Promet I.S.

Process Moisture Analyzer

Promet I.S. Process Moisture Analyzers are heavy duty, industrial hygrometer systems for measurement of high pressure, process gases and vaporized liquids on natural gas platforms and terminals, petrochemical plants and industrial gas manufacturing facilities. Promet I.S. combines the latest Michell moisture sensing technologies with sample conditioning system design engineering capabilities to provide a reliable and easy to operate, multi-channel on-line instrument for both flammable and non-flammable gases.

Highlights

- Simple, cost efficient operation and low-maintenance
- Immune to chemical attack from H_2S, mercaptans and other sulphides
- Protected against glycol or other liquid contaminants
- Accurate direct dew-point measurement at process pressure up to 45 MPa (450 barg)
- Moisture range from ambient to ppb level with exhaustive list of hygrometric units, including key parameters of natural gas
- Two 4-20 mA configurable outputs and digital Modbus RTU based communication.
- Assured calibration integrity traceable to NPL (UK) and NIST (USA)
- User programmable or real-time active pressure compensation for moisture content calculation
- Multichannel with up to 4 independent measurement channels

Applications

- Natural gas production and processing
- Pipeline drying
- Offshore export pipeline natural gas
- Transmission pipeline monitoring
- Fiscal metering of gas
- Gas storage facilities
- Refinery recycle gas – reformer and platformer
- LNG production processing and receiving terminals

Michell Promet I.S. Process Moisture Analyzer

Michell Promet I.S. is a rugged on-line instrument tailored to customers' specific application and technical requirements. Measurements can be made across a wide range from -100 to +20°C dew point with an accuracy of ±1°C dew point and at process or pipeline pressures up to a maximum of 45 MPa.

The rack-mounted Promet I.S. Control Unit provides real-time two-line display of moisture content/dew point and pressure, user settable alarms together with analog output and digital communications, conveniently located in a safe area. Intrinsically safe sensors, with a sampling system, are installed in the hazardous zone to minimize sample transportation time and ensure fast response to process moisture changes.

The Control Unit in the multi-channel MCU format can also include moisture in liquid analysis function by combining with Liquidew I.S. Moisture in Liquid Analyzer.

Multi-Channel Unit

Features

Reliable measurement

Michell's process industry-proven moisture sensor used in the Promet I.S. is exceedingly durable. Chemically inert materials coupled with physical resilience provide long-term reliable service in process measurements of up to 45 MPa, enabling measurement directly at process/pipeline pressure. The sensor is protected against glycol and other process borne liquid contaminants as well as immune to chemical attack from H_2S, mercaptans and other sulphides.

Easy to use with complete functionality

The 19" sub-rack mounting Promet I.S. Control Unit is simple to operate. The bright alphanumeric LED display with optional live pressure compensation provides unit conversions from dew point to an exhaustive list of moisture content units, so the user has flexibility to select the preferred hygrometric unit. The conversion method is for ideal gases and also specific to natural gas, using either the long established IGT Research Bulletin No. 8 or the more recently published ISO 18453, to customer order preference.

The front panel interface, enables the user to scroll through the set-up menus to easily configure the analyzer to their own requirements. Four user-adjustable alarm points and two analog 4-20 mA outputs are provided as well as a digital RS485 RTU for connection to external devices.

Calibration integrity for accurate measurement

The Promet I.S. Ceramic Moisture Sensors are individually calibrated down to -100°C dew point/10 ppb_V. This avoids the common problems associated with other trace moisture solution providers of lack of calibration integrity at trace moisture levels together with low end drift to the dry and failing to respond to increase in process moisture condition after extended period of 'desiccation'.

All Michell moisture probe calibrations are 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.

Measurements at line pressure made easy

The Promet I.S. features moisture content calculation with user input analysis pressure but, in applications where pressure varies, the real-time pressure sensor signal provides more accurate, active compensation for moisture content conversion. (Pressure sensor optional.)

