

# Lubrication & hydraulics

/ MEASURING MOISTURE IN OIL



**VAISALA**



Don't measure the damage.  
Prevent it.



## Water deteriorates oil

Water is a common contaminant in industrial oils that deteriorates its performance, whether used as a lubricant, coolant, insulator, or for other purposes. High moisture content increases the risk of corrosion, overheating, machine malfunctions and other costly problems. The ability of oil to hold water in solution depends on the oil type, its age, and what additives are present. When the water content in oil reaches the saturation point, it

separates out and free water is formed. Free water formation is critical in terms of problems related to water in oil. It prevents the formation of a uniform oil layer on metal surfaces, thus reducing its lubrication performance and increasing equipment wear and corrosion. It ruins polar additives like AW (anti-wear) and EP (extreme pressure). Water can also initiate micro-pitting. Free water provides a growth medium for microbes to form slime or mats, which easily plug filters and valves and may cause critical malfunctions.

## Avoid costly failures

By measuring water activity in the oil, one can gauge whether there is a risk of free water formation and thus significantly reduce wear and corrosion. With a relative scale from 0 (no water present) to 1 (the oil is saturated with water) water activity measurement gives a reliable indication of how close the oil is to the saturation point. Water activity measurement is also independent of oil type. The measurement remains







proportional to the saturation level of water in each individual oil. The reading always indicates the true situation at that moment. In its simplicity, the value is understandable at a glance and trends can be easily tracked.

Continuous monitoring of moisture in oil ensures reliable equipment performance at all times and helps to schedule service intervals and prevent unscheduled downtime. It also reduces the risk of failures of critical and expensive machine parts, while requiring the activation of oil dryer systems only when necessary.

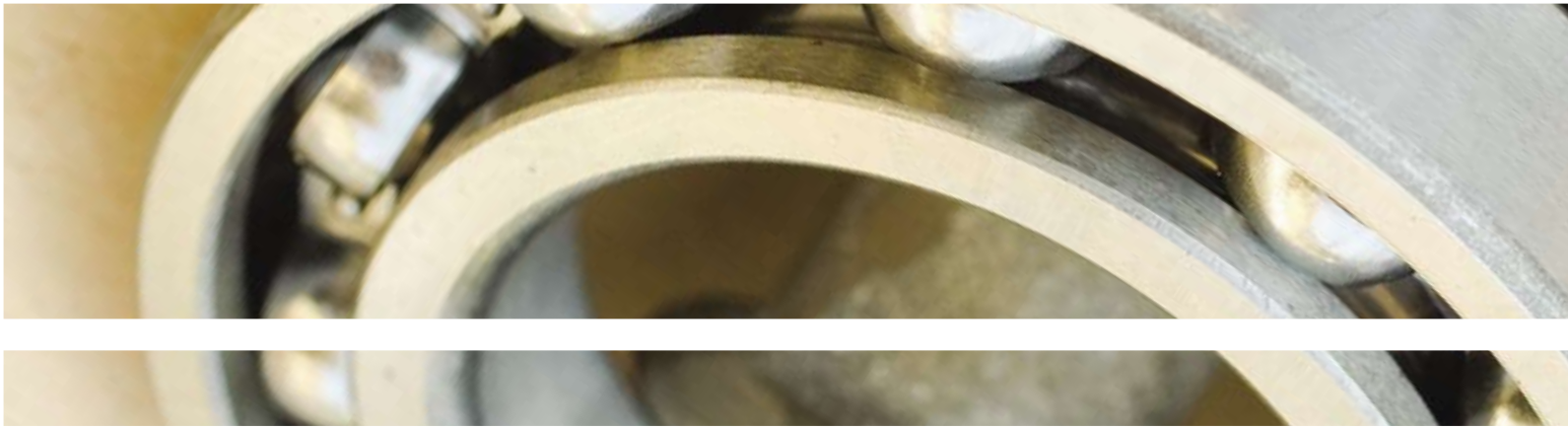
## Online measurement

Water activity measurement can be performed online. Unlike traditional sampling methods, which can take days or weeks to produce test results, online measurement gives real-time data enabling immediate corrective actions. This is especially important in applications where the consequences of water contamination are high, such as in transformers, turbines, marine engines and paper mills.

## Supporting preventive maintenance

With Vaisala's portfolio of moisture in oil instruments you can optimize the operational efficiency and performance of your machinery. Simply put, our moisture and temperature in oil transmitters indicate directly and online how saturated the oil is, thus comprehensively supporting your preventive maintenance programs.





## Real-time measuring

Our moisture in oil instruments are designed for direct, in line installation measuring in real time. In line moisture measuring in oil instruments is a critical tool for any preventive maintenance program.

## Works in most oils

Vaisala HUMICAP® moisture in oil sensors tolerate a wide range of hydrocarbon fluids, from pure oil to a variety of lubrication oils and hydraulic fluids.

