



**APCO AVS-1300/1900
SLOW CLOSING
AIR/VACUUM VALVE**



Instruction **D12021**
December 2012

DeZURIK

APCO AVS-1300/1900 Slow Closing Air/Vacuum Valves

Instructions

These instructions provide installation, operation and maintenance information for APCO AVS-1300/1900 Slow Closing Air/Vacuum Valves. They are for use by personnel who are responsible for installation, operation and maintenance of APCO AVS-1300/1900 Slow Closing Air/Vacuum Valves.

Safety Messages

All safety messages in the instructions are flagged with an exclamation symbol and the word Caution, Warning or Danger. These messages indicate procedures that must be followed exactly to avoid equipment damage, personal injury or death. Safety label(s) on the product indicate hazards that can cause equipment damage, personal injury or death.

Safety label(s) on the product indicate hazards that can cause equipment damage, personal 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 APCO AVS-1300/1900 Slow Closing Air/Vacuum Valve has been packaged to provide protection during shipment; however, it 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

Recommended spare parts are listed on the assembly drawing. These parts should be stocked to minimize downtime. Order parts from your local DeZURIK sales representative, or directly from DeZURIK. When ordering parts please choose from the following:

If the valve has a DeZURIK APCO nameplate please include the 7-digit part number and 4-digit revision number (example: 9999999R000) located on the data plate 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 nameplate visible on the valve, please include Valve Model number, the part name, and item number from the assembly drawing. You may contact your local DeZURIK APCO 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 www.dezurik.com.

Table of Contents

Description - - - - -	4
Handling and Storage - - - - -	4
Installation - - - - -	4
Fusion/Powder Coated Valves - - - - -	5
Maintenance - - - - -	5
<i>Disassembly Procedure (Air/Vacuum Valve)</i> - - - - -	5
<i>Assembly Procedure (Air/Vacuum Valve)</i> - - - - -	6
<i>Disassembly Procedure (Surge Check Valve)</i> - - - - -	6
<i>Assembly Procedure (Surge Check Valve)</i> - - - - -	7
Operation - - - - -	7
Drawings - - - - -	8
Troubleshooting - - - - -	10

DeZURIK

APCO AVS-1300/1900 Slow Closing Air/Vacuum Valves

Description

The APCO Slow Closing Air/Vacuum Valve actually consists of a standard Air/Vacuum Valve mounted on top of a Surge Check Unit. It 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 itself and at the same time prevents the Air/Vacuum valve from creating a surge in the pipeline by slamming shut.

This type Slow Closing Air/Vacuum Valve should not be considered as relief for shock conditions which develop elsewhere in the system. However, actual field tests prove the Surge Check Unit may protect the Air/Vacuum Valve in cases where it may be destroyed by severe shut-off shock.

This protection far outweighs the small cost of the Surge Check Unit when you consider the tremendous field damage that can result from an Air/Vacuum Valve failure.

Handling and Storage

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, place valve indoors in secure, weather tight storage. If temporary outside storage is unavoidable, make sure a vermin proof rain cover (water shedding tarp, etc.) is secured around/over the valve to keep off rain and mud. Skid and set the assembly on a flat, solid, and well drained surface for protection from ground moisture, runoff and pooled rain water.

Installation

The Slow Closing Air/Vacuum 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 F.P.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.

Note to Engineer: 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.

- 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/Powder Coated Valves

**CAUTION!**

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

Maintenance

The APCO AVS-1300/1900 Slow Closing Air/Vacuum 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 that 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

See Figures 1 and 2 for part identification.

Air/Vacuum Valve

**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 before servicing the Air Valve.
-

**WARNING!**

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

2. Slowly remove pipe plug near inlet of valve body (1) to relieve internal pressure and to drain the unit.
3. Check to see if foreign matter or dirt is preventing float (14) from seating properly against seat (6). 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 screws (4) and cover (2).
6. Remove seat screws (16) and lift out seat (6) from recess in cover (2).
7. Inspect seat (6) and float (14) seating surfaces for damage. Replace if necessary.
8. Inspect all other parts of valve such as guide bushings (26 & 43) and bumper (40).

