

**KLEENOIL**

## **LOW VACUUM DEHYDRATION MACHINE (PLC OPERATED UNIT)**



**KEENOIL FILTRTATION INDIA PVT LTD.**

## PRINCIPLES OF OPERATION

Contaminated oil is drawn into the Kleenoil Low Vacuum Dehydration machine by a vacuum of 700 millibars. The oil passes through the in-line low watt density heater where the oil is heated to an optimum temperature of 66°C-70°C (depending on oil flash point capacity).

The oil then enters the distillation column where it is exposed to the vacuum using special dispersal elements.

This increases the exposed surface area of the oil and converts the water to vapor form, which is then drawn through the condenser by the vacuum pump.

The water-free oil falls to the bottom of the column and is removed by a heavy-duty lube oil pump. This pump forces the dry oil through a final particulate removal filter. Clean oil passes out of the unit, back to the reservoir – and into the system.

### Effects of Water Contamination

Water is one of the most common contaminants in a fluid system and one of the most damaging. When water contaminates a system, it can cause serious problems such as:

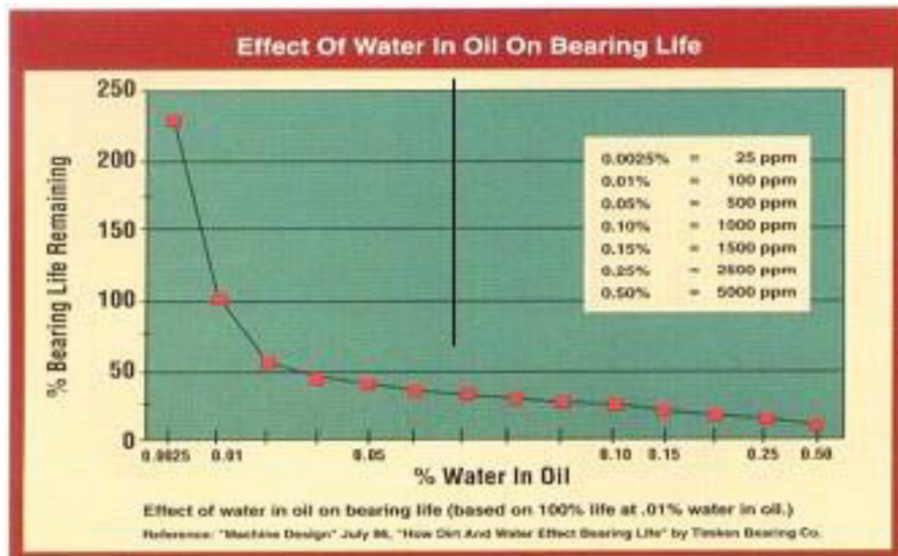
- Corrosion by etching metal
- Abrasive wear in hydraulic components
- Fluid breakdown, reduction of lubricating properties, additive precipitation, and oil oxidation

### Effect Of Water in Oil on Bearing Life

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

TYPICAL SATURATION POINTS		
Fluid Type	PPM	%
Hydraulic Fluid	300	.03
Lubrication Fluid	400	.04
Turbine Fluid	50	.005

Free water occurs when oil becomes saturated and cannot hold any more water. This water is usually seen as cloudy oil or puddles of water at the bottom of an oil reservoir. Water which is absorbed into the oil is called dissolved water. At higher temperatures, oil can hold more water in the dissolved stage due to the expansion of oil molecules. As the oil cools, this ability reverses and free water will appear where not visible before. In addition to temperature, fluid type also determines the saturation point for your system (see chart above).



The LVDH is the only system which can remove water dissolved oil, thus restoring oil to its original properties.

It removes water/moisture to below 50% of the saturation point in oil at low temperature. (44-60°C)  
Remove free, emulsified, and dissolved water by vacuum distillation & mass transfer – achieve overall content as low as 300 PPM

Remove entrained air and dissolved gases by vacuum distillation.

