

# Val-Matic® Oil Accumulator System

## Operation, Maintenance and Installation Manual

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# OIL ACCUMULATOR SYSTEM OPERATION, MAINTENANCE AND INSTALLATION

## INTRODUCTION

This manual will provide you with the information to properly install and maintain the oil accumulator system to ensure a long service life. The system is skid-mounted and designed to provide 60 to 125 psig oil supply pressure to operate a group of valves equipped with hydraulic actuators, even after a power failure. Typical oil delivery capacities are presented in Figure 13 at the end of this document for reference.

The oil accumulator system has dual oil pumps and dual air compressors that partially fill the air over oil accumulator tank with oil and then charge the tank with air pressure. When oil supply is required, the oil automatically flows under pressure from the accumulator tank to a supply header to the hydraulic actuated valves and the return oil flows back to the sump tank through a return header and a filter mounted on top of the sump tank.

One of the oil pumps comes on automatically to refill the accumulator tank. If the air pressure is low, then an air compressor will start to add pressurized air to the accumulator tank. The system electric panel displays run and alarm conditions and also allows manual operation of the pumps and air compressors.

For proper operation of the system, the panel must be wired to the proper supply voltage. The panel model number, voltage, and maximum supply pressure are stamped on the nameplate for reference.

## RECEIVING AND STORAGE

Inspect the system upon receipt for damage in shipment. Unload the skid carefully to the ground without dropping.

The system should remain covered, clean and dry until installed to prevent weather related damage. For long-term storage greater than three months, the system must be stored indoors and the ends of the pipe connections sealed to prevent contamination or damage.

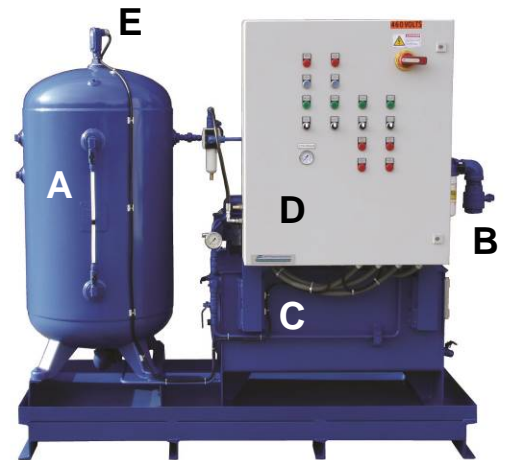


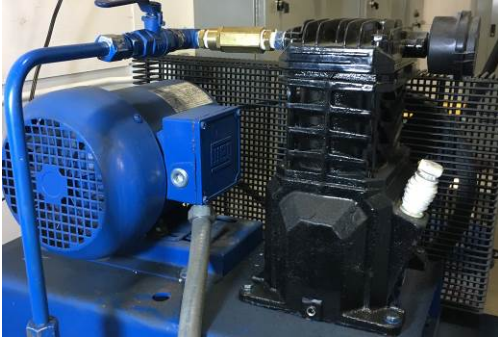
Figure 1. Oil Accumulator System

## DESCRIPTION OF OPERATION

The accumulator tank (A) is partially filled with hydraulic oil and pressurized with air. The tank is connected to a supply header that provides a reliable and clean oil supply to operate a group of cylinder actuated valves, even after a power failure. The return oil flows back through a return header (B) to the vented sump tank (C).

Lead/lag oil pumps submerged in the sump tank automatically transfer the oil under pressure to the bottom of the accumulator tank. Once the FULL oil level is reached, lead/lag air compressors send pressurized air into the top of the accumulator tank. The electric control panel (D) contains circuit breakers, motor starters, alternators, relays and switches to display run and alarm conditions and control the lead/lag operation of the pumps and air compressors.

Level switches (E) in the accumulator tank control the start and stop of the oil pumps. Once the oil level is FULL, the air compressors (Figure 2) become operational and are controlled by pressure switches.



**Figure 2. Typical Air Compressor and Motor**

## INSTALLATION

These instructions are provided to aid in the installation of this equipment. Val-Matic Valve cannot be responsible for improper installation.

### **CAUTION**

To reduce the risk of electric shock, serious injury or death when installing this equipment, follow these basic precautions:

1. Read all instructions before powering the panel.
2. Observe all local codes and ordinances.
3. Follow grounding instructions or injury from electrical shock may occur.
4. Safety glasses must be worn since air or oil may be expelled under pressure during maintenance or repair

## SELECTING THE LOCATION

The system is skid mounted and should be placed on a concrete floor or pad indoors near the valves to be operated. It may be prudent to fasten the skid to the floor in seismic active locations. The system should be located to provide at least 36 inches of access around the unit. Also allow sufficient space for the panel door to swing fully open and allow space to make the supply and return header connections on the rear of the system.

