

# Low Vacuum Dehydration Machine

Complete guide of LVDM



✓ What is Vacuum Dehydrator

✓ When to Choose Vacuum Dehydrator

✓ Working Principle of Vacuum Dehydrator

✓ Design and Function of Vacuum Dehydrator (LVDM)

# 1. What is Vacuum Dehydrator

A Vacuum dehydration oil purification system is an electromechanical machine that works on various heating principles and vacuuming technologies to remove gaseous substances and water from various types of oil.

This technology was developed decades ago and it is one of the most efficient and reliable way to remove water contamination from the oil.

It is more effective than Coalescer, water absorbing filter or solid liquid separator (Centrifuge).

With the provided accessories it is able to reduce water contamination down to 200 ppm.

Depending on your hydraulic system, you may deal with water that exists in different forms as below

*\* Phases of water in Oil \**



Free Water



Dissolved Water



Emulsified Water

## 2. When to Choose Vacuum Dehydrator

### 2.1 When you want to remove all 3 Phases of water from Oil

|                      | Free Water | Dissolved Water | Emulsified Water |
|----------------------|------------|-----------------|------------------|
| Gravity              | ✓          | X               | X                |
| Centrifuge Purifiers | ✓          | X               | X                |
| Desiccant Units      | X          | X               | X                |
| Coalescer Units      | ✓          | X               | X                |
| Absorbing Elements   | ✓          | X               | ✓                |
| Vacuum Dehydrator    | ✓          | ✓               | ✓                |

## 2.2 When you need less than 200 ppm of water in your Oil

Hydraulic systems always carry all 3 phases of water in their Oil due to nature of operation. When it comes to cleanliness of oil in hydraulic systems, you can not take any chances. This is because the kind of damage water contamination can cause in your hydraulic system will be catastrophic.

Below are some of the most devastating effects of water:

| Effect of Water on Hydraulic Oil                              | Effect of Water in Hydraulic Systems    |
|---------------------------------------------------------------|-----------------------------------------|
| Deteriorates oil additives such as anti-wear additives in oil | Corroding surfaces of hydraulic systems |
| Reduces viscosity of oil                                      | Reduces the lifespan of filters         |
| Accelerates oil oxidation                                     | Causes valves lock                      |
|                                                               | Increases hydraulic system parts wear   |
|                                                               | Rapid silting of orifices and valves    |
|                                                               | Reduces pumps efficiency                |

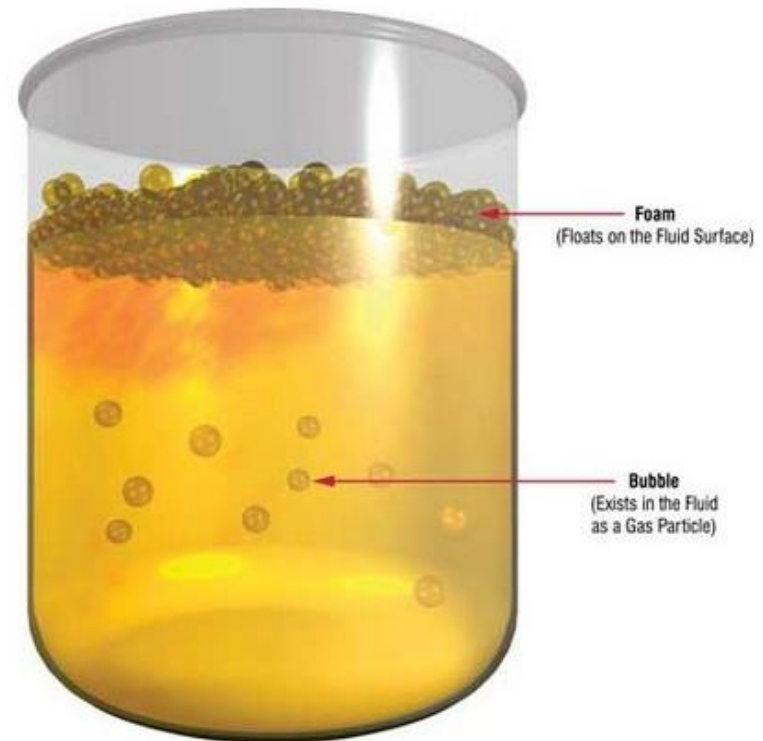
## 2.3 When you need to remove gases from hydraulic oil

Entrained air and gases can also affect the normal operations of hydraulic systems. In some cases, it will lead to the system failure.

