

# **OIL X-CHANGE-R<sup>®</sup> SYSTEM**

Model 990DS



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INSTALLATIONS AND OPERATING INSTRUCTIONS

## 1.0 DESCRIPTION

The Model 990DS was designed specifically for larger diesel vessels with multiple engines. Particularly, the 9990DS was designed to service a vessel's two main diesel engines, each transmission or gear and one or two generators. However, the system is capable of servicing any combination six engines. The oil flow from each main engine is controlled by a separate manifold which designates the flow from the engine, its transmission and a designated generator(s).

## 2.0 CONSTRUCTION

The 990DS is constructed with the highest quality materials selected for both wear and resistance and service life. The 990DS utilizes a heavy-duty reversible bronze body motor and rotary gear pump which has self-lubricating carbon bearings and drip-proof lip seals. Powered by a single phase, 1/3 HP 115V/60(Hz) or 230v/60(Hz) corrosion resistant motor which is overload protected, the pump is driven directly from the motor shaft by means of a flexible coupling. The motor is controlled by a three pole, double throw switch with FILL-OFF-DRAIN positions. Housed in a heavy duty, 16 gauge steel, Polane® coated enclosure, the 990DS' rigid construction will withstand the harshest of marine environments.

## 3.0 SPECIFICATIONS

Phase	HP	Voltage	Length	Width	Height	Weight	GPM
1	1/3	115V	11"	8.5"	16"	33 lb.	4*
1	1/3	230V	11"	8.5"	16"	33 lb.	4*

\*Flow rates are approximate and may vary due to the temperature and/or viscosity of the oil.

## 4.0 LOCATION AND INSTALLATION

This is a permanent system for mounting on a horizontal surface in the engine room. The system should be located in a readily accessible location to allow easy operation and service. The Model 990DS has excellent priming characteristics and is capable of lifting liquids on the suction side as high as 15 feet. However, as a general rule, the suction lift should be kept as limited as possible by placing the system as central as central to all engine sources as possible.

Installing the unit requires general knowledge of engine service and electrical wiring skills. If you are not familiar with these techniques, it is recommended an experienced marine mechanic be engaged to install the X-Change-R®. The Model 9990DS is delivered with the enclosure unattached to allow access to the four mounting holes. Secure the system to a flat surface through the mounting holes which accommodate ¼" X 20 mechanical screws.

## 5.0 ELECTRICAL WIRING REQUIREMENTS

The Model 990DS is designed for use with an 115V/60(Hz) or 230v/60(Hz) power source. The system is supplied with a 6' three conductor cord which allows for easy plug-in convenience to an engine room outlet. However, if preferred, the cord can be cut and hard wired to a panel breaker. When wiring the system, choose UL approved marine-grade wire and connectors.

## 6.0 INSTALLATION OF THE HOSES

Because oil is a viscous fluid (particularly when cool) every attempt should be made to keep the length of the hose runs at a minimum. When changing engine oil or transmission oil, a small amount of waste oil will return to the system along with the fresh oil. This is acceptable for hose runs of 15 feet or less. Hose runs of 20 feet or more should be avoided, especially when connected to transmissions or small engines. Care should also be taken to avoid sharp bends in the hose and direct exposure to hot surface. When installing the hoses, design the layout symmetrically. It is easier to determine the location of the lines and presents a neat appearance.

### 6.1 Connecting Engine Oil Pan Hoses

1. Drain oil from each engine
2. If the engines are not equipped with a factory installed oil pan drain hose, replace each oil pan drain plug with a drain hose assembly supplied by the engine manufacturer, or install a compatible fitting that will accommodate a ½" ID oil drain hose, an adapter may be required.
3. Connect properly measured lengths of approved ½" ID hose from each engine's oil pan drain to the appropriate manifold on the X-Change-R®.
4. After completing the hose installation, carefully inspect the hose to insure each connection includes a hose clamp and that the clamp is in place and secure.

