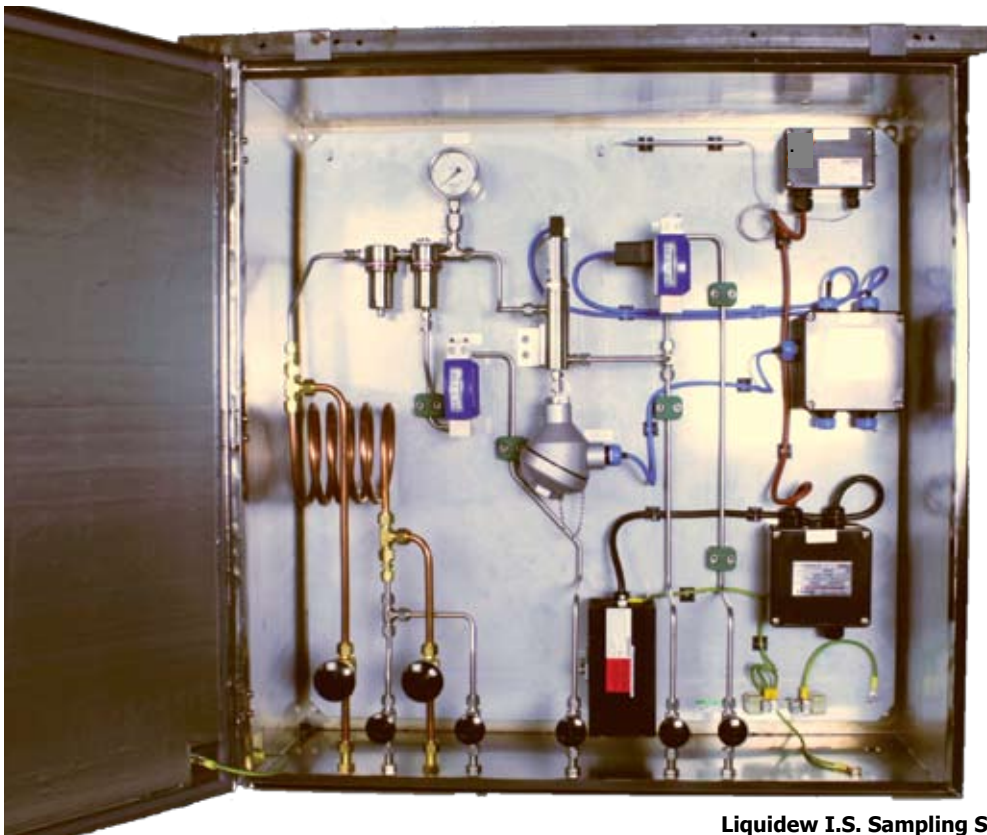


# Liquidew I.S.

## Moisture in Liquid Analyser

On-line measurement of moisture content in liquids is accurate, fast and reliable with the Liquidew I.S. Moisture in Liquid Analyser from Michell.

A wide variety of non-polar liquids can be measured continuously, on-line, even in hazardous area applications such as petrochemical refineries, power industry and pharmaceutical manufacturing.



Liquidew I.S. Sampling System

### Benefits

- Reliable measurements over a long period of time
- Easy to use with complete functionality
- Accuracy you can rely on – traceable to NPL and NIST
- Certified intrinsically safe
- Simple to maintain with a sensor calibration exchange programme
- Flexible configuration

### Applications

- Petrochemical process liquids
  - Protects catalyst
  - Prevents acid formation during reactor process
  - Controls moisture in solvents for polymer production
- Liquid fuels to avoid supply line blockage
- Lubricant oils for preventative maintenance
- Transformer oil to prevent insulation breakdown

# Liquidew I.S.

## Michell Liquidew I.S. moisture in liquid analyser

The Michell Liquidew I.S. provides a complete solution for accurate, on-line moisture measurement in process liquids, and offers many advantages over sample collection and laboratory analysis methods.

Continuous on-line measurement allows control of process moisture conditions to achieve optimum production efficiency. Intrinsically safe sensors, with a sampling system, are installed in the hazardous zone to minimise sample transportation time and ensure a fast response to process moisture changes. The rack-mounted Liquidew I.S. Control Unit, which is conveniently located in a safe area, provides real-time display of moisture content, user settable alarms as well as analogue output and digital communications. The Control Unit is connected to the remote sensors/sampling system in the field by standard instrument pairs cable, so existing cable runs can often be used where Liquidew I.S. is installed as a site retrofit.

