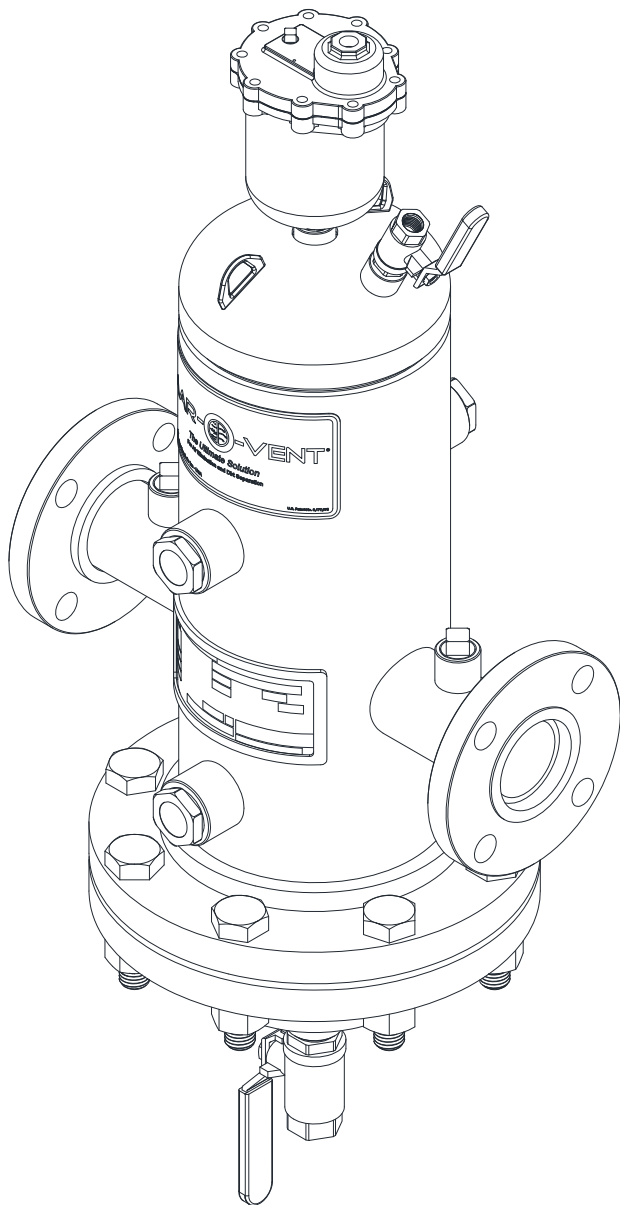




AAR--VENT[®]

High Performance Air & Dirt Separators
Manual # 9636-1230 Rev. A

Operation & Maintenance Manual



340 West 8th Street

Peru, IN 46970

PH: 765-472-3351

FX: 765-472-3968

www.thrushco.com

COPYRIGHT THRUSH CO., INC. 2014

Table of Contents

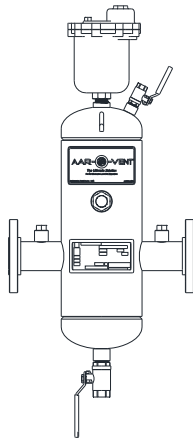
<u>Section No.</u>	<u>Description</u>	<u>Page No.</u>
1	General Product Information	1
2	Safety Information/Warnings	2
3	Component Identification and Information	3-6
4	Installation and Operation	7-12
5	Maintenance Information	13
6	Parts Ordering/Contact Information	14

THIS DOCUMENT CONTAINS INFORMATION THAT THRUSH CO. DEEMS CONFIDENTIAL AND PROPRIETARY. THE BASIC THRUSH CO. PRODUCT REVEALED IN THIS DOCUMENT IS PATENTED, AS ARE CERTAIN PRODUCT COMPONENTS. IN CONSIDERATION FOR THE RECEIPT OF THIS DOCUMENT, RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE OR TRANSMIT THIS DOCUMENT OR THE INFORMATION CONTAINED HEREIN, IN WHOLE OR IN PART, OR TO PERMIT OTHERS TO DO SO, FOR ANY PURPOSE WITHOUT FIRST OBTAINING THE EXPRESS WRITTEN PERMISSION FROM THRUSH CO. RECIPIENT FURTHER AGREES TO SURRENDER THIS DOCUMENT UPON REQUEST BY THRUSH CO.

Section 1
General Product Information

1.1 Overview

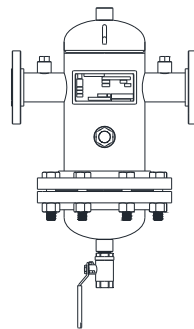
The *Aar-O-Vent*® is another product in the long line of innovations from Thrush Co.,INC. It has been carefully assembled and factory tested to provide years of trouble-free service. This manual provides information to install, operate, service and maintain the *Aar-O-Vent*. Multiple *Aar-O-Vent* models are covered (Figure 1-1). There are three main types of *Aar-O-Vent*: Air Separator (Air Only), Dirt Separator (Dirt Only), and combination Air & Dirt Separator.