### 6.2 Connecting Transmission Hoses

1. Drain oil from each engine
2. If the transmissions are not equipped with a factory installed drain hose, replace each oil pan drain plug with a drain hose assembly supplied by the engine manufacturer, or install a compatible fitting that will accommodate a ½" ID oil drain hose, An adapter may be required.
3. Connect properly measured lengths of approved ½" ID hose from each transmission's oil pan drain to the appropriate manifold on the X-Change-R®.
4. After completing the hose installation, carefully inspect the hose to insure each connection includes a hose clamp and that the clamp is in place and secure.

### 6.3 Connecting Generator Hose

1. Drain oil from each generator(s).

2. If the generator(s) is not equipped with a factory installed drain hose, replace the oil pan drain plug with a drain hose assembly supplied by the engine manufacturer, or install a compatible fitting that will accommodate a ½" ID oil drain hose, an adapter may be required.
3. Connect properly measured lengths of approved ½" ID hose from each engine's oil pan drain to the appropriate manifold on the X-Change-R®.
4. After completing the hose installation, carefully inspect the hose to insure each connection includes a hose clamp and that the clamp is in place and secure.

#### 6.4 Connecting Input/Output Valves 950GV

1. Connect the Input/Output Valves to either New/Used Oil Reservoirs or Cockpit (external connection) and Engine Room access.
2. If the Reservoirs are not equipped with a factory installed drain hose, replace the oil pan drain plug with a drain hose assembly supplied by the manufacturer, or install a compatible fitting that will accommodate a ½" ID oil drain hose, an adapter may be required.
3. Cockpit (external connection) is best connected to a quick disconnect and used for main oil change. Engine Room access is best used to top off.
4. Connect properly measured lengths of approved ½" ID hose from each connection to the appropriate manifold on the X-Change-R®.
5. After completing the hose installation, carefully inspect the hose to insure each connection includes a hose clamp and that the clamp is in place and secure.

## 7.0 DRAINING USED OIL FROM THE ENGINES / TRANSMISSIONS / GENERATOR(S)

To insure the oil maintains proper viscosity during the removal process, it is recommended the operator run the engines long enough to permit the engine block to become warm – at least 140°. Shut the engines down and allow ample time for the circulated oil to return to the oil pan.

### 7.1 Draining the Engine, Transmission or Generator

1. Warm engine to at least 140°F, then turn engine off.
2. Insert the PVC wand of the Drain/Fill hose into a container suitable for waste oil collection. (Remember, it is a legal requirement to dispose of waste oil in a responsible manner.
3. Loosen the oil filler cap on the engine or remove the dip stick to allow air to enter the crankcase.
4. Release the safe lock device on the toggle switch. Do not turn.
5. Select the individual engine, transmission or generator on the top of the system using the **BLACK HANDLE**. Select the output port on the side of the system using the **SILVER HANDLE** (SPECIAL NOTE: Open only one valve at a time with other engine valves closed tight to prevent accidental draining or other engines.)

6. Flip the motor control switch to the “DRAIN” position. The pump will start immediately. You should hear a noticeable change in the sound (speed) of the pump motor when the used oil enters the pump.
7. Continue to operate the pump until there is a noticeable change in the sound (speed) of the pump motor, which is an indication air is being drawn into the crankcase oil hose and that the specified crankcase is now empty. Oil is drained at the rate of about a gallon each 15 seconds (4 gallons a minute).
8. Return the pump motor control switch to the “OFF” position when the crankcase is empty and shut the individual valve to OFF with **BLACK HANDLE**.
9. When you have completed the service, be sure to cover the safe lock handle over the toggle switch.

## 8.0 FILLING THE ENGINES

Before attempting to fill an engine, make certain the engine has been completely drained or is in need of a measured amount of additional oil. **DO NOT OVER FILL!** Next, determine the type and the amount of oil recommended by the manufacturer for each engine. Remember, **FOUR QUARTS = ONE GALLON**.