Liquidew I.S. offers a complete measurement range capability from low trace moisture below 0.1 ppmW right up to the saturation concentration specific to the fluid being measured at the analysis temperature.

### Benefits

- **Reliable**  
Michell's Thick- and Thin-film Ceramics Moisture Sensor is exceedingly durable; chemically inert materials coupled with physical resilience provide long-term reliable service in liquid phase measurements.
- **Easy to use with complete functionality**  
Wide moisture content measurement range from sub-ppm levels to saturation conditions. The 19" sub-rack mounting Liquidew I.S. Control Unit provides complete operational functionality. The bright alphanumeric LED display with auto-scale function gives measurement values across six orders of magnitude. The front panel buttons, enable the user to scroll through the set-up menus to easily configure the analyser to their own requirements. Two user-adjustable alarm points and analogue 4-20mA output are provided as standard. RS232 or optional RS485 is also available.

- **Accurate on-line moisture measurement in liquid**  
Michell's Calibration Laboratories are world recognised through the UKAS accreditation scheme under the auspices of EAL (European co-operation for the Accreditation of Laboratories). Each sensor is calibrated and certified traceable to the humidity standards of leading international metrology institutes, NPL (UK) and NIST (USA), so assuring correct measurement of the moisture in your process.
- **Certified Intrinsically Safe**  
Liquidew I.S. is designed for flammable and non-flammable liquid within hazardous areas. ATEX certified by EECS for use in hazardous areas to II 1G EEx ia IIC T4.
- **Simple to maintain and easy to calibrate (Fully field interchangeable sensors)**  
For Liquidew I.S., calibration maintenance is simple. The unique Michell Calibration Exchange Service offers fast, world-wide delivery of replacement ceramic sensors with certified calibration. As the calibration data for the sensor is factory programmed into an onboard non-volatile memory, fitment of a Calibration Exchange Sensor renews the calibration, with minimal down-time. No programming or data input is required by the user to complete the calibration process.

The Calibration Exchange Service facilitates a professional, scheduled user QA programme at a lower cost than a traditional 'return to manufacturer' re-calibration service.



### • Flexible Configuration

The Control Unit is available in multi-channel format (MCU). This MCU Multi-channel Control Unit enables up to four measurement channels within a single 19" sub-rack unit. The sister product for moisture in process gas analysis, Promet I.S., can be combined together with Liquidew I.S. into an MCU in any configuration of channels to enable both liquid and gas phase samples to be measured with a single analyser system. With the MCU, each measurement channel functions totally independent of the others, so that any maintenance on one channel will not affect the others.

A comprehensive options list for the Liquidew I.S. Premium Sampling System enables each complete analyser to be configured to suit individual customer's application and installation requirements. Particulate filtration is provided in single or dual stages so that sensor and system performance is maintained even in processes prone to contamination. A panel-mounted version of the sampling system and sensor are offered for internal installations, while various alternative enclosures and heating options are available for field installation next to the sample source. Sample cooling, using a water heat exchanger, is available for process fluids at elevated temperature. If your need is not accommodated by these options, our systems engineering department will work with you to provide a customised solution.

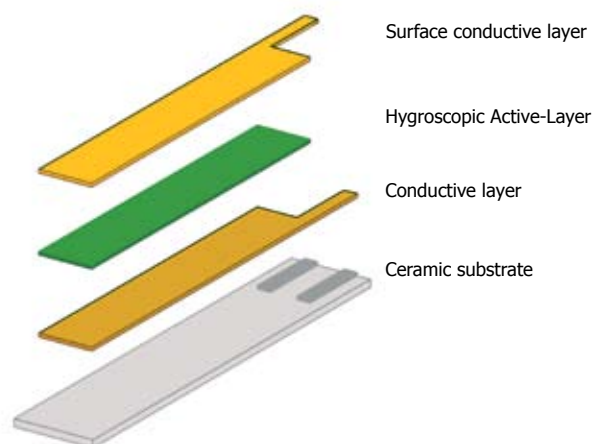
The Michell Liquidew I.S. provides the complete solution to on-line moisture measurement in process liquid analysis.