Vacuum dehydration is the only process that can remove 100% of free gases and nearly 90% of dissolved gases from the oil.

### Some effects of air in hydraulic systems:

- Spongy control
- System will be less stiff and softer
- Loss of horsepower
- Loss of system fluid
- Erosion and cavitation



## 3. Working Principle of Vacuum Dehydrator

LVDM works in 2 major stages to achieve the results.

### 3.1 Heating Oil to a suitable Temperature

Once you connect vacuum dehydration machine, oil will flow into the system. This is the contaminated oil you wish to purify.

The 1<sup>st</sup> stage is to heat the contaminated oil to a suitable temperature.

This is critical stage since it should ensure that the heat does not interface with the basic oil constituents.

Depending on the oil or vacuum dehydrator, you can heat the oil to a temperature of 45 deg. to 60 deg.

At this stage, it is important to avoid any instance of permanent deterioration of oil such as permanent change in oil viscosity. When you increase the temperature of oil, its viscosity tends to decrease. This is because temperature makes oil molecules to become hyperactive. In addition, there are certain additives that will deteriorate at extremely high temperatures.

## 3.2 Distillation Column of Hydraulic Dehydrator

This is critical stage in the working principle of vacuum dehydrator oil purification system. It's at this stage that this vacuum oil purifier removes water in the oil. You can also refer to this column as a vacuum chamber.

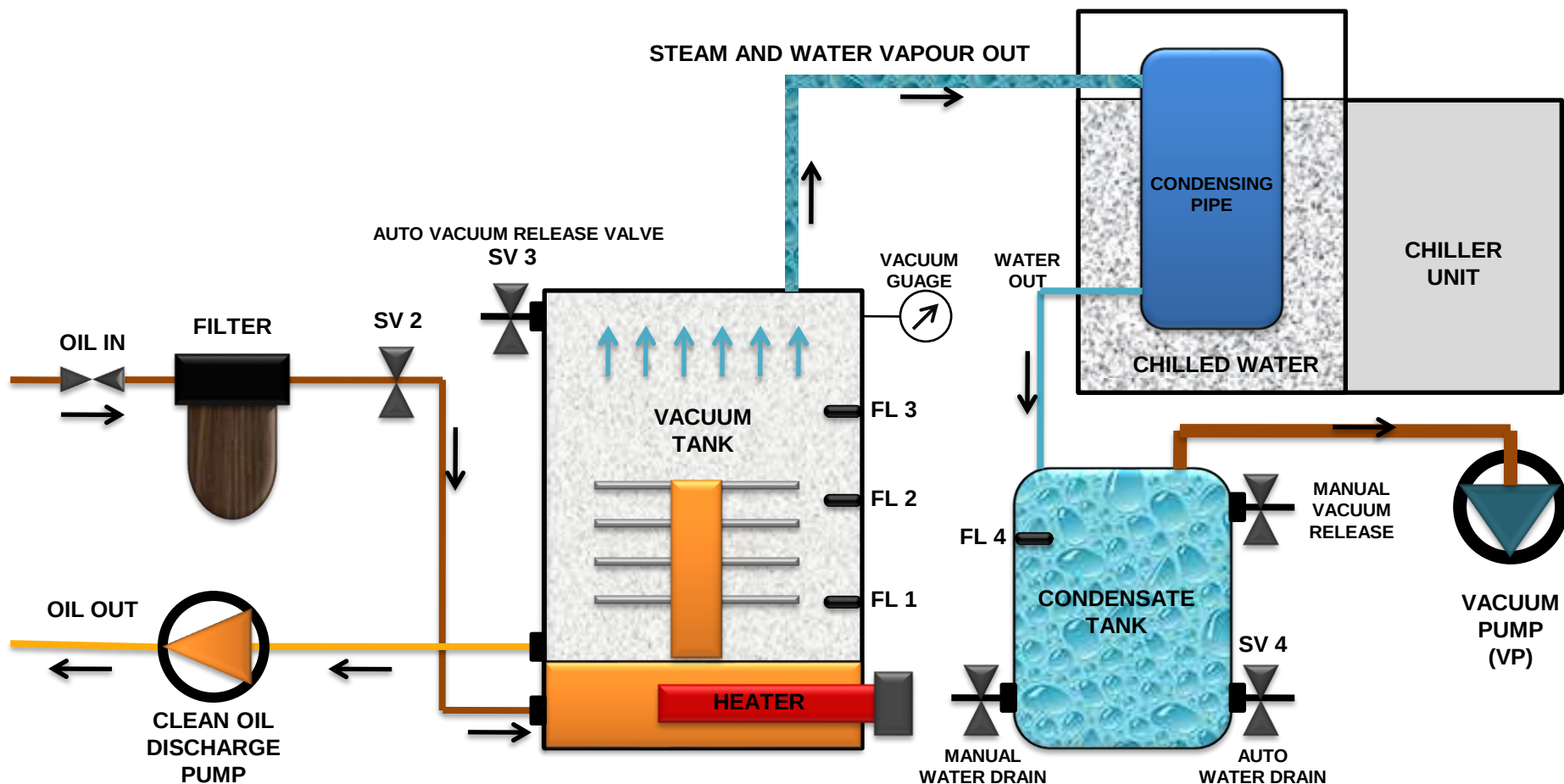
The vacuum dehydration system has a vacuum pump. It is this vacuum pump that creates vacuum in this vacuum chamber. In the most instances, it draws the vacuum at about 700 mm of Hg. **It is more important to remember that, very high vacuum will lead to slower water removal.** Thus you need to have a proper balance between vacuum and temperature to effective removal of water and gases from the oil.

