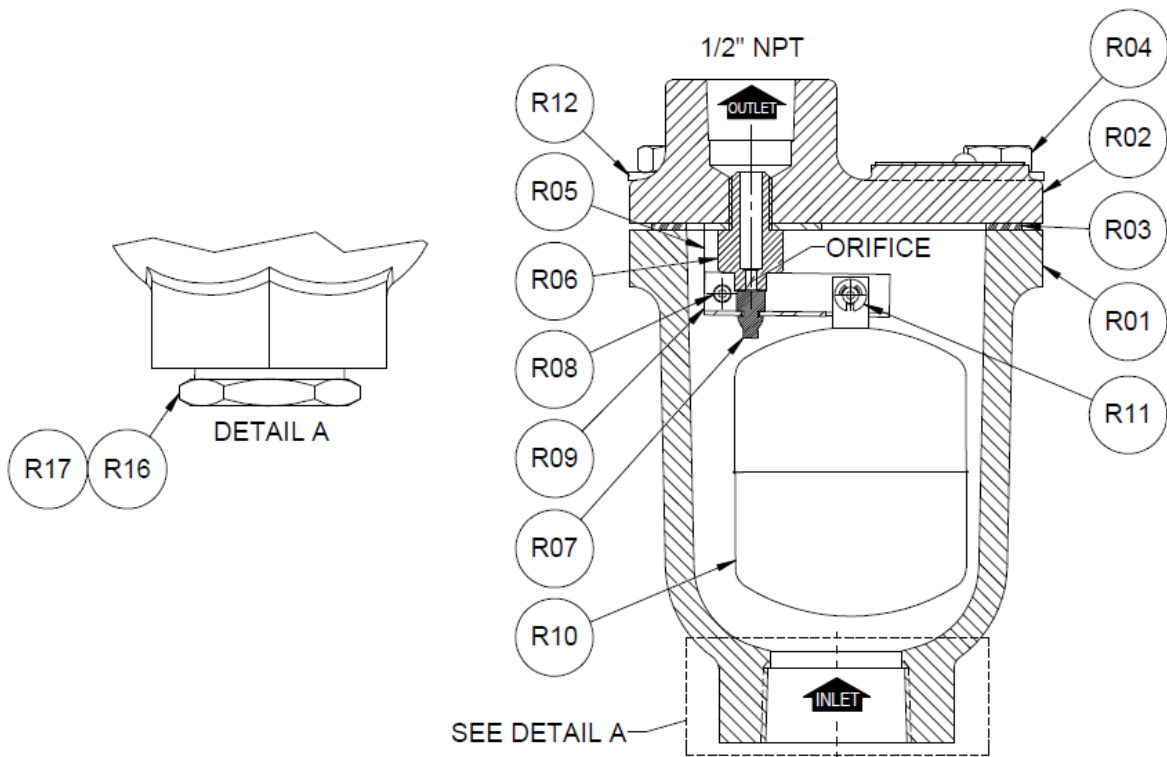


Part No.	Description
A01	Body
A02	Cover
A03	Cover Gasket / O-Ring
A04	Cover Bolts
A06	Seat
A14	Float
A16	Seat Screws
A26	Lower Float Guide Bushing
A27	Upper Retaining Ring (18" Only)

Part No.	Description
A28	Hood
A29	Hood Screws
A40	Bumper
A42	Lower Retaining Ring (18" Only)
A43	Upper Float Guide Bushing
A44	1" Pipe Plug
A58	Bug/Rock Screen (Optional)
A59	Cover Bolt Washer (Note 3)
A60	Hood Washers (Note 3)

Figure 4: AVV-150 4-18" (100-450mm) Air/Vacuum Valve

Drawings (Continued)



VALVE BODY ALWAYS TAPPED WITH 1" NPT. ALL VALVES ARE SUPPLIED WITH 1" NPT TO 1/2" NPT AND 1" NPT TO 3/4" NPT HEX REDUCER BUSHINGS. SEE DETAIL A.

