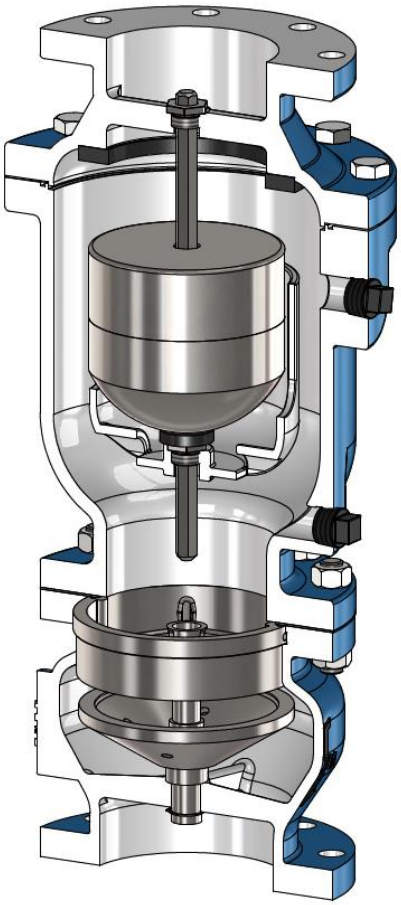
APCO AVV-140/150 AIR/VACUUM VALVE WITH OPTIONAL CSV SURGE CHECK VALVE



Instruction **D12021**
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DeZURIK, Inc. Sartell, Minnesota USA | Phone: 320-259-2000 | www.dezurik.com | info@dezurik.com

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 Air/Vacuum Valve mounted on top of a CSV Surge Check Valve is designed to eliminate critical shock conditions occurring in those 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.

This type of Air/Vacuum Valve with Surge Check Valve should not be considered as relief for shock conditions which develop elsewhere in the system. However, actual field tests prove the Surge Check Valve may protect the Air/Vacuum Valve from damage by severe shut-off shock.

The Air/Vacuum Valve with Surge Check 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 manufacture’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.

Maintenance

The APCO AVV-140/150 Air/Vacuum 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 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)

See Figure 1 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).
6. Remove seat retaining screws (A34) and baffle (A24) and lift out seat (A06) from the recess in the cover (A02) or baffle. For valves with water diffuser, it is necessary to remove the water diffuser by removing baffle plug (A41) or float bushing (A26) for size 3".
7. Remove cover gasket (A03).
8. Clean all surfaces.
9. If water diffuser is used, replacement is recommended.
10. Inspect all components. Replace if necessary.

Disassembly Procedure (AVV-150)

See 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 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 (A44) 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).
6. Remove seat screws (A16) and lift out seat (A06) from recess in cover (A02).
7. Inspect seat (A06) and float (A14) seating surfaces for damage. Replace if necessary.
8. Inspect all other parts of valve such as guide bushings (A26 & A43) and bumper (A40).

Disassembly Procedure (CSV-1600A)

See Figures 1 & 2 for part identification.

⚠WARNING

Servicing the Surge Check 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 Surge Check Valve.

1. Relieve pipeline pressure or shut off isolation valve before servicing the Surge Check Valve.
2. Remove the Air/Vacuum Valve from the Surge Check Valve (See instructions in previous sections for AVV-140 and AVV-150 disassembly).
3. Loosen seat retaining screws (S06).
4. Remove seat (S02). In some cases, it may be necessary to use penetrating oil or rust solvent to loosen the rust that may have formed between the body (S01) and seat (S02). Also, it may be helpful to rotate the seat in the body to break loose the seat retaining ball (S07). Check if the bore through the center of the seat (S02) is worn.
5. Lift and remove plug (S03). Inspect plug assembly (S03) for any bent or worn features.
6. Remove bushing retaining ring (S11) and bushing (S05).
7. Clean all surfaces before re-assembly. Replace all defective parts.

Assembly Procedure (CSV-1600A)

1. Install the parts inside the body (S01) in the following order:
   a. Bushing (S05) and bushing retaining ring (S11) into the center bore of the body (S01).
   b. Plug (S03) with the concave side facing upward.
   c. Seat (S02) and seat retaining ball (S07). Tighten seat retaining screw (S06) when flush with flange face.