Air Separator

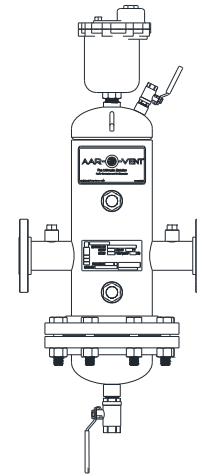
ASF - Standard Velocity Air Separator
AHF - High Velocity Air Separator

Model Designation



Dirt Separator

DSR - Standard Velocity Dirt Separator
with Removable Cover
DHR - High Velocity Dirt Separator
with Removable Cover
DSF - Standard Velocity Dirt Separator
with Fixed Cover
DHF - High Velocity Dirt Separator
with Fixed Cover



Air & Dirt Separator

SVR - Standard Velocity Air & Dirt Separator
with Removable Cover
HVR - High Velocity Air & Dirt Separator
with Removable Cover
SVF - Standard Velocity Air & Dirt Separator
with Fixed Cover
HVF - High Velocity Air & Dirt Separator
with Fixed Cover

(L) AFTER ANY MODEL # DENOTES "LESS OPTIONS"

Figure 1-1 Overview

Section 2 Safety Information/Warnings

2.1 Safety Information and Warnings

Every practical safety feature has been incorporated into the design and manufacture of the Thrush Co. *Aar-O-Vent*. If questions are not answered by this manual, or if specific installation, operation, and/or maintenance procedures are not clearly understood, contact your local representative before proceeding. Personnel must, at all times, observe all safety regulations while performing maintenance or repairs.

All installation, operation, and maintenance procedures should be performed by qualified, experienced and well trained personnel. The potential exists for severe personal injury if proper procedures are not followed.



Depending on the size of *Aar-O-Vent*, the bundle can be quite heavy. It is recommended that supports be used when removing the head and bundle. Once all bolts have been removed from the head, the head and bundle are free to drop. Risk of severe personal injury and/or property damage may occur if the bundle and head are not supported.



5" and larger *Aar-O-Vents* have lift lugs to aid in lifting and locating the unit. The lift lugs are not intended to be used to support the *Aar-O-Vent* during operation. Adequately sized and spaced supports/hangers should be used to prevent damage or strain on the system piping.



The *Aar-O-Vent* is not designed to be used as a make-up water inlet point. Using any of the connections for make-up water would impede proper operation and void the warranty.



System water over 100°F can be very hazardous. Keep flow away from the body when flushing the unit. Failure to do so could result in serious bodily injury or property damage.

Section 3
Component Identification and Information

3.1 Component Identification

The following paragraphs contain functional descriptions for each of the major components of a Thrush Co. *Aar-O-Vent*. This manual provides information for multiple *Aar-O-Vent* models. All the components listed have the same functional purpose in each model.

