Combination Air Valve

For Sewage and Wastewater

Model C50

Installation, Operation and Maintenance Manual (IOM)

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General

BERMAD C50 is a high quality combination air valve for a variety of sewage and wastewater networks and operating conditions. It evacuates air during pipeline filling, allows efficient release of air and gas pockets from pressurized pipes, and enables large volume air intake in the event of network draining.

With its advanced aerodynamic design and double orifice, this valve provides excellent protection against air and gas accumulation and vacuum formation with improved sealing at low pressure conditions.

This document is 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 waste water networks and sewage systems with toxic or corrosive environment, 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 PN10, ANSI / ASME 150
Operating pressure range	0.1-10 bar / 1.5-150 psi
Operating temperature	Water up to 60°C / 140°F

Materials and Connections

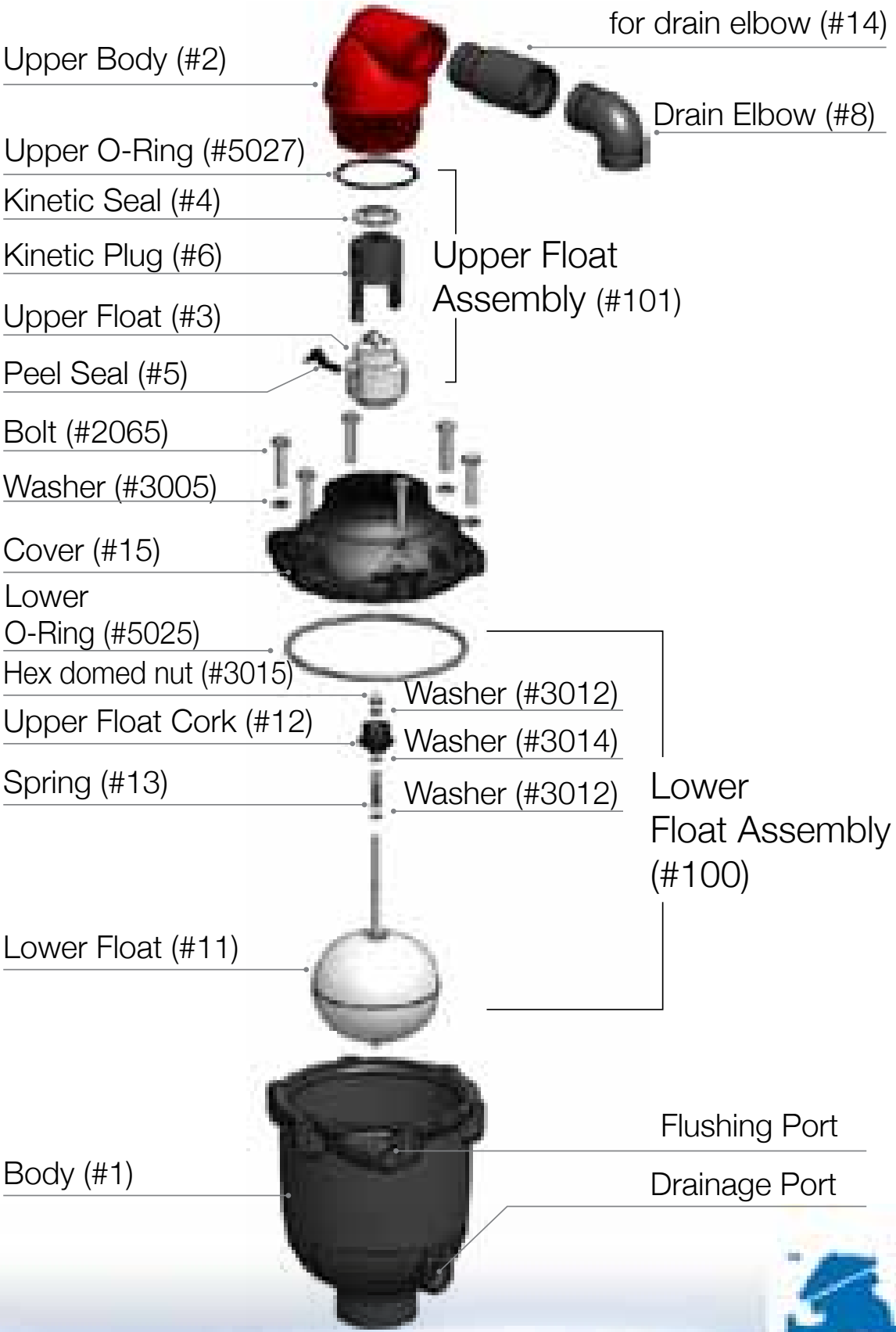
Body material	Glass-reinforced plastic
Inlet diameter	DN50, DN80, (2”, 3”)
Connections	Threaded Male and Female BSPT, NPT Flanged ISO PN16 or ANSI/ASME 150
Outlet types	Sideways, Downwards

