WATER-IN-OIL SENSORS AND TERMINAL BOXES

Effects of water in oil



Surveys have documented that water or moisture is the second largest contamination (after particles) in oil systems. Water has a damaging effect on the life time of oil and system components:

Reduced oil film strength and lubricity
Corrosion
Hydrogen-induced fractures (embrittlement or blistering)
Fastened oil degradation which will speed up the oils oxidization

The effect is damages to engine parts, cylinders, bearings, etc with resulting mechanical failures and therefore repairs and expensive downtime costs (ranging between EUR 10,000 - 200,000).

Any oil can hold a certain amount of water (dissolved water) depending on the oil type and temperature - until free water is formed. Free water is what has the most damaging effects, however, the damaging effect occur already at low water activity. For optimal protection of machine components the water content should not exceed 30% of the saturation point. The amount of water a specific oil type can dissolve varies significantly, depending on e.g. the base oil, additives, oxidation, temperature and pressure.

Measuring the water activity





Traditionally the water content of oils has been measured using either chemicals or laboratory equipment providing a percentage (%) or as ppm (parts per million). This laboratory approach has some drawbacks:

The small oil sample volume may not represent the many tons of oil
Time will elapse before the result returns from the lab – and the damage may actually have happened before results are knows
The analysis are typically only conducted once or twice a month
Samples are highly dependent on the personnel and correct handling & storage for precise measurements
Many types of oil analysis state water content very inaccurately – e.g. less than 1000 ppm. In many oil types the damaging effects, however, already occur at 100 ppm

These drawbacks can be eliminated by installing PAJ Water-In-Oil sensors which will monitor the water level in the entire oil system 24/7. PAJ sensors have the highest measuring quality in the market, and are calibrated for the specific oil type. Our WIO sensors are GL and MAN Diesel & Turbo approved.

The sensor will be giving you early warnings and the ability to take preventing actions – and is thus a cheap insurance against the very costly repair and downtime costs. Repair and downtime costs in most applications range between EUR 10,000 – 200,000, and the payback on the sensor cost is thus very high – without including the commercial/customer effects in the downtime costs.

Applications

Anywhere where there is lube oil, gear box oil, hydraulic oil, transformer oil or diesel oil, there is a

potential application of our WIO sensors:

- Engine or oil systems –for two-stroke vessel engines up to high speed engines
- Gear boxes – repairing or reinstalling gear boxes in machines, turbines or vessels is very costly
- Turbines - e.g. gas turbines in powerplants, hydropower or wind energy
- Hydraulic systems – especially high pressure hydraulic systems are intolerant of water
- Transformers – water in the transformer oil can be very dangerous and is safety critical
- Cooling/ventilation systems – keeping the cooling or vantilation systems up and running is critical
- Cylinders – adjacent machinery injecting the oil directly into the cylinders
- Pumps – especially large scale water or heat pumps
- Compressors – large industrial air compressors in for example factories or power plants