

# Oilfield Water Analysers & Consultancy





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

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

## 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.

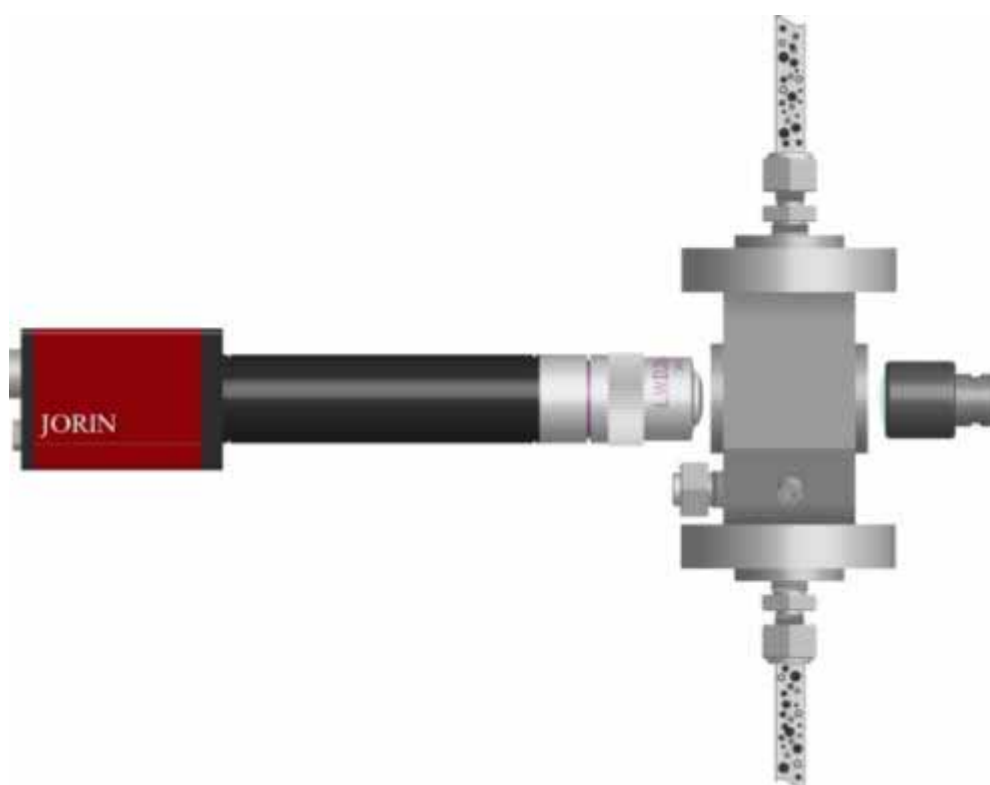
The ability to monitor significant parameters throughout the oily water separation and disposal process allows previously unattainable levels of control, offering the opportunity to optimise performance, reduce operating costs and to avoid many current process problems in the future.

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  $5\text{ms}^{-1}$  when measuring on the micron scale and higher velocities when measuring larger objects.



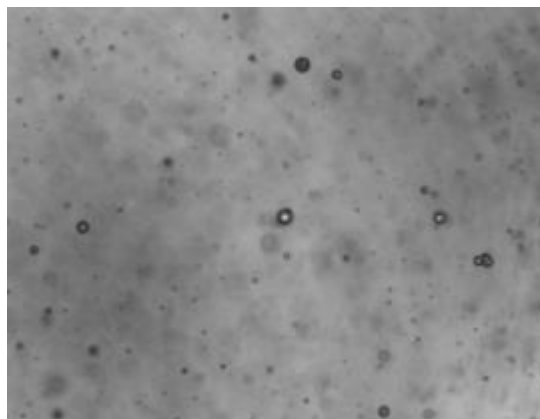
Schematic of the core technology, showing flow cell, camera and lenses, and lighting unit



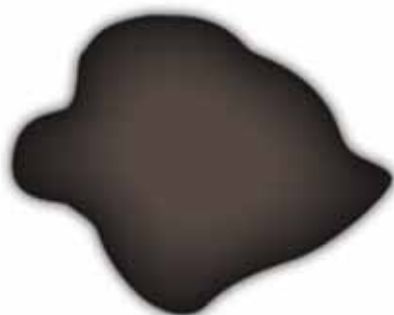
## Jorin's Image Analysis Software

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.



