

# JUNDERSTANDING YOUR PROCESS UNLOCKING YOUR PERFORMANCE

### Oilfield Water Analysers & Consultancy

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Jorin Limited is the longest established and market leading specialist in online oilfield water quality measurement and investigation. Since 1998 our technology, the ViPA, has been used around the world to investigate, understand, optimise and control oily water separation, treatment and disposal processes.

Jorin was incorporated in order to deliver the best possible produced

water separation monitoring and control data to the oil and gas industry and by maintaining this purity of purpose and continuous research and development programmes, we have maintained our position as market leaders in on-line water quality monitoring for the oil and gas sector.

We believe that in order to provide the greatest value, data needs to be provided fast and be truly relevant to, and representative of, the process being monitored. Whether you are using our ViPA instruments or our Process Insight services, the focus is on providing high quality data, quickly in the field; and you can be assured that the tools we use are the best available, have the most up to date instrument designs and are coupled with the strongest software algorithms as well as using the most comprehensive field chemistry. This is how we aim to enable you to understand your process and help you unlock your performance.



The company is based in the heart of the United Kingdom near Leicester where it has its primary development and manufacturing facilities, administrative offices and training facilities. From this base and working with select partners around the world, we have supplied over 200 analyser systems and provided analysers and consultancy services to customers on 6 continents. Our clients include:

ADCO AIOC Amerada Hess Bluewater BP Brunei Shell Petroleum Cairn India Chevron Conoco Dana Petroleum Exxon Husky Kerr McGee KOC Maersk Marathon Oil Occidental Petroleum Oil India OMV ONGC PDO Pearl PEMEX Petrobras Petronas PTT Qatar Gas Qatar Petroleum RasGas Saudi Aramco Schlumberger Shell Sibneftgas Statoil Total Woodside Energy

We also work with dozens of Universities and many of the major oilfield water separation equipment manufacturers and production chemical suppliers worldwide.

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### The ViPA Technology

Jorin are the inventors and developers of patented on-line video imaging analysers for identifying and measuring the discrete contaminants in liquids. We manufacture a range of products based around these technologies.

ViPA is the market leading technology for produced water and injection water quality monitoring in the oil and gas production sectors, simultaneously providing data on oil droplet size, oil concentration, solid particle size and solids concentration.

The ability to monitor significant parameters throughout the oily water separation and disposal process allows previously unattainable levels of control, offering the opportunity to optimise performance, reduce operating costs and to avoid many current process problems in the future.

Process Insight is a complete consultancy and project management service for exploration geochemistry, oil and gas fluid behaviour in the reservoir, during production, water injection, waste water treatment and produced water injection projects. These studies encompass all project stages, from initial reservoir studies through to conceptual and detailed design and to final plant commissioning and operation.

#### **Core Technology**

The core technology uses a flow cell where the liquid sample passes between a video microscope and a light source. The video microscope system can be built to suit a range of size measuring requirements from 1- 150 microns up to macro scale objects.

Using a specially developed strobe lighting unit the analyser can work with liquid flow velocities of 5ms<sup>-1</sup> when measuring on the micron scale and higher velocities when measuring larger objects.



Schematic of the core technology, showing flow cell, camera and lenses, and lighting unit



#### Jorin's Image Analysis Software

Jorin's own software performs morphological and mathematical analyses on each particle detected, in standard form measuring and calculating 17 different parameters for each particle, and completely analyses 25 images per second for real-time data generation.

Typical parameters include Feret diameters, perimeter, size, aspect ratio, shape factor and optical density. These measurements can be used to create a mathematical description of a particle size for real-time particle identification. Size distributions and volumetric concentrations are generated for each particle type assessed. For example, quartz sand has high aspect ratios, medium shape factors, low optical density and these parameters can be used to differentiate between quartz sand and silt.





Sketch of a possible particle, showing some typical parameters measured and calculated



The company is owned, managed and run by engineers with extensive experience of making particle measurements in the most challenging environments and decades of experience in working with oilfield water. Working in the same environments as our customers and maintaining a genuine understanding of our customers' needs and applications is key to our success and to the on-going successful development of our hardware and software.

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#### ViPA Data

The ViPA produces many different types of data for each particle observed, the most commonly used data are particle or droplet sizes and concentration information.



In the graph to the left, the particle size distribution for solid particles and the particle size distribution for oil droplets are each plotted separately; further statistical information and the concentration data are in the details below the curves.

When operating in continuous online mode then the ViPA analyser will provide data updates as frequently as every 10 seconds. Typical data outputs are oil concentration (red points) and solids concentration (green points) in the graph below to the left and oil droplet size (pale green) and solid particle size (olive green) in the graph below to the right.



These graphs reflect the data measured over a period of time, in this case 2 hours. This allows process condition and fluctuations to be monitored and the ViPA software can also use trend analysis to monitor for future process upsets.

All the data provided in graphs, along with many analyser alarms can be provided as serial data over Modbus or through 4-20mA outputs and volt free contacts.







A Cabinet Mounted Jorin ViPA FZ2 Unit

The ViPA FZ2 HiFlo analyser is a bespoke engineered product for fixed permanent installation and is individually designed to meet the specific requirements of the customer, the site and the process.

