

Combination Air Valve

Model C70/C70-SP/C70-AS



Installation, Operation and Maintenance Manual (IOM)



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General

The BERMAD C70 is a high quality combination Air Valve for a variety of water networks and operating conditions. It evacuates air during pipeline filling, allows efficient release of air pockets from pressurized pipes, and enables large volume air intake in the event of network draining.

With its advanced aerodynamic design, double orifice and anti-slam/slow closing device, this valve provides excellent protection against air accumulation, vacuum formation and surges, while minimizing undesirable leakage and spraying.

This document serves as the Installation, Operation and Maintenance Manual (IOM) of this valve; it describes the procedures required for proper usage of the valve.

Safety

Since Air Valves operate in pressurized water systems you are required to carefully read this manual before using the valve. Handle the valve with care and make sure to comply with all the relevant required safety instructions and standards, general and local.

Operational Data

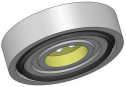
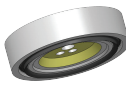
Pressure rating:	ISO PN16/PN25/PN35/PN40
Operating pressure range:	0.1 - 16 bar, 0.1 - 25 bar, 0.1 - 35 bar, 0.1 - 40 bar or 1.5 - 230 psi, 1.5 - 360 psi, 1.5 - 580 psi
Operating temperature:	Water up to 60° C / 140° F

Materials and Connections

- Body Material: Standard – Cast ductile iron; Optional -Stainless Steel, Bronze
- Coating: Baked epoxy, blue
- Inlet sizes: DN50, DN80, DN100, DN150, DN200 (2", 3", 4", 6", 8")
- Connections: Threaded Female BSPT/NPT – only for DN50 (2"), Flanged ISO PN16/25/40 or ANSI 150/300, AS16/35
- Outlets: Sideways, downwards, mushroom configuration
- Additional features: Surge Protection (C70-SP), Adjustable Surge Protection (C70-AS), Inflow Prevention (C70-IP)

C70, C70-SP, C70-AS Versions

Please note the difference in the automatic float assembly and the Surge Protection disc between the earlier version (PN16/230psi, 2012-2013) and later version (PN16, PN25, PN40/230, 360, 580psi from 2013). In each version the dimension of the float, automatic disc and surge protection disc are different.

