

## Vacuum Dehydration Oil Purification System (VDOPS)

### VACUUM DEHYDRATION OIL PURIFICATION SYSTEM

The harmful effects of water and particulate contamination in hydraulic, lubrication & dielectric oils have been well documented. By maintaining absolutely clean and dry oil, the life of critical wear components in rotational and hydraulic equipment can be significantly extended, minimizing equipment downtime, optimizing its efficiency, and maximizing profitability.

We design and build the most effective, reliable, and user-friendly vacuum dehydrators on the market today. Several design features enable our systems to consistently outperform all others, and our water-extraction rates are the best in the industry.

- **Remove free, emulsified, and dissolved water by vacuum distillation & mass transfer – achieve overall water content as low as 20 PPM**
- **Remove entrained air and dissolved gases by vacuum distillation**
- **Achieve particle counts as low as ISO 14/12/9 Cleanliness Level**
- **Process flow rates from 3 to 100 GPM**
- **No other utilities other than electricity are required (no costly water consumption)**

Our Vacuum Dehydration Oil Purification Systems (VDOPS) are recommended for use on the following applications:

**Turbine Lube Oils**  
**Paper Machine Lube Oils**  
**Gearbox Oils (ISO 150 to ISO 680)**  
**Transformer Oils (Mineral Based)**  
**Silicon Oils**  
**Refrigerant Oils**  
**Compressor Oils**  
**EHC Fluids (Fyrquel)**  
**PAO Fluids**



Model VDOPS-15VFD-840X-36KW-480-N4-V

#### FEATURES

**Dry Running Claw Vacuum Pump** - Pulls deeper vacuum than conventional vacuum pumps, dramatically increasing water extraction rates. Requires virtually no maintenance - no vanes to wear out and no lubricating oil to become contaminated by a wet air stream.

**Permanent Dispersion Media in Vacuum Tower** – Maximizes water extraction rates, enables processing of high viscosity gear oils, and eliminates the need for frequent and costly coalescer element change-outs.

**High Efficiency Particulate Removal Element**  
Synthetic pleated microglass filter media rated Beta(c)>1000 per ISO 16889 removes particles as small as 2.5 micron with 99.9% efficiency in multi-pass. An electrical differential pressure gauge/switch indicates when the filter element is plugged and needs to be changed.

**Variable Frequency Drive** - Greatly enhances overall system performance & reliability during cold start-ups, on high viscosity gear oils, or when a restricted inlet condition exists.

**System View Windows** – For ease of operation and instant understanding of system performance and oil condition.

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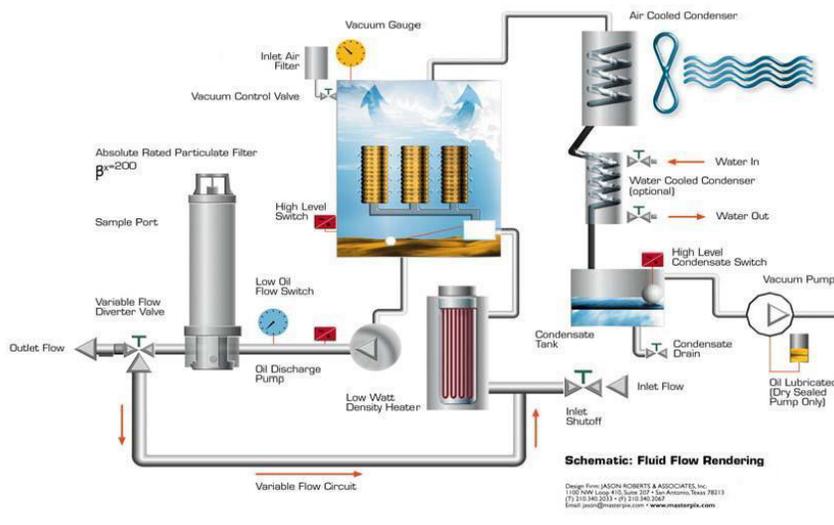
## VDOPS Purifies and Conditions

The Vacuum Dehydration Oil Purification System (VDOPS) is designed to effectively remove free, emulsified, and dissolved water, particulate, and gaseous contamination from petroleum and synthetic based fluids. The water removal principle used is simple, reliable, and will dependably remove water well below the oil saturation point, even when tightly bound in an emulsion. The high performance VDOPS removes 100% of free and emulsified water, air, & gases, 90% of dissolved water, air, & gases, is capable of reducing water content to as low as 20 PPM, and can reduce particle counts to ISO 14/12/9 Cleanliness Levels.