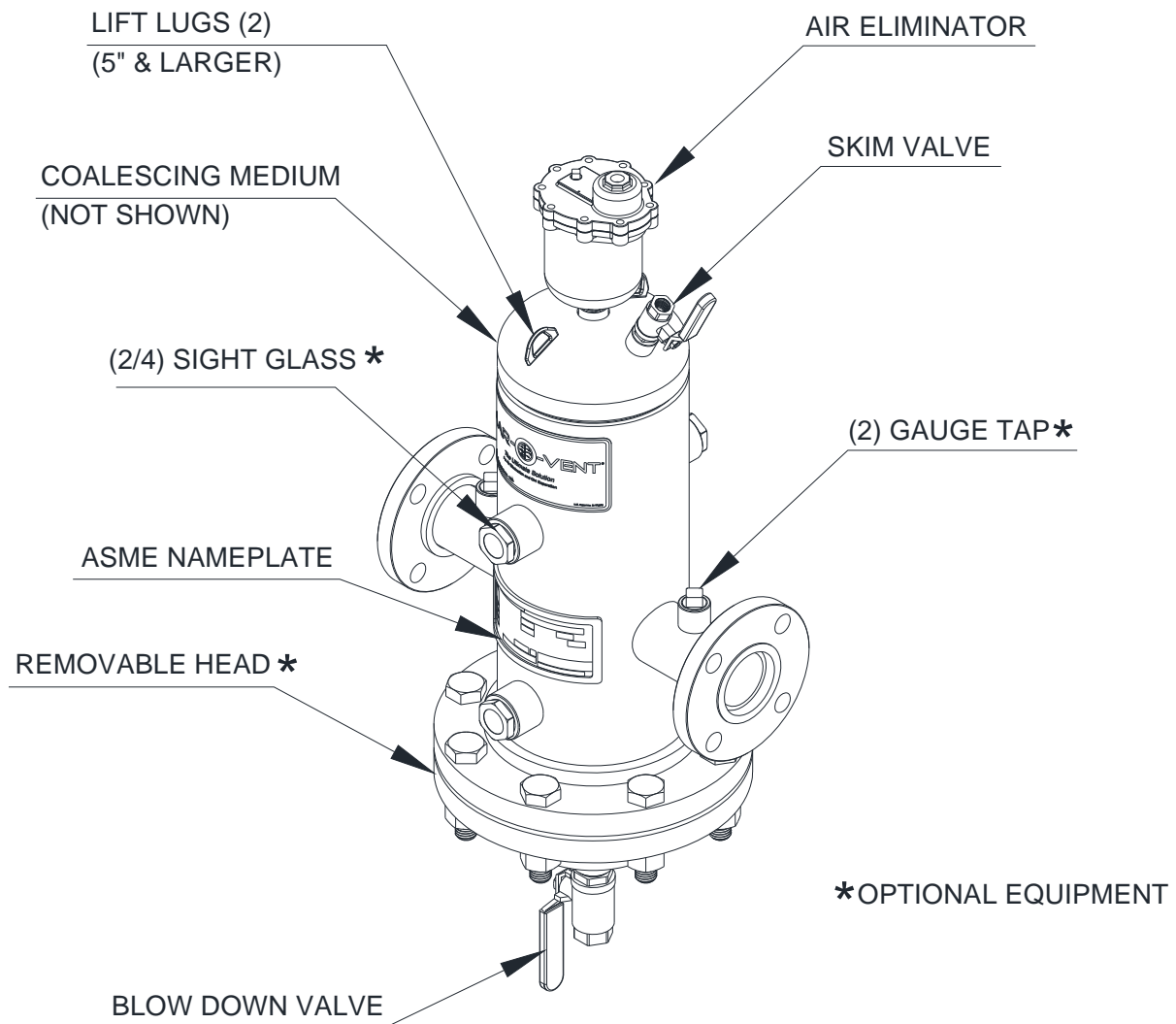


Figure 3-1 Components

3.1.1 Coalescing Medium

Each *Aar-O-Vent* model incorporates an all stainless steel coalescing medium often referred to as the bundle. This coalescing medium eliminates virtually any dirt particles, air bubbles and/or entrained air from the water by means of an air eliminator or blow down valve. This patented design resists corrosion and can be easily cleaned.

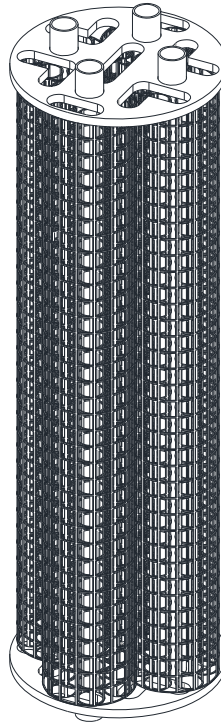


Figure 3-2 Coalescing Medium

3.1.2 Sight Glass (Optional)

One of the optional features offered with each *Aar-O-Vent* is sight glasses. Sight glasses allow the user to periodically check the coalescing medium for signs of dirt build-up.

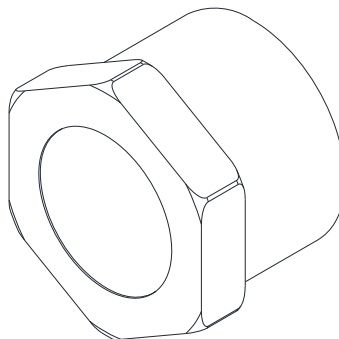


Figure 3-3 Sight Glass

3.1.3 Removable Head Option

The removable head option allows the user to easily remove the bundle for cleaning or inspection, available on all models.