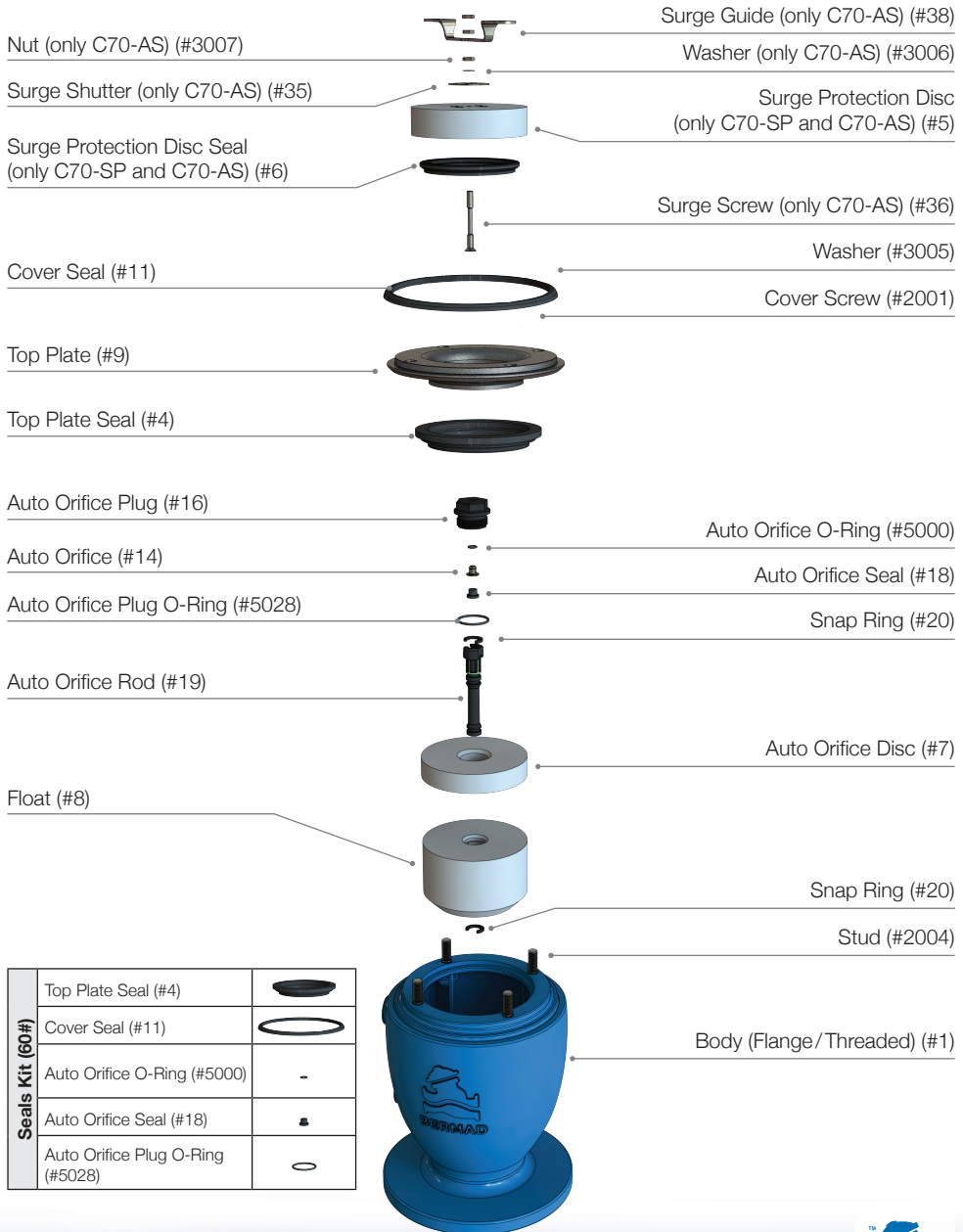
Earlier Versions	Later Version
- The automatic orifice is part of the plug, they are connected above the automatic disc - Casts are being marked with AZ or ATM - Width of the Polypropylene parts are bigger on ATM version Vs AZ	- The automatic orifice is part of the automatic disc - Casts are being marked with ATM
 Automatic float assembly, view from the top	 Automatic float assembly, view from the top
Earlier Versions	Later Version
 Automatic disc, view from the side	 Automatic disc, view from the side
 Shape of the Surge Protection Disc	 Shape of the Surge Protection Disc

It is recommended to specify model, cast mark (AZ or ATM) and serial number when ordering the following Polypropylene parts – float, automatic disc, Surge Protection disc.

Earlier Version (PNI6/230psi, 2012-2013)



Earlier Version (PN16/230psi, 2012-2013)



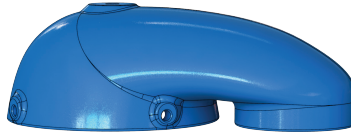
IOM C70, C70-SP, C70-AS

Later Version (PNI6, PN25, PN40/230, 360, 580psi from 2013)

Eye Bolt (#2002)



Outlet - Down (#2a), Side (#2b)
Mushroom (#2c)



Cover Seal (#11)



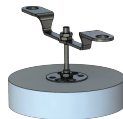
Top Plate (#9)



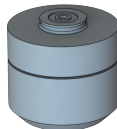
Top Plate Seal (#4)



Surge Protection Assembly
(only C70-SP and C70-AS) (#5a)



