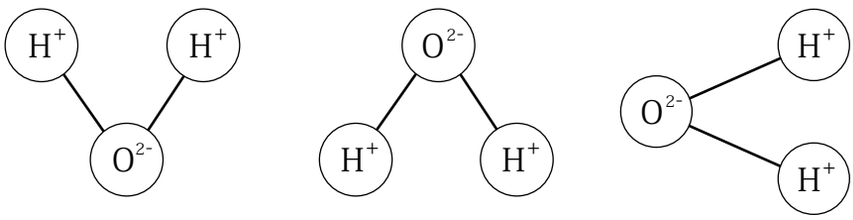
Explanation of the principle of the moisture-in-oil analyzer (basis)

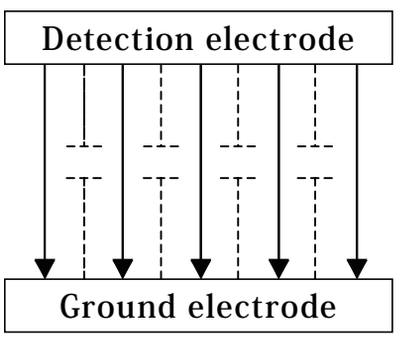
Our moisture meter detets the moisture value by measuring the dielectric constant (capacitance) in the oil.

Dielectric constant measurement

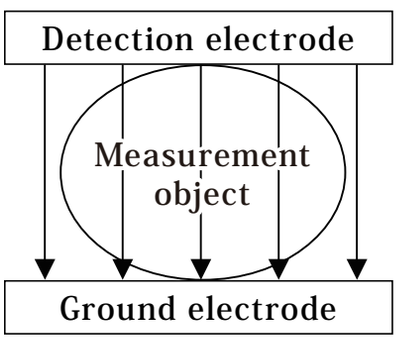
Dielectric (Insulator, Semiconductor) has a molecular structure that stores electricity.



It works like a capacitor. The amount of electricity stored differs depending on the difference in the molecular structure of the substance. ※See dielectric constant table.
Our moisture meter measures the dielectric constant of the object to be measured, converts it into an electrical signal, and converts the change into a moisture value.
In actual work, electrodes are often installed in the middle of pipelines, but for the sake of clarity, the parallel plate type is used in this explanation.
We measure the charge between two plates, the detection electrode and the ground electrode.
We perform the measurement in the following procedure.



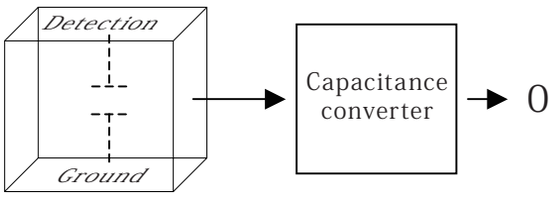
- A small constant current flows from the sensing electrode to the ground electrode.
- When the object to be measured is placed between the detection electrode and the ground electrode, the current value between the electrodes changes.
- The current value is converted to a capacitance value.



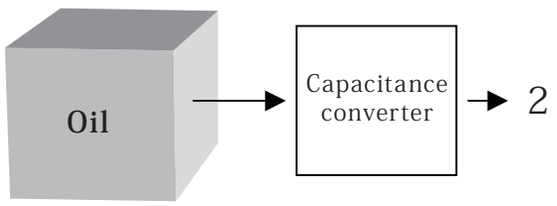
【Placing the object to be measured increases the capacitance value.】

・・・Now let's start with the explanation of the main subject, the moisture-in-oil analyzer.

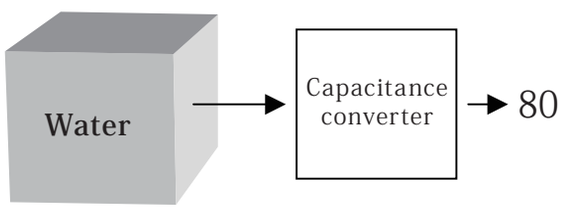
1. About the oil or water capacitance value.



