

## **Laboratory water Distillers**

### **1. Definition**

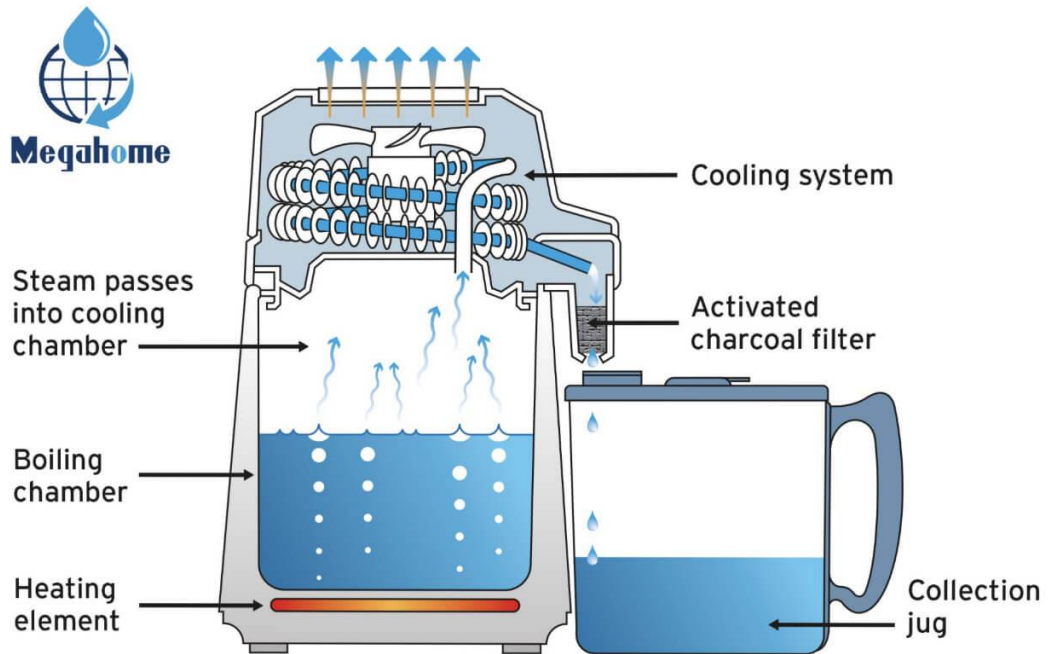
A water distiller is a machine that purifies water by removing more than 99.9% of contaminants, including chemicals, heavy metals, microorganisms and sediment. While design may vary, a typical water distiller consists of a boiling chamber, a cooling system and a separate storage tank.

Water distiller is a machine which is used to purify water using distillation process, which is related to first boiling impure water after that collecting condensed water in a separate container. This distilled water is used in laboratory, organic chemistry lab, clinic, fermentation and medical industry etc. It is also used in autoclave, battery and miscellaneous equipment.

### **2. Water Distiller Work**

**Distillation** is a fairly simple scientific process.

- a. Water is added to the boiling chamber, and the machine is plugged into a power source and switched on. The boiling chamber will then heat up to water's boiling point.
- b. Water evaporates into steam and rises up into the cooling system. Here, it passes down a sloping corridor, where it condenses and drips into a clean container.
- c. The majority of contaminants do not have the same boiling point as water. That means that when water is heated in the boiling chamber, the contaminants cannot evaporate alongside the H<sub>2</sub>O particles.
- d. They are left behind in the boiling chamber, and once the distillation process has finished, they are cleared away when the chamber is washed out.



## Principle of Water Distiller

Fig 1: Principle of Water Distiller. Image Source: [megahome-distillers.co.uk](http://megahome-distillers.co.uk)

### 3. Parts of a Water Distiller

#### a. Vapour generator/Boiling tank

Small-volume water distillers are made of glass, while larger-volume machines are made of stainless steel with copper, tin, or titanium coverings. It is designed to store the water to be distilled.

#### b. Water Level Gauge

It facilitates the regulation of the quantity of water in the vapor generator. The device enables the amount of liquid that has evaporated to be recovered when the amount of water in the liquid phase in the boiling tank drops.

#### c. Control valve

It is a device that allows water flow toward the vapor generator tank to be controlled mechanically or electromechanically.

