

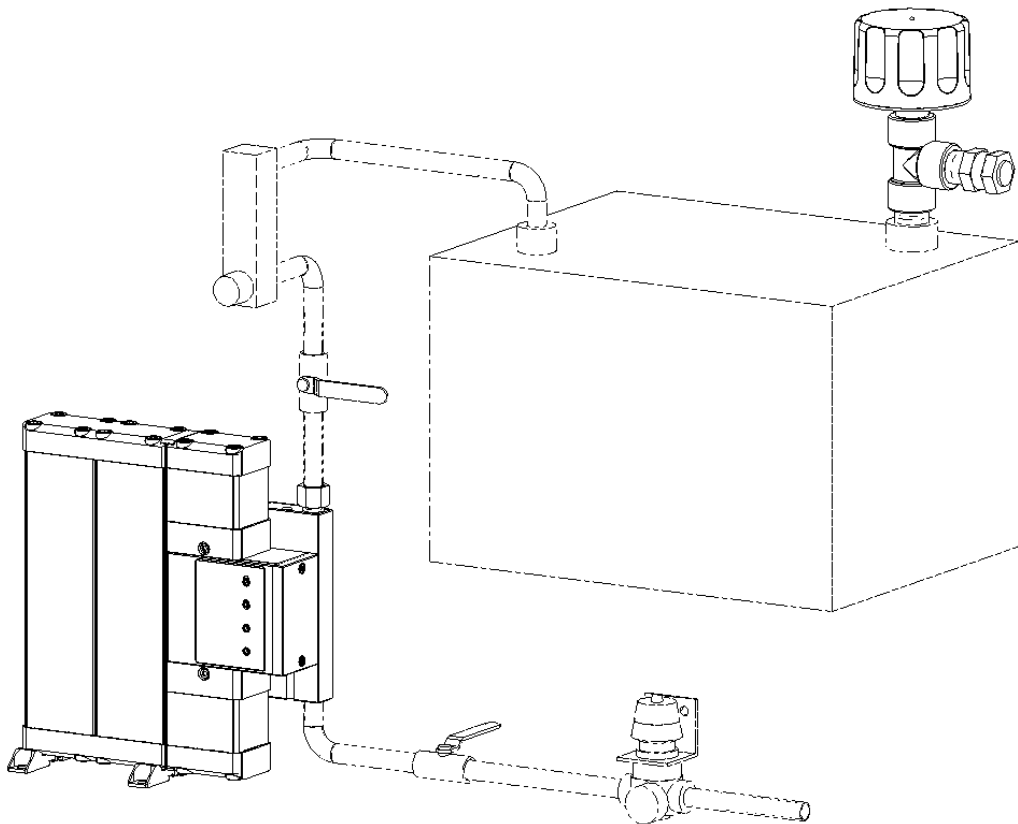


**Donaldson**<sup>®</sup>  
*Filtration Solutions*

# **ARV<sup>TM</sup>-3 & ARV<sup>TM</sup>-10**

*Active Reservoir Vent<sup>TM</sup>*

## **Installation and Operation Manual**



**As the installer or operator, you should make yourself familiar with this Installation and Operation Manual in terms of the optimum installation of the Active Reservoir Vent™ system and components. In addition, you should also make yourself familiar with the included Donaldson® Ultrafilter® Ultrapac 2000 Operation Manual. This additional manual describes many safety precautions and must be followed. A basic prerequisite for safe working with and error free operation of the system is a knowledge of the basic and special safety features. Some points from the Ultrapac 2000 Operation Manual are reiterated below:**

- This kit should be used for its intended purpose only: drying compressed air to flow through an oil reservoir.
- This manual and the **Ultrapac 2000 Operation Manual** should always be available at the location of the unit.
- Always use the appropriate tools when installing or servicing this system.
- Always use original parts.
- Failure to follow operation instructions could result in personal injury or damage to equipment.
- Start-up and shut-down procedure outlined in the **Ultrapac 2000 Operation Manual** must be followed precisely.
- Any service to the electrical components of this system must be performed by a trained professional.
- Always disconnect electrical power source and decompress the system before servicing:
  - Replacing components
  - Disconnecting any plumbing
  - Replacing filters
- When installing this system, use proper lifting and fastening devices.
- Inspect the unit for proper operation regularly:
  - Visual inspection for external damage
  - Perform all required service at the required intervals.
  - All labels and warnings must not be removed.

