

## CONDUMAX II HYDROCARBON DEW-POINT ANALYZER

Envent Engineering is working in partnership with Michell Instruments to provide a more comprehensive product offering of online process instruments designed specifically for measuring Hydrocarbon moisture in Natural Gas. The Condumax II Hydrocarbon Dew-Point Analyzer by Michell Instruments is designed to provide automatic, on-line measurement of hydrocarbon and water dew-point in Natural Gas.

### FEATURES

- ✎ Fully automatic on-line analysis
- ✎ Objective, highly repeatable measurement
- ✎ 0.5°C (0.9°F) hydrocarbon dew-point accuracy
- ✎ Fundamental chilled mirror measuring principle
- ✎ Patented detection technique
- ✎ Self-cleaning
- ✎ No purge or cooling gas needed
- ✎ Optional water dew-point analysis available
- ✎ Modbus RTU
- ✎ IEC/Ex, ATEX, cCSAus and GOST EX certifications
- ✎ Built-in verification of customer process gas
- ✎ Intuitive, 4.3" LCD display with touch pad operation. No "hot work" permit required
- ✎ Class I, Division 1 certified for hazardous areas
- ✎ Integrated sampling conditioning system
- ✎ 40 years of expertise in moisture measurement built into the design.

### APPLICATIONS

- ✎ Natural gas processing
- ✎ Protection of turbo-expander plant
- ✎ Gas quality measurements at custody transfer
- ✎ Transmission pipeline monitoring
- ✎ Confirmation and control of fuel gas 'super-heat' to turbine power plant



**CONDUMAX II CONTROL PANEL**

## HOW IT WORKS

Condumax II uses a patented chilled optical measurement technique that is radically different to that of any other instrument. Sensitivity of better than 1ppm molar (1mg/m<sup>3</sup>) of condensed hydrocarbons enables the analyzer to detect the most invisible films of condensate that are characteristic of hydrocarbon gases at dew point, due to their low surface tension and colourless appearance. The result is a breakthrough in accuracy and repeatability.

The optical sensor comprises an acid etched, semi-matte stainless steel 'mirror' surface with a central conical-shaped depression, which is chilled during a measurement cycle. Collimated visible red light is focused onto the central region of the optical surface. In the dry condition, the incident light beam is dispersed by the matte surface providing a base signal to the optical detector. During a measurement cycle, hydrocarbon condensate is formed on the optical surface and it becomes reflective due to the low surface tension of the condensate. An annular ring of light forms around the detector and there is a dramatic reduction in the scattered light intensity within the central Dark Spot region. The secondary effect is monitored and interpreted. The Dark Spot detection technique utilizes the physical characteristic of hydrocarbon condensate that makes it so difficult to detect in a manual visual dew-point meter. When a pre-determined layer of condensate has been detected, the instrument records the temperature of the optical surface as the hydrocarbon dew-point. In the subsequent recovery cycle, the optical surface is actively heated typically to +50°C (122°F), to evaporate the condensates back into the flowing gas sample. This fully automated process is complete in under 10 minutes.

The design of the Condumax II sensor cell is critical to its dynamic performance. This cell combines the optical detection system, Dark Spot sensor, thermocouple and three stage peltier heat-pump in a stainless steel cell assembly. The cell carries an operating pressure rating of 10,000 kPag and achieves a ΔT, of up to -55K from the analyzer operating changes.



**DARK SPOT DETECTION**

## SIMULTANEOUS WATER DEW-POINT ANALYSIS

Water dew-point measurement is of equal importance to hydrocarbon dewpoint for all gas producers and pipeline operators. An optional second measurement channel utilizing the advanced Michell Ceramic Moisture Sensor, can be added to provide an additional dew-point measurement.