## SUPPLY AND RETURN CONNECTIONS

The supply and return connections are located on the rear of the accumulator tank and side of the sup tank. The connections should be equipped with isolation valves and connected to a steel, schedule 40 supply and return piping system.

The oil supply and return headers should be of sufficient size to supply oil to all of the powered valves simultaneously at the valve emergency (after power failure) closure rate (typically 10-30 seconds) at a fluid velocity of 10 ft/sec or less. The headers should be equipped with bleed valves at the high points and drain valves at the low points to facilitate system filling and maintenance. Isolation valves and pipe unions should also be provided at each valve panel.

## WIRING CONNECTIONS TO PANEL

The standard panel has a high voltage 3-Phase power connection and an internal transformer for control voltage. Refer to the wiring diagram provided with the unit for the correct supply voltage. Connect the ground wire and the appropriate power wires to the designated terminals on the wiring diagram per local electrical codes. With the Main Breaker in the off position, place the four door-mounted pump and compressor HOA switches to the OFF position.



**Figure 3. Panel Switches**

Turn the main breaker on and the power on light should be illuminated. Jog the first oil pump to the HAND position for one second and verify the rotation of the motor by observing the motor rotation and the arrow marked on the unit (Figure 4). If the rotation is backwards, reverse two of the 3-Phase power leads.



**Figure 4. Motor Rotation**



**Figure 5. Sump Tank Sight Glass**

## START UP AND TEST

The oil accumulator system should be started up with the supply and return headers isolated by closing the header isolation valves on the back of the unit. The electrical panel should be powered and the POWER light should be on.

## SYSTEM OIL REQUIREMENTS

The system requires high quality hydraulic oil such as Mobile DTE 24 or equal. Equivalent food-grade oil can also be used. Hydraulic oil should meet an ISO 4406 cleanliness level of 19/17/14 where the three numbers specify that there shall be less than 5000 4  $\mu\text{m}$ , 1300 6  $\mu\text{m}$ , and 160 14  $\mu\text{m}$  or larger particles per 100 ml of fluid. New hydraulic oil rarely meets this level, hence all fluid used for flushing or filling hydraulic systems should be filtered using a portable 10 micron pressure filter system such as a HYDAC Model "OF 7". Supply and return headers should also be flushed thoroughly before use.

The volume of oil required can be calculated by summing the oil volume to fill the:

1. Valve cylinders supplied by the system
2. Valve control panel piping
3. Supply header to each valve
4. Accumulator tank (i.e. OA080 = 80 gallons) Note: the accumulator tank is only filled 60% but extra oil is needed for the sump tank.
5. Spare 50 gallon drum of oil

## ACCUMULATOR SYSTEM START-UP

1. Fill the sump tank to the top of the sight glass with filtered hydraulic oil to begin the start-up process. The oil level must be maintained in the range of the sight glass during startup or a low oil level alarm will be shown on the panel.

2. Turn the 4 HOA switches to the AUTO Position. Both oil pumps should start delivering oil to the Accumulator tank. Pump noise or "crackle" is normal and caused by air in the suction lines.
3. The oil level in the sump tank should be maintained so it always appears in the range of the sight glass.
4. As the accumulator tank fills, oil will appear in the sight glass on the accumulator tank and slowly rise. It may require 10-30 minutes to fill the accumulator tank.
5. Check the oil lines to the accumulator tank for leaks and tighten fittings as needed.
6. The oil pumps will stop automatically when the FULL mark is reached on the accumulator tank. There are level switches in the accumulator tank to control the oil level to about 60% of the tank capacity.
7. The air compressors will then automatically come on and start filling the accumulator tank with compressed air to 125 psig. This may take several minutes.
8. The air compressors will build the tank pressure set on the pressure switch in the panel, typically 125 psig.
9. When the tank oil is FULL and the air pressure is at the normal pressure, the oil pumps and air compressors should be off.
10. Press the RESET buttons on the panel if any alarm lights are lit.

## SUPPLY HEADER START-UP

The accumulator system is connected to a pressurized supply header for the operation of a group of valves equipped with hydraulic actuators. A low pressure return header is connected to the sump tank to create a closed-loop hydraulic system.