DeZURIK

APCO AVS-1300/1900 Slow Closing Air/Vacuum Valves

Maintenance (Continued)

Surge Check Valve

9. Remove studs (9) and nuts (10) and remove Air/Vacuum Valve body (1) from Surge Check Valve body (1).
10. Loosen seat retaining screw (7), located on the face of seat (2). Push down plug (3), to compress spring (4), then release plug to knock out seat.
11. Remove plug (3), spring (4), retaining ring (5B) and bushing (5A) from body (1).
12. Clean all surfaces before re-assembly. Replace all defective parts.

Assembly Procedure

See Figures 1 and 2 for part identification.

Surge Check Valve

1. Install the parts inside the body (1) in the following order:
 - a. Bushing (5) at the center of the hub.
 - b. Spring (4) centering on the bushing (5).

Note: If conical spring, smaller diameter of spring should fit the outside diameter of bushing.

- c. Plug (3) with the concave side facing upward.
 - d. Seat (2). Tighten seat retaining screw (7) when flush with flange face.
2. If gasket (8) is damaged, install new gasket making sure gasket fully covers the seat (2) face.
3. Assemble Air/Vacuum Valve body (1) to Surge Check Valve body (1).

Air/Vacuum Valve

4. Clean surface of recess in cover (2) and install seat (6) with seat screws (16). Buna-N seat hardness (Durometer) should correspond to operating pressure as shown in Table A:

Table A: Buna-N seat hardness (Durometer)

Valve Size	Working Pressure, psi				
	0-10	11-50	51-100	101-200	201-300
4"	45	65	85	85	Metal
6"	65	85	85	85	Metal
8"	65	85	85	85	Metal
10"	65	85	85	85	Metal
12"	65	85	85	85	Metal
14"	Metal	Metal	Metal	Metal	Metal
16"	Metal	Metal	Metal	Metal	Metal
18"	Metal	Metal	Metal	Metal	Metal
20"	Metal	Metal	Metal	Metal	Metal
24"	Metal	Metal	Metal	Metal	Metal

Note: Stainless Steel metal seats have Buna-N molded ring.

Maintenance *(Continued)*

5. Install bumper (40) and float (14) in place.
6. Assemble cover (2) and gasket (3) to body (1). Tighten cover screws (4) opposite each other in rotation.
7. Install and secure pipe plug and perform a seat test per Step 4 of Disassembly Procedure.
8. If valve was removed from pipeline, place valve in pipeline, and open isolation valve on inlet to Air Valve. Valve is now back in service.

Operation

The Air/Vacuum Valve operates normally allowing air to escape freely at any velocity (maximum discharge velocity is approximately 300 feet per second at 6.7 psi; however, good pipeline design restricts velocity flows of air to 100 feet per second which occurs at approximately 1 psi).

The Surge Check Unit 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 unit, 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 its 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 and immediately have full re-entry flow of air into the pipeline before a vacuum can form.

