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## Water in Lubrication systems

EESIFLO's online water in oil detection monitor and transmitter

Online monitoring of commonly used conditioning methods to purify fluids in hydraulic and lubrication raised questions about the impact of high heat and vacuum pressure on the chemical and physical properties of fluid and their performance. Of particular importance is the examination of the impact of vacuum pressure on water and gas removal, and on the chemical and physical properties of hydraulic and lubrication fluids.

Fluid conditioning or purification is the removal of contaminants such as water and air/gases combine to remove particulate (solid contaminants) from hydraulic and lubrication oils. It is a relatively straightforward cost-effective approach to make these fluids suitable for continued use thus extending their service life reducing the waste stream.



Fluid conditioning is an essential step to ensure reliability of hydraulic and lubrication systems since it enhances the performance of the fluid, but also helps protect system components, resulting in increased productivity and equipment availability. Water is one of the most common contaminants due to its ubiquity and ability to ingress into the system. Water may be present in the base fluid in any or all of its three forms: emulsified, dissolved, and each can damage the fluid and the system components.

The EASZ-1 will measure total water irrespective of conditioning methods whether by both mechanical

chemical separation should they be Centrifuge, coalescer and absorbent filter methods. The EASZ-1 and monitor removal of non removal of saturated or free and emulsified water.

ONLINE WATER IN OIL MONITOR FOR HYDRAULIC OILS, LUBRICATION FLUIDS AND ADDITIVES  
DIESEL OIL AND HYDROCARBONS.

### THE EASZ-1 IS YOUR IDEAL ONLINE WATER OIL MONITOR



The Eesiflo EASZ-1 Water in Oil Monitor is designed to:

- Accurately measure small amounts of water content
- Automatically compensate for changes caused by temperature changes
- Provide a linear analogue output representative of water content

The EASZ-1 is able to measure small amounts of water by the changes in the dielectric property of the fluid passing through the probe. The probe works as a capacitor where the inner and outer sections form the two electrode plates in a capacitor. The fluid itself forms the dielectric.

The EASZ-1 does in fact not directly measure the water content, it measures the amount of energy that can be stored in the capacitor currently within the probe. The amount of energy that can be stored is determined by the average dielectric constant (DC) of whatever fluid is currently within the probe.

#### Dielectric Constant:

A material characteristic expressed as the capacitance between two plates when the intervening space is a given insulating material divided by the capacitance of the same plate arrangement when the space is air or is evacuated.

Oil and Water have very dissimilar dielectric properties; the typical value for oil is between 1.7 and 2.1 and water has a typical value of 80. So, in other words, water is capable of storing much more energy per volume than average oil.

It is important to understand that any changes to the oil that affects the dielectric properties of the oil will be seen as a small change in water content. If at any point the oil is changed by additives, a tank is filled in with a new oil, or maybe a full oil change, one will most likely have to reset the zero. Note: If changes are large, i.e. you change to a completely different oil through the probe; there may also be a need to change the calibration curve.

It is also important to understand that for applications where the oil is subject to wear and tear there will be a drift over time as the dielectric properties will slowly alter as the oil degrades.

It is wise, due to the principles of operation, to take samples to a lab on a regular basis, and using this whenever needed, retune the instrument zero. To an initiated user the slow drift over time may be a warning to monitor oil wear, while at the same time more rapid changes in readout can be considered true indications of contamination.

The ideal mounting position for the EASZ-1 is vertical, with the flow coming in from the bottom. The reason for this is to avoid trapping of air bubbles. It is perfectly OK to mount the EASZ-1 in any position, but care should be taken to avoid trapping air. If air is trapped, or the flow contains lots of air bubbles, then the measurement will be affected. The Dielectric Constant of air is roughly 1 and will therefore cause the total reading to drop towards zero. If the EASZ-1 is used to monitor a larger pipe, and therefore mounted on a bypass, care has to be taken that the bypass stream is representative of the total stream ensuring that the water and oil are mixing well. The following throughput limitations given are rough guidelines. Too low flow can cause water-oil separation, i.e. give you an unrepresentative reading. Too high flow may cause gas breakout, i.e. give you a too low reading. It is important to mount the instrument at a place where readings will be most representative of what is flowing through the pipe.

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Contact your local representative for more information on the EASZ-1 or log onto [www.eesiflo.com](http://www.eesiflo.com)