

EX-400

SIDE-STREAM OIL/PARTICULATE IN WATER
ANALYSER

With new image processing



Microscopy



Ultrasonics

EX-400



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MICROSCOPY

SIDE-STREAM
OIL / PARTICULATE IN WATER
ANALYSER

The updated EX-400 is a side-stream unit that uses video microscopy to measure concentrations of oil in water, Total Suspended Solids (TSS) and oil droplet size, whilst still taking advantage of patented self cleaning technology to keep fouling from impacting the data gathered.

Now with machine learning/AI and faster image processing, this version outplays its predecessor by offering 5 times greater measurement range and 8 times more objects detected, plus the ability to measure in higher turbidity.

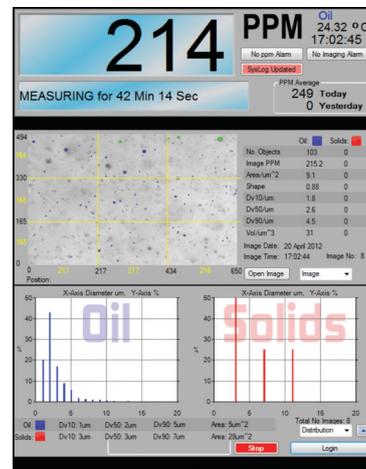
Typical applications include re-injection and re-use of water, desalter, crude and solids in produced water. Please talk to ASL about your specific application.

BENEFITS

- No user required maintenance
- New Image Processing Engine:
 - A mix of AI algorithms (machine learning) and human algorithms (based on the most recent advances in image processing), leading to increases in accuracy and performance.
- Same sample used for analyser and lab measurement for better accuracy
- Remote control of analyser
- No sample conditioning system required
- Up to 120 days backup of images and allowing re-examination using powerful software tools.
- Ability to measure particle size and distinguish between oil and solids [TSS]
- Helps to identify process upsets

FEATURES

- Adaptive Ultrasonic Cleaning
- Optional integrated laboratory sample point
- Remote management and diagnostics
- Easy to install
- Data and image storage
- Particle and droplet size information
- Turbidity detection; suited to high turbidity levels



Microscopy Specification	
Measurement principle	CCD Camera 2D Image
Image resolution	2 Million Pixels
Illumination	Controlled LED
Number of images per dataset	1-500 Images (User Configurable)
Time between each image	1 to 10 Seconds (User Configurable)
Imaging modes	Flowing and static modes
Microscopy Image Processing	
Advanced Sensors Image Processing Engine with Machine Learning/AI (no 3rd party Algorithms)	
Shape and object matching used to classify objects in the image	
No need to change parameters for different turbidity samples, due to automatic exposure time and multi-level image threshold algorithms	
Microscopy Measured Items	
Content (ppm)	Hydrocarbon Droplets, Suspended Solids
Size distribution	Hydrocarbon Droplets, Suspended Solids
Turbidity: Absorption measurement of turbidity suited to high ranges	Measurements in AU***
Microscopy Concentration Measurement	
Range	0-2500 ppm*
Calibration	Multiple 3 parameter curve fit with gain
Repeatability	±4% of full scale range
Units of measure	ppm or mg/l
Microscopy Measured Parameters	
ppm, % Concentration, High sensitivity circularity, Convexity, Size, Diameter ped (circle of equal perimeter), Length, Width, Turbidity, No. of Objects Per Image, Aspect Ratio, Elongation, Dv10, Dv50, Dv90, Dn10, Dn50, Dn90, Configurable Object Sharpness, Volume, Area	
Microscopy Size Range	
Dimensional range	1-450 µm‡
Repeatability	±4% of full scale range
Calibration	Particle size calibrated with standardized beads
Microscopy Turbidity	
Range: Absorption measurement of turbidity suited to high ranges	Only functions above 100NTU. 0-1,500 AU Light
Optional Turbidity high alarm	Reports high ppm and Out of Range
Measurement timeline	Every Image Cycle
Data Storage	
Image storage	30-60 days depending on schedule
Data of every particle measured	120 days storage
Operating Conditions	
Process temperature	Up to 160°C
Process pressure (MAWP)	Up to 35 bar _g
Process flow	Up to 10 l/m**
Operational ambient temperature	-20°C to +55°C
Cleaning	Ultrasonic (automatic)
Utilities	
Power supply	110 or 230 VAC (Pre-configured)
Power Frequency	50 or 60Hz
Power consumption	60W normal, 300W peak
Air consumption	450ml per rotation

* Dependent on sample matrix & instrument configuration. Image measurement can be affect by gas in the system please contact Advanced Sensors Applications Team for confirmation.

** Flow rate through the analyser measurement chamber. Flow control may be implemented external to the analyser to manage the flow rates.

*** Attenuation units.

‡ Theoretical, based on CCD array size.

Weight & Dimensions (for shipping)		
Weight (including stand, standard pneumatic Stainless Steel valve assembly, termination box and isolation switch)	200kg	
Dimensions	L 92 cm x W 83 cm x H 148 cm	
Communications		
4-20 mA (1)	Passive, Configurable for measurement readings/temperature	
Digital Input (1)	Start/Stop cycle control	
Digital Output (s) (dry contact (s))	Configurable as alarm contacts	
Remote access	Windows Remote Desktop	
System data storage	>10 years	
Security	2 level password protection	
Optional Communications		
Additional 4-20mA	Passive, Configurable for measurement readings/temperature	
HART	Yes	
Modbus RTU	Implemented via HART to Modbus converter	
Extended Ethernet	2 wire connection, capable of 1.3km distance	
Additional Information		
Flange fitting	1" ANSI RF (various flange ratings available)	
Wetted parts	316SS (other materials available upon request)	
Manual sample take off point	Integral to analyser	
Viewing window	Provided as standard	
Ultrasonic Homogenisation	Automatic oil droplet size compensation	
Enclosure material	316L SS	
Certification		
Ingress protection	IP66 / NEMA 4X	
Analyser	 II 2G	EX db [op is IIC T4 Gb] IIB T4 Gb Max. liquid temperature +100°C Ta = -20°C to +55°C Or
		Ex db [op is IIC T4 Gb] IIB T3 Gb Max. liquid temperature +160°C Ta = -20°C to +55°C
	Canada & USA	Class 1 Division 1 Groups C & D T3/T4 Class 1 Division 2 Groups A, B, C, D, T3/ T4 Class 1 Zone 2 AEx d/de IIB T3/T4
	Brazil	INMETRO
CE Compliant		

Size calibration of objects conforms to ASTM E1951 standard guide for calibrating reticles and light microscope magnifications