Item No.	Description
R01	Body
R02	Cover
R03	Cover Gasket
R04	Cover Bolts
R05	Lever Frame
R06	Seat
R07	Needle
R08	Lever Pin
R09	Float Lever
R10	Float
R11	Pin Retainer
R12	Washer (Epoxy/FBE Coating Only)
R16	1" NPT to 3/4" NPT Reducer
R17	1" NPT to 1/2" NPT Reducer

Figure 5: ARV-50A Air Release Valve

Drawings (Continued)

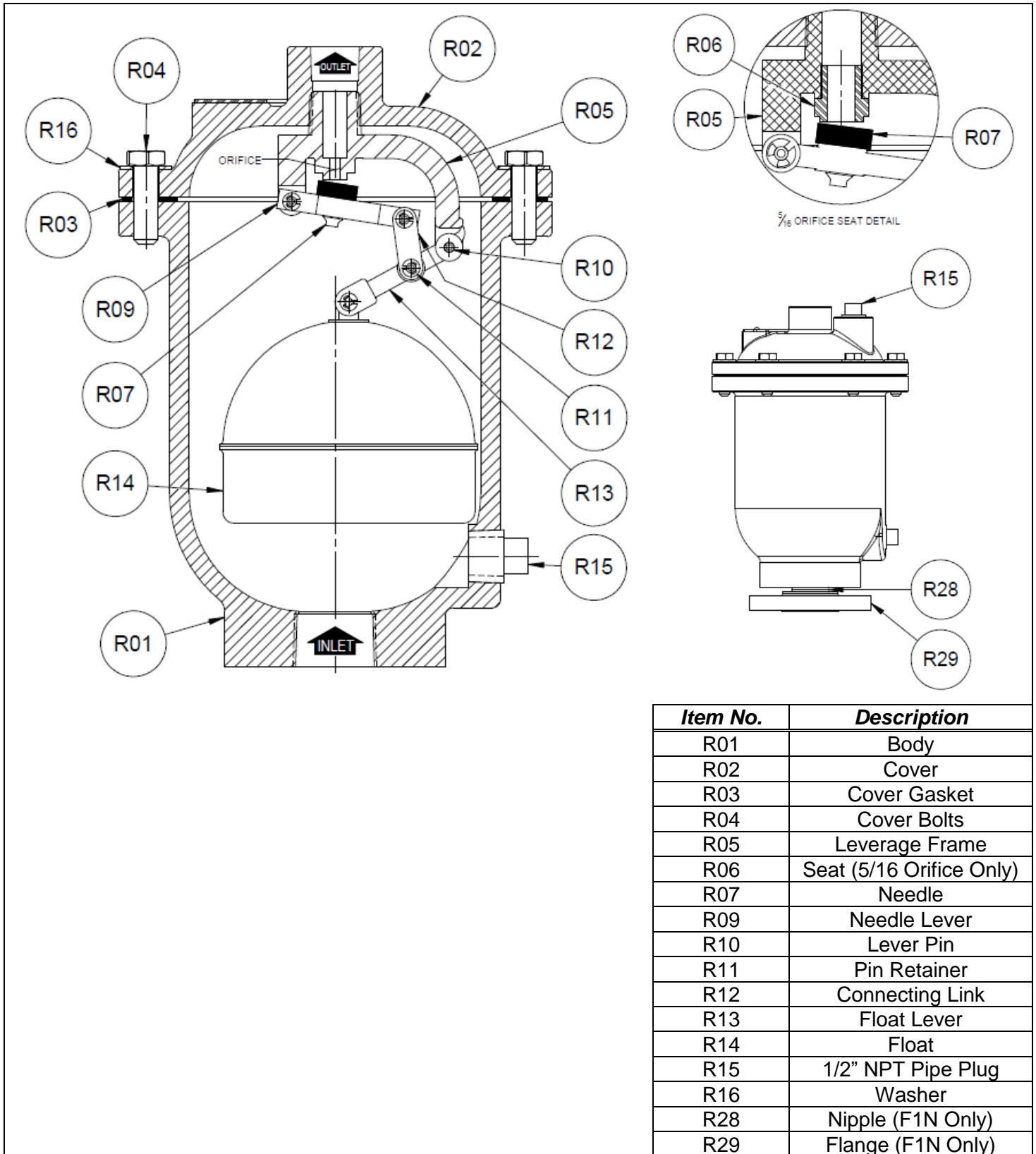


Figure 6: ARV-200A Air Release Valve

Drawings (Continued)

