

MULTIPHASE MEASUREMENT IN DESALTERS

The power of advanced
radiometric measurements



REVOLUTIONIZING DESALTER OPERATIONS WITH ADVANCED MEASUREMENTS

Desalters are crucial equipment in oil refineries and production facilities removing, salts, minerals, and other contaminants from crude oil before it is processed further. This step is important to reduce corrosion and fouling in downstream equipment. The desalting process typically involves mixing crude oil with wash water, which attracts salts and minerals due to its dipolar nature. An electric field is applied to grids inside the vessel accelerating the coalescence process separating the water and oil. The cleaner oil rises to the top of the desalter vessel, while the salt-laden water settles at the bottom and is removed. Every refinery has at least one desalter, as this pre-treatment step is essential for protecting expensive downstream equipment, ensuring efficient operations, and maintaining product quality. Effective desalting can significantly reduce maintenance costs and extend the lifespan of refinery assets.

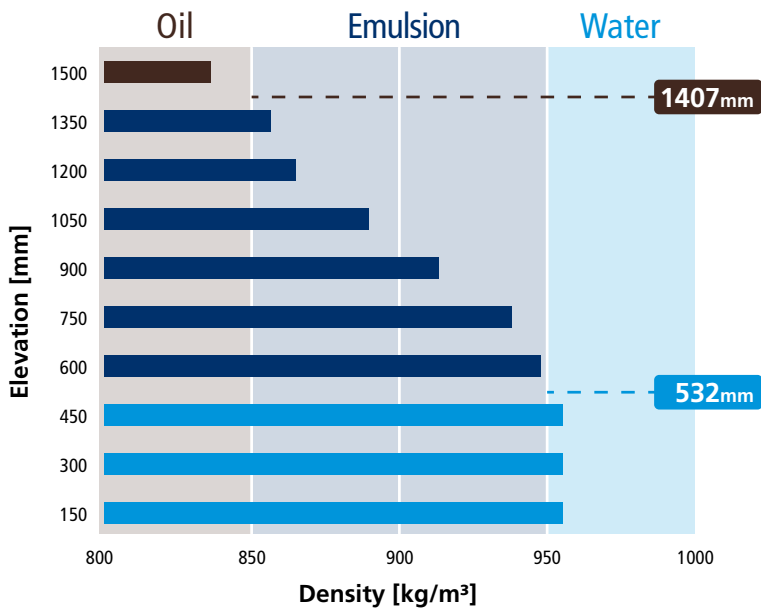
Accurate desalter level measurement is challenging due to the presence of multiple phases and the dynamic nature of the desalting process. Radiometric multiphase level measurements are critical for efficient desalter operation, monitoring the interfaces between oil, emulsion, and water.

Unveiling the invisible: the EmulsionSENS advantage

The EmulsionSENS, Berthold’s radiometric multiphase level measurement system, provides a non-intrusive, real-time window into desalter operations. By accurately measuring multiple interface levels and characterizing the emulsion layer, Berthold’s EmulsionSENS offers a level of insight previously unattainable, overcoming the limitations of traditional measurement methods.

Density profiles under normal conditions

Elevation [mm]	Density [kg/m³]
1500	835.7
1350	856.5
1200	864.8
1050	889.6
900	913.6
750	938.5
600	948.2
450	955.5
300	955.1
150	955.7



MULTIPHASE LEVEL MEASUREMENT TURNING CHALLENGES INTO OPPORTUNITIES

The EmulsionSENS addresses several longstanding operational challenges, including handling varying crude qualities, maintaining proper interface levels, and preventing upset conditions such as short circuiting electrostatic grids. By providing the operator with a glimpse into the vessel, it eliminates operational uncertainty, simplifies regulatory compliance, enhances safety, and streamlines troubleshooting. The system represents a strategic investment in operational performance, environmental compliance, and long-term profitability. By providing unprecedented visibility and control, EmulsionSENS transforms the desalter from a black box into a well-controlled, optimized operating unit, ultimately leading to more efficient, sustainable, and profitable refinery operations.

Optimized desalter efficiency and cost savings

With precise interface control, operators can fine-tune desalter performance to ensure the optimal removal of salts, minerals, and other contaminants, reducing corrosion and fouling in downstream equipment and extending asset life. A detailed emulsion profile allows for optimized chemical injection, enhances operational control, increases energy efficiency while reducing carbon emissions, and boosts overall efficiency.

Environmental responsibility and compliance

Improved desalter control reduces oil undercarry in effluent water, reducing the load on wastewater treatment plants and heating requirements downstream of the desalter, facilitating compliance with strict environmental regulations.