The Kleenoil Vacuum Dehydration Oil Purification Systems (LVDH/PLC-3000) is recommended for use on the following applications:

- Turbine Lube Oils
- Gearbox Oils (ISO 150 to 680)
- Transformer Oils (Mineral Based)
- Synthetic Oils
- Refrigerant Oils
- Compressor Oils
- EHC Fluids (Fyrquel)

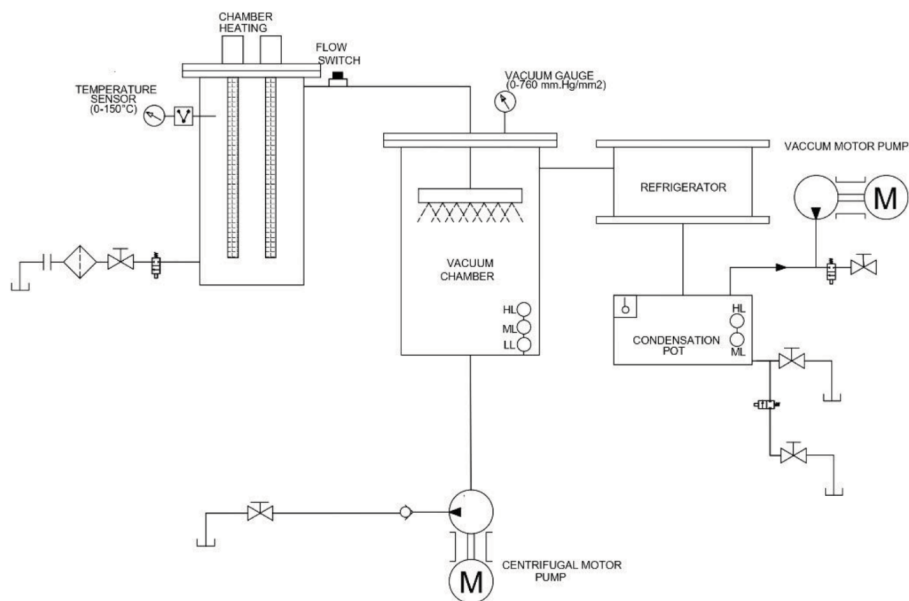
**Table 1. Oxidation Life of Mineral Oils Under Ideal Conditions**

Oil Type	k <sub>i</sub>	Max Temperature for 1,000-hour Life
Uninhibited (used in once-through systems)	-10.64	75°C
Extreme-pressure gear lubricant	-10.31	84°C
Hydraulic	-8.76	99°C
Turbine	-8.45	106°C
Heavily refined, hydrocracked	-8.05	121°C