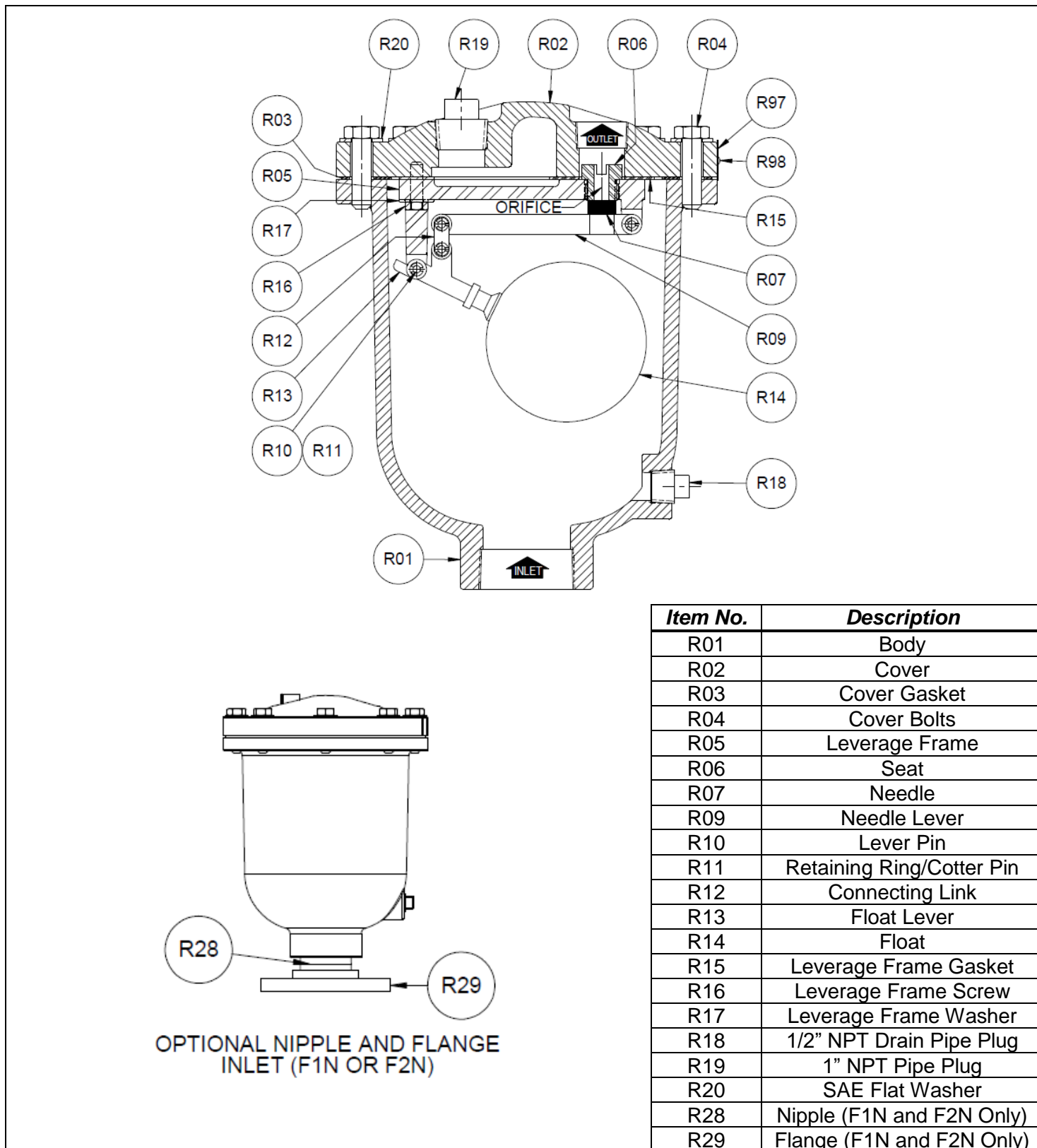


Figure 7: ARV-200 Air Release Valve

Drawings (Continued)