Drawings

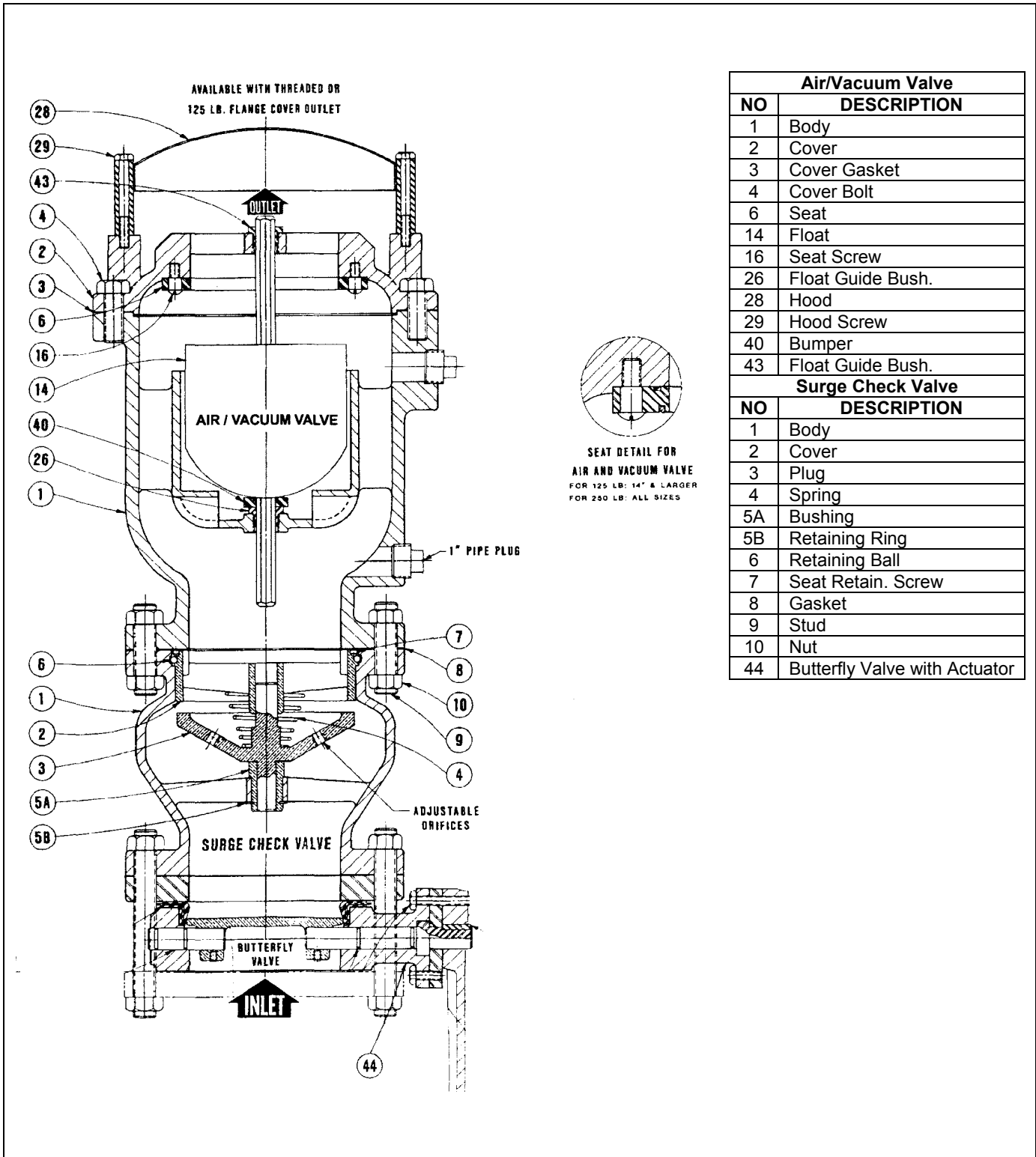
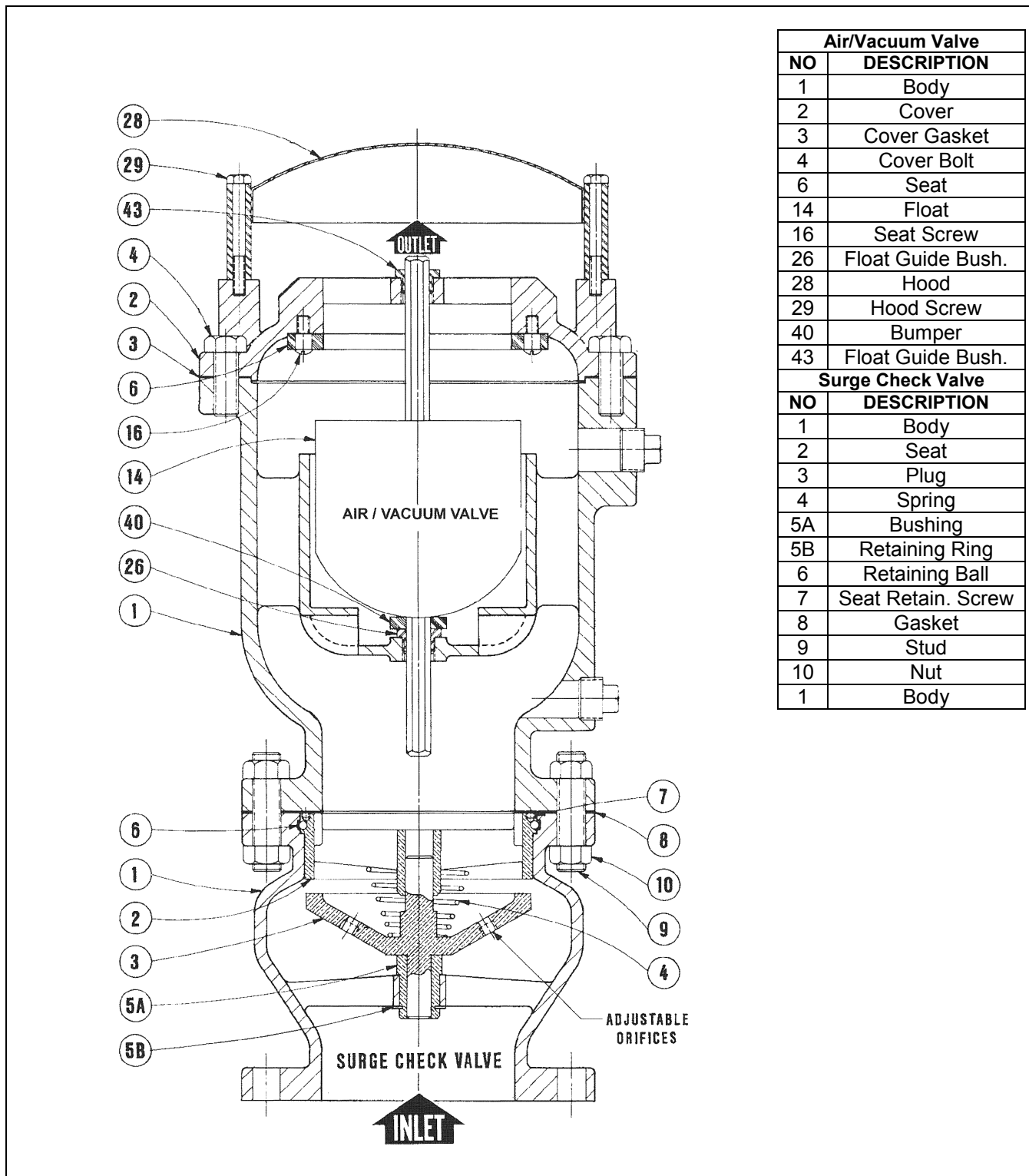