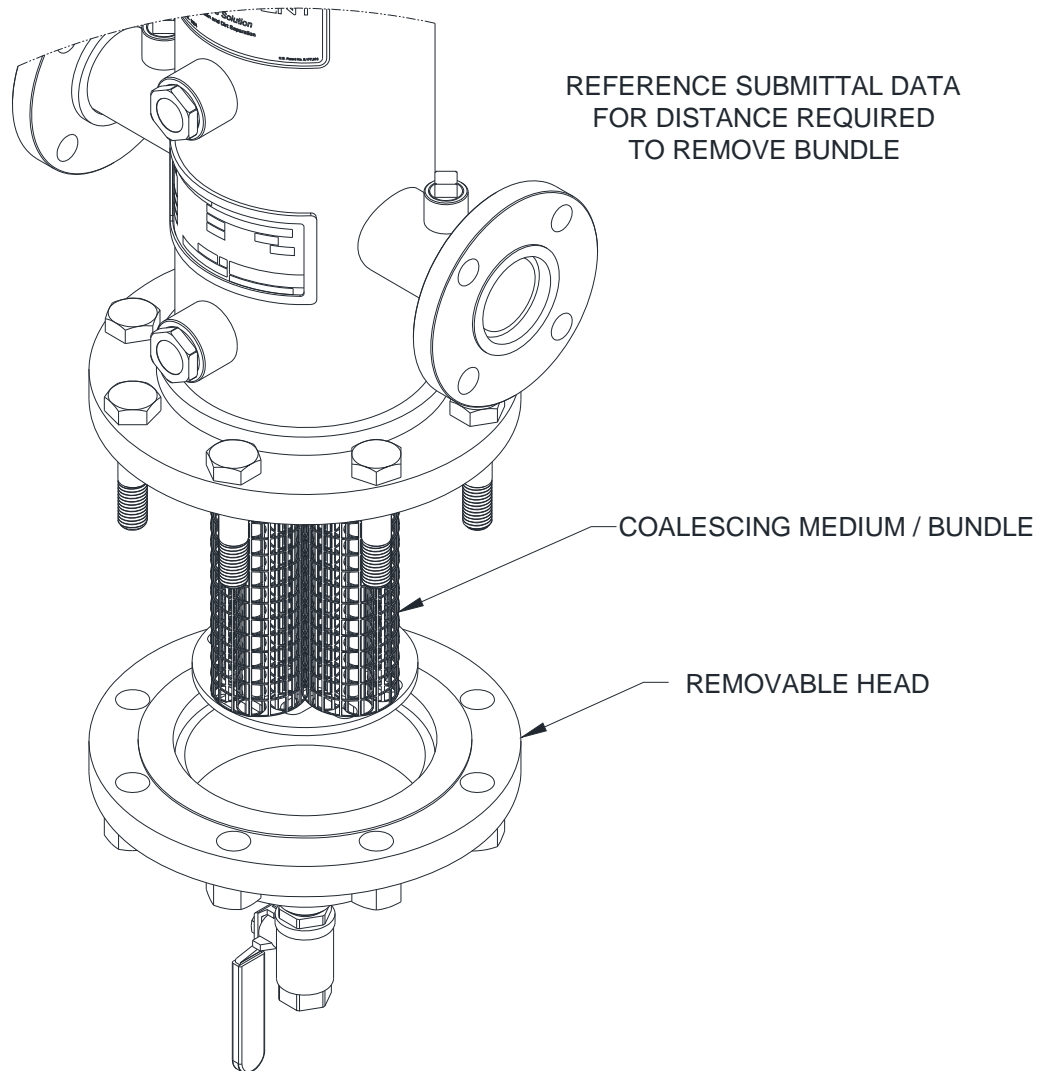


Figure 3-4 Removable Head Detail



Depending on the size of *Aar-O-Vent*, the bundle can be quite heavy. It is recommended that supports be used when removing the head and bundle. Once all bolts have been removed from the head, the head and bundle are free to drop. Risk of severe personal injury and/or property damage may occur if the bundle and head are not supported.

3.1.4 Thrush Model 720 Air Eliminator

The Thrush Model 720 Air Eliminator is a unique high capacity, air elimination device. It is designed to eliminate air as fast as it can be separated from liquid. The valve will not open if negative pressure occurs, preventing air from being drawn back into the system.