## CONDUMAX II SPECIFICATIONS

### HYDROCARBON DEW-POINT MEASUREMENT

<b>Measurement Technique</b>	Dark Spot™ fixed sample analysis. Direct photo-detection of hydrocarbon dew-point temperature
<b>Sensor Cooling</b>	Automatic via 3-stage Peltier effect electronic cooler under adaptive control
<b>Measurement Range</b>	Up to Δ -55K measurement depression from Main Unit operating temperature
<b>Accuracy</b>	±0.5°C hydrocarbon dew-point (single and multiple condensable component analysis)
<b>Sample Flow</b>	0.03m <sup>3</sup> /hr (0.5 NI/min) - alarm standard
<b>Measurement Frequency</b>	6 cycles/hour (recommended) 12 cycles/hour (maximum)
<b>Operating Pressure</b>	Max 100 barg (1450 psig)

### PRESSURE MEASUREMENT(S)

<b>Units</b>	MPa, barg, psig
<b>Resolution</b>	0.1 MPa and barg, 1 psig
<b>Range</b>	HC dew-point: 0 to 100 barg (0 to 1450 psig) Water dew-point: 0 to 200 barg (0 to 2900 psig)
<b>Accuracy</b>	±0.25% FS



**CONDUMAX II WITH SAMPLE CONDITIONING SYSTEM**

### WATER DEW-POINT MEASUREMENT (OPTIONAL)

<b>Measuring Technique</b>	Michell Ceramic Moisture Sensor
<b>Units-Moisture Content</b>	°C and °F water dew-point; lbs/MMscf; mg/m <sup>3</sup> ; ppm <sub>v</sub>
<b>Resolution</b>	0.1°C, 0.1°F
<b>Range (dew-point)</b>	Calibrated from -100 to +2°C (-148 to +68°F)
<b>Accuracy (dew-point)</b>	±1°C (1.8°F) from -59 to +20°C (-74 to +68°F) ±2°C (3.6°F) from -100 to +68°C (-148 to +154°F)
<b>Sample Flow</b>	0.06 to 0.3 m <sup>3</sup> /hr (1 to 5 NI/min) - alarm standard
<b>Temperature Coefficient</b>	Algorithm compensation (-20 to +50°C)
<b>Operating Pressure</b>	Max 138 barg (2000 psig)

### HYDROCARBON DEW-POINT ANALYZER

<b>Resolution</b>	Hydrocarbon and water dew point: 0.1°C (0.18°F)
<b>Sample Gas Supply</b>	Natural gas up to 100 barg (1450 psig), pressure regulated in sampling system
<b>Sample Gas Connections</b>	1/8" NPT (ATEX / IECEx) or 1/4" NPT (CSA) female ports for both hydrocarbon and water dew-point channels; Sampling system: 6mm OD or 1/4" OD
<b>Operating Environment</b>	Indoors/Outdoors -20 to +50°C (-4 to +122°F) Max 95% RH
<b>Power Supply</b>	90 to 260 VAC 50/60 Hz, 125 W Main Unit 300W c/w indoor sampling system 400W c/w outdoor sampling system
<b>Weight</b>	~60kg (132.3 lbs) c/w Sampling system
<b>Display</b>	Touch screen with vacuum fluorescent display
<b>Sample System Enclosure</b>	Carbon Steel or 316L Stainless Steel optional.
<b>Outputs</b>	Modbus RTU, RS485 @ 9600 baud rate. Two 4-20 mA linear (non-isolated) outputs, user configurable for any combination of dew point or pressure parameters
<b>Alarms</b>	Process and analyzer status via software register and display annotation. Integrated low flow alarms for each sample flow. Analyzer status fault flag 23 mA on mA output 1
<b>Hazardous Area Certification</b>	<b>ATEX</b> II 2 G Ex d IIB + H2 Gb <b>IECEX</b> Ex d IIB + H2 Gb <b>CSAus</b> Tamb -40°C to +45°C T4 <b>*TC-TR</b> Tamb -40°C to +60°C T3 Class I, Division 1, Groups B, C & D, T4 1Ex d IIB+H2 T4, T3 Gb
	*Available to customer specific order (Please consult Envent)
<b>Pattern Approval</b>	GOST-R, GOST-K, GOST-T