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## Introduction & Overview

Water is a frequent and damaging contaminant in hydraulic and lubrication systems. Water contamination causes a host of problems, including: corrosion, component seizure, microbial growth, additive dumping, and accelerated oil oxidation. The Active Reservoir Vent™ (ARV™) is a novel and effective dry air purging system for minimizing water contamination in fluids. This system continuously supplies dry air to reservoirs and other vented components. Slight pressurization of the reservoir head space with dry air prevents ingress of humidity, thereby eliminating a common source of water contamination. In addition, as dry air sweeps over the surface of the oil, water evaporates and the oil dries to beneficial low levels. Through efficient and user-friendly water contamination control, this unique dry air purging system provides a wide range of benefits, including longer component life, extended fluid change intervals, and greater system uptime and reliability.

There are two main components of the ARV™ system. The first described below is the Donaldson® Ultrapac 2000 heatless regenerative dryer. The second is the ARV™Vent Kit with T.R.A.P.™.

### Ultrapac Heatless Regenerative Dryer

The Donaldson® Ultrapac 2000 Series of heatless adsorption dryers is a complete purification system including prefilter, dryer, afterfilter, control system, automatic condensate drain and silencer. All components are factory sealed, providing minimum installation requirements for fast start up. The desiccant is supplied in sealed cartridges, providing easy maintenance compared to loose desiccant.

Heatless desiccant dryers, like all adsorption type dryers, use a desiccant to adsorb the water vapor in the airstream. One desiccant cartridge dries the air from the compressed air system, while the desiccant in the other cartridge is being regenerated to provide continuous operation. In the heatless desiccant dryer design, no internal or external heaters are used. Regeneration is achieved by using a partial stream of the dried air, expanding it to atmospheric pressure, and running it through the desiccant cartridge that is being regenerated. Figure 1 shows a schematic of the flow path.

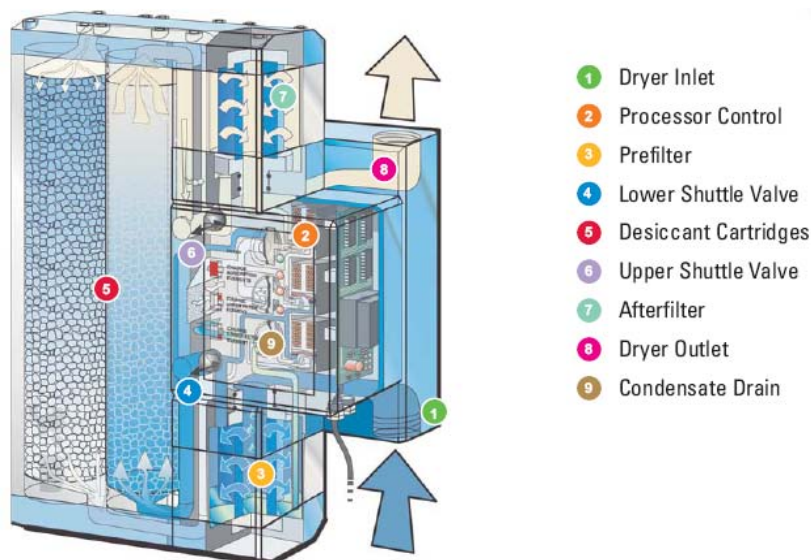


Figure 1 – Flow path through the Donaldson® Ultrapac 2000.

