

# MOD 4100

The new **MOD-4100** represents a breakthrough in crude oil on-line analysis. This unique analyzer is combination of different chemical and physical technologies for accurate measuring of major critical crude oil parameters, by one single analyzer system. The analyzer comes installed in outdoor stainless steel enclosure and equipped with an integral sample conditioning system.

## MEASUREMENTS

- ⇒ SALT CONTENT
- ⇒ TAN
- ⇒ VISCOSTITY
- ⇒ DENSITY
- ⇒ HYDROGEN SULFIDE
- ⇒ WATER
- ⇒ SULPHUR
- ⇒ RVP
- ⇒ DISTILLATION CURVE
- ⇒ EMULSION PROPERTIES
- ⇒ More ...



## ADVANTAGES

- ◆ Measures on-line critical parameters of crude oil qualities.
- ◆ Allows on-line optimization of the desalter process conditions in response to any fluctuations in crude oil cargos
- ◆ Reduces water, chemicals and energy consumption in the desalters
- ◆ Indicates the desalter and de-emulsification efficiency.
- ◆ Provides on-Line information about properties of crude oils from the well, during storage, shipping and transportation in pipelines
- ◆ Provides on-line data about crude oil homogeneity and compliance with its specification
- ◆ Reduces corrosion, preventing plugging and fouling of pipelines
- ◆ Enables efficient crude blending

## THE BENEFIT OF CRUDE ANALYSES

Crude oils and crude oil blends have different physical and chemical properties which depend on their place of origin. Even if originated from the same location, fluctuations in the physical properties are a common phenomenon. Several quality properties have an impact on the crude price and cost of processing a crude oil in blending stations and refineries. Major properties of interest are the density, the salt content, the hydrogen sulfide content, the viscosity, sulfides, the distillation curve and the water and TAN content etc.

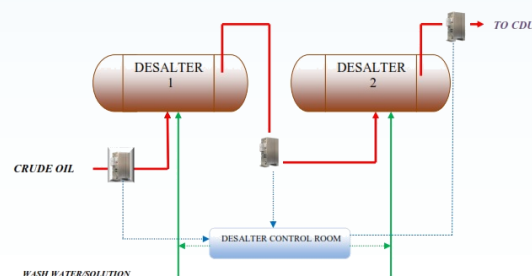
On-line information of these parameters is critical for the CDU performance, the sulfur content of final distillates and in the prevention of corrosion, fouling and plugging of the pipelines and production units of the refinery.



The MOD 4100 has been developed as an *“all included” On-Line Crude Oil Process analyzer* to provide on-line and at real time analytical data of these critical crude oil properties.

In crude distillation, real time data is a basic requirement that enables taking immediate steps in desalter and CDU process parameters for reducing the impact of these parameters to its minimum.

Incorporation of the MOD 4100 before, between and after the desalters allows to operate the desalter at maximum efficiency and at lowest cost. It enables to reduce the salt content to its minimum before entering the CDU, and to provide additional analytical data for optimized operation of the CDU



The importance of measuring on-line crude oil parameters is not only restricted to the refinery operations, but is also essential from a commercial point of view.

It enables to check the crude quality on-line, during the transportation and storage chain from well-head to until the end user.

The MOD 4100 is also an effective tool in crude blending. It allows on-line changing of the ratio between different crude qualities to form crude blend of lowest cost, and by maximization of low cost heavy and opportunity crude in the blends, without losing expected physical properties.

## TECHNICAL SPECIFICATION

PROPERTY	SALT (*)	DENSITY (*)	VISCOSITY (*)
Principle / Detection	Electrometric / Conductivity (Based on ASTM 3230)	Oscillating U-Tube	Vibrating technology at resonance
Measuring Range	0-150 PTB 0-400 PTB	0-3000 Kg/m <sup>3</sup>	From 0.1-10 mPa. To 1000-1000000 mPa.s
Accuracy	Correlates with ASTM D 3230	± 0.1 kg/m <sup>3</sup>	+/- 0.5% FS
Repeatability	± 2 % FS	± 0.1 kg/m <sup>3</sup>	+ /- 0.2 % FS

