



Thermo Scientific Nitus
Profiler System



optimize desalter operations
with new density profiling technology

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Thermo Scientific Nitus Profiler System

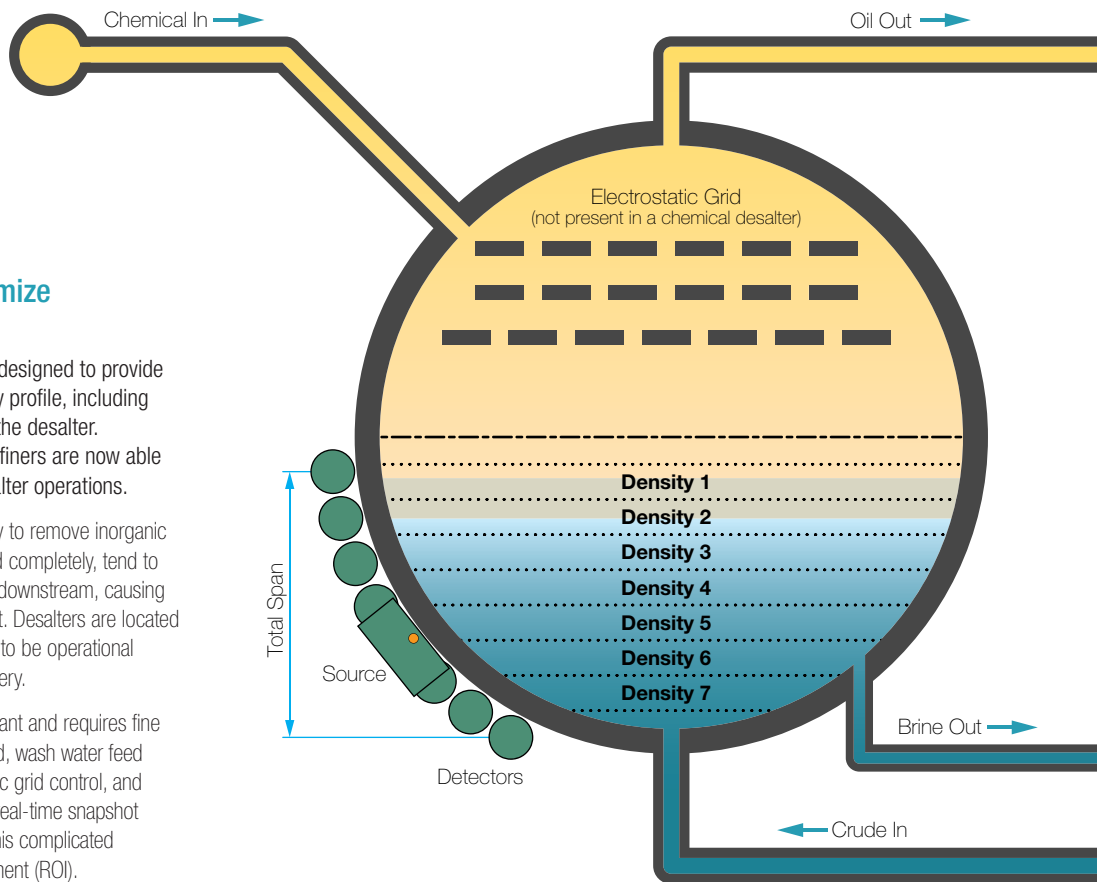
Non-intrusive technology provides a view inside the desalter

Nitus Profiler System Helps Optimize Desalter Operations

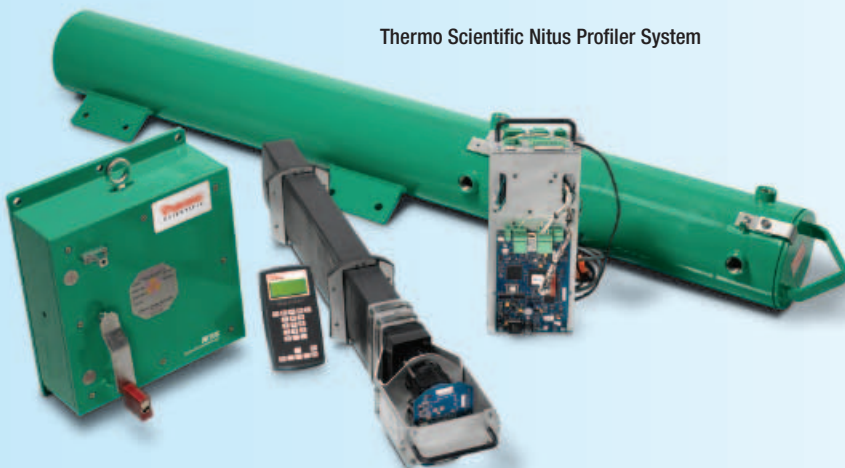
The Thermo Scientific Nitus Profiler System is designed to provide a continuous, real-time snapshot of the density profile, including the oil, brine and oil-water interface, inside of the desalter. With this patented, cutting edge technology, refiners are now able to control the density profile and optimize desalter operations.