● Please adjust the capacitance converter to show 0 when there is nothing between the detection electrode and the ground electrode.



● If the place between the electrodes was filled with oil, the converter displays 2.



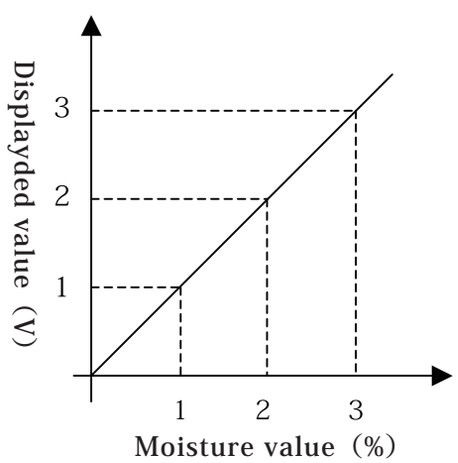
● If the place between the electrodes was filled with water, the converter displays 80.

● The converter is detecting the permittivity.

● If even one drop of water (80) is mixed in with oil (2), the value displayed by the converter will increase.

● If you adjust the converter so that it displays 0V when there is only oil and no water, and 1V when 1% of water is mixed, it will display 2V when 2% of water is mixed.

● The capacitance value changes linearly according to the moisture value.

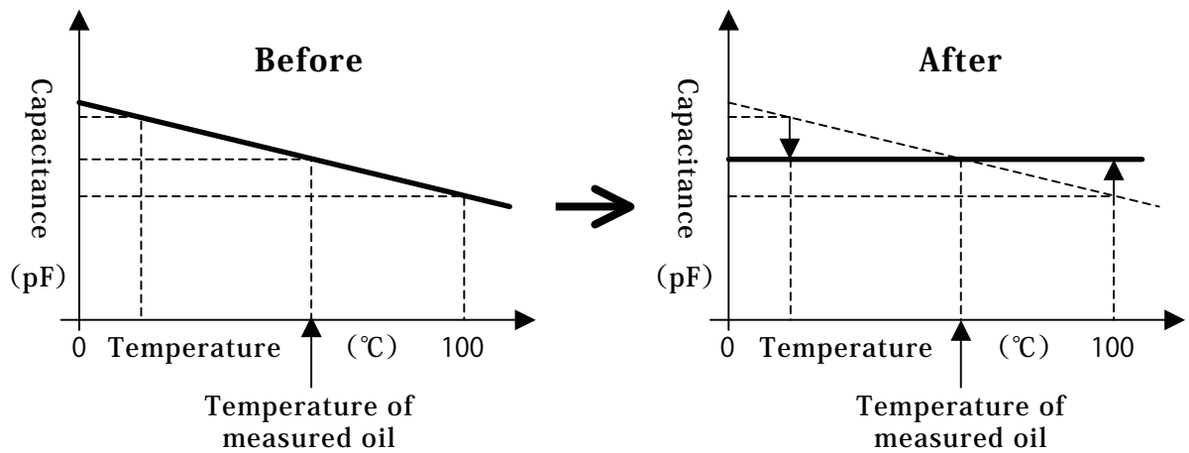


Important Notes!

The capacitance value changes linearly according to the moisture value.

2. Temperature correction.

- The measured value of capacitance depends on the temperature of the object to be measured.
- We will explain using the case of measuring the moisture content in oil as an example.
- In most cases, the measured value of capacitance will decrease as the oil temperature increases.



3. System configuration.

1. The value measured by the capacitance converter is corrected by the controller and display using the value measured by 2. the temperature transducer.

4. Precautions for use.

Important Notes!

- Avoid air bubbles.
- Keep the pressure constant, because air bubbles are generated due to pressure changes.
- Make sure it is properly calibrated before use.