## ARV™ Vent Kit with T.R.A.P.™

The ARV™ Vent Kit with T.R.A.P.™ is designed to protect the reservoir head space during fluid volume changes or during maintenance of the Donaldson® Ultrapac 2000. For hydraulic systems with fluid volume changes within the reservoir, such as when a cylinder is extended, air must be allowed to enter the reservoir to makeup for the lower oil volume. If this flow volume change is larger than the compressed air flow rate from the Ultrapac, air will enter through the ARV™ Vent Kit.

The ARV™ Vent Kit has two primary components, the T.R.A.P.™ breather, depicted in figure 2, and a relief valve, allowing air to pass from the system in the event of unexpected restriction.

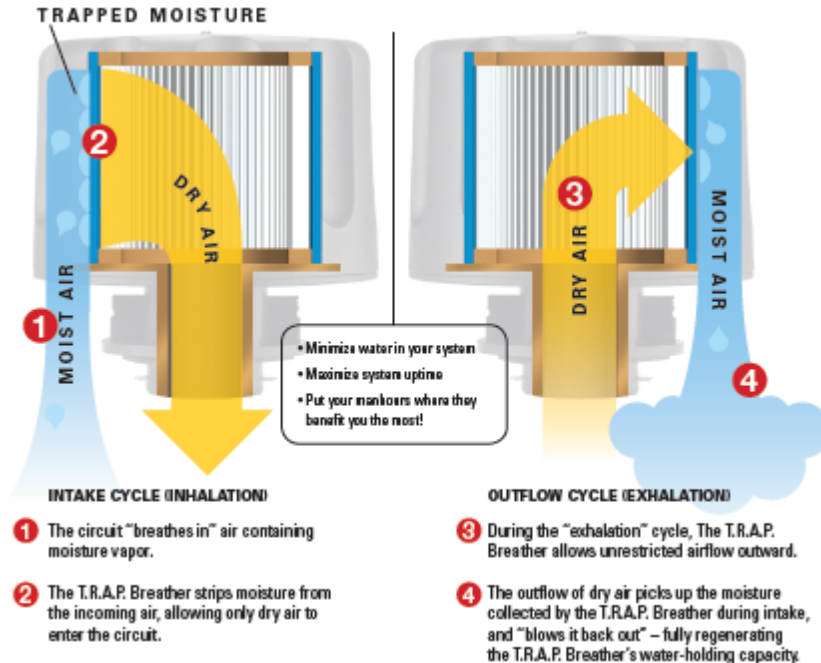


Figure 2 – How T.R.A.P.™ breather works.

**Caution: The ARV™ Vent Kit with T.R.A.P.™ is sized for a maximum flow of 10 cfm. This will easily handle the air flow from the Ultrapac unit. However, if the ARV™ is used on a hydraulic system or lube reservoir where air flow in or out of the reservoir may exceed this value, this kit should not be used and an alternative should be identified.**

## Assembly & Installation

The parts included with the ARV™ kit are shown in table 1 in bold. For your convenience, a list of additional components supplied by the customer is included.

Qty	Description of Item	Part Number	Notes
	<b>Compressed Air Supply</b>		
1	Regulator	NA	Recommended - Supplied by customer
1	Pressure Gauge	NA	Recommended - Supplied by customer
1	Inlet Shut-off Valve	NA	Required - Supplied by customer
<b>1</b>	<b>Ultrapac</b>	<b>P568790 (ARV-3) P568791 (ARV-10)</b>	<b>Supplied</b>
1	Outlet Shut-off Valve	NA	Required - Supplied by customer
	<b>Flow Control</b>		
1	Orifice or Flow Meter	* See below	Required - Supplied by customer
1	Pipes, hoses, or fittings to reservoir	NA	Required - Supplied by customer
<b>1</b>	<b>ARV Vent Kit</b>	<b>P568793</b>	<b>Option Supplied: Includes 1" NPT Nipple, 1" Tee, TRAP Breather, and a 0.5 psi relief valve</b>

Table 1 – List of supplied parts (in bold) and other required or recommended parts supplied by customer.