Ferets: 10, 12, 12, 16  
Perimeter: 65  
Area: 252



Average Feret = Size

$50/4 = 12.5$  Microns

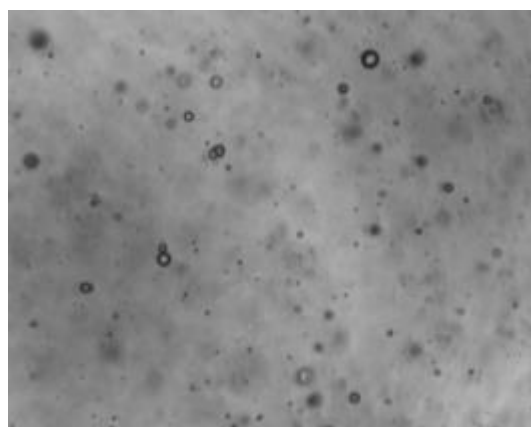
$\frac{\text{Minimum Feret } \phi}{\text{Maximum Feret } \phi} = \text{Aspect Ratio}$

$\frac{10}{16} = 0.63$

$\frac{4\pi \cdot \text{Area}}{(\text{Perimeter})^2} = \text{Shape Factor}$

$\frac{4\pi \cdot 252}{(65)^2} = 0.75$

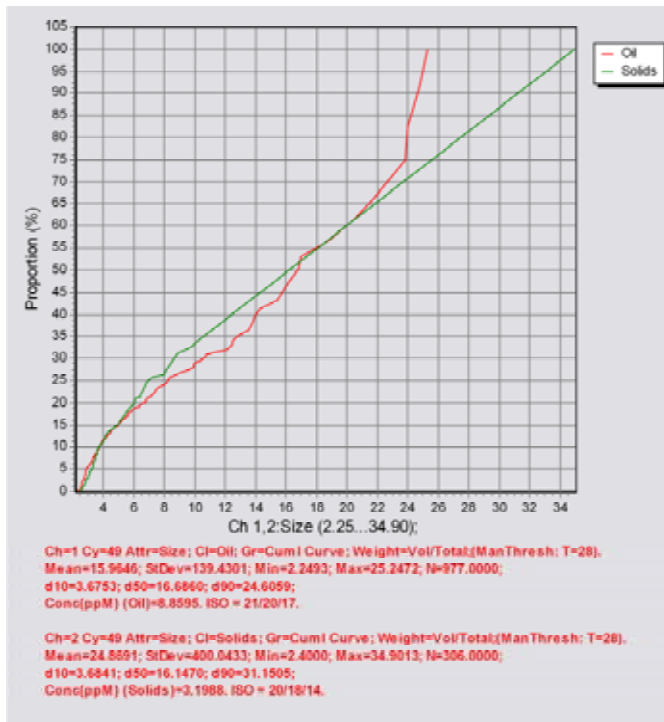
Sketch of a possible particle, showing some typical parameters measured and calculated



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.

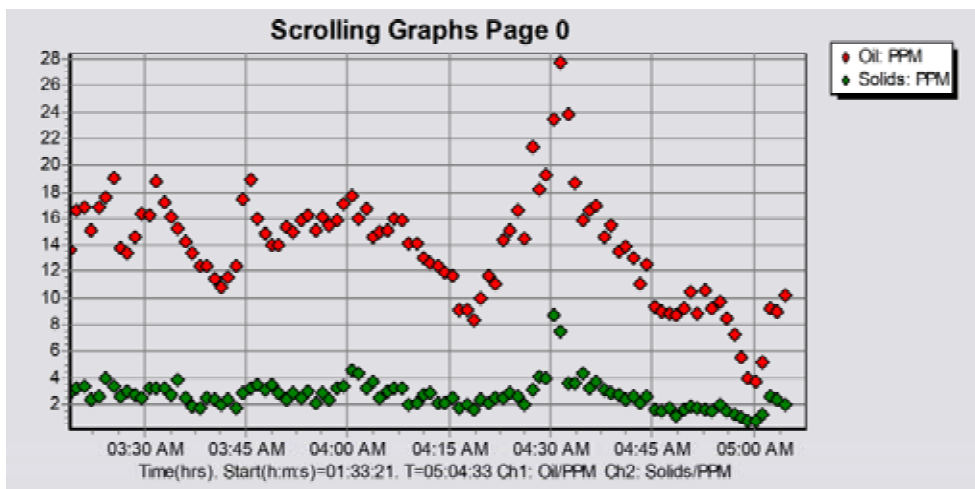
## ViPA Data

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.