1. Before filling the supply header, inspect the header from end to end very carefully and identify and understand the purpose of all of its connections and valves. Bleed valves at the high points and drain valves at the low points should be closed to start the filling process.
2. The hydraulic cylinder actuator panels connected to the supply header should be equipped with isolation valves. Close these valves to start the header filling process.
3. Begin filling the supply header by cracking open the large header fill valve on the back of the accumulator system. Oil should flow rapidly from the accumulator system into the header.
4. The oil pump should come on to maintain the level in the accumulator tank. The oil level in the sump tank should be maintained so it always appears in the range of the sight glass as the filling process continues.
5. Continue the process of filling the header and adding oil to the sump tank as needed. Long headers may require an additional 55-gallon barrel of oil or more.
6. Once the flow into the header stops and the accumulator tank level is restored, slowly crack open the bleed valve on the supply header to release any trapped air through a short hose into an open container until oil flow is observed. The accumulator system should come back on to refill the accumulator tank to fill the air space with oil.
7. The oil level in the sump tank should be maintained so it always appears in the range of the sight glass.
8. Crack open the drain valves at the low points on the header to discharge a gallon of oil at each location to remove grit and debris from the header. Dispose of this discharged oil.
9. The supply header is now filled and pressurized. Fully open the supply header isolation valve on the back of the accumulator system.

#### RETURN HEADER START-UP

The accumulator system is connected to a return header for the operation of a group of valves equipped with hydraulic actuators. The return header is connected to a return filter (Figure 6) and the sump tank. As valves are operated, return oil will flow back to the sump tank so that the accumulator tank can be automatically refilled.



**Figure 6. Return Filter**

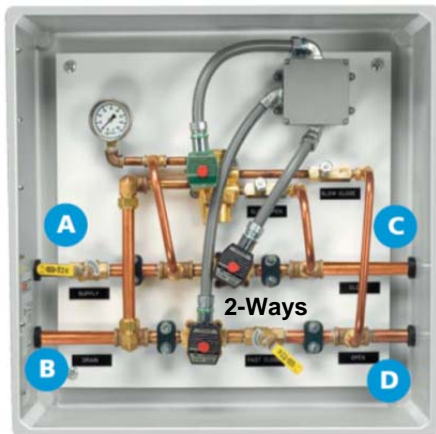
Return headers sometimes run along the floor or are elevated above the level of the valves. Floor level headers are typically filled with oil. Elevated return headers may flow by gravity back to the sump tank and therefore not remain full.

1. Before starting up the return header, inspect the header from end to end very carefully and identify and understand the purpose of all of its connections and valves. Bleed valves at the high points and drain valves at the low points should be closed for start-up.
2. Fully open the large return header isolation valve on the back of the accumulator system. No flow should occur, since the return header is connected to the sump tank, which is vented to atmosphere.
3. For floor level return headers, header can be filled from the supply header if there is a cross-over or bypass valve connected to the supply header. Otherwise, control valve operation will eventually fill the return header.
4. If the header will be full of oil, use the header bleed valve to vent air as it is filled.
5. Also crack open the drain valves at the low points on the return header to discharge a gallon of oil at each location to remove grit and debris from the header. Dispose of this discharged oil.
6. It may require several operations of the control valves to fill the return header. Therefore, the sump tank level must be monitored as the control valves are operated and the return header fills.

#### VALVE SYSTEM START-UP

Each control valve should be equipped with a cylinder actuator and hydraulic control panel (Figure 7). The hydraulic panel will have four connections. Two connections are made to the hydraulic actuator and two connections are made to the supply and return headers connected to the accumulator system. Refer to the valve control system instruction manual and submittal drawings for operation of the valve.

1. If the valve control system has 2-Way solenoid valves, it is necessary to provide electrical power to the valve control panel so that they are energized and closed.



**Hydraulic Panel**  
 A. Supply Pressure      C. Pressure to Close  
 B. Drain                      D. Pressure to Open

**Figure 7. Typical Valve Hydraulic Panel**

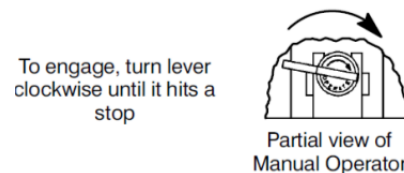
2. Slowly apply oil pressure to the panel by partially opening the panel shut off valve. Oil should flow into the panel and register on the supply gauge.
3. Verify that the supply pressure does not exceed the pressure rating shown on the control panel nameplate.
4. Continue to let the oil flow through the panel and towards the valve cylinder. There will be trapped air in the line to the valve, so open a bleed valve or fitting near the cylinder to vent the air. It may take a few minutes to fill the lines and cylinder with media.
5. Flip the manual override lever on the 4-Way clockwise (CW) and the flow should be directed to the other side of the hydraulic cylinder piping. The open pipes to the pump control valve will fill. Bleed the air out of the pipes and cylinder.
6. Using the lever on the 4-Way, send the pump control valve open and closed 3 times to remove the air in the lines.
7. As the control valve systems are filled and operated, the accumulator system will come back on to refill the accumulator tank. The oil level in the sump tank should be maintained so it always appears in the range of the sight glass.