Additional Features:
Surge Protection (C50-SP)
Inflow Prevention (C50-IP)

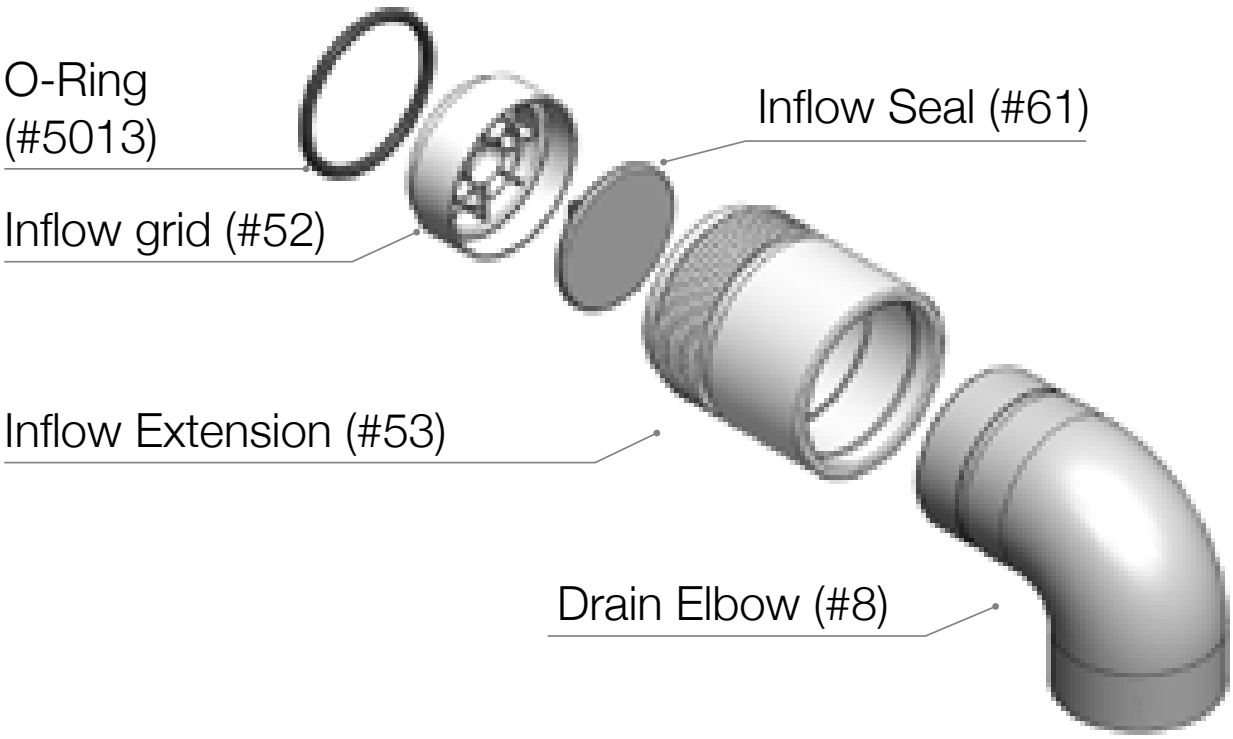
C50 - Chart


Insect Screen
Dynamic Seal
(Kinetic Orifice)
Upper Body (2#)
Peel Seal
(Automatic Orifice)
Cover (15#)
Spring (13#)
Washer
(3012#)
Float Rod
Body (1#)
Lower
Float (11#)
BSPT / NPT
Female Threaded

