

SWC - Smart Water Cut Monitor

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Production Optimization in Mature or under Water injection Fields

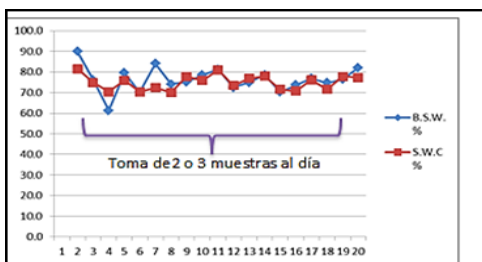
Real Time Monitoring of Water Cut in Production Lines

The Smart Water Cut (SWC) system has been designed to monitor water cut in production lines transporting oil and water with small percentage of gas, the system is based on electrical parameters of the fluids (dc conductivity and dielectric constant) flowing thru the sensors distributed inside the production line.

The sensor module acquires the data and communicates directly to the data storage, processing and communications module which transfer data to the control center via wireless using RS32, or wired using analog standard 4-20ma or digital standard ModBus protocols.

The system also can upload data to the cloud via internet using the **SWARM – SafeWireless Advanced Remote Monitoring** system and platform.

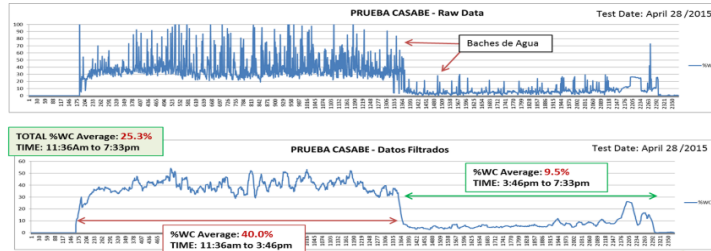
The transducers are axially distributed in spiral around the horizontal production line for 100% coverage. Each sensor measures both conductivity and capacitance and, the electronics in the NODE condition the signals for the HUB where a special software calculates the water cut as laminar (sectional) or turbulent (each sensor). The measuring range is 0-100% and the standard resolution is less than 3% and less than 1% if the tool is calibrated using actual produced water and hydrocarbon.



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The system has the *intrinsically safe sensor module* (NODE) and the *communications and data processing module* (HUB) which provides power (solar panels, local AC/DC)



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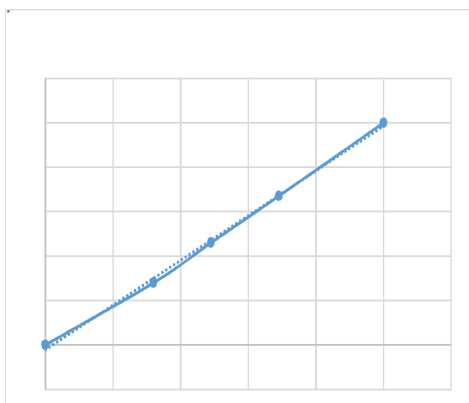
Applications

- Water cut measurement to optimize and manage wells from surface. Measurements in real time for oil and water producing Wells or in manifolds or production stations.
- Real time monitoring of water cut in mature fields under water driven mechanism or water flooding. Helps to determine direct communication of the injection front or water source when combined with temperature and salinity from the equipment measurement.
- Water cut monitoring in real time, production history or tendency. Improves efficiency and cost optimization in mature fields.
- Water cut monitoring and measurement is critical to optimize Pareto Wells or top producers in the field. The system operates in heavy oil mixtures and emulsions which are typical in heavy oil shallow fields.
- Identification of multiple flow regimes, flow distribution and emulsions.
- Inline system with full cross section monitoring using a helicoidal distribution of sensors. Each sensor can measure different fluid properties directly related to the flow regime.
- Simple and versatile system which can be used in a big variety of conditions including different diameter of flow lines, different densities of oil, different field conditions and with a fast response against parameter changes which make it the best option to identify sudden changes in the well/field.
- Basic salinity measurements which can be used to identify the water origin.
- Safe and reliable system with low exposure, designed for mature fields.
- Low operational costs which leads to an excellent cost-benefit ratio.
- Combinable with velocity modules to have real time production economically.
- Local Technical Support.

Advantages/Benefits

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Sensor Response and Technical Specifications



Technical Specifications	
Parameters	Specs and Comments
Diameter	2", 3", 4", according to production pipe
Material	ANSI 316 / ASTM A53 Sch.80
Max. Operational Temp.	125°C (Std. Assy) / 150 °C (HT Assy)
Max. Internal Temp.	0 to 125°C (In-Line Node SWCXX)
Pressure Range	0 to 1000 psi (Std. Assy); Flange type determine max. pressure
Repeatability	<1.87%
Measuring Range	0 to 100% linear - R ² average 0.998 (Std. Assy).
Accuracy	< ± 3% (Std. Assy) / < 1% in-situ cal.
Power Input	Self Solar Energy (HUB-I) or 24 VDC (HUB-II)
Input Voltage	24 VDC regulated to 12VDC (line)/5 VDC/3.3VDC
Comm. Ports	RS232, 4-20 Std. ModBus (Ethernet)
Sampling Rate	Programmable (default 90 s)
Safety Area	Built-in Safety Equipment