#### FINAL OIL SYSTEM START-UP

1. Check that the accumulator tank is FULL of oil and pressurized to the operating pressure.
2. Check that the sump tank is at the low level on the sight glass. Capacity is needed in the sump tank so that when there is a power failure and the control valves operate, there is room for the return oil.
3. Check that the supply header is full and bled of air.
4. Check that the return header is operational.
5. Check that the large header valves on the back of the accumulator are open.
6. Check that the HOA switches on the accumulator panel are in the AUTO position and no alarm lights lit.

#### CAUTION: To prevent overflow of the sump tank:

- 1) The air/oil accumulator system must be powered and operational when the pump control valves are operated.
- 2) The 2-Way Solenoid Valves in the control valve control panel must have electrical power when the 4-Way valve is energized or operated by the manual override lever (keep the 4-Way lever in the full counter-clockwise position for normal operation), Figure 8.



**Figure 8. 4-Way Lever Operation**

## MAINTENANCE

The air/oil accumulator system requires annual maintenance.

### **WARNING**

**The system contains hydraulic pressure. Care must be taken to release pressure slowly or pressure may cause injury.**

**CONTROL PANEL:** Check the panel for alarm lights for low pressure or low oil. Low pressure alarm may require service to an air compressor. Low oil alarm may require checking the sump tank oil level or require service to an oil pump. Refer to the product data sheets for the pumps and compressors for repair.

**OIL INSPECTION:** Cleanliness of the supply media is important. Annual inspection of the return filter (Figure 9) should be cleaned or changed. Check the piping and fittings for leaks and tighten or replace fittings as required.

**LEAKAGE:** If leakage is observed, tighten the appropriate fitting or replace the leaky fitting.

**LUBRICATION:** The compressors and oil pumps require no lubrication or fluids for proper operation.

**SYSTEM CLEANLINESS:** After repairs are complete, clean all of the surfaces of excess debris, dust, and oil. Dirty surfaces prevent convection cooling of the system.



**FIGURE 9. Typical Return Filters**

**AIR COMPRESSOR BELTS:** Check the belts for cracks or fraying and replace as needed, Figure 10.



**Figure 10. Air Compressor Belt**

## TROUBLESHOOTING

Several problems and solutions are presented below to assist you in trouble shooting the air/oil accumulator system. There are also troubleshooting steps in the valve control system instruction manuals.

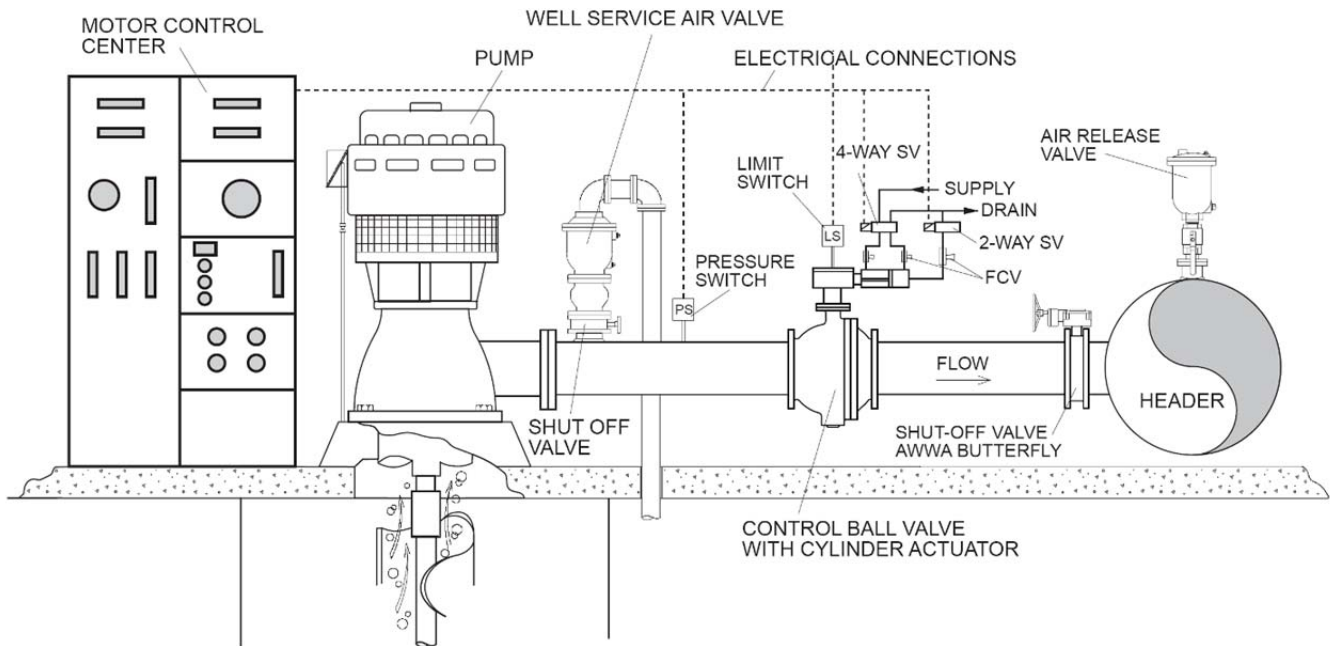
1. Leakage at fittings. Re-tighten or replace fittings.
2. Low Pressure Alarm. Check that the Air Compressors are in the AUTO position. Press the RESET button to reset. If alarm reoccurs, check the operation of the air compressors by putting each one in the HAND position. Repair or replace as needed.
3. Low OIL Alarm. Check that the oil pumps are in the AUTO position. Press the RESET button to reset. If the alarm reoccurs, check that the sump tank is above the low level on the sight glass, see Figure 5. Do not overfill the sump tank: capacity is needed in the sump tank so that when there is a power failure and the control valves operate, there is capacity for the return oil. Also, check the operation of the oil pumps by putting each one in the HAND position. Repair or replace as needed.
4. Sump tank overflow. Capacity is needed in the sump tank so that when there is a power failure and the control valves operate, there is room for the return oil. The air/oil accumulator system