Desalters are primarily used in the refining industry to remove inorganic salts from crude oil. Inorganic salts, if not removed completely, tend to form corrosive acids at high temperatures further downstream, causing serious damage to refining vessels and equipment. Desalters are located at the beginning of the refining process and need to be operational at all times to maintain the productivity of the refinery.

Optimizing the salt removal process is very important and requires fine tuning of various parameters such as crude oil feed, wash water feed and quality, chemical feed and control, electrostatic grid control, and emulsion layer control at the oil-water interface. A real-time snapshot of the density profile enables refiners to optimize this complicated process and achieve a significant return on investment (ROI).



Standard Nitus System in an electrostatic desalting application: Seven detectors and one 1Ci source are installed to cover a span of four feet (1219 mm) with a density reading every 6.85 inches (174 mm).



Thermo Scientific Nitus Profiler System

System Delivers Strong ROI

- Increase uptime—avoid costly downstream upsets and maximize process uptime by preventing water from entering the oil outlet
- Reduce costs—improve your bottom line by significantly reducing chemical usage during emulsion control
- Negate fines—eliminate wastewater contamination by helping prevent oil from entering the brine outlet stream
- Save energy—enable personnel to tightly control the grid voltage to achieve the optimal rag layer thickness
- Stay online—there is no need to shutdown the process during installation because the source and detector mount externally on the vessel
- Heighten safety—non-contacting technology ensures no personnel are exposed to tank contents during troubleshooting or maintenance

measures density, level or interface

Unique, Patented, Non-Contacting Technology

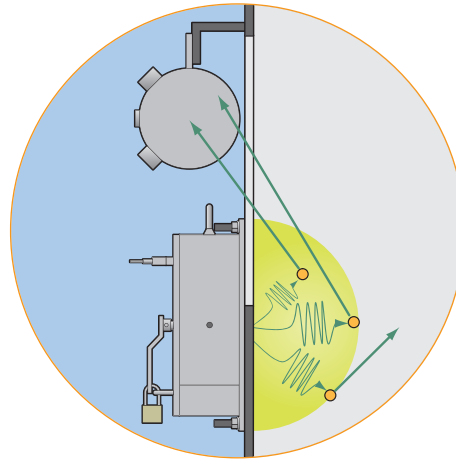
The non-contacting, non-intrusive Nitus system measures the density, level or interface of highly viscous process materials using energy attenuation. This energy is in the form of Cesium 137 (Cs-137) that is contained in an all-metal, fireproof source head. Energy attenuation is a necessary component of gamma backscatter technology and enables both the source and the detector to be mounted externally on the same side of a vessel or pipe. With gamma backscatter, it is not necessary for the sensor to be in contact with the process material which makes the system easier to use and maintain and sets it apart from commonly used density and level technologies.

The backscatter principle that the Nitus system is based on is called the Compton Scatter Effect. A very small amount of energy is emitted via the source into a vessel or pipe. The energy is absorbed by the process material but is also reflected or "scattered" away from the process material. This reflected energy is measured at the location of the detector as either density or level, depending on the application. The overall diameter of a vessel or pipe is a non-issue because, with backscatter, precise measurement is achieved by penetrating a significant portion of the process material but not the entire span. In addition, the source head is specifically designed to maximize the scatter effect to provide more data points to the detector for greater measurement precision. This unique technology heightens productivity, increases plant safety, and reduces maintenance and capital expenditures.

Precise Density Profiling Regardless of Vessel Size

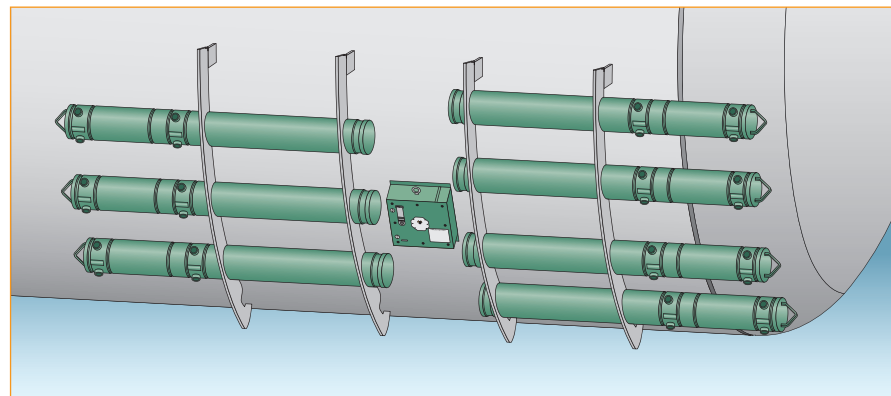
For a desalter system, one source and multiple Nitus detectors are used to determine the density profile across a certain span. The span of measurement is from the center line of the uppermost detector to the centerline of the lowermost detector. The source head is located equidistant from the uppermost and lowermost detectors and the number of detectors placed in between determines the span of each measurement region.