There are two commonly used methods to determine when the proper amount of oil has been delivered to the engine.

Pre-measured Method – this method requires the operator to set aside a known quantity of oil prior to filling. For example, if the engine requires 22 quarts of oil, the operator may want to pump from a 5-gallon container, adding 2 additional, quarts as the container empties.

Timed Method – the timed method is used when pumping from a container of unknown capacity or a reservoir. The flow of the oil through the system varies primarily with the viscosity and temperature of the oil. Under normal conditions (75° - 85°), the system pumps approximately 4 gallons per 60 seconds. Filling time is a function of several factors, including oil temperature and weight.

### 8.1 Filling the Engine

1. Insert the PVC wand of the Drain/Fill hose into a container suitable for waste oil collection. (Remember, it is a legal requirement to dispose of waste oil in a responsible manner.)
2. Loosen the oil filler cap on the engine or remove the dip stick to allow air to vacate the crankcase.
3. Release safe lock device on the toggle switch. Do not turn.
4. Select the individual engine, transmission or generator on the top of the system using the **BLACK HANDLE**. Select the output port on the side of the system using the **SILVER HANDLE** (SPECIAL NOTE: Open only one valve at a time with other engine valves closed tight to prevent accidental draining or other engines.)

5. Flip the motor control switch to the "Fill" position. The pump will start immediately. You should hear a noticeable change in the sound (speed) of the pump motor when the used oil enters the pump.
6. Continue to operate the pump until a measured amount of oil has been pumped into the engine's crankcase. Fresh oil is pumped at the rate of approximately 4\* gallons per minute. If you do over fill an engine, you may simply flip the motor control switch to the "DRAIN" position for a few seconds to remove the overage.
7. Once filled, return the pump motor control switch to the "OFF" position when the crankcase is empty and shut the individual valve to OFF with **BLACK HANDLE**. When you have completed the service, be sure to cover the safe lock handle over the toggle switch.

## 9.0 TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
No Liquid Delivery	1) Closed valves	1) Open valves
	2) Plugged suction	2) Eliminate restriction
	3) Air leak at suction	3) Locate and repair leak
	4) Suction lift too high	4) Do not exceed vapor pressure of liquid
	5) Motor wired incorrectly	5) Check wiring instructions
Low Liquid Delivery	1) Pump shaft speed incorrect	1) Check driver speed
	2) Discharge pressure too high	2) Reduce downstream pressure
	3) Air leak at suction	3) Locate and repair leak
	4) Worn or damaged pump	4) Inspect and repair as required
	5) Low viscosity	5) Verify original application conditions
Gradually Losses Prime	1) Suction lift too high	1) Improve suction pressure
	2) Air or gas in fluid	2) Eliminate air or gas from fluid
	3) Air leak at suction	3) Locate and repair leak
	4) Worn or damaged pump	4) Inspect and repair as required
Noisy	1) Cavitating	1) Improve system suction pressure
	2) Solid particles in fluid	2) Install suction strainer
	3) Air or gas in Fluid	3) Eliminate air or gas in fluid
	4) Worn or damaged pump	4) Inspect and repair as required
Motor Runs Hot or Overloads	1) Discharge pressure too high	1) Reduce downstream pressure
	2) Shaft speed too fast	2) Reduce speed
	3) Fluid viscosity higher than expected	3) Change to larger horsepower
	4) Incorrectly wired motor	4) Check wiring instructions
	5) Binding internal pump parts	5) Inspect and correct condition
	6) Motors normally feel hot	6) Verify if actual amperage draw is within range
Seal Leaks	1) Dry running	1) Open valves, prime pump
	2) Solids in fluids	2) Add suction strainer
	3) Seal material incompatible with fluid	3) Verify original application conditions

# 10.0 WIRING DIAGRAM