      Note: When assembled, make sure that both ends of plug stem are completely engaged in their respective guides in both open and closed positions. Plug should freely move when activated.
2. Attach the Air/Vacuum Valve to the Surge Check Valve (see instructions in following sections for Assembly Procedures for the AVV-140 or AVV-150).
3. If valve was removed from pipeline, install valve in pipeline, and open isolation valve on inlet to Air Valve. Valve is now back in service.

Assembly Procedure (AVV-140)

1. 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).

2. Install seat (A06) in body (A01).
3. 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.
4. 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.
5. 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).

6. Install new cover gasket (A03) and set cover (A02) assembly to the body (A01), then tighten cover screws (A04) alternating in a crisscross pattern.
7. Install and secure pipe plug (A25) and perform a seat test per Step 4 of *Disassembly Procedure*.
8. If there is no more leakage, fully open isolation valve on the inlet pipe.

Assembly Procedure (AVV-150)

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 perform a seat test per Step 4 of Disassembly Procedure.
5. If there is no more leakage, fully open isolation valve on the inlet pipe.

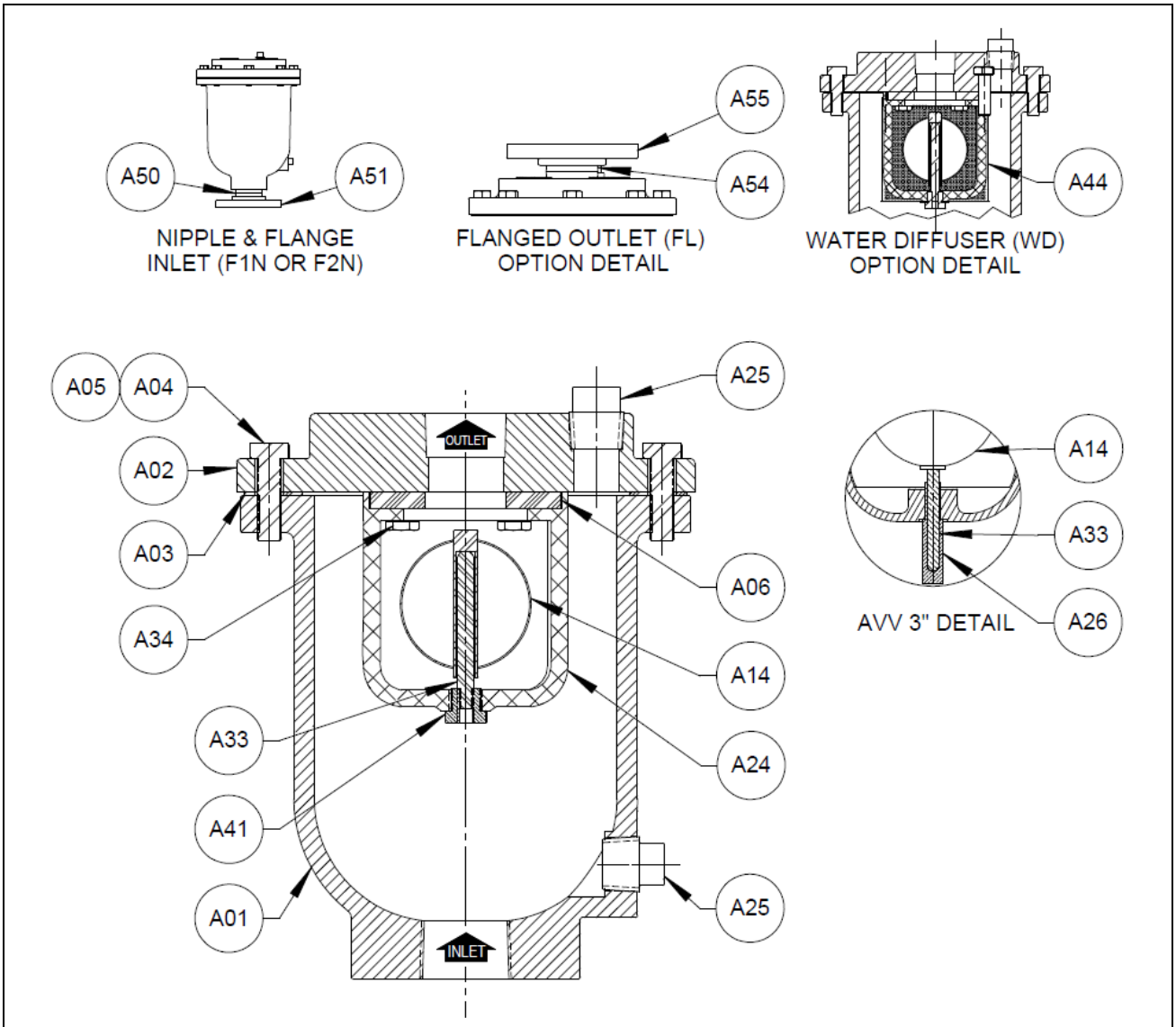
Operation

The Air/Vacuum Valve is normally open and allows air to escape freely. Maximum discharge velocity is approximately 300 feet per second (102 meters per second) at 6.7 psi (50kPa). However, good pipeline design restricts velocity flows of air to 100 feet per second (34 meters per second) which occurs at approximately 1 psi (7kPa).

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, spring loaded, so that air passes through unrestricted. When water rushes into the Surge Check Valve, the disc begins to close against the spring tension 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.