## Cost efficiency via stability and robustness

The Vaisala HUMICAP® polymer sensor is designed and produced in-house in our own cleanrooms so you can be certain that you are getting a high performance measurement with the best accuracy and stability available anywhere. In fact, Vaisala developed the world's first capacitive polymer sensor. Vaisala HUMICAP® sensors feature high accuracy and excellent long-term stability. They are resistant to particulate dirt, oil contaminants and all additives – which together means greater long-term cost efficiency.

# Vaisala helps your operation and machinery

## Fast, customized implementation

Vaisala can build your customized instrument to specification on a schedule that helps you meet your deadlines. In fact, the standard delivery time for a custom-built product from our factory is just three days.







# to optimize anal efficiency y performance.

Here's how:

## Convenience

You can choose from various installation options and a configurable product platform with a multilingual user interface. Together, these features provide the flexibility to meet your unique application requirements.


## Local support – globally

Understanding measurements from an application perspective is important when developing products with features that meet specialized needs. Vaisala supports all of our instruments with highly qualified application engineers and technical support staff who are easily accessible and always ready to answer your most difficult questions. Whether you need service or purchasing support, or simply would like to discuss your measurement needs, we're there for you locally – across the globe.

## Easier maintenance

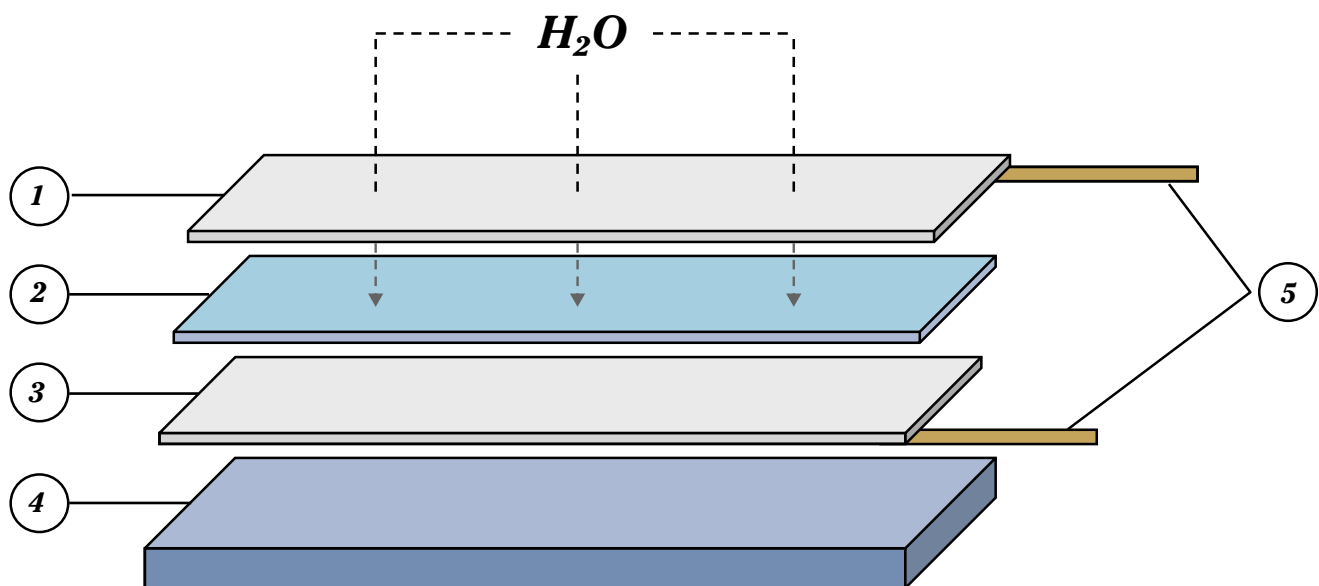
For easy field calibration and spot-checking Vaisala provides a salt solution field calibration kit and a hand-held moisture in oil meter. For ease of use, the online transmitters can be connected to the hand-held instrument to perform automatic calibration and adjustment.

Returning a Vaisala product to any one of our service centers worldwide is easy. As an alternative we also have a Vaisala Returns On Web (ROW) system in place for selected products and locations. The system enables easy shipping of Vaisala instruments for calibration or service. The system processes your service order step-by-step and produces all required shipping documents and all needed instructions.



# The result of decades of field experience.

*Vaisala's products which measure moisture in oil incorporate a capacitive thin-film polymer-sensor – the Vaisala HUMICAP® sensor. It is characterized by high accuracy and excellent long-term stability, thus permitting a long calibration interval. It is insensitive to particulate dirt, oil contaminants and all additives.*



*HUMICAP® Capacitive humidity sensor structure*

**1.** Water vapor permeable upper electrode | **2.** Humidity sensitive polymer layer | **3.** Bottom electrode | **4.** Sensor substrate | **5.** Connection pins





Vaisala HUMICAP® for oils is the result of a decade of field experience. It was developed in response to the demanding requirements of moisture measurement in liquid hydrocarbons. Vaisala's more than 35 years of experience in manufacturing these industry-leading sensors provides you with products you can rely on.