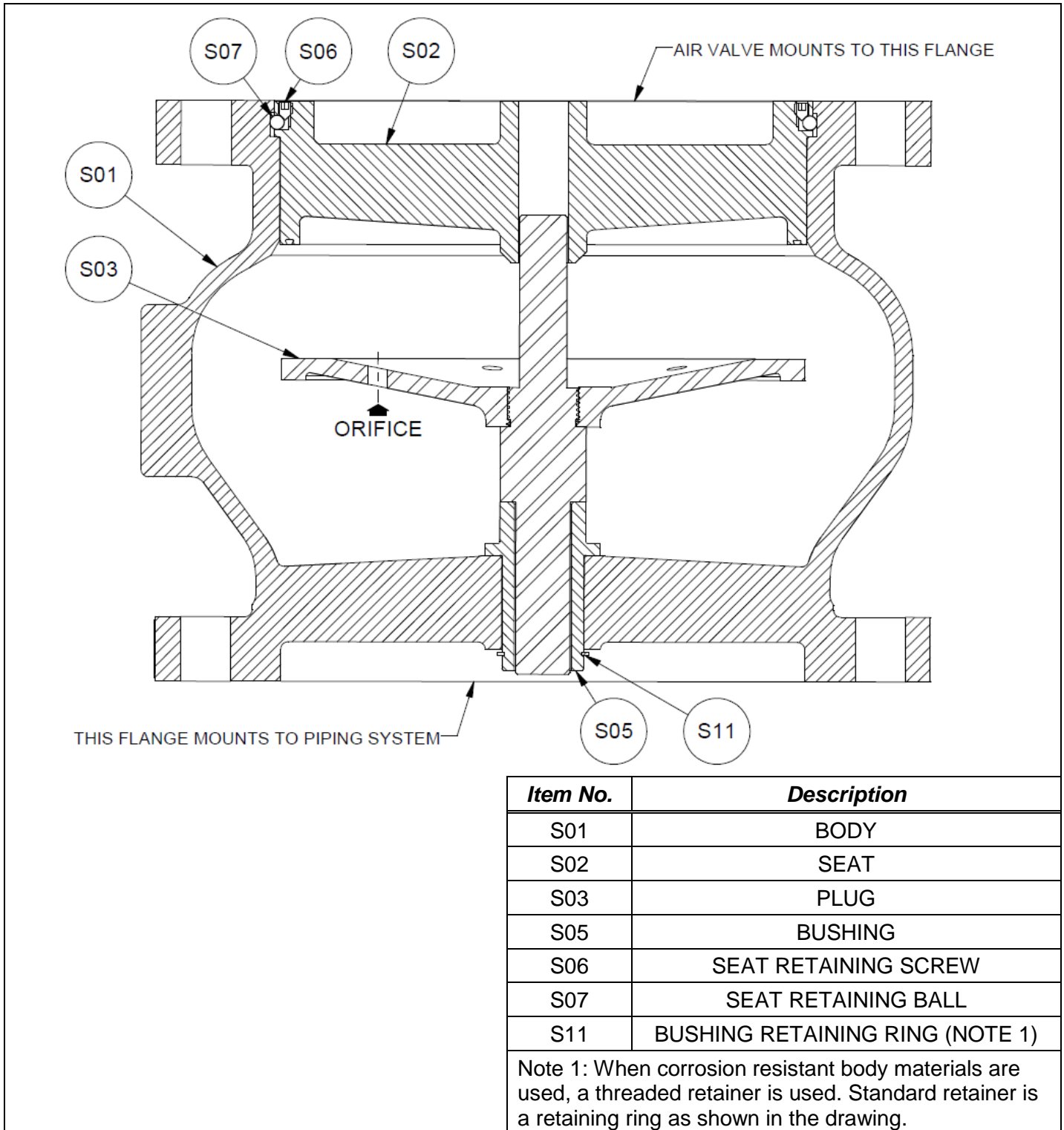
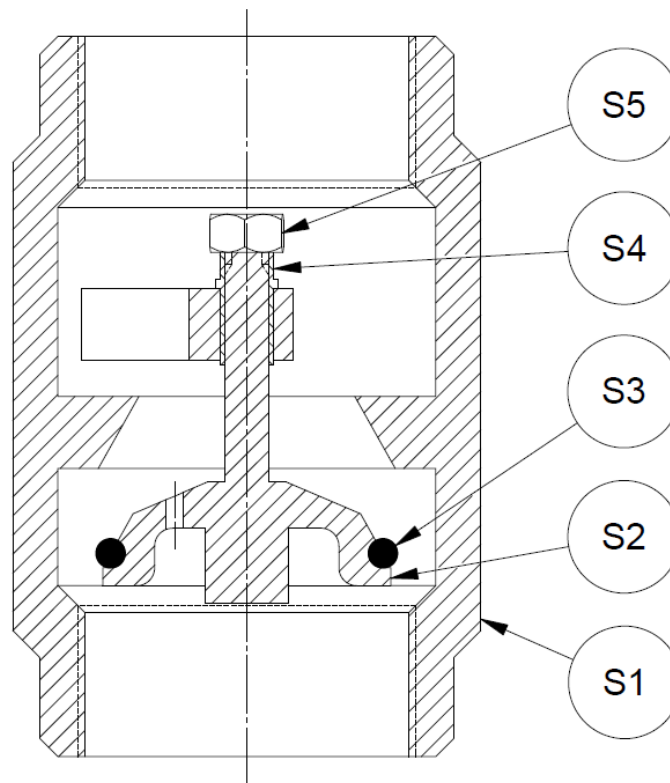