For optimum performance, the ARV™ installation should include all the components shown in table 1. A suitable flow control must be used to restrict flow to below the flow rating of the Ultrapac: 3 cfm or 10 cfm. For fixed flow installations, a critical flow orifice such as McMaster-Carr P/N 2822T251 (3 cfm) or 2822T999 (10 cfm) or equivalent should be used. For adjustable control, we recommend a variable area flow meter with integral valve such as McMaster-Carr P/N 41945K15 (3 cfm) or 41945K17 (10 cfm) or equivalent should be used. Many options are available.

After becoming familiar with this entire manual and the **Ultrapac 2000 Installation and Operating Manual**, proceed to below.

### Planning the installation

There are a few considerations for planning the installation of the ARV™. See figure 3.

1. Compressed air and electrical power are required for ARV operation. A compressed air source capable of maintaining a minimum of 60 psi pressure to the inlet of the Ultrapac is recommended. Power supply: 120V / 50-60Hz.
2. The installer should identify two head space ports available on the reservoir for this installation, an inlet and an outlet. For optimum performance, these should be located on opposite ends of the top of reservoir.
3. The outlet port must be sized to accommodate both the flow from the ARV™ as well as flow caused by oil level changes caused by the system. **Caution: The ARV™**

**Vent Kit with T.R.A.P.<sup>™</sup> is sized for a maximum flow of 10 cfm. This will easily handle the air flow from the Ultracac unit. However, if the ARV<sup>™</sup> is used on a hydraulic system or lube reservoir where air flow in or out of the reservoir may exceed this value, this kit should not be used and an alternative should be identified.**

4. In certain installations, the liquid level in the reservoir may be very near the top of the reservoir. To avoid jetting the air into the liquid and creating bubbles or foam, a side inlet should be considered.

## **Assembly and Installation steps**

Refer to figure 3 for an overview of the installation.

1. Make sure all required components listed in table 1 are available before proceeding.
2. Install the Ultracac 2000 near the point of use, being careful to follow the separate **Ultracac 2000 Operation Manual**. A few points that should be emphasized:
  - a. The unit must be installed upright with max. 5° out of level.
  - b. Ensure that the area to be used for installation of the unit is clean and allows access from all sides. Take special care that there is sufficient room to swap over the unit or perform maintenance on it. Leave a minimum of 10.5 inches above the Ultracac to allow for replacement of desiccant cartridges.
  - c. Ensure that any vibration from other units or machinery is not transmitted to the dryer.
  - d. For proper and safe startup, shutdown, and maintenance, a shutoff valve should be installed both upstream and downstream of the Ultracac. We do not recommend a bypass for the ARV<sup>™</sup> application of Ultracac.
  - e. For proper operation of the unit, a pressure regulator and gauge are highly recommended. Inlet pressure should be adjusted to the highest pressure that can be maintained. Note for pressures greater than 100 psi or less than 90 psi, the internal throttle must be changed as described in the Ultracac 2000 Operation Manual in section 7.1, page 19, titled Preparatory Work..
3. Using appropriate fittings, pipes, and/or hoses; route a compressed air line from the outlet of the Ultracac 2000 to the inlet point on the reservoir. Again, a shutoff valve should be provided in this line, downstream of the Ultracac unit. A fixed orifice or variable area flow control must be installed in this line.
4. Attach the ARV<sup>™</sup> Vent Kit to the headspace outlet port on the reservoir. The stainless steel nipple should attach to the outlet port on the reservoir. Use appropriate fittings if necessary. The T.R.A.P.<sup>™</sup> breather can then be installed into the open port on the tee fitting. **Caution: The ARV<sup>™</sup> Vent Kit is sized for a maximum flow of 10 cfm. This will easily handle the air flow from the Ultracac unit. However, if the ARV<sup>™</sup> is used on a hydraulic system or lube reservoir where air flow in or out of the reservoir may exceed this value, this kit should not be used and an alternative should be identified.**