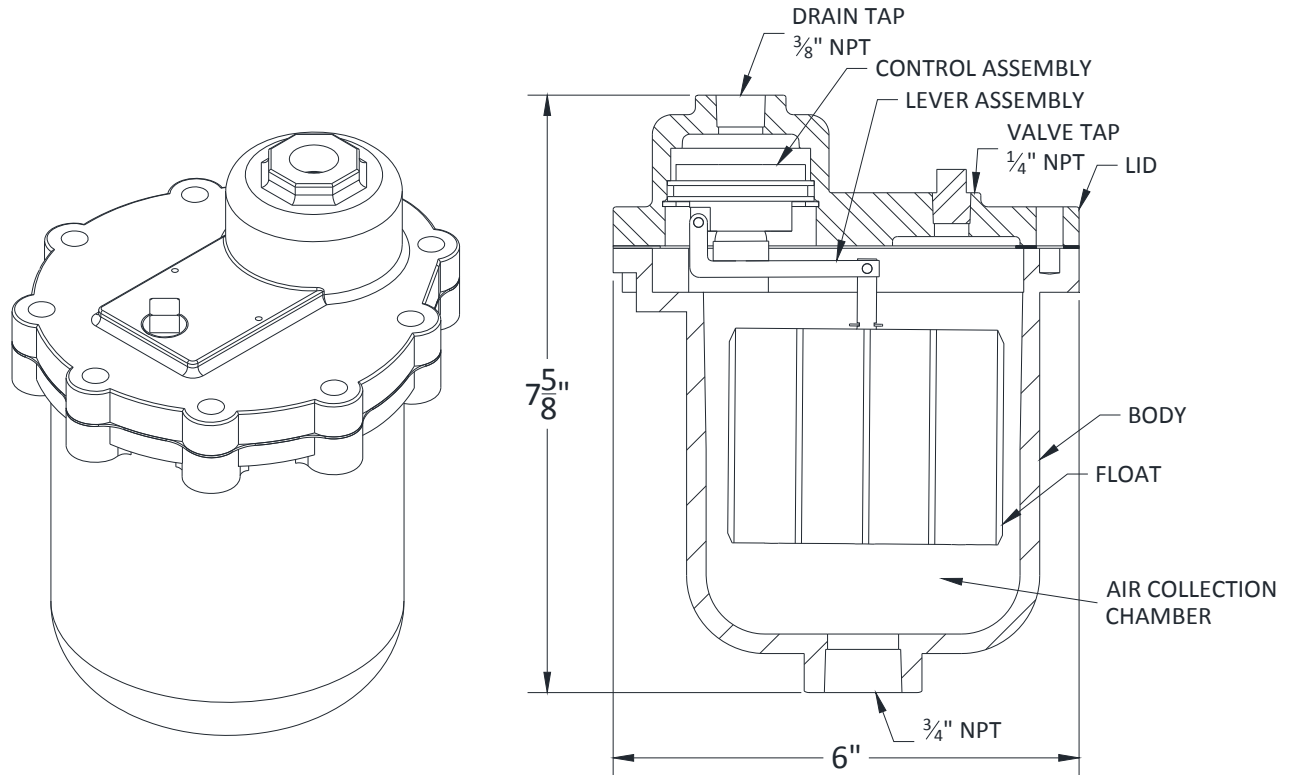


Figure 3-5 Air Vent

Air Eliminator Operation

The air eliminator is used on the *Aar-O-Vent* to remove unwanted air that could reduce system performance, increase operational cost, and support the damaging effects of corrosion.

The collection of air in the body of the air eliminator causes the float to drop allowing the air to be vented through an air eliminating orifice. As the liquid level rises in the air eliminator body, the float also rises shutting off the flow of vented air (Figure 3-5).

Section 4 Installation and Operation

4.1 Installation Tips

The following procedures are to aid the operator in installing the *Aar-O-Vent*. All procedures are to be performed by experienced, trained, and certified personnel only.



5" and larger *Aar-O-Vents* have lift lugs to aid in lifting and locating the unit. The lift lugs are not intended to be used to support the *Aar-O-Vent* during operation. Adequately sized and spaced supports/hangers should be used to prevent damage or strain on the system piping.

1. To protect the *Aar-O-Vent* during shipping, some of the components are shipped unattached in protective packaging. These components are to be installed on site. See Figure 3-1 for component locations.
2. The *Aar-O-Vent* should be located where it is easily accessible for inspection, service and repair.
3. A standard *Aar-O-Vent* should be installed in-line in the system piping, in a vertical position only. Adequately sized and spaced pipe supports/hangers should be used to prevent damage or strain on the system piping.
4. An *Aar-O-Vent* should be installed in a piping system at its lowest point of solubility. Typically the point of highest temperature and lowest pressure is the ideal location.
5. When placing the *Aar-O-Vent* with removable head in the system piping, be aware of the clearance required for bundle removal and cleaning. See Submittal Data for distance required to remove bundle.
6. When piping the unit into system piping, the pipe should be sized to allow adequate flow at a minimal head loss, and be, at minimum, the same size as the *Aar-O-Vent* connections. The use of elbows, tees or other restrictive fittings should be kept to a minimum.
7. Isolation valves are recommended to allow gasket changes and inspection of the bundle.
8. Expansion joints and or flex connectors are recommended to prevent pipe strain caused by thermal expansion or piping misalignment.
9. System by-pass piping is also recommended to better facilitate system service and maintenance.
10. The *Aar-O-Vent* will operate with flow entering the unit at either connection.

4.1 Installation Tips (Continued)

Using the figure below as reference only, note the steps outlined to install piping for the *Aar-O-Vent* (Figure 4-1).