PROPERTY	H <sub>2</sub> S (*)	WATER (*)	TAN(*)	SULPHUR (*)
Principle / Detection	Stripping and H <sub>2</sub> S detection	Dielectric Constant	Titration	XRF
Measuring Range	0-100 ppm	0-4%	0-500 ppm	0-6%
Accuracy	+/- 10 ppm	+/- 0.1%	+/-2% of FS	<1—5% Depending on range and matrix
Repeatability	+/- 5 ppm	+/- 0.02%	+/- 2% of F.S	

PROPERTY	DISTILLATION POINTS & TBP (*)	EMULSION PROPERTIES (*)	RVP (*)	OTHERS (*)
Principle / Detection	Near Infrared Spectroscopy (NIR)			

(\*) OPTIONAL

GENERAL PROPERTIES <i>(Varies according to optional configurations)</i>	
Operating Temperature	0– 40°C
Sample Temperatures	0- 60 °C
Sample Inlet Pressure	4-12 barg
Sample Return Pressure	0 -2 bar
Power Supply	100-130 VAC 50-60 Hz 200-220 VAC 50-60 Hz
Sample Flow Rate	3 l/min
Ambient Temperature	0—35 °C (outside) , optional –40 to + 70 °C
Instrument Air	5-6 barg clean instrumentation air 5-10 l/min
Nitrogen (if required)	4 –10 Barg, 2-5 l/min
ATEX	Zone 2 or Zone 1

## PRINCIPLE AND USERS BENEFIT

The MOD 4100 provides a complete solution to measure major properties in crude oil, by implementation of different techniques. The analyzer is controlled by an automatic system, that opens valves and activates pumps and dosing pumps to bring the sample from the sampling point to the measuring system.

Accurate analyses start from the sampling. The MOD 4100 crude analyzer is equipped with a appropriate sampling system, for sampling the process stream and preparing the sample, if required heating, cooling, filtration etc, to be measured at optimized conditions.

Sample can be withdrawn from the oil-well, pipes, vessel, tanks, or at any other location in the crude oil supply chain from the oil well during transportation and storage, desalting until the crude distillation unit.

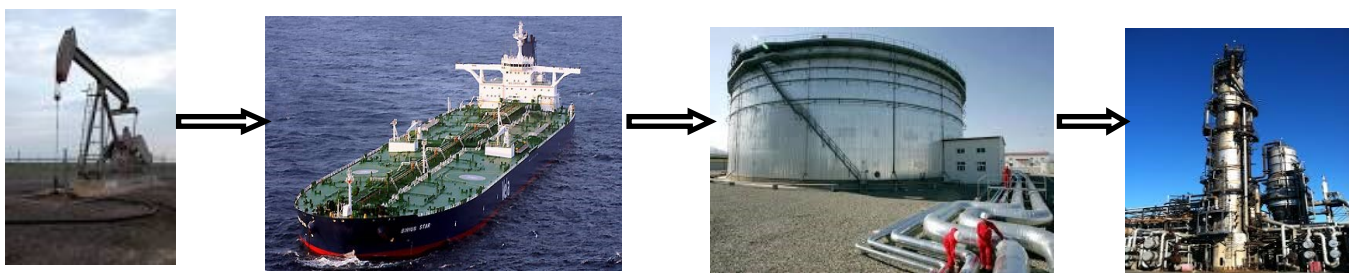
Water, viscosity and density, Sulfur, Ddistillation points, TBP and emulsion properties are determined directly in a flowing sample. The salt and TAN concentration is measured in samples taken from the process stream.


The analyses to be performed by the MOD 4000 Crude oil analyzer are adapted to crude oil to be measured and the requirements and the needs of the customer.


The MOD 4100 crude oil analyzer contributes to a better on-line control of the physical properties of the crude oil at any spot. It enables to ensure the homogeneity of crude oils in and during transportation. It enables to determine that an entire cargo of crude oil complies with its specification.

The MOD 4100 is characterized by low cost of ownership and maintenance.


Corrosion prevention, efficient operation of the desalter, on-line crude oil monitoring of critical crude oil parameters during transportation, storage and blending reduce unnecessary financial losses in the crude oil chain that can easily be prevented. This provides a short ROI (return of investment) to the MOD 4100 Crude Oil analyzer.



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