Figure 1: AVS -1300 Slow Closing Air/Vacuum Valves

APCO AVS-1300/1900 Slow Closing Air/Vacuum Valves

Drawings (Continued)



Air/Vacuum Valve	
NO	DESCRIPTION
1	Body
2	Cover
3	Cover Gasket
4	Cover Bolt
6	Seat
14	Float
16	Seat Screw
26	Float Guide Bush.
28	Hood
29	Hood Screw
40	Bumper
43	Float Guide Bush.
Surge Check Valve	
NO	DESCRIPTION
1	Body
2	Seat
3	Plug
4	Spring
5A	Bushing
5B	Retaining Ring
6	Retaining Ball
7	Seat Retain. Screw
8	Gasket
9	Stud
10	Nut
1	Body

Figure 2: AVS -1900 Slow Closing Air/Vacuum Valves

DeZURIK

APCO AVS-1300/1900 Slow Closing Air/Vacuum Valves

Troubleshooting

Condition	Possible Cause	Corrective Action
Valve leaks at flange joint.	Loose flange bolting.	Tighten flange bolting.
	Blown flange gasket.	Replace flange gasket.
	Miss-alignment or damage to field piping and supports.	Adjust miss-alignment 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.	Replace seat with softer seat.
	Float linkage is dirty.	Clean float linkage.