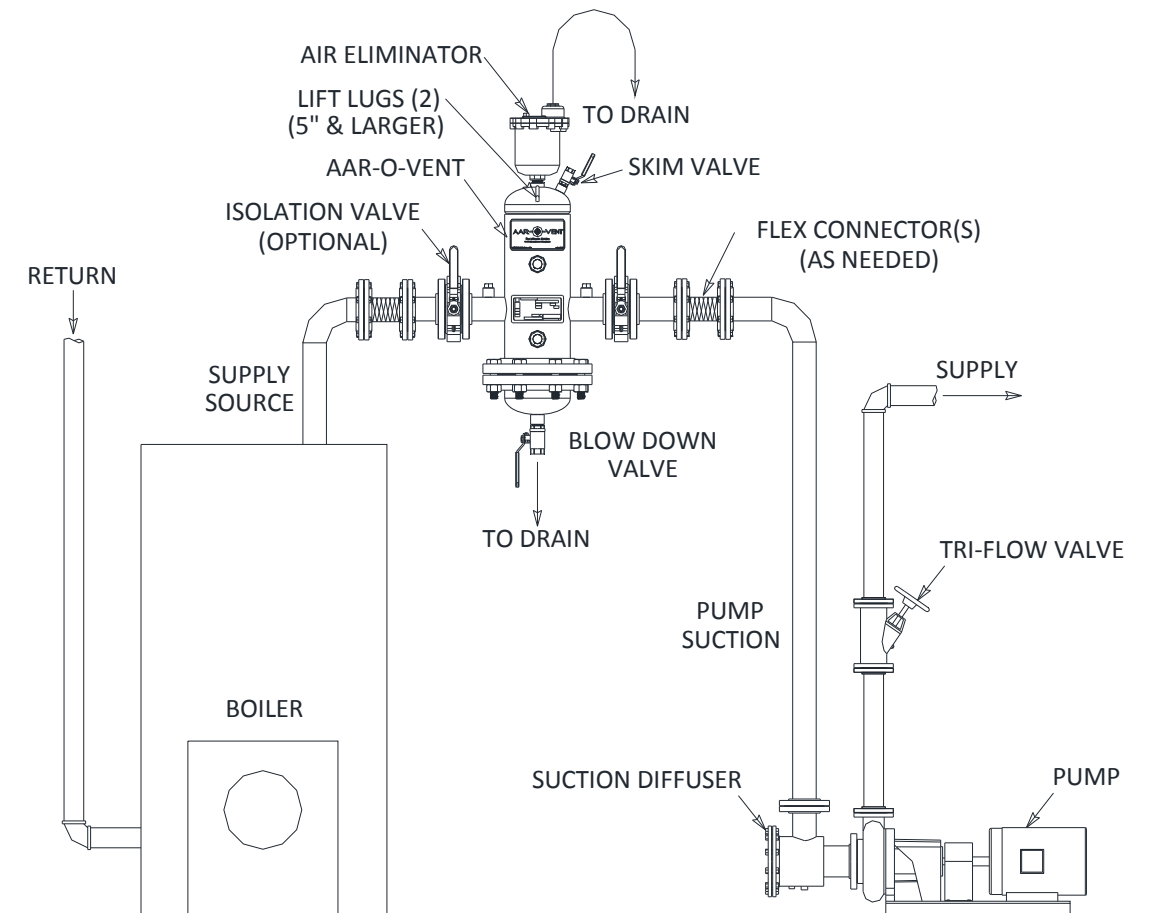


Figure 4-1 Typical Piping Diagram

1. Connect the supply source to one connection of the *Aar-O-Vent*.
2. Connect suction piping of the pump to the other connection of the *Aar-O-Vent*.
3. The air vent, the blow down valve and the skim valve should be run to an adequate drain.
4. Once all connections are made, allow the system to completely fill with water. Opening the skim valve will speed up this process.
5. After the unit is completely filled, the *Aar-O-Vent* is ready for operation.

Thrush Co.

Manual #9636-1230

4.2 Operation

Heating/cooling system efficiency and component life is greatly dependent on water quality. Air and dirt particles can cause pump cavitation, corrosion and increased component wear. In a closed loop system, the *Aar-O-Vent* eliminates air bubbles, entrained air and dirt particles quickly and easily.

Air Elimination:

Thrush Co. offers the *Aar-O-Vent* in “Air Only”, “Dirt Only” and combination units “Air and Dirt”. The “Air Only” and “Air & Dirt” units are the only models that utilize the Thrush Model 720 air elimination device, air vent. They also have extra space in the top of the vessel for the collection of air. Outlined below is operational information on the air elimination feature of the *Aar-O-Vent*. Use Figure 4-2 for reference (“Air and Dirt” model shown).

- Large air bubbles in the system water enter the *Aar-O-Vent* and collide with the coalescing medium. They quickly rise to the top of the vessel and into the air elimination device.
- Micro bubbles coalesce and form larger bubbles. The larger bubbles then rise to the top of the vessel and into the air elimination device.
- Entrained air is pulled out of solution and forms micro bubbles. The micro bubbles coalesce forming larger bubbles. The larger bubbles rise to the top of the vessel and into the air elimination device.
- As air bubbles collect at the top of the vessel they create an air pocket. This pocket of air pushes the water level down inside the vessel. As the water level drops, the float inside of the air elimination device also drops releasing the air to atmosphere.
- The air elimination device releases air as fast as it can be separated. It will not allow air back into the system, even if a vacuum occurs.
- Once the air has been released, the water level will rise inside the vessel. This causes the float to rise and close the air elimination device.

This cycle will continue as new water is introduced into the system piping. With each pass of system water the *Aar-O-Vent* will eventually eliminate up to 99.7% of dissolved oxygen content in the system piping.



The *Aar-O-Vent* is not designed to be used as a make-up water inlet point. Using any of the connections for make-up water would impede proper operation and void the warranty.