## Minimize unexpected maintenance costs

Monitoring and managing water in your oil can provide significant cost savings by extending the lifetime of your equipment and minimizing unexpected downtime.

## Vaisala – right at the heart of it.

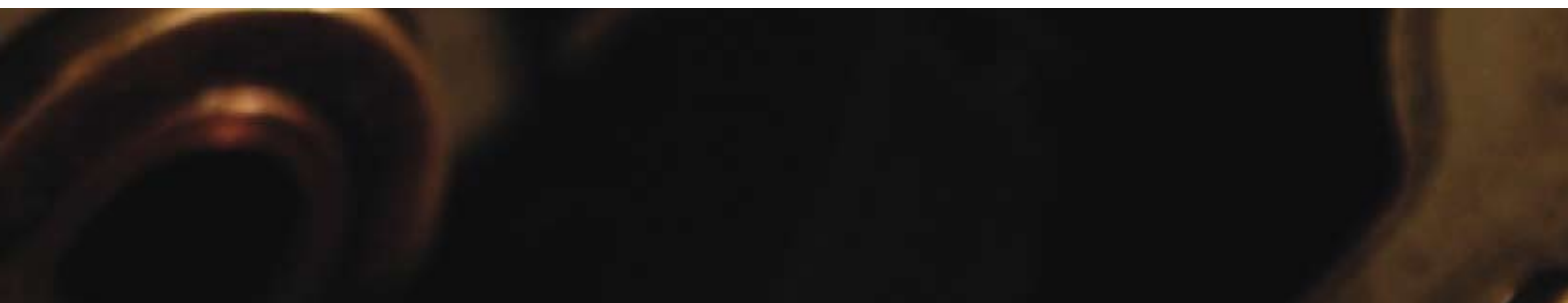
*Curiosity, the desire to meet challenges and an extraordinary ability for innovation are at the heart of the company – both past and present. Through the years our expertise has grown to include three business areas:*

**Controlled Environments** serving industrial customers whose primary interests are in operational quality, productivity and energy savings.