Common sources of water contamination are heat exchanger and seal leaks, condensation, inadequate reservoir covers, and temperature drops that lead to dissolved water becoming free. Entrained and dissolved gases can cause foaming and lead to cavitation of pumps, produce higher fluid temperatures, and reduce system response time. Particulate contamination can cause premature component failure and lower the system efficiency by increasing internal leakage in pumps, cylinders, and other components.

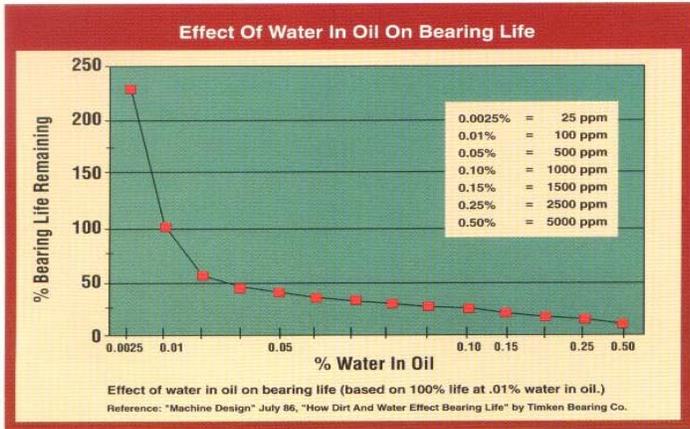
## System Principles

Figure 1 below shows schematically the VDOPS operation. A vacuum pump creates a vacuum that draws fluid into the unit through a circulation heater, where the fluid temperature is raised to roughly 150°F (66°C). Oil then flows through Permanent Dispersion Media (PDM) located inside the vacuum tower. Oil flows through the pores of this media where it is exposed to vacuum, normally 22-24" Hg (635m Hg). The boiling point of water is below the 150°F fluid temperature at that vacuum, so water and dissolved gases are "boiled off" and the fluid is effectively dehydrated. An oil discharge pump removes the dehydrated oil from the bottom of the vacuum chamber and pumps it through a high efficiency particulate-removal filter element rated  $\beta_c > 1000$  per ISO 16889 and back into the reservoir.



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## ◆ Effects of Water ◆



- ◆ Corrosion of Metal Surfaces
- ◆ Accelerated Abrasive Wear
- ◆ Accelerated Fatigue
- ◆ Additive Precipitation
- ◆ Fluid Oxidation
- ◆ Viscosity Variation
- ◆ Reduced Lubricity

## ◆ Value Packed Standard Features ◆

FEATURES	ADVANTAGES	BENEFITS
<b>Compact Size and Weight</b>	<ul style="list-style-type: none"> <li>▪ Smallest Envelope in the Industry</li> <li>▪ Ease of Portability</li> </ul>	<ul style="list-style-type: none"> <li>▪ Fits Through Doorways and Narrow Aisles</li> <li>▪ Increased Usage</li> </ul>
<b>Caster Wheels and Fork Lift Guides</b>	<ul style="list-style-type: none"> <li>▪ Provides Safe, Secure Method for Transporting Unit</li> </ul>	<ul style="list-style-type: none"> <li>▪ Easily Transported</li> <li>▪ Increased Usage</li> </ul>
<b>Automatic Operation</b>	<ul style="list-style-type: none"> <li>▪ Promotes Unattended Use</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increased Run Time</li> </ul>
<b>Programmable Thermostat</b>	<ul style="list-style-type: none"> <li>▪ Maintains Fluid Temperature to within 1degree F</li> </ul>	<ul style="list-style-type: none"> <li>▪ Prevents Fluid Breakdown</li> <li>▪ Increased Fluid Life</li> </ul>
<b>Self-Diagnostic Controls</b>	<ul style="list-style-type: none"> <li>▪ Indicates Problem Areas and Services to be Performed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reduced Downtime for Maintenance</li> </ul>
<b>Condensate Holding Tank with High Level Switch</b>	<ul style="list-style-type: none"> <li>▪ Captures Removed Water and Solvents</li> <li>▪ Auto-Shutdown when Tank is Full or Foaming Occurs</li> </ul>	<ul style="list-style-type: none"> <li>▪ Eliminates Potential of Hazardous Discharge</li> <li>▪ Prevents Spills</li> </ul>
<b>Close Coupled Heavy Duty Lube Pump</b>	<ul style="list-style-type: none"> <li>▪ Eliminates Belt Driven Pump Maintenance</li> <li>▪ More Robust than Typical Gear Pumps</li> <li>▪ True Rated Flow Performance Even Under Vacuum</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ease of Maintenance</li> <li>▪ Faster Purification</li> </ul>
<b>Air Cooled Condenser</b>	<ul style="list-style-type: none"> <li>▪ Extends Dry Seal Vacuum Pump Life</li> </ul>	<ul style="list-style-type: none"> <li>▪ Longer Equipment Life</li> </ul>
<b>Variable Flow Circuit</b>	<ul style="list-style-type: none"> <li>▪ Permits Redirection of Outlet Flow to Heaters</li> <li>▪ Quickly Raise Temperature of Process Fluid</li> </ul>	<ul style="list-style-type: none"> <li>▪ Faster Purification</li> </ul>
<b>Phase Fail Circuit / Reversal Switch</b>	<ul style="list-style-type: none"> <li>▪ Enable Immediate Unit Start without the Need of an Electrician</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reduced Downtime</li> </ul>
<b>Corrosion Proof Vacuum Tower with Large Observation Window</b>	<ul style="list-style-type: none"> <li>▪ Eliminates Corrosion</li> <li>▪ Monitor the Vacuum Dehydration Process</li> </ul>	<ul style="list-style-type: none"> <li>▪ Longer Equipment Life</li> <li>▪ Visual Verification of Equipment Function</li> </ul>