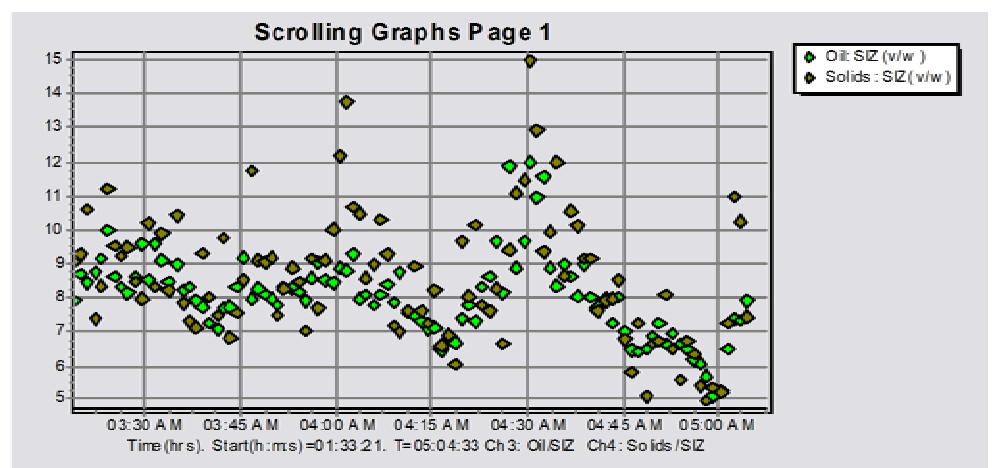
In the graph to the left, the particle size distribution for solid particles and the particle size distribution for oil droplets are each plotted separately; further statistical information and the concentration data are in the details below the curves.

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.





**The Jorin ViPA Model B HF operating on a bench top with laptop control computer**

The compact and robust ViPA B HiFlo analyser is equally at home on a process line, laboratory bench or as a portable field unit. Like all Jorin's analysers it is supplied with fully featured control software capable of complex particle analysis and data reporting including serial data output over Modbus TCP/IP.

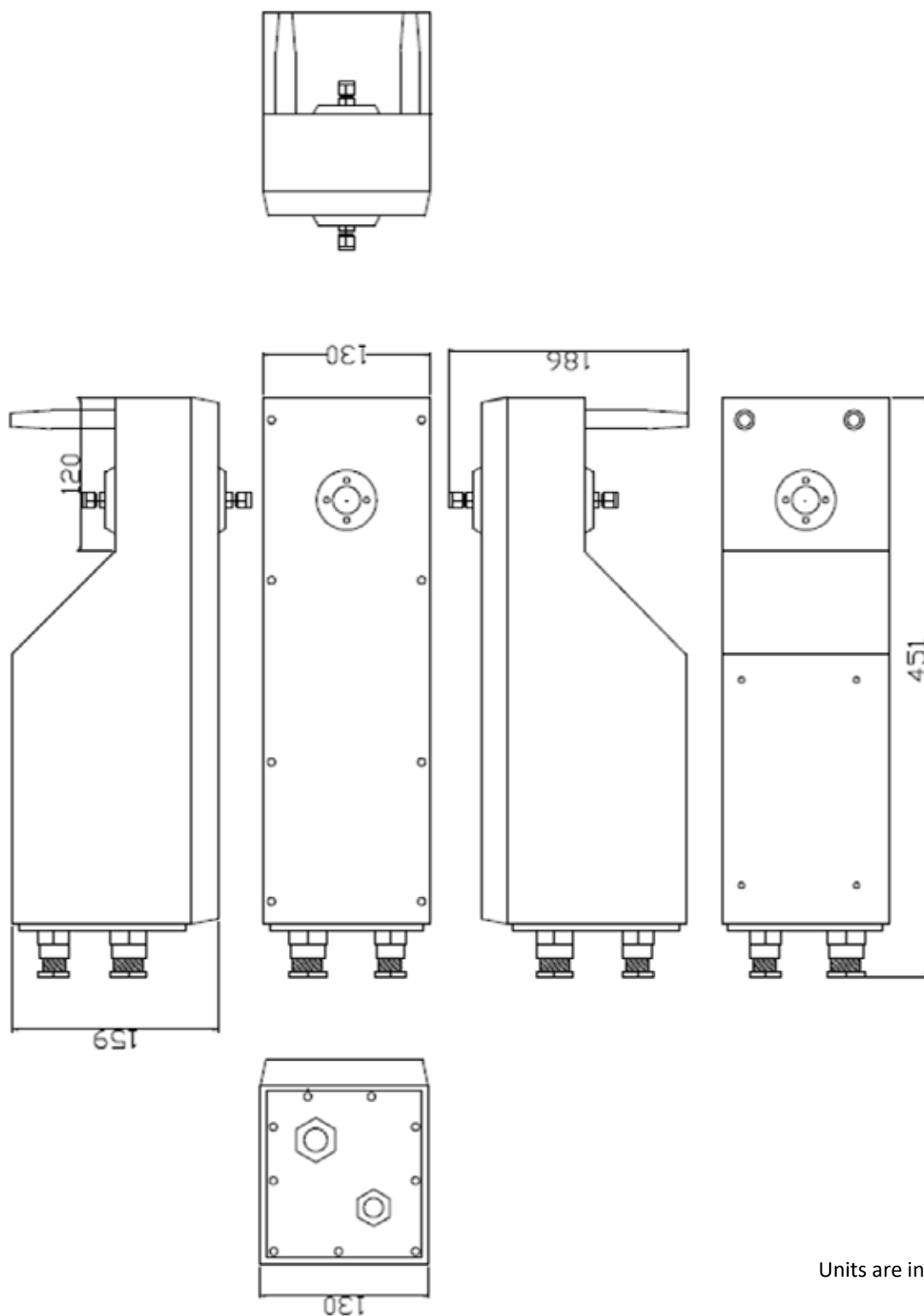
Its stainless steel construction and flow cell rated for continuous use at 120 Bar (1740 PSI/12000 kPa) with the capability to operate with process liquid temperatures of up to 120°C (248°F) make the analyser ideal for use in harsh environments. Options for higher temperatures and pressures are available on request.