Its stainless steel construction and flow cell rated for continuous use at 120 Bar (1740 PSI/12000 kPa) with the capability to operate with process liquid temperatures of up to 120°C (248°F) make the analyser ideal for use in harsh environments. Options for higher temperatures and pressures are available on request. The ability to work with flow velocities of up to 5mS<sup>-1</sup> ensure great response to process changes and minimal flow control requirements ensuring that no upstream sample conditioning is required.

Each FZ2 series analyser can be supplied with a fully automated sample handling and sample return system; automated analyser wash system to maintain both the analyser flow cell and sample system at optimum cleanliness (FZ2 AW); automated sample manifolds to select, flush and analyse from different points in a process and the whole package can be supplied within cabinets or field enclosures, on frames or gear plates, or built to suit the requirements of the installation area. ViPA FZ systems can be controlled by the client's own DCS or SCADA control system or can be supplied with a stand alone PLC controller.

Existing installations operate in a wide variety of conditions from very low temperatures to desert conditions; onshore and offshore on platforms and FPSOs as well as on unmanned facilities and stations. They are used for sampling at a single point and with automated manifold systems for automatic sampling from several different points within a process.

While we recommend that control computers are installed in control rooms, options are available for installing the control computers locally on the analyser skid and all FZ systems are available with ATEX certification. A wide range of data outputs are available as is remote analyser control over a network.















Note: Dimensions may change and actual size will be shown on the project as built drawing.







Air actuated solenoid valve

SV

316SS 500 micron strainer,

ST

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HFM Jorin HiFlo module

V Jorin ViPA



The Jorin ViPA FZ2 AW HF P&ID

#### ViPA Model FZ2 HF Data Sheet



General						
1.01	Туре	Droplet & Particle Analyser				
1.02	Manufacturer	Jorin Limited				
1.03	Model	ViPA FZ2 HiFlo				
1.04	Sample Temp Limits	0 – 120°C (32 – 248°F)				
1.05	Max Operating Pres- sure	120 Bar (1740 PSI)				
1.06	System Description	Analyser with remote control cabinet			1	
1.07	Tag Number	TBC				
1.08 Instrument Fittings Swagelok SS316						
Instrument Characteristics						
2.01	Accuracy	±2% Full Scale	±2% Full Scale			
2.02	Repeatability	±1.5%	±1.5%			
2.03	Linearity	±7.5% in range 0 – 400PPM				
2.04	Drop Size Range	1.2 – 150 microns				
2.05	Particle Size Range	1.2 – 150 microns				
2.06	Concentration	0 – 2500 ppmV	0 – 2500 ppmV			
2.07	Data Outputs	Modbus or 4-20mA for all data a	Modbus or 4-20mA for all data and alarms			
2.08	Flow Rates	Flow through measuring zone Up to 4 litres/min			3	
Physical Characteristics						
3.01	Sample Feed ½" Bulkhead Union or Tube					
3.02	Analyser Drain	1/2" or 3/4" Bulkhead Union or Tube				
3.03	Wash Connection	½" Bulkhead Union or Tube				
3.04	Purge Air Connection	1/2" Bulkhead Union or Tube				
3.05	Mounting	Analyser	Analyser Mounting Plate			
		Control Cabinet	abinet Rackmount computer			
3.06	Weights (dry)	Analyser Field TBC				
		Control Cabinet TBC				
3.07	Materials	Analyser Wetted SS316, Viton, Industrial Sapphire				
		Analyser Field 316 SS				
		Junction Boxes	Pickled Aluminium/GRP			
		Control Cabinet	ol Cabinet Misc			
3.08	Enclosure Rating	ViPA Analyser IP65				
	8	Other field components IP65				
3.09	Hazardous Area	Zone 1 (optional Class 1 Div II or better)				
3.10	Classifications	ATEX EEx-e-p-d IIC T3 (optional UL, FM or CSA-US Approved)				
3.11	Cable Gland	Peppers Brass M20 & M16			4	
3.12	Environment	Analyser Field Cabinet $0 - 55^{\circ}$ C		Ambient (32 – 131°F)		
		Control Computer 10 - 30°C Ambient HVAC(50 – 86°F)				
Electrical Data						
4.01	Supply Voltage Consumption	Analyser Field Cabinet		110/240 V AC 50/60 HZ	5	
		Control Computer		110/240 V AC 50/60 HZ	5	
		Analyser Field (Peak)		2000 Watts		
		Control Cabinet (Peak) 1200 Watts				
Supply Requirements						
5.01	Purge	Clean dry air, 225 litres per minute @ 4 bar				
5.02	Instrument Air	Clean dry air, 25 litres per minute @ 4 bar				
5.03	Water	Potable water or cleanest available source of process water for cleaning				
Notes						
1	Analyser housing and the control computer will be supplied in as complete a state as is consistent with transportation requirements.					
2	Serial data outputs provide detailed information on both sample and analyser status. 4-20mA are active.					
3	Equivalent to 5 mS <sup>-1</sup> velocity					
4	M16 & M20 glands to be used for all instrument entries. Control cables between field and control room will be sized in accordance with cables used.					
5	Alternate power supplies can be provided on discussion with client					



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