Drawings

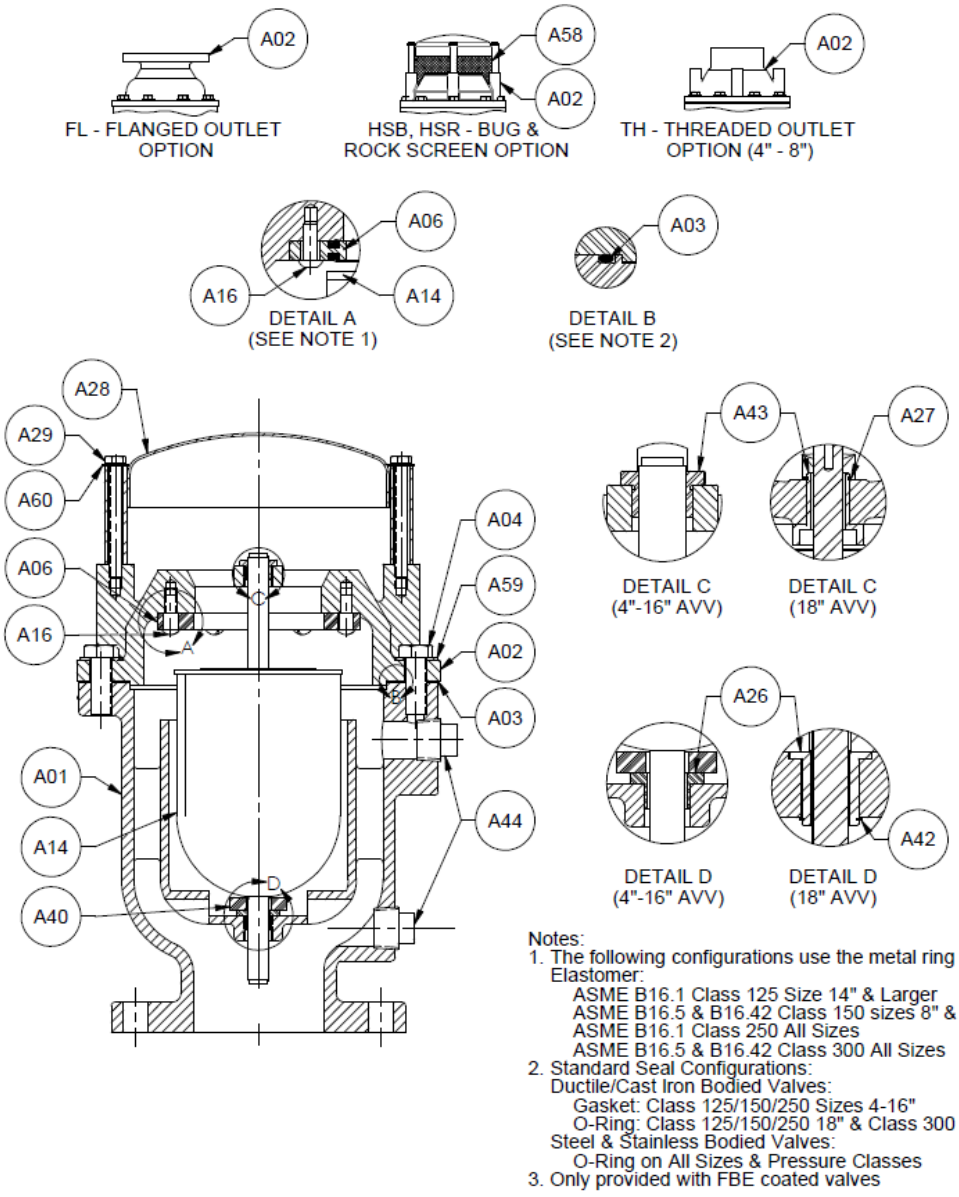


Part No.	Description
A01	Body
A02	Cover
A03	Cover Gasket
A04	Cover Bolts
A05	Washer
A06	Seat
A14	Float
A24	Baffle
A25	Pipe Plug