### Features:

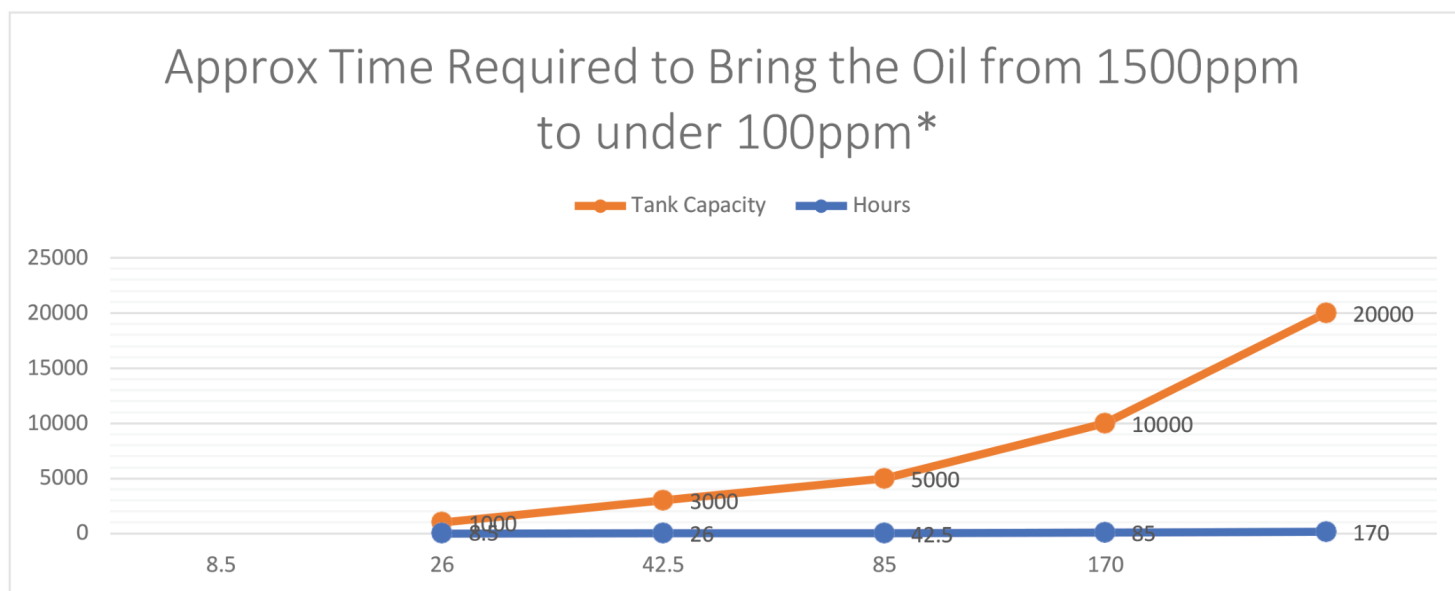
- Dehydration Process flow rates from 50LPM
- No consumable costs other than electricity are required (no costly water consumption)
- Easily portable and requires very little user intervention.
- Requires virtually no maintenance – no vanes to wear out and no lubricating oil to become contaminated by a wet air stream
- PLC - Operated

## SCHEMATIC MECHANICAL LINE DIAGRAM



### The Kleenoil LVDH:

- ✓ Removes water and dissolved gases from oil
- ✓ Water reduction below 300 ppm
- ✓ No oil quality is damaged since the temperature ranges between 45 to 60 deg.
- ✓ Plug and Play
- ✓ Run both offline and online



\*Values are made depending on parameters such as viscosity, machine handling rate of ingress of water

### Construction:

LVDH machine consists of four parts:

- A) Heating chamber
- B) Vacuum Chamber
- C) Refrigerated Type Condensing Apparatus
- D) Control Panel (PLC BASED)



Oil is passed through a strainer in the heating chamber where it is indirectly heated to about 50 -55 °C.

The oil so heated is dispersed in a thin film in the vacuum chamber. Dispersing the oil into a thin film increases the surface area exposed to vacuum. As water will boil at low temperatures in vacuum, it evaporates and is excavated through the condenser where it is condensed into water and drained out. Dehydrated oil is then pumped back into the oil reservoir. Vacuum, temperature gauges and moisture sensors are installed on the equipment

**TECHNICAL SPECIFICATIONS:**

Electrical Supply	415v Ac, 3 Phase, 50hz
Control Panel	PLC with 7" HMI Display
Oil Inlet/Outlet	SAE R1AT 1" BSP hose pipes with end fittings
Discharge Pump Details	
Type	DG- 50 Trochoidal Monoblock
Nominal Flow Rates	50 Lpm
Operating Pressure	0-6 Bar (Kg/Sq.Cm.)
Motor Power	2.0 Hp
Vacuum Chamber Capacity	110 Liters
Operating Vacuum	Upto 750mm Of Hg @ Msl
Heater Type	Low Watt Density Heaters
Heater Load	15 KW 440v Ac
Vacuum Pump Details	
Capacity	300 Lpm
Drive –	Direct Driven
Motor Power –	1.0 Hp, 2800 Rpm, 3 Phase
Overall Dimensions	
Length	1790mm
Width –	1100mm
Height –	1500mm
Weight Of the Unit	
Empty –	400 Kgs Approx
Full –	530 Kgs Approx
Provided With	Fixed castor wheel, two swivel with lock
Duty Conditions –	Continuous
Color Shade –	Anthracite Grey (Ral 7016)
Water Discharge –	Auto-drain
Condenser	0.5 TR

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