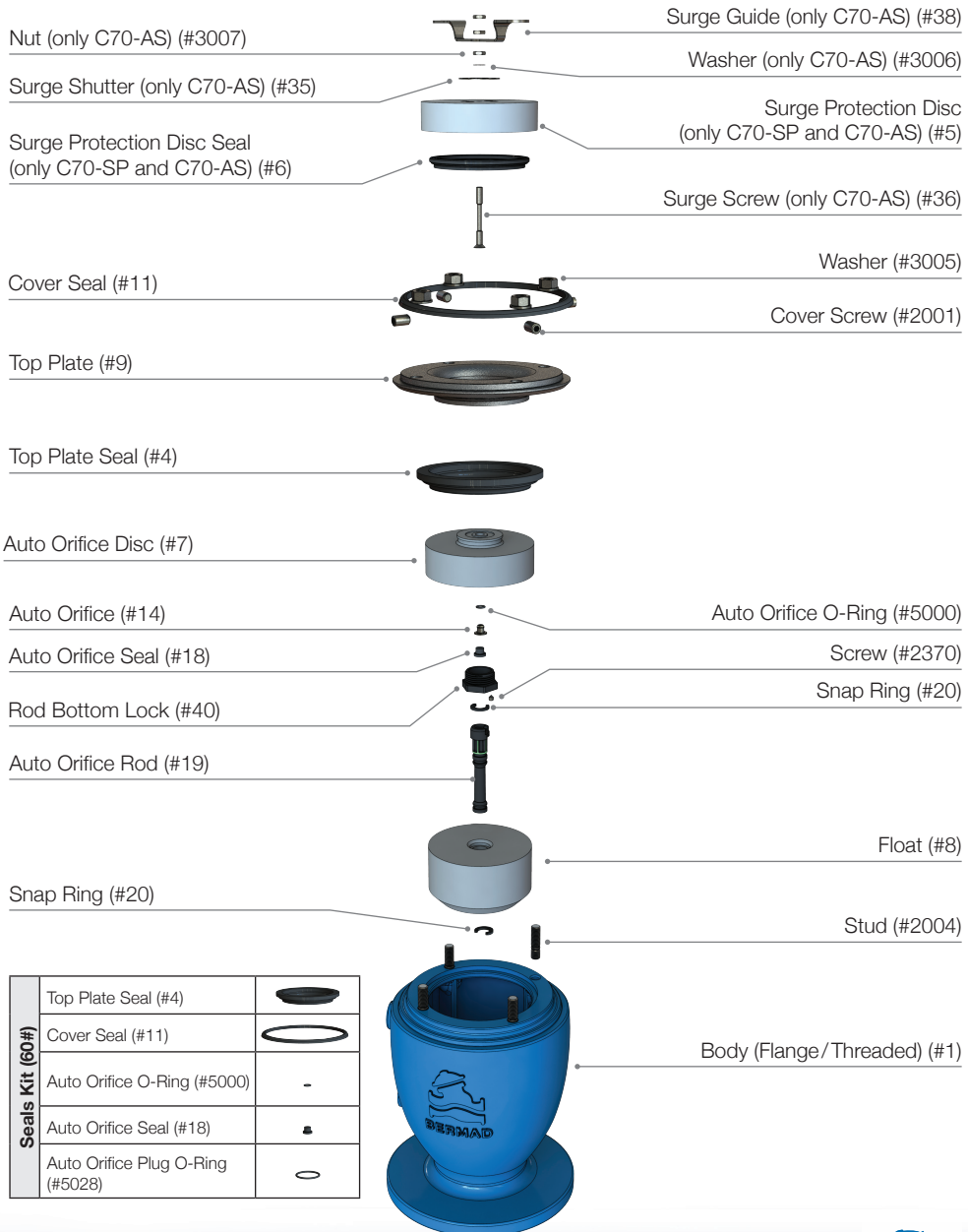
Float Assembly (#8a)



Body (Flange/Threaded) (#1)



Later Version (PNI6, PN25, PN40/230, 360, 580psi from 2013)



Unpacking and post shipment inspection

- Make sure that until the actual installation the valve remains dry and clean in its original package.
- Unpack the valve and make sure that all the wrapping materials are removed.
- Before installation it is necessary to inspect that no damage to the valve occurred during shipment; **do not install a damaged valve!**
- Verify that the valve to be installed meets the design specifications of the specific installation site; take extra care in making sure that the expected system pressure complies with the pressure rating of the valve.

