



Continuous in-line and online Oil-in-Water monitoring



## OPERATING PRINCIPLE

The Mirmorax Oil-in-Water analyzer is based on an ultrasonic measurement technique in which individual acoustic echoes are characterized using advanced signal processing.

A highly focused acoustic signal is transmitted directly into the produced water flow. The reflection and absorption of the signal provides a wide range of accurate measurements. In the focal region, individual solids, oil droplets and gas bubbles will reflect the acoustic energy and each reflected signal will hold particle specific information. Based on a large number of direct measurements, the monitor calculates full size distributions for oil and sand. The size distributions are used to calculate corresponding concentration values.

Important process information as salinity and temperature are measured and presented in the Oil-in-Water graphical user interface. The analyzer performs self-diagnosing and auto calibration and automatic flushing.

## MODEL FEATURES

The Mirmorax Subsea Oil-in-Water analyzer is developed from the 3rd generation ultrasonic analyzer. Model SOIW 2500 is specially developed to manage the lower range, 0-2500 ppm of oil and particles with highest accuracy and at the same time deliver classification of particles and size distribution. This is especially suitable for re-injection applications, where knowledge on this is essential for reducing ppm levels and optimizing the separation process.

## DESIGN

The Mirmorax Subsea Oil-in-Water analyzer consists of two ultrasonic probes in series in a spool piece. The retrievable electronics canister has two redundant electronics, one for each probe. The system has a built in flushing system which can use any available liquid for flushing with a 20 process overpressure. This gives a design life of 25 years for the overall system. The system has a design pressure of 690 bar and is designed for 3000 meter water depth.

## FACTS

Key features for the Mirmorax Oil-in-Water analyzer are:

- Accurate and high resolution real-time measurements
- Simultaneous detection of oil, particles and gas
- Provides full size distributions and concentration for oil and particles
- Temperature measurements of process water
- Salinity Measurements of the process water
- 690 bar design pressure
- 3000 meter water depth
- Retrievable electronics canister
- Flushing system
- Remotely control and data access
- Insertion design, "one size fits all"
- Reliable and robust
- Low maintenance



**SPECIFICATIONS**

PRIMARY OUTPUT PARAMETERS:			
Size distributions for oil and solids [µm]	Median particle diameter for oil and solids, D50 [µm]	Mass – volume concentration for oil and solids [mg/l]	Volume concentration [ppm]
Mass concentration [ppm]	Temperature of process flow [°C]	Salinity of water [g/l]	

**SYSTEM PERFORMANCE AND CHARACTERISTICS**

<b>Concentration range:</b> Oil: 0 – 2500 ppm* Solids: 0 – 1000 ppm*	<b>Repeatability:</b> 99% relative	<b>Operating pressure:</b> 200 bar g	<b>Operating temperature:</b> max. 90°C (120°C non ATEX)
<b>Ambient temperature:</b> -20°C to +60°C	<b>Salinity:</b> 0 – 350g/l NaCl	<b>Flow velocity:</b> max. 0.2 – 4 m/s	<b>Particle size range:</b> > 2 – 3 micrometer
<b>Reynolds no.:</b> < 5000	*Max. Concentration range dependent on particle size range		

**INTERFACE DETAILS – ELECTRICAL**

STANDARD		OPTION	
<b>Power supply:</b> 24VDC	<b>Power consumption:</b> Maximum 36W	<b>Power supply:</b> 260VAC / 110VAC	<b>Power consumption:</b> Maximum 36W
<b>Serial communication:</b> RS485	<b>Protocol:</b> Modbus RTU	<b>Serial communication:</b> 4-20mA/HART/Ethernet	<b>Protocol:</b> CanBus

**INTERFACE DETAILS – MECHANICAL**

STANDARD		OPTION	
<b>Connection type to pipe:</b> • 2” 150 lbs. weldoflange (or spool piece) • Suitable for any pipe size >3”	<b>Probe:</b> • Materials: SS316 • Hazardous area classification: Zone 1 II 2 G Ex d IIB T5/T4 Gb (ATEX & IECEx) • Weather protection: IP66, IEC 60529 • Weight: 20 kg	<b>Connection type to pipe:</b> • 2” 300 lbs. weldoflange (or spool piece) • 2” 1500 lbs. weldoflange (or spool piece) • By-pass solution for pipe size 1–2”	<b>Probe:</b> • Materials: TiGr2H • Hazardous area classification: Zone 1 II 2 G Ex d IIB T5/T4 Gb (ATEX & IECEx) • Weather protection: IP66, IEC 60529 • Weight: 18 kg

**SIGNAL PROCESSING AND COMMUNICATION ELECTRONICS, SPCE**

STANDARD		OPTION	
<b>Safe area:</b> • 19” rack, height 4U • Material: Aluminum • Weight: 10 kg	<b>Ex area:</b> • Material: SS316 • Weather protection: IP66 • Weight: 70 kg • Hazardous area classification: Zone 1 II 2 G Ex d IIB T5 (ATEX)	<b>Safe area:</b> • 19” rack, height 4U • Material: Aluminum • Weight: 10 kg	<b>Ex area:</b> • Material: SS316 • Weather protection: IP66 • Weight: 70 kg • Hazardous area classification: Zone 1 II 2 G Ex d IIB T5 (ATEX)

**AUTOMATIC CLEANING SYSTEM**

STANDARD		OPTION	
<b>Option 1</b> • EX • Material: SS316 • Weight: 36 kg • Process pressure range: 0–60 bar (Option: 60 – 250 bar)	<b>Option 2</b> • Safe area	<b>Option 1</b> • EX • Material: SS316 • Weight: 36 kg • Process pressure range: 0–60 bar (Option: 60 – 250 bar)	<b>Option 2</b> • Safe area