4.2 Operation (Continued)

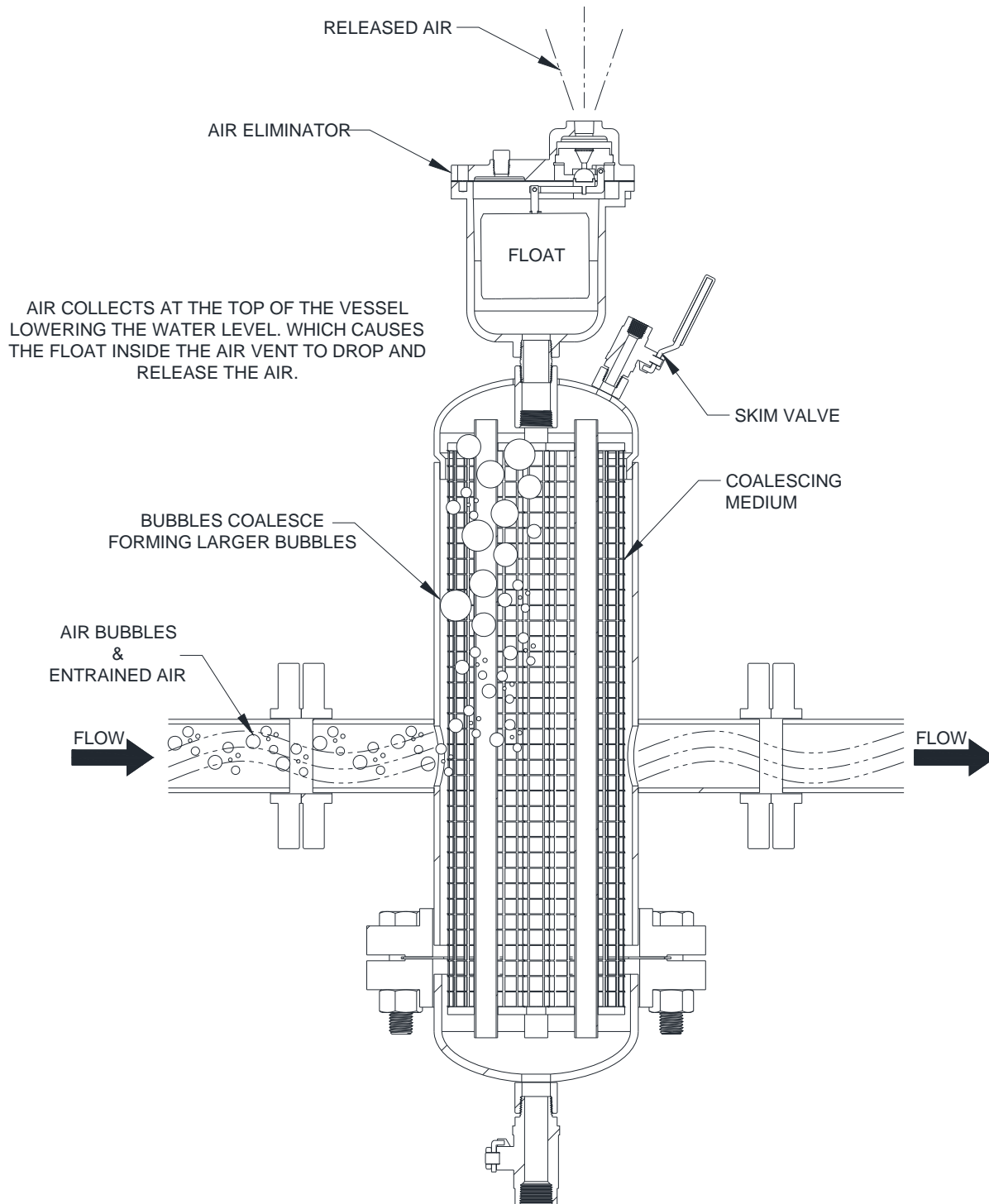


Figure 4-2 Operation (Air Elimination)

4.2 Operation (Continued)

Dirt Elimination:

The “Dirt Only” and “Air & Dirt” *Aar-O-Vent* models have extra space in the lower section of the vessel for collection of dirt particles. Outlined below is the operational information on the dirt elimination feature of the *Aar-O-Vent*. Use Figure 4-3 for reference (“Air and Dirt” model shown).

- Dirt particles in the system water enter the *Aar-O-Vent* and collide with the coalescing medium.
- The coalescing medium creates an area of less turbulence allowing the dirt particles to fall out of the flow path and to the bottom of the vessel.
- Dirt particles will continue to collect at the bottom of the vessel until they are flushed out through the blow down valve.
- Floating debris can be flushed out by opening the skim valve located on the top of the vessel.
- Should the need to clean the coalescing medium arise, the removable head provides ease of removal and cleaning.



Depending on the size of *Aar-O-Vent*, the head and bundle can be quite heavy. It is recommended that supports be used when removing the head/bundle. Once all bolts have been removed from the head, the head and bundle are free to drop. Risk of severe personal injury and/or property damage may occur if the bundle and head are not properly supported.