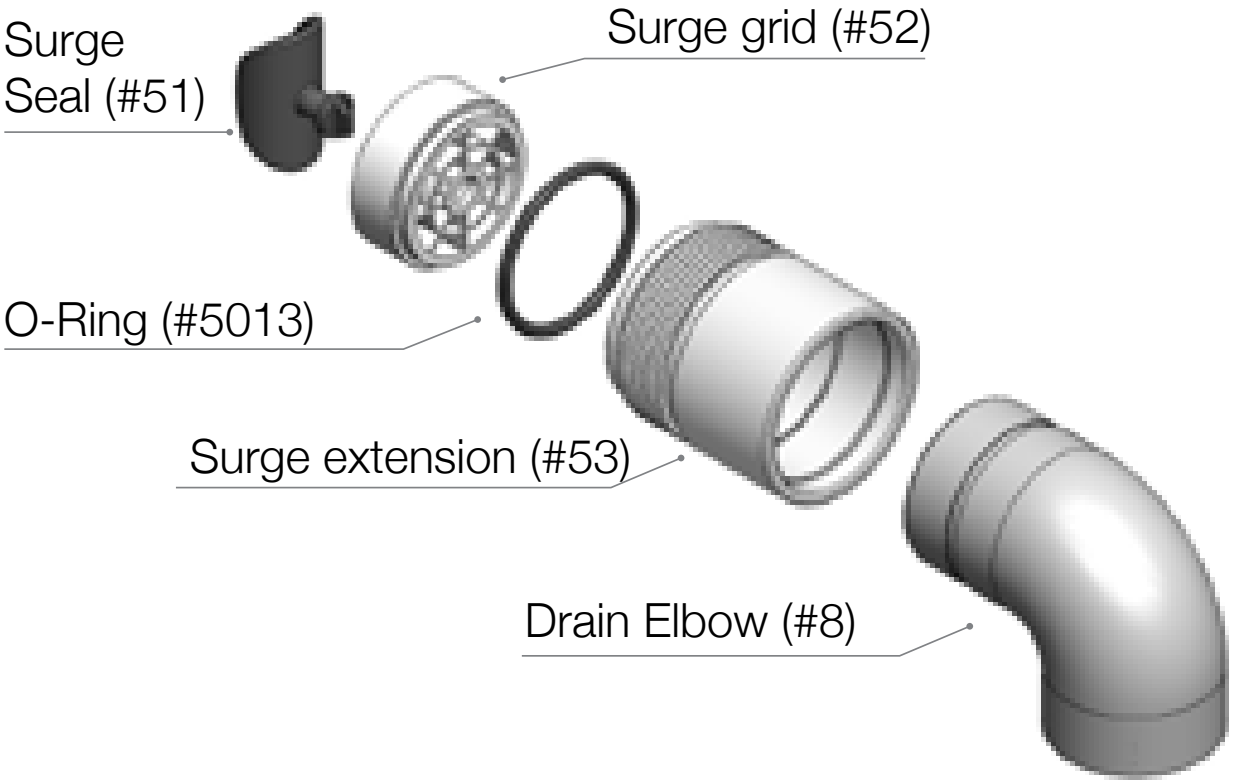
C50 Parts List



Inflow Prevention Parts List



Surge Protection Parts List



Unpacking and post shipment inspection

- Make sure that till 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 had 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 and make 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 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.

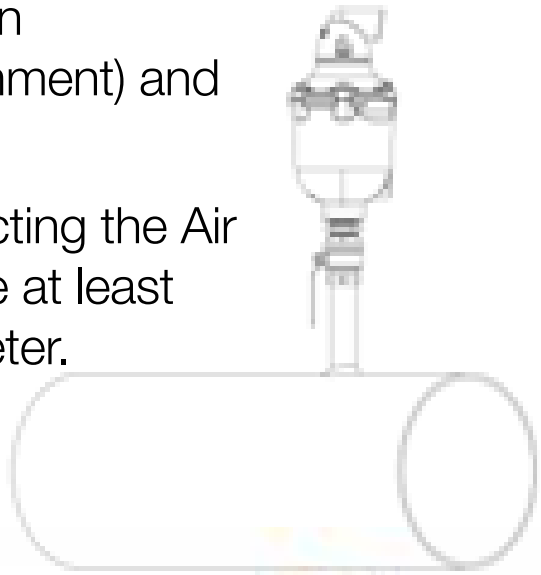
Installation

Typical Applications

- Sewage and wastewater pumping stations – Air relief and vacuum prevention.
- Sewage and wastewater pipelines – Protection agains air and gas accumulation and vacuum formation at elevations, slope change points and at road/river crossings.
- Municipal and industrial wastewater treatment plants – Protection against air and gas accumulation and vacuum formation.

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.

Operation and Maintenance

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 upwards 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)

The anti-slam device is fitted to the air valve outlet. In the event of a pressure surge it partially closes the valve's outlet. The approaching water column decelerates due to the resistance of the rising air pressure in the valve.

Inflow Prevention

The inflow prevention mechanism is a Normally Closed check device fitted on the valve's outlet and preventing flow of atmospheric air into the valve.

Inspection

The valve does not require any specific maintenance, however a periodical inspection of the seals and flushing of the valve are recommended for removing debris and foreign objects. The valve's flushing and cleaning frequency depends on water quality and dirt-load.

Stage A. Flushing the valve:

1. Close the shutoff valve connecting the Air valve with the main pipeline.
2. Open the drainage port, located at the lower side of the body (Part #1), and the flushing port at the upper side of the Body.
3. Flush the valve by discharging pressurized clean water into the flushing port till clean water exists through the drainage port.
4. Close the flushing and the drainage ports and reopen the shutoff valve.

Stage B. Dismantling the valve:

(to be performed only if stage A is not sufficient for cleaning the valve):

1. Unscrew the bolts (Part #2065) and lift the internal sub assemblies of the valve out of the Body (Part #1).

2. Clean the Body.
3. Inspect the internal sub-assemblies of the valve (lower and upper parts) and if necessary dismantle and clean.
4. Reassemble the cover (Part #15) and tighten the bolts (Part #2065).
5. Close the flushing and the drainage ports and reopen the shutoff valve.