Guarantee

Products, auxiliaries and parts thereof of DeZURIK, Inc. manufacture are warranted to the original purchaser for a period of twenty-four (24) months from date of shipment from factory, against defective workmanship and material, but only if properly installed, operated and serviced in accordance with DeZURIK, Inc. recommendations. Repair or replacement, at our option, for items of DeZURIK, Inc. manufacture will be made free of charge, (FOB) our facility with removal, transportation and installation at your cost, if proved to be defective within such time, and this is your sole remedy with respect to such products. Equipment or parts manufactured by others but furnished by DeZURIK, Inc. will be repaired or replaced, but only to the extent provided in and honored by the original manufacturers warranty to DeZURIK, Inc., in each case subject to the limitations contained therein. No claim for transportation, labor or special or consequential damages or any other loss, cost or damage shall be allowed. You shall be solely responsible for determining suitability for use and in no event shall DeZURIK, Inc. be liable in this respect. DeZURIK, Inc. does not guarantee resistance to corrosion, erosion, abrasion or other sources of failure, nor does DeZURIK, Inc. guarantee 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 DeZURIK, Inc. 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 install and operate said products and parts according to instructions furnished by DeZURIK, Inc., or misuse, modification, abuse or alteration of such product, accident, fire, flood or other Act of God, or failure to pay entire contract price when due shall be a waiver by you of all rights under this warranty.

The foregoing guarantee 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 DeZURIK, Inc. Factory 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 DeZURIK, Inc., despite anything to the contrary contained in the purchase order or represented by any agent or employee of DeZURIK, Inc., in writing or otherwise, notwithstanding, including but not limited to implied warranties.

Metric fasteners should not be used with ASME Class 150/300 bolt holes and flange bolt patterns. If you use metric fasteners with ASME Class 150/300 bolt holes and flange bolt patterns, it may lead to product failure, injury, and loss of life. DeZURIK Inc. disclaims all liability associated with the use of metric fasteners with ASME Class 150/300 bolt holes and flange patterns, including but not limited to personal injury, loss of life, loss of product, production time, equipment, property damage, lost profits, consequential damages of any kind and environment damage and/or cleanup. Use of metric fasteners with ASME Class 150/300 bolt holes and flange bolt patterns is a misuse that voids all warranties and contractual assurances. If you use metric fasteners with ASME Class 150/300 bolt holes and flange bolt patterns, you do so at your sole risk and any liability associated with such use shall not be the responsibility of DeZURIK, Inc. In addition to the foregoing, DeZURIK's Manufacturer's Conditions apply.

THE FOREGOING REPAIR AND REPLACEMENT OBLIGATIONS ARE IN LIEU OF ALL OTHER WARRANTIES, OBLIGATIONS AND LIABILITIES, INCLUDING ALL WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR OF MERCHANTABILITY OR OTHERWISE, EXPRESSED OR IMPLIED IN FACT OR BY LAW, AND STATE DEZURIK, INC.'S ENTIRE AND EXCLUSIVE LIABILITY AND YOUR EXCLUSIVE REMEDY FOR ANY CLAIM IN CONNECTION WITH THE SALE AND FURNISHING OF SERVICES, GOODS OR PARTS, THEIR DESIGN, SUITABILITY FOR USE, INSTALLATION OR OPERATIONS.

Limitation of liability

LIMITATION OF LIABILITY: IN NO EVENT SHALL DEZURIK, INC. BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES WHATSOEVER, AND DEZURIK, INC.'S LIABILITY, UNDER NO CIRCUMSTANCES, WILL EXCEED THE CONTRACT PRICE FOR THE GOODS AND/OR SERVICES FOR WHICH LIABILITY IS CLAIMED. ANY ACTION BY YOU FOR BREACH OF CONTRACT MUST BE COMMENCED WITHIN 12 MONTHS AFTER THE DATE OF SALE.

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

DeZURIK, Inc. reserves the right to incorporate our latest design and material changes without notice or obligation. Design features, materials of construction and dimensional data, as described in this manual, are provided for your information only and should not be relied upon unless confirmed in writing by DeZURIK, Inc. Certified drawings are available upon request.