

Homogeneous and Heterogeneous Liquids Density Meter



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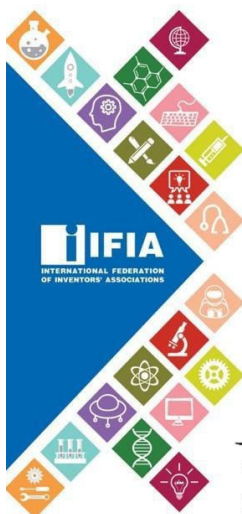
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CERTIFICATE OF "Inv" MEMBERSHIP

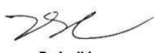
According to the Enactment Approved by IFIA Executive Committee Members to Respect Inventors

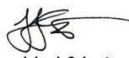
This is to certify that

Inv. Hassan Mohammadi

Has been recognized as an IFIA Inv member

IT MUST BE NOTIFIED THAT THE "Inv" TITLE IS GIVEN TO AN INVENTOR WHO HAS ACHIEVED THE REQUIREMENTS FOR THIS TITLE. THIS CERTIFICATE IS ISSUED BY THE REQUEST OF THE ABOVE-MENTIONED PERSON AND HOLDS NO LIABILITIES AND RESPONSIBILITIES WHATSOEVER FOR THE SIGNATORIES AND IFIA.


Dr. Insil Lee
IFIA Women's Affairs


John J. Calvert
IFIA Jury President


Prof. Dr. Michal Szota
IFIA Director

Homogeneous and Heterogeneous Liquids Density Meter

was designed and manufactured in 10 years and was patented in 2018 and has the following certificates:

- Iran's National Elites Foundation
- Approval from Tabriz University of Iran
- Certificate of “Inv” Membership (IFIA)
- Silver medal of the second international invention (Aug 2022, IFIA)

The main reason and purpose of designing and building this device is that in various industries around the world, devices that look like a scale and are equipped with a special container is often used to measure pulps density. For the following reasons, this type of density meters have low accuracy and working with them has special problems:

- They have a special container that has holes to set one liter of liquid for measurement. Adjusting 1000 cc of liquid with this method is not an accurate method due to the overflow of the liquid from the holes in the container.
- At least one liter of liquid is required for measurement.
- It is difficult to read the information from its calibrated screen and it is accompanied by errors.
- Due to the relatively high weight of the device and the overflow of liquid from the holes of the measuring container, its usage has certain problems, especially if the user is alone.
- Temperature compensation is not considered in container, scale and liquid parts.



Homogeneous and Heterogeneous Liquids Density Meter

Capabilities

- Measuring the density of homogeneous liquids such as waters, acids, alkalis, alcohols, refinery products, perfumes, etc.
- Measuring the density of heterogeneous liquids such as pulps, water and cement mixtures, production line slurries, industrial effluents, suspensions, body fluids, drinks, etc.
- Measuring the density of solid parts such as plastics, metal and non-metal alloys, glass, ceramics, powders, etc.
- Materials such as powders.
- Liquid density measurement is done independent of liquid temperature and with desired volume without physical contact with it.
- Measuring the density of liquids that precipitate quickly or insoluble particles settle quickly.
- Density measurement of thick, volatile and unstable liquids

Applications

- Concentration factories such as steel, copper, aluminum and gold mines to measure the density of pulps and slurries.
- Refineries and petrochemicals to measure the density of products such as crude oil, gasoline, alcohol, acetone, detergents.
- Medical industries such as measuring the density of suspensions, body fluids, blood, pharmaceutical fluids.
- Food industries such as measuring the density of drinks, honey, water and sugar solutions, etc.
- Construction industry to measure the density of concrete and cement mortar.
- The density of solid parts of the production lines of all kinds of metals, plastics and etc.



Homogeneous and Heterogeneous Liquids Density Meter

- Laboratories and Universities.

Possibilities

- Equipped with Wi-Fi to send information to peripheral devices such as mobile phones and computers.
- Wireless charger to charge the battery.
- Full color display.