must be powered and operational when the pump control valves are operated.

5. Noisy Operation: Some flow noise is normal. Loud crackling noise from the oil pumps may indicate the sump tank suction filters require cleaning or replacement.
6. Pump or AC Alarm Light: These lights indicate that the motor starter tripped due to current overload. Reset the starter, Figure 11, in the cabinet. Check operation of the motor using the HAND setting on the HOA Switch. Repair or replace the pump, air compressor as needed.



**Figure 11. Motor Starters. Shown in Normal (untripped) Position**



**Figure 12. Typical Pump Control Valve Installation**



<b>OIL ACCUMULATOR SYSTEM SIZING</b>			
<b>Accumulator System Size (gallons)</b>	<b>Delivered oil volume for a given Pressure Range (gallons)</b>		
	<b>40-125 psi</b>	<b>60-125 psi</b>	<b>80-125 psi</b>
<b>OA080</b>	48.6	37.2	25.7
<b>OA120</b>	72.9	55.8	38.6
<b>OA200</b>	121.6	93.0	64.4
<b>OA240</b>	145.9	111.6	77.3
<b>OA400</b>	243.2	186.0	128.8

**Figure 13. Sizing Chart (Reference)**

## **PARTS AND SERVICE**

Parts and service are available from your local representative or the factory. Make note of the Valve Size and Model Number located on the valve nameplate and contact:

Val-Matic Valve and Manufacturing Corp.  
 905 Riverside Drive  
 Elmhurst, IL 60126  
 Phone: (630) 941-7600  
 Fax: (630) 941-8042  
[www.valmatic.com](http://www.valmatic.com)

A sales representative will quote prices for parts or arrange for service as needed.

### **LIMITED WARRANTY**

All products are warranted to be free of defects in material and workmanship for a period of one year from the date of shipment, subject to the limitations below.

If the purchaser believes a product is defective, the purchaser shall: (a) Notify the manufacturer, state the alleged defect and request permission to return the product; (b) if permission is given, return the product with transportation prepaid. If the product is accepted for return and found to be defective, the manufacturer will, at his discretion, either repair or replace the product, f.o.b. factory, within 60 days of receipt, or refund the purchase price. Other than to repair, replace or refund as described above, purchaser agrees that manufacturer shall not be liable for any loss, costs, expenses or damages of any kind arising out of the product, its use, installation or replacement, labeling, instructions, information or technical data of any kind, description of product use, sample or model, warnings or lack of any of the foregoing. NO OTHER WARRANTIES, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, ARE MADE OR AUTHORIZED. NO AFFIRMATION OF FACT, PROMISE, DESCRIPTION OF PRODUCT OF USE OR SAMPLE OR MODEL SHALL CREATE ANY WARRANTY FROM MANUFACTURER, UNLESS SIGNED BY THE PRESIDENT OF THE MANUFACTURER. These products are not manufactured, sold or intended for personal, family or household purposes.



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