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

Drawings *(Continued)*

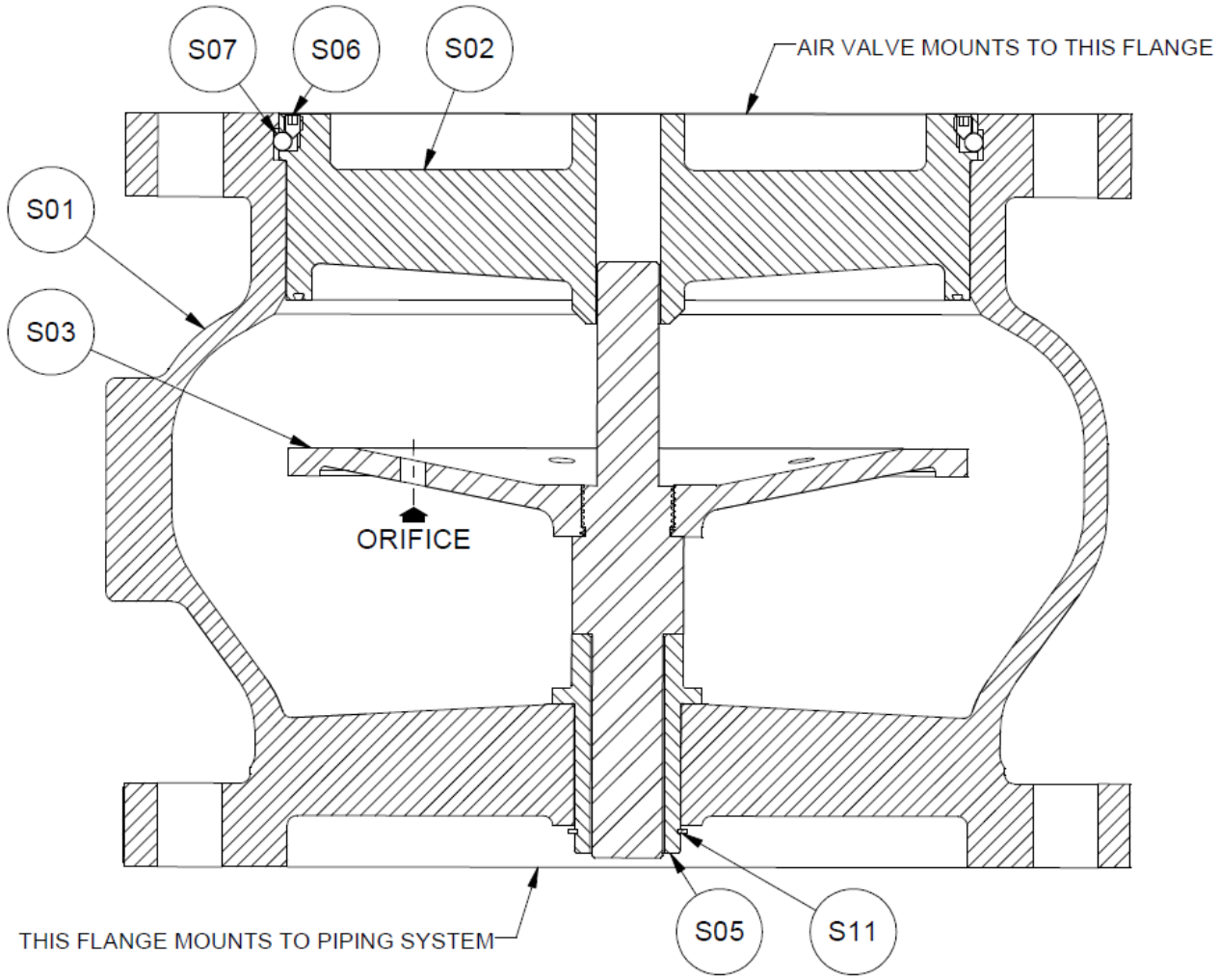


Part No.	*Description*
A01	Body
A02	Cover
A03	Cover Gasket / O-Ring
A04	Cover Bolts
A06	Seat
A14	Float
A16	Seat Screws
A26	Lower Float Guide Bushing
A27	Upper Retaining Ring (18” Only)

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 2: AVV-150 Air/Vacuum Valve Sizes 4-18” (100-450mm)

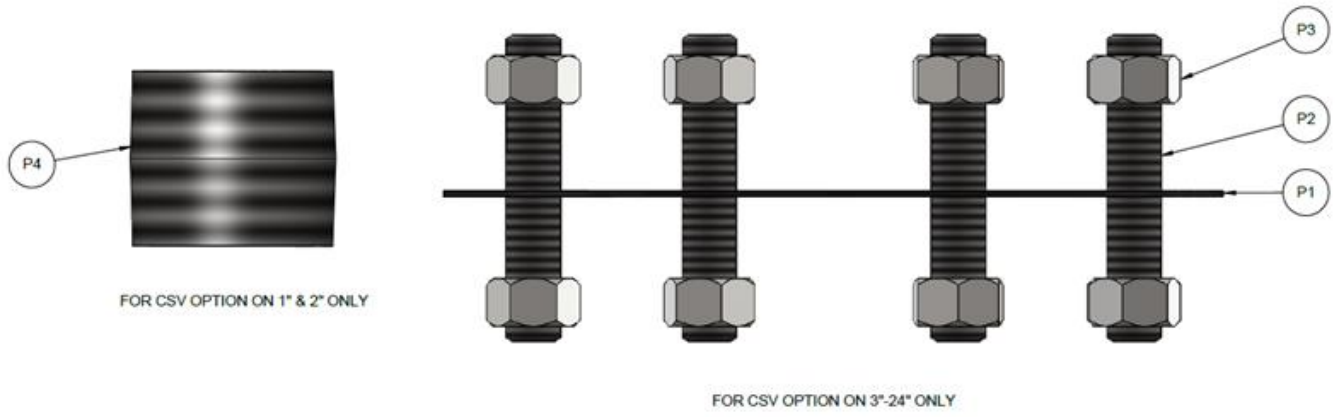
Drawings (Continued)



Item No.	*Description*
S01	BODY
S02	SEAT
S03	PLUG
S05	BUSHING
S06	SEAT RETAINING SCREW
S07	SEAT RETAINING BALL
S11	BUSHING RETAINING RING (NOTE 1)
Note 1: When corrosion resistant body materials are used, a threaded retainer is used. Standard retainer is a retaining ring as shown in the drawing.	

Figure 3: CSV-1600A Surge Check Valve Sizes 3-18" (80-450mm)

Drawings (Continued)



Connecting Parts	
Item No.	***Description***
P1	Gasket
P2	Threaded Rod
P3	Nut
P4	Nipple

Figure 4: Connecting Parts

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.	Dirty seat and/or float.	Clean seat and/or float.
	Worn seat and/or float.	Replace seat and/or float.
	Line pressure is under 10 psi (70kPa).	Contact DeZURIK representative for low pressure applications.
	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.

All orders accepted shall be deemed accepted subject to this limited warranty, which shall be exclusive of any other or previous warranty, and this shall be the only effective guarantee or warranty binding on Seller, despite anything to the contrary contained in the purchase order or represented by any agent or employee of Seller in writing or otherwise, notwithstanding, including but not limited to implied warranties.

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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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