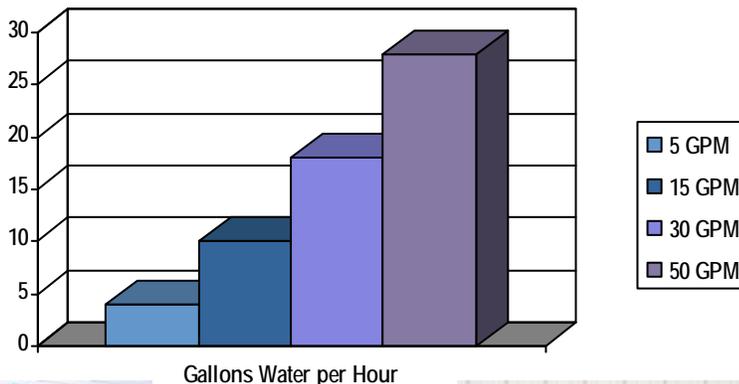
# Vacuum Dehydration Oil Purification System (VDOPS)



Samples of ISO 32 Turbine Oil

**BEFORE**  
 Water Concentration – 1800 PPM  
 Particle Count – ISO 21/20/18

**AFTER**  
 Water Concentration – 24 PPM  
 Particle Count – ISO 14/12/10



**Left:**  
 3 GPM Vacuum Dehydrator  
 32"D x 32"W x 60"H



**Right:**  
 50 GPM Vacuum Dehydrator  
 47"D x 70"W x 85"H

## VDOPS CONFIGURATIONS (0 = Optional)

	3 GPM	5 GPM	10 GPM	15 GPM	20 GPM	30 GPM	50 GPM
Dry Running Claw Vacuum Pump	STANDARD						
420X Outlet Filter Housing	STANDARD	0	0	0	0	0	0
820X Outlet Filter Housing	0	STANDARD	STANDARD				
840X Outlet Filter Housing		0	0	STANDARD	STANDARD	STANDARD	STANDARD
B2.5>1000 Outlet Filter Cartridge	0	0	0	0	0	0	0
β5>1000 Outlet Filter Cartridge	STANDARD						
B7>1000 Outlet Filter Cartridge	0	0	0	0	0	0	0
230VAC / 3Ph / 60Hz Power	0	0	0	0	0	0	0
380VAC / 3Ph / 50Hz Power	0	0	0	0	0	0	0
480VAC / 3Ph / 60Hz Power	STANDARD						
575VAC / 3Ph / 60Hz Power	0	0	0	0	0	0	0
12 kW Heater	STANDARD						
16 kW Heater	0	STANDARD					
24 kW Heater	0	0	STANDARD				
32 kW Heater	0	0	0	STANDARD	STANDARD		
48 kW Heater	0	0	0	0	0	STANDARD	
64 kW Heater	0	0	0	0	0	0	STANDARD
Permanent Dispersion Media	STANDARD						
Air Intake Filter	STANDARD						
Air Cooled Condenser	STANDARD						