Site Preparation

- Air Valves located above ground should be protected from freezing, contamination and vandalism.
- If the valve is to be installed in a pit, make sure that the pit has proper drainage and sufficient dimensions for servicing the valve.
- Flush the pipeline prior to the Air Valve installation in order to prevent damage to the valve internals due to large debris carried by the water during startup.
- The C70 Air Valves are not to be used in systems containing high suspended solids; consider selecting other BERMAD Air Valve models for such water type.

Installation

Typical Applications

- Pipelines – Protection against air accumulation and vacuum formation at elevations, slope change points and road/river crossings.
- Water networks – Protection against air accumulation and vacuum formation.
- In proximity to control valves and water meters – Prevention of biased readings and inaccurate pressure regulation due to air flow through devices.
- Industrial and residential networks – Protection against air accumulation.

Please note:

1. If required, a connection to a Drainage Pipe can be fitted to the valve's Side outlet.
2. Depending on the specific installation requirements a Surge Protection (SP) or an Inflow Prevention (IP) device may be added to the air valve.

Installation instructions

- Install the Air Valve as close as possible to the pipe, at a high point of its circumference, in vertical position (within 5 degrees of vertical alignment) and with its inlet facing down.
- The diameter of the pipe connecting the Air Valve with the pipeline should be at least equal to the Air Valve inlet diameter.

- Install a shutoff valve between the Air Valve and the pipeline for allowing easy inspection and maintenance.

Start-up and first operation

- Open the shutoff valve and verify that the Air Valve connections are not leaking; if needed follow the troubleshooting instruction section of this document. Please note that at the first time the valve is filled up some water may exit through its outlet port.
- Prevent water hammer during startup and pipeline filling by maintaining the velocity lower than 0.5m/sec (1.6 feet/sec). Consider adding the Surge Protection feature in systems where higher velocity is expected.



Principles of Operation

Pipeline Filling

During the filling process of a pipeline, high air flow is forced out through the kinetic orifice of the Air Valve. Once water enters the valve's chamber, the float buoyed upward causes the kinetic orifice to close. The unique aerodynamic structure of the valve body and float ensures that the float cannot be closed before water reaches the valve.

Pressurized Operation

During pressurized operation of the pipeline, air accumulates in the upper part of the Air Valve chamber, causing the float to gravitate downwards. This in turn causes the automatic orifice to open, releasing the accumulated air. Once the air is discharged, the water level and float rise, causing the automatic orifice to close.

Pipeline Draining

When a pipeline is drained, a negative differential pressure is created causing atmospheric air to push the float down. The kinetic orifice stays open and air enters the valve chamber, preventing vacuum formation in the pipeline.

Surge Protection (Anti-slam)

In the event of a pressure surge, the surge protection (SP) disc rises, partially closing the valve's orifice. The approaching water column decelerates due to the resistance of the rising air pressure in the valve.

Inflow Prevention

The inflow prevention (IP) mechanism is a Normally Closed check disc mounted on the top of the valve's orifice preventing flow of atmospheric air into the valve.

Please note:

1. During initial pipeline filling as well as during the automatic air release some water may exit through the valve outlet.

Inspection & Troubleshooting

The valve does not require any specific maintenance, however a periodical inspection of the orifices and seals is recommended for removing debris and foreign objects.

Trouble shooting

Symptom	Action
Leakage at the inlet connection	Tighten the valve connection, use thread sealant.
Leakage at the valve cover	Tighten the valve's cover, check the cover's O-Ring.
Leakage at the valve's outlet	Disassemble and inspect the valve's orifices, float and seals. Remove any foreign objects, check and replace any damaged part before re assemble the valve.
Valve does not release air or allow air intake	Verify that the operation pressure does not exceed the valve's rated working pressure. Check and removed foreign objects, clean the valve's internal parts, replace if necessary. Consult BERMAD if the symptom continues.