The compact nature of the analyser head allows installation very close to the sample point to ensure the best possible sampling is achieved and 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. There are no upstream sample conditioning required.

ViPA B HiFlo is connected to its control laptop computer by a Gigabit Ethernet link and cable lengths between 5 and 100 metres can be specified to ensure that the laptop and operator can be sited in a safe and convenient location.

Both the analyser and laptop each require their own power supply but the ViPA B can be provided with an internal battery, enabling the ViPA B HiFlo to be used in the field without connection to a local power supply for several hours. This allows easy and flexible investigations to be made at remote locations or at sample points that are used only occasionally.

The ViPA B weighs approximately 8 kilogrammes and can be supplied with its laptop in a rugged travel case where portability is critical.



Units are in mm

The Jorin ViPA B HF General Arrangement Drawing

## Jorin ViPA B HF Data Sheet



General				
1.01	Type	Droplet & Particle Analyser		
1.02	Manufacturer	Jorin Limited		
1.03	Model	ViPA B HiFlo		
1.04	Sample Temp Limits	0 – 120°C (32-248 °F)		
1.05	Max Operating Pressure	120 Bar (1740 PSI)		1
1.06	System Description	Bench top analyser for online or batch use		2
1.07	Tag Number	TBC		
1.08	Instrument Fittings	Swagelok 316SS		3
Instrument Characteristics				
2.01	Accuracy	±2% Full Scale		
2.02	Repeatability	±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		
2.07	Data Outputs	Data displayed on control computer screen or can provide Serial Data by Modbus TCP/IP for all data and alarms if necessary		4
2.08	Flow Rates	Flow through measuring zone	Up to 4 l/minute, either pumped control for lab batch use or using high flow module for online use	
Physical Characteristics				
3.01	Sample Feed	¼” for lab use, ½” for online use		
3.02	Analyser Drain	¼” for lab use, ½” for online use		
3.03	Mounting	Analyser	Table Top	
		Control Computer	Table Top	
3.04	Weights (dry)	Analyser	8 Kgs	
		Control Computer	3 Kgs	
3.05	Materials	Analyser Wetted	316 SS, Viton, Industrial Sapphire	
		Analyser Environment	316 SS	
3.06	Enclosure Rating	ViPA Analyser	IP65	
3.07	Hazardous Area	Not Rated		
3.08	Classifications	None		
3.09	Cable Gland	Peppers, Brass, M20		
3.10	Environment	Analyser	0 – 50°C Ambient	
		Control Computer	10 - 30°C Ambient HVAC	
Electrical Data				
4.01	Supply Voltage	Analyser	110/220 V AC 50/60 Hz	
		Control Computer	110/220 V AC 50/60 HZ	
		Pump	110/220 V AC 50/60 HZ	5
4.02	Consumption	Analyser	5 Watts	
		Control Computer	75 Watts	
		Pump	253 Watts	5
Notes				
1	Flow cell is rated to 120 bar. If using online, ensure any sampling accessories used are suitably rated.			
2	The analyser is supplied with 2 steel legs for bench top use or can be attached in any orientation to appropriate fixings.			
3	Wetted materials to meet fluid specifications			
4	Serial data can be provided by Modbus over TCP/IP			
5	Peristaltic pump can be provided if required			





# JORIN

UNDERSTANDING YOUR PROCESS  
UNLOCKING YOUR PERFORMANCE