4.2 Operation (Continued)

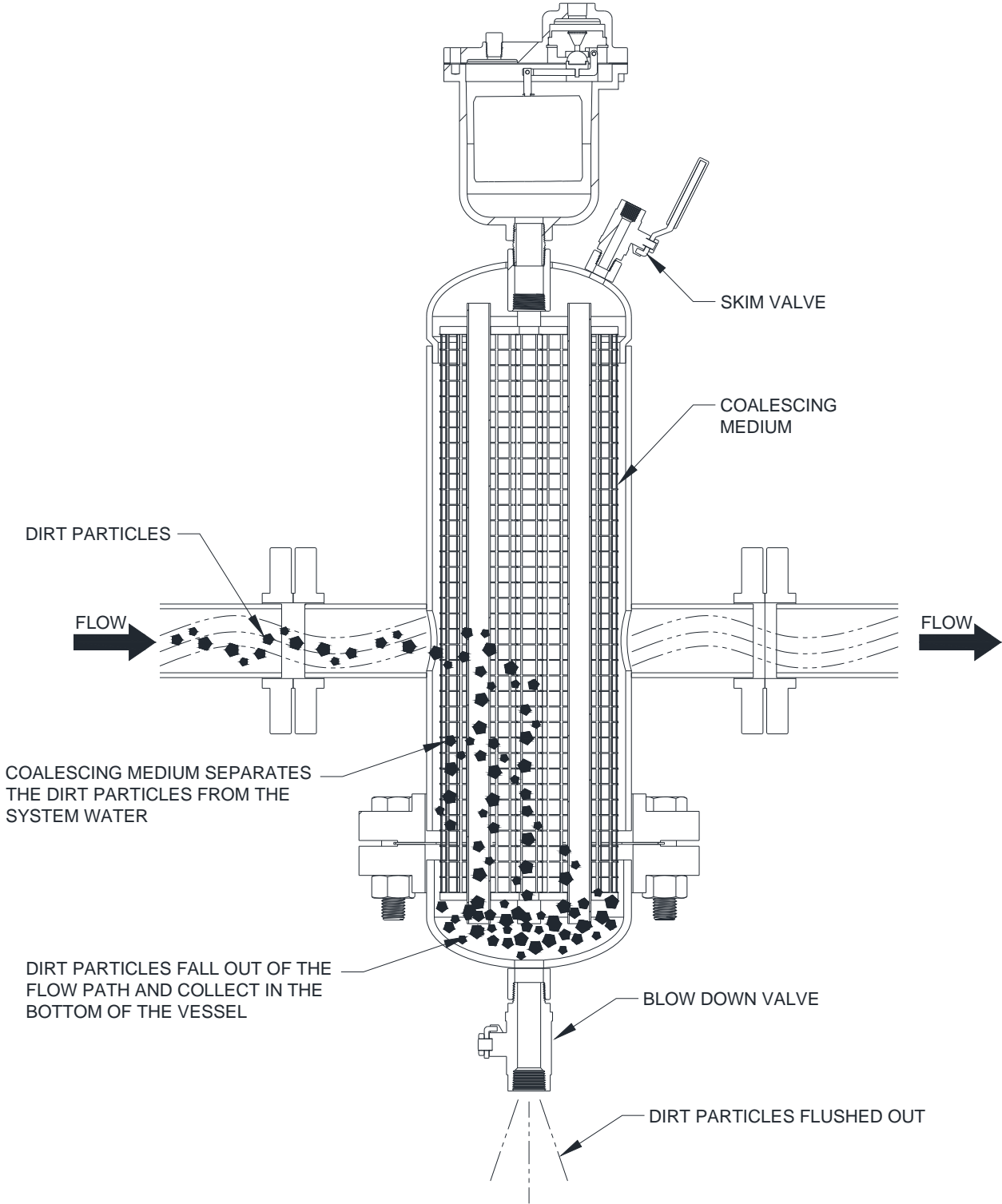


Figure 4-3 Operation (Dirt Elimination)

Section 5
Maintenance Information

5.1 Maintenance Information

The *Aar-O-Vent's* simple design allows for minimal maintenance. There are no moving parts other than the air elimination device itself.

- Routine flushing of the blow down valve and skim valve are recommended. Frequency of flushing is system specific based on water quality. A container or hose should be used to catch the sediment when flushing the valves, unless they are piped to an adequate drain.



System water over 100°F can be very hazardous. Keep flow away from the body when flushing the unit. Failure to do so could result in serious bodily injury or property damage.

- The coalescing medium (bundle) can be removed for cleaning as needed. A power washer or hose is sufficient. The stainless steel construction allows for ease of cleaning. A new gasket should be installed upon reassembly of the unit. Tighten all bolts in a criss-cross fashion, properly torqued. See chart below.



Depending on the size of *Aar-O-Vent*, the head and bundle can be quite heavy. It is recommended that supports be used when removing the head/bundle. Once all bolts have been removed from the head, the head and bundle are free to drop. Risk of severe personal injury and/or property damage may occur if the bundle and head are not properly supported.

- When replacing the gaskets and reassembling the unit, the bolts should be torqued incrementally to 30%, 60% and then 100% of the appropriate value shown in the chart below. They should also be torqued in a criss-cross pattern.

<u>Aar-O-Vent</u> <u>Connection size</u>	<u>Removable</u> <u>Head Size</u>	<u>Bolt Size</u>	<u>Number of Bolts</u>	<u>Torque Ft/Lb</u> <u>(150# Flgs.)</u>
2"	6"	3/4"	8	50
2.5"	6"	3/4"	8	50
3"	6"	3/4"	8	50
4"	8"	3/4"	8	50
5"	10"	7/8"	12	80
6"	12"	7/8"	12	80
8"	16"	1"	16	123
10"	20"	1 1/8"	20	195
12"	24"	1 1/4"	20	273

Section 6

Parts Ordering/Contact Information

6.1 Contact Information

Any additional information not supplied in this manual can be given by your representative.

If your representative cannot be reached, please contact our customer service department:

Thrush Co., Inc.
PO Box 228
340 West 8th Street
Peru, IN 46970
Attention: Customer Service Group

Phone: (765) 472-3351
(800) 755-8110
Fax: (765) 472-3968
E-mail: customerservice@thrushco.com

When calling or writing to place a parts order to your representative, it is recommended to have the following items for reference:

1. Part number(s).
2. Description of product(s).
3. Quantity required.
4. National Board Number (If applicable).