As oil flows through the dispersion medium in the vacuum chamber, both the dissolved gases and water present in the oil are 'boiled off'. This effectively dehydrates the oil.

Remember, the essence of passing heated oil in a vacuum chamber is to ensure the oil is dehydrated at a relatively low temperature. Due to this, there is no possibility of thermal breakdown of oil.

Within this chamber, the vacuum oil purifier dehydrates and degasses oil without changing or altering any of its properties. It removes all phases of water and gases.

## 4. Design and Function of Vacuum Dehydrator (LVDM)



**FLOW DIAGRAM OF LOW VACUUM DEHYDRATION MACHINE (LVDM)**

## ISOMETRIC VIEW OF OUR LVDM



LVDM -100

## 4.1 Function of our Low Vacuum Dehydration Machine (LVDM)

Our LVDM works on low vacuum dehydration principle to eliminate maximum water and dissolved gases from the oil. It is suitable for hydraulic oil as well as lube oil, gear oil, transformer oil and all mineral and synthetic oil up to viscosity 320 Cst.

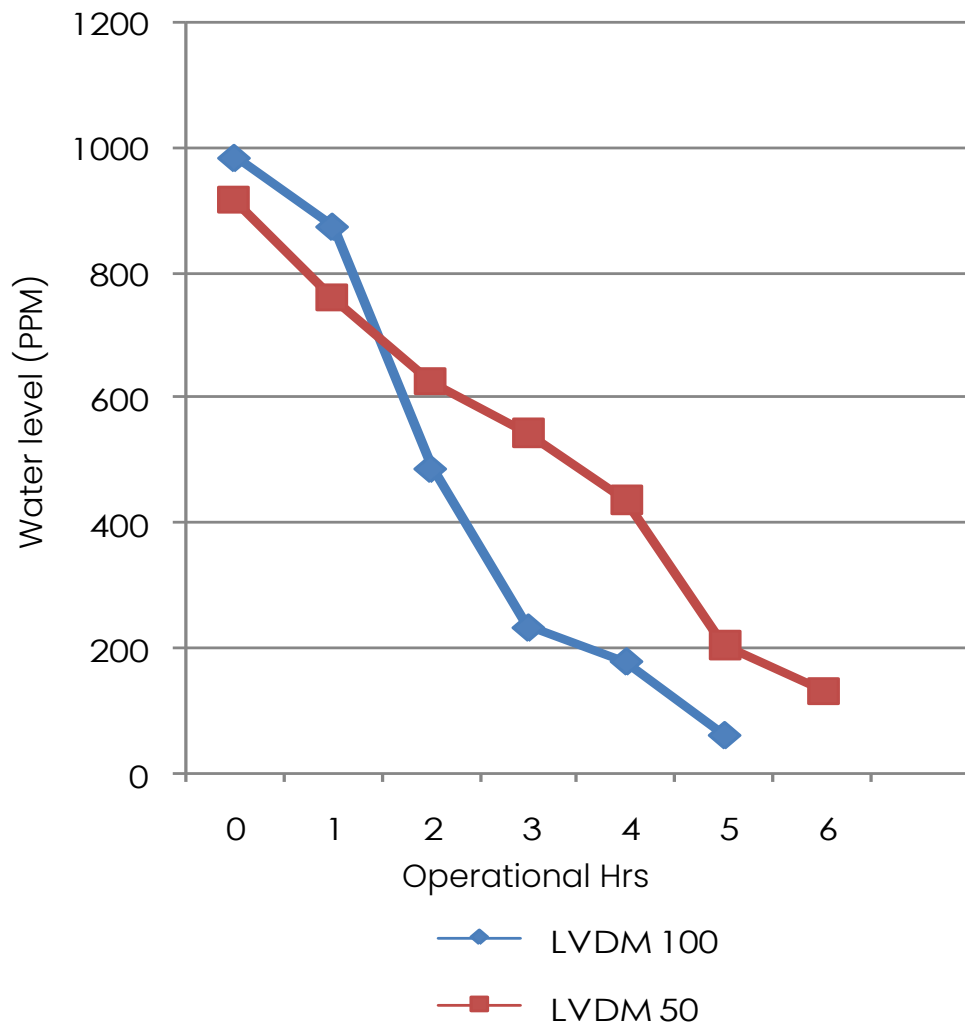
When the inlet valve is open, oil enters the vacuum chamber which has heater at the bottom,. Oil is heated by the heater up to 45 to 60 deg C where water starts boiling. Under vacuum, moisture and water present in the oil separate out as steam and is condensed in the chiller / condenser and then collects in the water collection tank. if the moisture content is not very high, the water vapor and steam comes out through the vacuum pump.

When the oil level in vacuum chamber rises to FL2 (indicated by the float switch), the discharge pump starts and pumps the oil back to the oil sourced tank. the discharge pump stops when the level of oil in the vacuum chamber reaches the level FL1. Condensate tank is provided with auto and manual valves to discharge water.