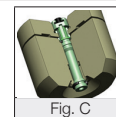
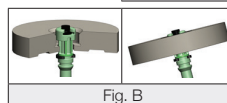
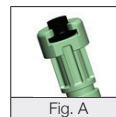
Disassembling & Reassembling the valve

Disassembling the C70 Air Valve

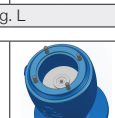
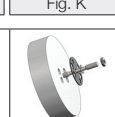
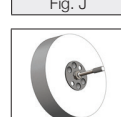
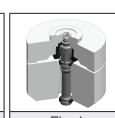
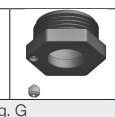
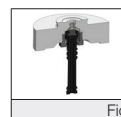
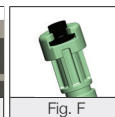
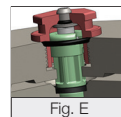
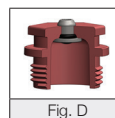
1. Loosen the screws located on the Cover (Part #2). Separate the Cover (Part#2) from the Body Assembly (Part #1a).
2. Disassemble and take out the Surge Assembly (Part #5a) from the Body Assembly (Part #1a).
3. If necessary, replace the gaskets in the Body Assembly (Part #1a).
4. Take out the Combination Float Assembly (Part #8a) from the Body Assembly (Part #1a).
5. Disassemble the Combination Float Assembly (Part #8a) by turning counterclockwise the Auto Orifice Plug (Part #16).
6. If necessary, replace damaged seals and clean the Auto Orifice (Part #14).

Reassembling the C70 Air Valve

1. Reassembling the Combination Float Assembly (Part #8a) – earlier version, automatic orifice is connected with a plug above the automatic disc.
 - a. Insert the Auto Orifice Seal (Part #18) into the Auto Orifice Rod (Part #19), See Figure A.
 - b. Insert the Rod with the Auto Orifice Seal into Auto Orifice Disc (Part #7) and close the Snap Ring (Part #20) on the upper groove of the Auto Orifice Rod (Part #19), See Figure B.



- c. Insert rod with all the parts into the Float (Part #8) and close the second ring (Part #20) on the lower groove of Auto Orifice Rod (Part #19), See Figure C.
 - d. Take Auto Orifice Plug (Part #16) which includes the Orifice (Part #14) and it's O-Ring (Part #5000), See figure D.
 - e. Place O-Ring (Part #5028) over Auto Orifice Plug (Part #16) and screw it into the screw thread of Auto Orifice Disc (Part #7), See Figure E.
2. Reassembling the Combination Float Assembly (Part #8a) – later version, automatic orifice is part of the automatic disc.
 - a. Insert Auto Orifice Seal (Part #18) greased into Auto Orifice Rod (Part #19), See Figure F.
 - b. Insert the automatic rod (part #18, #19) into the automatic disc (Part #7) and close with Rod Bottom Lock (Part #40), then close the screw (part #2370), See Figure G.
 - c. Add the snap ring (part 20) to the upper groove on the automatic rod, See Figure H.
 - d. Insert the Automatic disc with all the parts into the Float (Part #8) and close the second ring in the groove on the lower part of the automatic rod, See Figure I.
 3. Assembly of the Surge Assembly (Part #5a) – C70-SP or C70-AS.
 - a. Take the Surge Disk (Part #5) which includes the Surge Seal (Part #6), See Figure J.
 - b. For Model C70-AS only – Insert Surge Screw (Part #36) into Surge Disk (Part #5), See Figure K.
 - c. For Model C70-AS only – Place the Surge Shutter (Part #35) over the Surge Screw (Part #36) and close with Nut (Part #3007) + Washer (Part #3006) on the bottom part of the screwing. Make sure that at least two large holes are open, See Figure L.
 4. Assembly of the Body (Part #1a).
 - a. In case the valve has service ports, use Teflon to close the Service ports with the plugs.
 - b. Insert Float Assembly (Part #8a) into the Body Assembly (Part #1a), See Figure M.
 - c. For Model C70-SP – Insert the Surge disc (Part #5, Part #6) into the element, above the float assembly, See Figure N.
 - d. For Model C70-AS – Insert Surge Assembly (Part #5a) with its parts into the element, above the float assembly, See Figure O.