In a standard desalter application, seven detectors are used with a 1Ci source covering a span of four feet (1219 mm) with a density reading every 6.85 inches (174 mm). While the standard system offers density measurement every 6.85 inches, the system can be customized to meet specific requirements with more detectors installed in a critical area and fewer detectors placed at less critical points. The span of measurement can also be improved by using multiple source heads. For instance, a 12 foot (3657 mm) diameter vessel will require three source heads in order to profile the entire vessel.

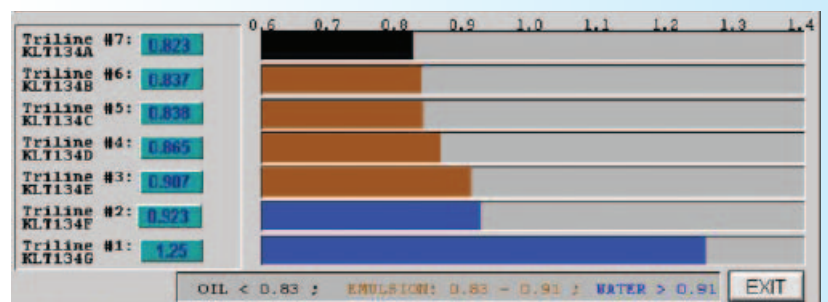


The source head of the patented Nitus system emits radiation into the desalter with the majority of the energy backscattered and read by the detector.

Standard Nitus Profiler System installation using seven detectors and one source.



Customer SCADA software generated this chart which represents a near upset condition as measured by the Nitus Profiler System.



Thermo Scientific Nitus Profiler System for Optimization of Desalter Operations

Rapid Data Processing for Turnkey Solution

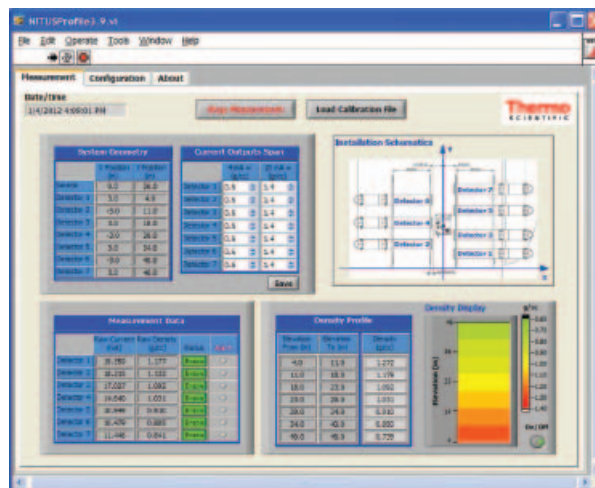
Every Nitus Profiler System includes a lightning-fast microprocessor-based computer that calculates the density for each section at a rate of up to four times per second. The computer can accept a maximum of eight inputs from eight detectors, and requires detector placement geometry and calibration data to accurately calculate the density per section.

The data is received from each detector using a 4-20 mA signal and, after processing the data, it is then fed into the customer's SCADA system using a 4-20 mA current loop.

The Nitus computer system must be stored in a safe area and features a touch screen graphical user interface (GUI). The GUI enables fault detection and simplifies troubleshooting by providing:

- Densities in multiple sections
- Details of the system geometry
- Installation schematics
- Input measurement data from each detector.

Thermo Scientific Nitus Profiler sample software report screen.



Advantages of the Nitus Profiler System

- Highly sensitive detector—system responds instantly to process changes to avoid overspills
- Non-intrusive technology—no part of the system in contact with the process
- High temperature capability—the source head in contact with the vessel wall can endure up to +800°C
- Extremely safe—system achieves high precision using a significantly reduced source size (<1 Ci)
- Easy installation—no need to stop the process; the source and detectors are located on the outer wall and on the same side of the vessel
- Zero maintenance—no contact with process eliminates maintenance and ensures long instrument life

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