**Liquidew I.S. Control Unit**

## Technology

Reliable and robust sensor design is fundamental to achieving accurate measurement of moisture in liquids over a long period of time. Proprietary thick- and thin-film techniques are applied in the Michell Ceramic Moisture Sensor. Base metal layers on semi-conductor grade ceramic substrate sense dissolved moisture within the sample liquid flow. The inert materials of the sensor have a high resistance to aggressive media while the inherent strength of the sensor and the thermal bonded connections to the active device ensures reliable operation even in dense fluid samples.



**Layers of the Michell Ceramic Moisture Sensor**

The Ceramic Moisture Sensor exhibits a response directly to partial pressure of moisture vapour. Calibration is certified traceable to NPL (UK) and NIST (USA) through the use of dew-point transfer standards.

With Liquidew I.S. the amount of dissolved moisture dispersed throughout the immiscible process liquid is measured on-line in real time in units of ppmW moisture content using Henry's Law.

The advanced firmware of Liquidew I.S. provides moisture measurements in ppmW through the application of Henry's Law using pre-programmed saturation concentration (Cs) values for the most common pure hydrocarbon liquid applications. A proportional mixing setting can be used for mixtures of two solutes, such as the propane and butane in LPG. Four user programmable entry tables enable Cs values to be entered for other solutes or for complex fluid compositions where the user may wish to enter their own Cs values either from their own sources, or from laboratory analysis of their process samples or estimated values from proportional calculation based on the Cs values for each of the major components in the solute mix.

# Order codes

## Control unit and sensor

Order codes	Product description
LDI {1}{2}	Intrinsically Safe moisture analyser for hydrocarbon liquids

Suffix:	Order code	Description
<b>{1} – Power supply</b>	1	110 V AC 50/60HZ
	2	230 V AC 50/60HZ
<b>{2} – Hazardous Area Certificate Configuration</b>	AT	ATEX certified system
	CS	CSA(US) certified system

Note: for more than one channel measurement, see multi-channel control unit order code

## Premium sampling system

Order codes	Product description
SAM LS1 {1}{2}{3}{4}{5}{6}	Premium Sample Handling System for Liquidew IS

Suffix:	Order code	Description
<b>{1} - Installation configuration</b>	A3	304 stainless steel enclosure, IP66/NEMA 4
	B3	316 stainless steel enclosure, IP66/NEMA 4
	C3	Panel mounted, 316 stainless steel (for indoor installations)
<b>{2} - Pressure configuration</b>	E3	Process liquid, 300 psig/20 barg
	E4	Process liquid, 2000 psig/138 barg
<b>{3} - Heater configuration</b>	F1	Standard heater/Fixed thermostat +20°C
	G1	Thermostatic heater, adjustable 0 to 50°C
<b>{4} - Sample cooling</b>	K1	Water/Sample heat exchanger for panel mounted version C3
	K3	Water/Sample heat exchanger for outdoor enclosure versions A3 or B3
<b>{5} - Two-stage sample filtration</b>	L1	Pre-filter, 75 micron mesh (in addition to standard 5 micron filter)
<b>{6} - Further options</b>	H	Enclosure cooling - instrument air supply required
	JXX	Trace heated sample line assembly - 6mm or 1/4"OD. where X is length in metres

## Multi-channel control unit

Order codes	Product description
MCU {1}{2}{3}{4}{5}{6}{7}	Multi-channel Control Unit (Maximum 4 channels), can be combined with Promet I.S. for gases

Suffix:	Order code	Description
<b>{1} – Power supply</b>	1	110 VAC 50/60HZ
	2	230 VAC 50/60HZ
<b>{2} – Hazardous Area Certificate Configuration</b>	AT	ATEX certified system
	CS	CSA(US) certified system
<b>{3} – Number of channels</b>	2	2 Channels
	3	3 Channels
	4	4 Channels
<b>{4} – {7} – Channel configuration</b>	L	Liquid measurement
	G	Gas measurement (combine with the Promet I.S.)
	P1	Gas measurement with active pressure compensation (range 1000psig)*
	P2	Gas measurement with active pressure compensation (range 2000psig)*
	0	Channel not required