#### d. Immersion resistors

When an electrical current passes through them, it produces heat. These are sealed off by a ceramic cover and shielded from the external environment by a metal plate.

e. **Refrigerator water outlet**

It is a line utilized for condensing the water vapor (cooling).

f. **Condenser**

The device cools and returns the vapor to its liquid phase after losing thermal energy. The process is sped up by forced convection, which involves circulating low-temperature fluids (such as water or air) around the line where the vapor flows.

g. **Filter**

Activated carbon filters are found in water distillers near the condenser or collector exit. As the vapor is being condensed, these remove any flavors or particles that could be there.

h. **Distilled water container**

It is the container where the liquid that has undergone distillation is collected. Ionic contamination must be prevented by storing distilled water in designated plastic containers. Containers made of polytetrafluoroethylene, polyethylene, or polypropylene are typically used.

Source of picture: www. agriculture.alberta.ca

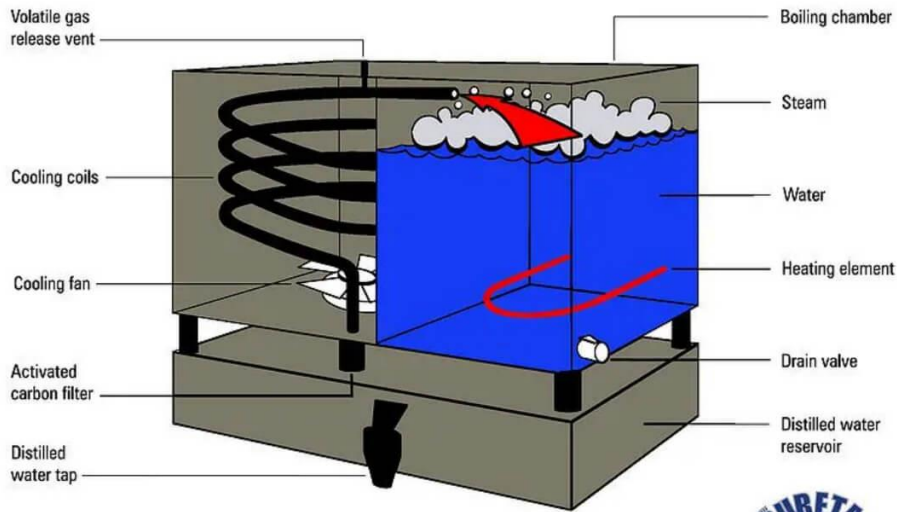


Figure 1. Distiller operation (air-cooled type)



## Parts of a Water Distiller

**Fig 2:** parts of water distiller. Image Source: [Puretap Water Ltd. https://microbenotes.com/](https://microbenotes.com/)

### 4. Types of Water Distillers

Distiller systems come in either manual or automatic configurations.

#### A. Manual distiller system

It can only produce 1 gallon of water at once. An individual should physically refill the system once the first gallon of water is created to produce the subsequent gallon of water. The amount of water a manual distiller can generate in an hour determines its capacity. Typically, 1-gallon-sized glass or plastic jars are used in manual distillation systems.

#### B. Automatic distiller system

A water pipe is connected to automatic water distillers, continuously creating pure water. When the holding tanks reach a specific level, systems are controlled by electronics or float valves to cease production. The daily output capacity determines an automatic system's capacity. 3 to 25 liters of water can be stored by automatic distillation systems in a stainless-steel reservoir.

## **5. Maintain a Water Distiller**

Water distillers require very little maintenance, but it is important to clean the system regularly and replace the activated carbon filter when necessary to ensure it can work at its optimum. Over time, minerals and impurities will build up in the distiller's boiling chamber, which will eventually affect the performance of the system. Bacteria and algae may also grow in the chamber without regular cleaning.

It is recommended to clean your distiller's boiling chamber after every distillation cycle. To do this, switch off the machine and remove the lid off the boiling chamber. Add a quarter-cup white vinegar to your kitchen sink, then fill it with warm water and soak the lid for a few hours.

While the lid soaks, add a mixture of equal parts water and white vinegar to the boiling chamber and leave it to sit overnight. The next morning, pour out the water-vinegar mix and rinse thoroughly with warm water. Wash the lid if you have not already, then let the machine air-dry before you use it again.

A reliable electricity supply should be established. Continuous supervision is required to ensure an adequate supply of cooling water, that the boiling flask doesn't run dry (sometimes automatic protection is offered), and that the receiver isn't overfilled.

## Water Distiller Examples



LAUDA Puridest stills  
Puridest PD 12 R



Stainless steel Re-distilled Water  
Distiller, WDST-D Series



Laboratory water distiller  
A 1104 (Liston, LLC)



WS400 4L/hr Automatic  
Water Distiller

**Fig 4:** Water Distiller Examples. Image Source: Respective Company Website.

<https://microbenotes.com/>