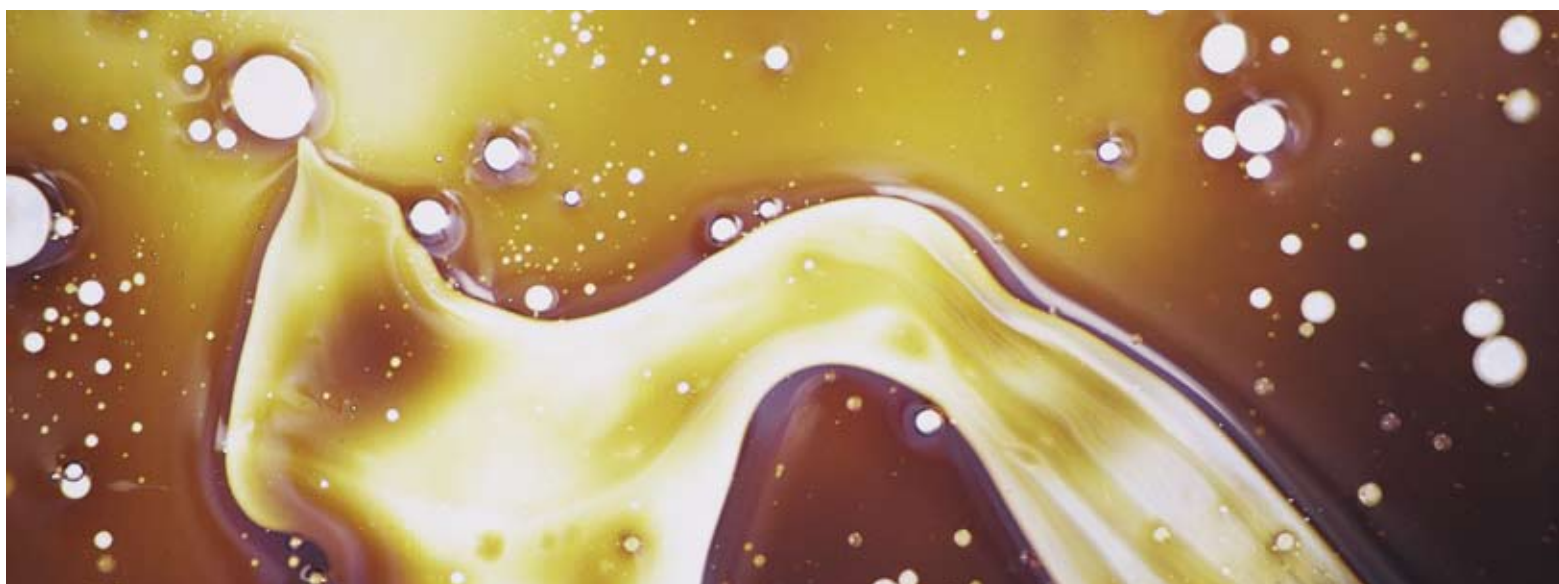
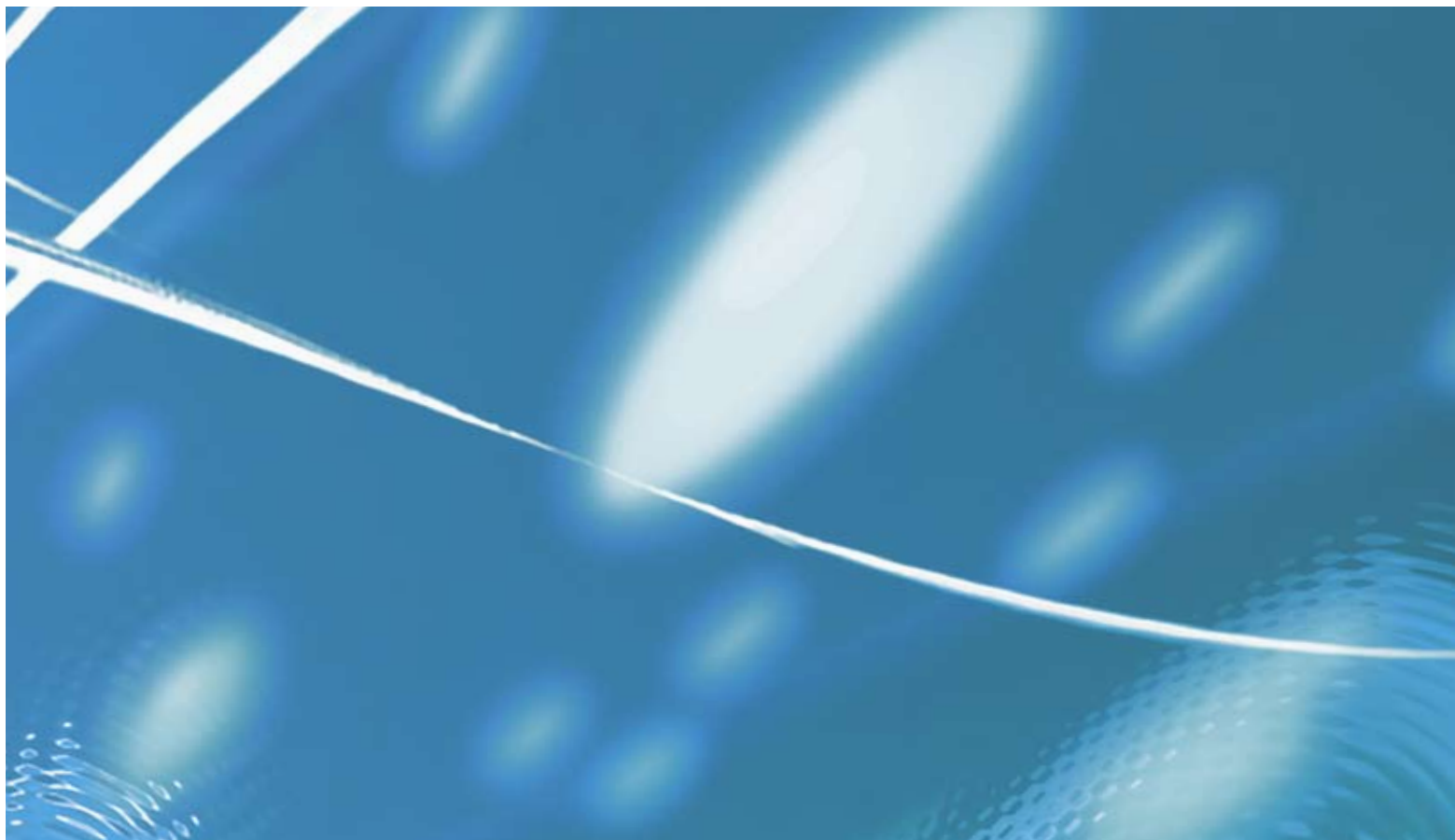
**Meteorology** serving national meteorological and hydrological institutes whose primary interests are the safety and well being of people and the safeguarding of property.

**Weather Critical Operations** serving operators and authorities whose primary interest is the safety and effectiveness of operations under all weather conditions.

Curious? Learn more about Vaisala at [vaisala.com](https://vaisala.com)







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