\*For other ranges, consult Michell



# Technical Specifications

## Sensors

<b>Sensor Technology</b>	Michell Ceramic Moisture Sensor
<b>Sensor version</b>	EA2-TX-I.S.-APV (ACCURACY plus Version)
<b>Measurement Range</b>	0.01 to 10,000 ppm <sub>w</sub> Actual range dependent on solubility of sample fluid
<b>Calibration Range</b>	-100°C dp to +20°C dew point
<b>Accuracy</b>	Dew point: ±1°C between -59.9 & +20°C dp Moisture content: ±10 % of reading Dew point: ±2°C between -60 & -100°C dp Moisture content: ±20 % of reading
<b>Resolution</b>	0.1°C between +20°C dp and -80°C dp 1°C between -80°C dp and -100°C dp
<b>Temperature measurement</b>	Pt100
<b>Temperature measurement range</b>	-20°C to +70°C
<b>Temperature measurement accuracy</b>	±0.3°C @ 0°C
<b>Analysis pressure</b>	Up to 30 MPa
<b>Operating temperature</b>	-20°C to +60°C
<b>Sample flow rate</b>	Min 0.01 l/min, Max 10 l/min 0.1 to 0.3 l/min recommended
<b>Calibration</b>	Traceable to British (NPL) and American (NIST) National Humidity Standards
<b>I.S. Certification</b>	ATEX certified by EECS for use in hazardous areas to Ex II 1G EEx ia IIC T4. (CSA certified IS Class I, Division 1, Groups A, B, C & D, T4)

## Control unit

<b>Display</b>	Two line 6-digits LED, displaying moisture content / dew point (user toggle) and temperature
<b>Analogue output</b>	Two 4-20 mA (max load 500 ohms) - User configured for parameter, unit and range.
<b>Digital output</b>	RS485 Modbus RTU
<b>Display mode</b>	Moisture content (ppm <sub>w</sub> ) Dew point (°C or °F) Temperature (°C or °F)
<b>Display resolution</b>	0.1°C dp, 0.1°F dp, 0.01 ppm <sub>w</sub> , 0.1°C temp
<b>Alarms</b>	"Four alarm relays. Control action and setpoint are user programmable. Two Form C contacts rated 10 A, 240 V AC or 8 A, 24 V DC. Non-inductive load. Two Form A contacts rated 5 A, 240 V AC or 4 A 24 V DC. Non-inductive load."
<b>I.S. Barriers</b>	Galvanic isolation type, integrated to Control Unit
<b>Interconnection cable</b>	General instrument type, twisted pair, screened, two pairs. Maximum length depends on cable characteristics. Refer to Michell for advice.
<b>Power supply</b>	110/230 V AC, 50/60 Hz. 10 Watts max. power consumption
<b>Enclosure</b>	19" sub rack unit Dimensions 132H x 483W x 370D mm
<b>Operating environment</b>	Indoor, safe area, 0 to +50 °C, <90% RH

## Premium sampling systems

<b>Enclosure</b>	304 stainless steel enclosure. Option for complete enclosure in AISI 316 stainless steel. All fixtures stainless steel. Galvanised steel internal mounting plate. Open panel version available for indoor installation Dimensions 800H x 600W x 300D mm
<b>Enclosure mounting</b>	Stainless steel wall mounting brackets
<b>Enclosure ingress protection</b>	IP66
<b>Enclosure temperature control</b>	Heater/thermostat options for fixed set-point +20°C or adjustable set-point range 0 to control 50°C.
<b>Heater power supply</b>	110/120 or 220/240/255 V ac, 50/60 Hz. Power consumption 100 Watts max.
<b>Operating environment</b>	Shaded position, on or off shore, -20 to +40°C (-40 to +60°C max transient) Enclosure cooling option recommended for climate ambient > +50°C
<b>Sample cooling option</b>	"Recommended for process fluid temperatures > +40°C Plant water supply required, ≤ +30°C"

## Michell Instruments

Michell Instruments is the international leader in the field of gas analysis, moisture and humidity measurement solutions.

With over 30 years' experience, Michell designs and manufactures a wide range of transmitters, instruments and system solutions capable of measuring trace moisture and relative humidity, as well as traces and percentages of oxygen, in diverse applications and industries including compressed air, power generation, process, oil and gas, HVAC, pharmaceutical and many more.

With a fast-growing international subsidiary and distribution network, the Michell Group provides solutions in moisture, humidity and gas analysis for the most demanding applications world-wide.

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**Please note: Michell Instruments adopts a continuous development programme which sometimes necessitates specification changes without notice.  
Contact us for latest version. Ref: LIQ\_IS-0509**