- e. Place the Top Plate (Part #9) over the Studs (Part #2004) while beforehand inserting the Top Plate Seal (Part #4) into the rung etched in the Body (Part #1a), See Figure P.
 - f. For Model C70-AS only – Place the Surge Guide (Part #38) over the two Studs (Part #2004) and the Surge Screw (Part #36) and close with the aid of two Nuts (Part #3007) on the upper part of the screwing of them Surge Screw (Part #36), See Figure Q.
 - g. Fasten the Top Plate (Part #9) to the Body Assembly (Part #1a) with the aid of 4 Nuts.
 - h. (Part #3004) + Washers (Part #3005), add the cover seal (Part #11) to the Top Plate (Part#9), See Figure R.
5. Assembly of the Outlet Cover (Part #2).
- a. Insert and screw the screws (Part #2001) it into the Cover (Part #2), See Figure S.
 - b. Place the Cover over the body. Close the screws evenly, by closing one screw opposite another until the cover touches the body, See Figure T.

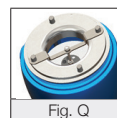


Fig. Q



Fig. R

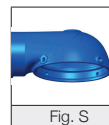


Fig. S

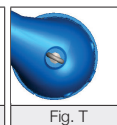
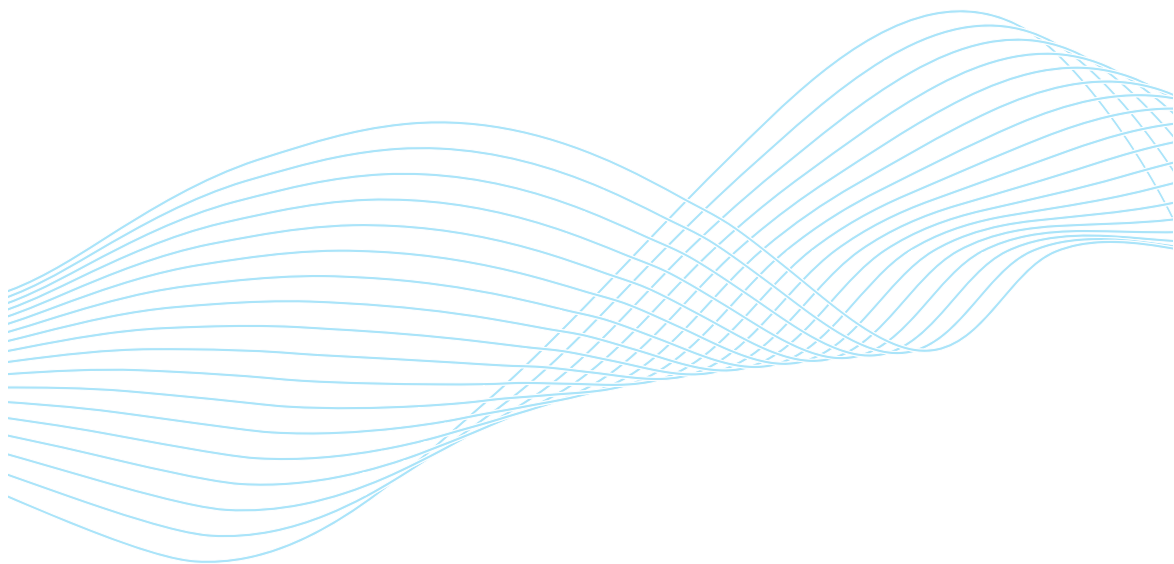


Fig. T

Attention – Make sure that all screws are tightened before lifting the Air Valves using the eye lift.





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