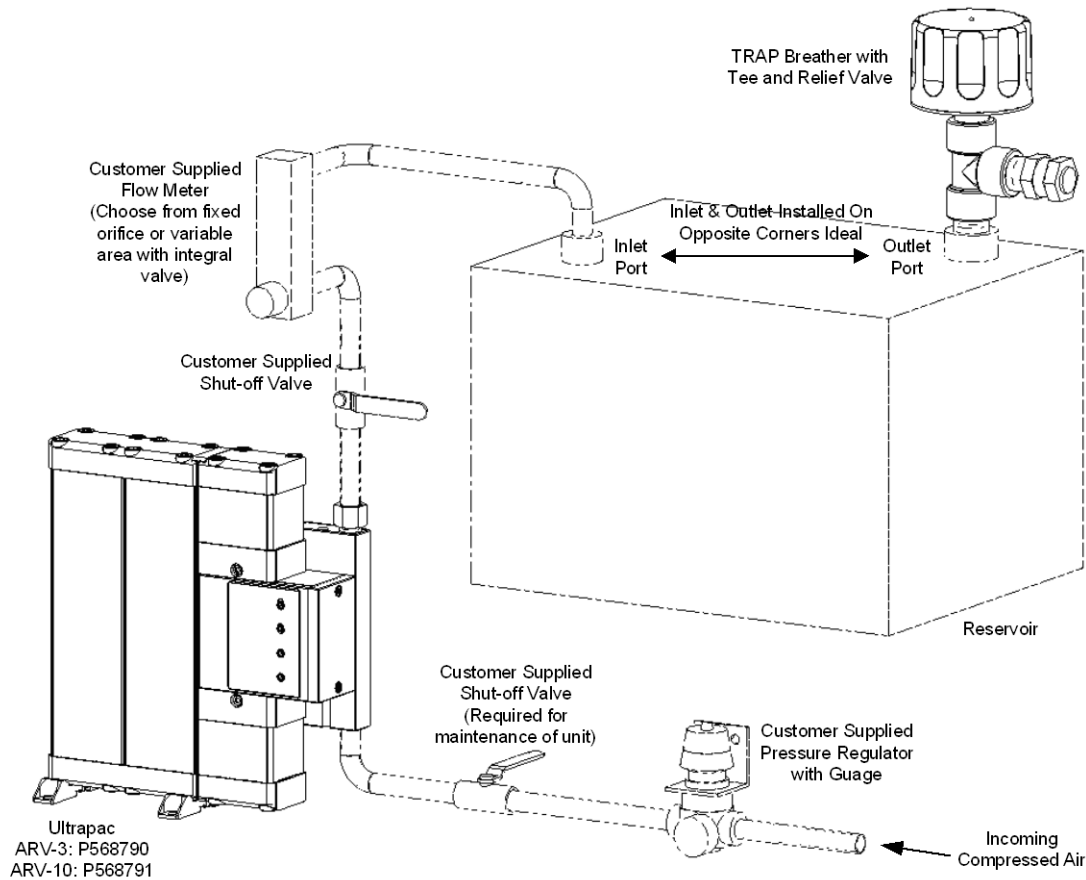


Figure 3 – Installation Overview

### ***Start Up and Shut Down***

Carefully follow the instructions in the **Ultrapac 2000 Operation Manual** for start up and shut down procedures.

### ***Replacement/Maintenance Parts and Schedule***

Description	Recommended Change Interval	Part Number
T.R.A.P.™ breather	6 Months	P564669
Ultrapac 2000 Carepack (prefilter element, afterfilter element, desiccant cartridges, set of seals) for Ultrapac adsorption dryer.	1 Year	ARV-3: P568796 ARV-10: P568797
* See <b>Ultrapac 2000 Operation Manual</b> for detailed description of replacement procedure.		
* See <b>Ultrapac 2000 Operation Manual</b> for additional replacement components if required.		