Troubleshooting

Symptom	Action
Leakage at the inlet connection	Tighten the valve connection, use thread sealant. Check whether any part/seal is damaged.
Leakage at the valve cover	Tighten the valve's cover Check the orifices area for leaks.
Leakage at the valve's outlet	Flush the valve to remove debris, dissemble and inspect the valve's orifices, floats and seals. Remove any foreign objects, check and replace any damaged part.
Valve does not release air or allow air intake	Verify that the operating pressure does not exceed the valve's rated working pressure. Check and remove foreign objects. Clean the valve's internal parts, replace if necessary. Consult Bermad if the symptom continues.

Disassembling and Reassembling the valve

The C50 valve consists of two main subassemblies; the Upper Float Assembly and the Lower Float Assembly.

Disassembling the Upper Float Assembly:

1. Release the Upper Body (Part #2) by turning it counterclockwise, un-screw and remove it from the Valve's Cover (Part #15). Make sure that the internal parts of this assembly do not fall out.
2. Inspect the Upper O-Ring (Part #5027) and if necessary replace it with a new one.
3. Pull the float and the Kinetic Plug (Parts # 3 & 6) out of the Upper Float cover.
4. Inspect the float's Peel Seal (Part #5) and the Kinetic Seal (Part #4) for wear and tear. If necessary replace the old parts.

Reassembling the Upper Float Assembly:

1. Wet the Kinetic Seal (Part #4) with water and install it on the Kinetic Plug (Part #6) with its raised edges side facing downward. See Fig. A

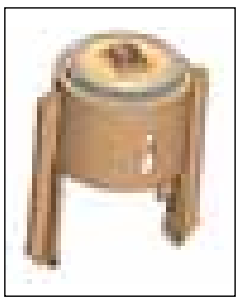


Fig. A

2. Wet the new Peel Seal (Part #5) with clean water.
3. Use the Lower Insertion Assistance Handle and insert the lower end of the Peel Seal (Part #5) to its designated groove in the Uper float (Part #3). Make sure that the serrated side of the seal (A) is facing the float flat side (B) as shown in the following drawing.
   See Fig. B

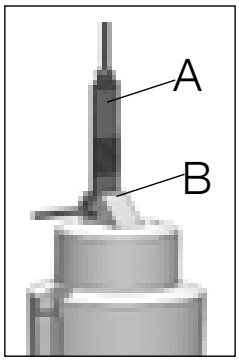


Fig. B

4. Use the Upper Insertion Assistance Handle to conduit the loose end of the Peel Seal (Part #5) through its designated bore in the Kinetic Plug (Part #6) body. Pull the Upper Insertion Assistance Handle till the upper mushroom shape of the Peel Seal sticks out of the Kinetic Plug upper side. Make sure that the Peal Seal remains straight and not folded within the bore.
5. Once the Peel Seal is correctly seated in place cut the Insertion Assistance Handles and discard them.
   See Fig. C

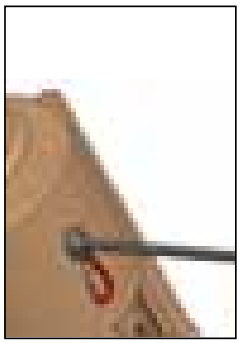


Fig. C

6. Connect the Kinetic Plug (Part #6) to the Float (Part # 4) using its Snap legs in the right orientation as shown in the following picture. See Fig. D
7. Insert the complete float assembly to its place in the Upper Body (Part #2).


Fig. D

Disassembling the Lower Float Assembly:

1. Release and remove the Cover (Part #15) by unscrewing the M12 bolts (#2065) together with their washers; remove the cover (Part # 15) and the Lower O-Ring (Part #5025).
2. Release and remove the Hex dome nut (Part #3015), the Upper Float Cork (Part #12) and then the three washers (Part # 3012, 3014), the rod with the Lower Float (Part #11) and the Spring (Part #13). Inspect these parts for wear and tear. If necessary replace the old parts.

Reassembling the Lower Float Assembly:

1. Install the Spring (Part #13) together with upper and lower washers (Part # 3012, 3014) on the upper side of the Rod (Part #11).
2. Install the Upper Float Cork (Part #12) together with upper and lower washers (Part # 3012, 3014) and lock with the Hex dome nut (Part #3015).

3. Connect the Upper Float Assembly to the Lower Float Assembly through the Air Valve Cover (Part #15).
4. Reassemble the Air Valve Cover (Part #15) on the Body (Part #1) using the M12 bolts (Part #2065) together with their washers. Make sure that the Lower O-Ring (Part #5025) is properly seated between the cover and the body.
5. The valve is reassembled, perform a compete start up procedure as described in page 10.

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