Figure 8: CSV 3-18" (80-450mm) Surge Check Valve

Drawings (Continued)



<i>Item No.</i>	<i>Description</i>
S01	Body
S02	Plug
S03	O-Ring
S04	Bushing
S05	Nut

Figure 9: CSV 1 & 2" (25 & 50mm) Surge Check Valve

Troubleshooting

Condition	Possible Cause	Corrective Action
Valve leaks at flange joint.	Loose flange bolting.	Tighten flange bolting.
	Blown flange gasket.	Replace flange gasket.
	Misalignment or damage to field piping and supports.	Adjust misalignment or repair piping or supports.
	Damaged flange face/s or improper flange connections.	Repair flange, replace valve body or adjust flange connections.
Valve leaks out of outlet port.	Line pressure is under 10 psi (70kPa).	Contact factory for low pressure application information.
	Worn needle and/or orifice.	Replace needle and/or orifice.
	Float does not move freely.	Readjust position of leverage frame to cover.
	Float has liquid in it.	Replace float.
	Dirty seat and/or float.	Clean seat and/or float.
	Worn seat and/or float.	Replace seat and/or float.
	Dirty needle and/or orifice of leverage frame.	Clean needle and/or orifice of leverage frame.
	Float linkage is dirty.	Clean float linkage.

Limited Warranty

DeZURIK, Inc. ("Seller") manufactured products, auxiliaries and parts thereof that we manufacture for a period of twenty-four (24) months from date of shipment from Seller's factory, are warranted to the original purchaser only against defective workmanship and material, but only if properly stored, installed, operated, and serviced in accordance with Seller's recommendations and instructions.

For items proven to be defective within the warranty period, your exclusive remedy under this limited warranty is repair or replacement of the defective item, at Seller's option, FCA Incoterms 2020 Seller's facility with removal, transportation, and installation at your cost.

Products or parts manufactured by others but furnished by Seller are not covered by this limited warranty. Seller may provide repair or replacement for other's products or parts only to the extent provided in and honored by the original manufacturer's warranty to Seller, in each case subject to the limitations contained in the original manufacturer's warranty.

No claim for transportation, labor, or special or consequential damages or any other loss, cost or damage is being provided in this limited warranty. You shall be solely responsible for determining suitability for use and in no event shall Seller be liable in this respect.

This limited warranty does not warrant that any Seller product or part is resistant to corrosion, erosion, abrasion or other sources of failure, nor does Seller warrant a minimum length of service.

Your failure to give written notice to us of any alleged defect under this warranty within twenty (20) days of its discovery, or attempts by someone other than Seller or its authorized representatives to remedy the alleged defects therein, or failure to return product or parts for repair or replacement as herein provided, or failure to store, install, or operate said products and parts according to the recommendations and instructions furnished by Seller shall be a waiver by you of all rights under this limited warranty.

This limited warranty is voided by any misuse, modification, abuse or alteration of Seller's product or part, accident, fire, flood or other Act of God, or your failure to pay entire contract price when due.

The foregoing limited warranty shall be null and void if, after shipment from our factory, the item is modified in any way or a component of another manufacturer, such as but not limited to; an actuator is attached to the item by anyone other than a Seller factory authorized service personnel.

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Sales and Service

For information about our worldwide locations, approvals, certifications and local representative:

Web site: www.dezurik.com E-Mail: info@dezurik.com



250 Riverside Ave. N., Sartell, MN 56377 • Phone: 320-259-2000 • Fax: 320-259-2227

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