Continuous improvement and water conservation

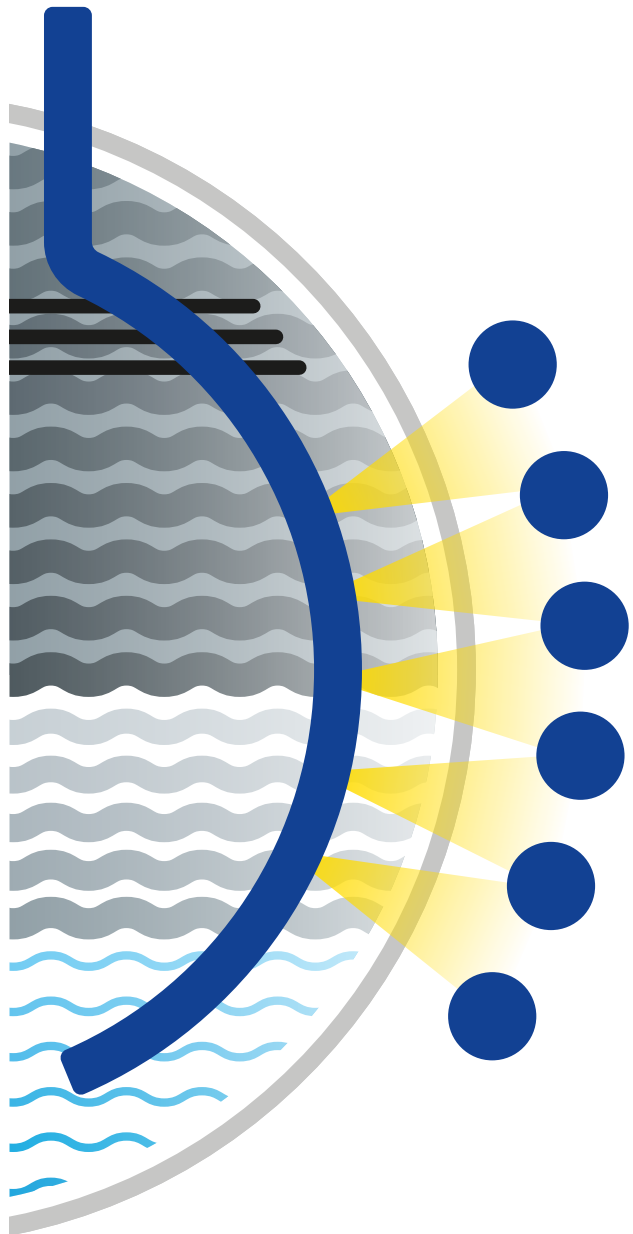
The EmulsionSENS enables continuous operational improvements and long-term sustainability by facilitating data-driven decision-making and optimizing wash water usage. With precise control of water level, it reduces the risk of hydrocarbons being discharged with the water, significantly lowering the environmental impact. efficiency.

Operational efficiency and risk reduction

Real-time, accurate data empowers operators to make informed decisions and respond quickly to process changes. This enables faster identification and response to upsets, reduced manual sampling, increased mud wash efficiency, and early issue detection.

Energy efficiency and crude flexibility

Improving desalter control enhances energy efficiency by minimizing heat losses from fouling in heat exchangers and furnace tubes. This allows for lower operating temperatures, and reduces catalyst deactivation in downstream units. As a result enabling the processing of a broader range of crude oils, including challenging opportunity crudes, potentially boosting refinery margins.





Addressing operational pains

- **Reduced operational uncertainty:** real-time, accurate measurements eliminate guesswork in desalter operation, giving operators confidence in their control decisions.
- **Faster response to upsets:** real-time data allows operators to quickly identify and respond to process upsets, minimizing their impact on downstream operations.
- **Improved safety:** non-intrusive measurements reduce the need for operators to interact directly with the process, enhancing overall safety.
- **Streamlined troubleshooting:** comprehensive data on desalter internals helps operators and engineers pinpoint root causes of issues more quickly, reducing downtime and improving overall reliability.
- **Optimized wash water usage:** precise interface control optimizes wash water rates, conserving water resources and reducing wastewater treatment costs.

System overview

- Radioactive sources, shield and dip pipe: individual design, project-dependent
- Non-intrusive measurement: radiometric detectors are mounted outside the desalter, avoiding direct contact with the harsh process environment. This reduces maintenance needs and eliminates potential leaks.
- Continuous real-time monitoring: The EmulsionSENS provides continuous, real-time data on the interface levels between oil, emulsion, and water phases.
- High accuracy: radiometric measurements can achieve high accuracy, typically within a few millimeters, even under challenging conditions

Transmitter LB 478

- Visualization: measured values, trend chart, density profile, interface level heights
- Reliable: important maintenance-oriented diagnostic functions and self-monitoring
- Located in 19" rack or wall-mounted housing
- Output to DCS: level values via 4 ... 20 mA (HART)

SENSseries LB 480

- Robust: stainless steel 316 L housing
- Sensitive: 2" scintillator
- Stable: $\leq 0.002\%$ per $^{\circ}\text{C}$ (-40°C ... $+60^{\circ}\text{C}$)
- Proven radiation interference protection: XIP
- Output to DCS: density values via 4 ... 20 mA (HART)



Multipart sources

- Safe and flexible: multiple Cs-137 point sources in flexible rods. Sources are safely sealed in durable stainless steel capsules
- Leak-tested: according to ISO 9978 and DIN 25426
- Customized: number of sources tailored to suit the measuring range and chosen arrangement
- ALARA principle (As low as reasonably achievable): customized project engineering for lowest possible source size

Flange shields

- Secure: houses flexible source rods during maintenance and storage, with the shield remaining mounted on the vessel
- Compact: designed to accommodate required source activities while minimizing height and weight
- Optional: pressure-proof design available in some countries



THE EXPERTS IN MEASUREMENT TECHNOLOGY

Berthold Technologies stands for excellent know-how, high quality and reliability. The customer is always the focus of our solution.

Using our varied product portfolio, our enormous specialized knowledge and extensive experience, we develop suitable solutions together with our customers for new, individual measurement tasks in a wide variety of industries and applications. Berthold Technologies has specialised in radiometric process measurements for over 75 years. This is our core competence with state-of-the-art and cutting edge products and solutions covering a vast range of industries and applications.

We are here for you – worldwide!

The engineers and service technicians from Berthold Technologies are wherever you need them. Our global network assures you fast and above all competent and skilled assistance in case of need. No matter where you are, our highly qualified experts and specialists are ready and waiting and will be with you in no time at all with the ideal solution for even the most difficult measurement task.

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