Specifications

Device + crystallizer weight	500 g
Dimensions	10 × 10 × 10 cm
Measuring container	Crystallizer 80 × 45 mm
Sample Volume range	40 to 130 cc
Accuracy ± (g/cm ³)	0.001 g/cm ³ (4 Digits)
Resolution (g/cm ³)	0.0001 g/cm ³
Minimum sample volume	40 cc
Temperature compensation	Automatic
Display / User interface	2.8" color LCD, buttons, Wi-Fi
Software	PC, Android
Connectivity	Wi-Fi
Power	Lithium ion battery charged by Wireless charger and Normal Adaptor 5 Vdc.
Ambient Temperature Range	-10 °C to +50 °C
Sample Temperature Range	-10 °C to +50 °C
Ambient Temperature resolution	0.1 °C
Sample Temperature resolution	0.1 °C
Sample Weight resolution	0.01 g
Sample Volume resolution	0.01 cc
power consumption	5Vdc, 100mA



Measurement method

- 1- Place the device on an almost horizontal surface.
- 2- Press the **ON** button to turn on the device.
- 3- If the weight of the container is not zero, press the **Tare** button to set it to zero.
- 4- Take the container and pour desired amount of liquid into it and place it inside the device.

In less than 5 seconds, visible information on the display:

- Liquid weight with an accuracy of 0.01 g.
 - Liquid volume with an accuracy of 0.01 cc.
 - Liquid temperature with an accuracy of 0.1 °C.
 - Ambient temperature with an accuracy of 0.1 °C
 - Liquid density with an accuracy of 0.001 g/cm³ (4 digits).
- 5- Turn off the device by pressing the **Reset** button for 3 seconds (if necessary).

Measuring the density of water

Use the **Measurement method** to measure the density of water. The density of water at room temperature is 0.997 g/cm³. Water is used for device calibration and verification. 0.997 g/cm³ should be observed at any ambient temperature and at any water temperature, otherwise calibrate the device.



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Device calibration

- Press both **Next** and **Up** buttons together.
- When the calibration number changes, release the buttons and change the calibration number by increasing or decreasing the number.
- Press the **Save** button and reset the device with the **Reset** button to perform the calibration.

Measuring the density of water and cement mixture

Use the above method to measure the density of water and cement mixture. The density of water and cement mixture is more than 1.000 g/cm^3 . If user want to see the percentage of dry cement soluble in water, it must enter the number 1440, which is related to the dry density of cement, to see the percentage of dry cement.



Setting the number of dry percentage of the material

- Press the **Up** button until the first letters of the number change from A to E.
- After seeing the letter A, press the **Next** key to highlight the thousands digit.
- Use the **Up** button to set the thousands digit.
- By pressing the **Next** key, set the hundreds, tens, and ones digits as well.
- Press the **Save** button and reset the device with the **Reset** button to set the dry percentage of the desired material.

The percentage seen on the display corresponds to the dry percentage of the substance.

The number of dry percentage of different materials can be stored in A, B, C and D (not E).

Measurement of solid particle density

- First, pour some water or a homogeneous liquid into the crystallizer and note its weight and volume on the device's display.
- Remove the container from inside the device and put the non-porous solid piece into the liquid and put it inside the machine.
- Record the weight and volume.
- From the difference of weights and volumes, the weight, volume and density of the solid piece are obtained.



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Mobile connection to the device

- Activate mobile Wi-Fi and connect to the device.
- Run the **Density Scale** software and click the **Connect** option so that the display information of the device can also be seen on the mobile phone.
- The **Solid Density** menu is used to measure the solid part.



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Connecting the computer to the device

- Activate the Wi-Fi of the computer and connect to the device.
- Run the **Density Scale** software and click the **Connect** option so that the display information of the device can also be seen on the computer.

Homogeneous and Heterogeneous Density Meter		
Particular Density 1440 g/cm ³	Liquid Density 0.9983 g/cm ³	Average Data1 <input type="button" value="Insert"/> Data2 <input type="button" value="Insert"/> Data3 <input type="button" value="Insert"/> Average <input type="button" value="Done"/>
Ambient Temperature 30.0 °C	Solid Density 00.00 %	Solid Density Data1 <input type="button" value="Insert"/> Data2 <input type="button" value="Insert"/> Solid Density <input type="button" value="Done"/>
Object Temperature 26.9 °C		
Weight 94.69 grams		
Volume 94.85 cc		
Connect IP: <input type="text" value="192.168.4.1"/> Port: <input type="text" value="4444"/> <input type="button" value="Received Data"/> <input type="button" value="Connect"/> <input type="button" value="Maximized"/> <input type="button" value="Exit"/>		Send <input type="text"/> <input type="button" value="Send"/>

Important points

- Only the bottom part of the device can be washed.
- This device is breakable.
- Notify the manufacturer of any problems with the measurement and performance of the device.
- Use only a wireless charger or 5V adapter to charge the device.
- The **Dead Band** message means that the device cannot measure the density of the liquid.
- Use the device's own container to measure.
- Pouring liquid on the bottom of the device will damage it.
- Calibrate this device with water.





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