A number of passes are required for the oil to be fully dehydrated.

## 4.2 Water Reduction Using Our Low Vacuum Dehydration Machine

In-house testing Report on 100 Cst hydraulic oil – 200 lit, Heater temp. 55 deg C. Water added manually



## 4.3 Models of Low Vacuum Dehydration Machine

We have 2 models of LVDM suitable for different tank capacities. Both models are provided with user friendly touch screen PLCs to control the machine.

|                                      | LVDM – 50           | LVDM – 100          |
|--------------------------------------|---------------------|---------------------|
| Suitable for tank capacities         | Up to 2500 lit      | Up to 5000 lit      |
| Oil inlet and outlet hoses           | 3/4" BSP            | 3/4" BSP            |
| Vacuum Pump with motor (belt driven) | 100 LPM, 0.5 Hp     | 200 LPM, 0.5 Hp     |
| Vacuum Chamber                       | 50 lit              | 100 lit             |
| Operation Vacuum                     | 750 mm of Hg        | 750 mm of Hg        |
| Discharge Pump with motor            | 50 LPM, 2 Hp        | 50 LPM, 2 Hp        |
| Low watt density Heater              | 6 KW                | 8 KW                |
| Chiller Unit                         | 0.6 TR              | 0.6 TR              |
| HMI with touch screen display        | 4.3" PLC with 8 I/O | 4.3" PLC with 8 I/O |
| Water discharge                      | Automatic           | Automatic           |
| Approximate weight                   | 250 Kg              | 300 Kg              |



Contact us for more Information



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