Superior measurement stability

To ensure continuous optimum performance, the Promet I.S. sampling system is internally temperature controlled. This greatly reduces the effect of potential temperature variations that would otherwise introduce transitional adsorption and desorption effects in the sampling system components and result in erroneous measurements during periods of temperature change. Best practice also dictates that sample line tubing should be maintained at an elevated temperature, so for customer convenience, self limiting heated tube bundle is available as a factory option for Promet I.S. sampling system.

Certified intrinsically safe

Promet I.S. sensors and sampling systems are designed for flammable and non-flammable gas within hazardous areas. ATEX certified by EECS for use in hazardous areas to II 1G EEx ia IIC T4. Complete packages conforming to NEC Class 1 Div 1 or IECEx certifications are also available. Promet I.S. carries GOST pattern approval and GOST Ex.

Simple to maintain with a sensor calibration exchange program

For Promet I.S., calibration maintenance is simple. The unique Michell Calibration Exchange Service offers fast, world-wide delivery of replacement ceramic sensors certified traceable to metrology standards of NPL and NIST. As the calibration data for the sensor is factory programmed into on-board non-volatile memory, no programming or data input is required by the user to complete the calibration process. Fitting a Calibration Exchange Sensor renews the calibration, with minimal down-time. The Calibration Exchange Service facilitates a professional, scheduled user QA programme at a lower cost than a traditional 'return to manufacturer' recalibration service.

Advanced Sensor Technology

Flexible configuration. Total analyzer system tailored to specific customer requirements

Promet I.S. is available in a multi-channel format (MCU). This MCU enables up to four measurement channels within a single 19" sub-rack unit. The Promet I.S. channels can be combined together with a sister product for moisture in liquid analysis, Liquidew I.S., into an MCU to enable both gas and liquid samples measurement with a single analyzer system. With the MCU, each measurement channel functions totally independently, so that any maintenance on one channel will not affect the others. Customers can also order blank channels for future expansion.

The Promet I.S uses the rugged Easidew PRO I.S. sensor, allowing the transmitter to be installed directly outdoors.

Best practice sampling systems

The design of the Promet I.S. Premium Sampling System has drawn on Michell's 35 years of expertise in on-line process gas analysis. There are two core configurations:

- The Natural Gas Processing and Transmission Sampling System uses the most advanced filtration techniques with microporous membrane and continuous by-pass flow to remove and dispose of all liquid phase contaminants. A glycol adsorption cartridge removes residual glycol vapour carried over from the dehydration process.

Promet I.S Sampling system

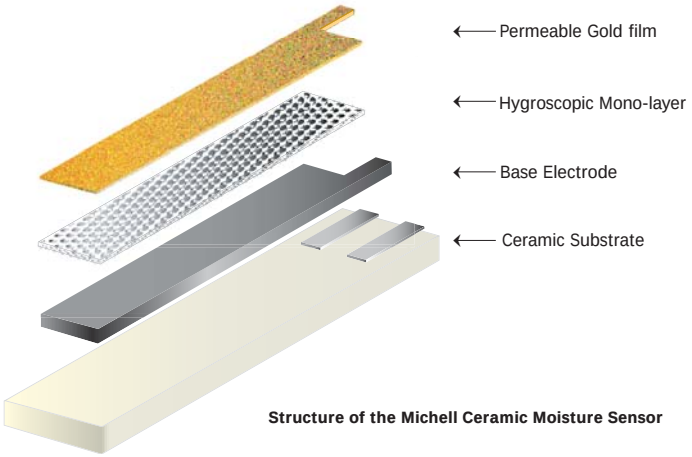
- The Trace Moisture in Hydrocarbon Gas Sampling System is for trace moisture measurement after the molecular sieve dehydration process which is also suitable for many other monitoring applications at ppm and sub-ppm levels in refinery gases and critical petrochemical processes. A minimalist approach to the sampling system design is essential to ensure best dynamic response to process moisture variations. A particulate filter and isolation valve are the only components prior to the sensor.

Promet I.S. utilizes Michell Ceramic Moisture Sensor, offering unrivalled reliability and performance with more than 1,000 installations in natural gas and petrochemical sites world-wide.

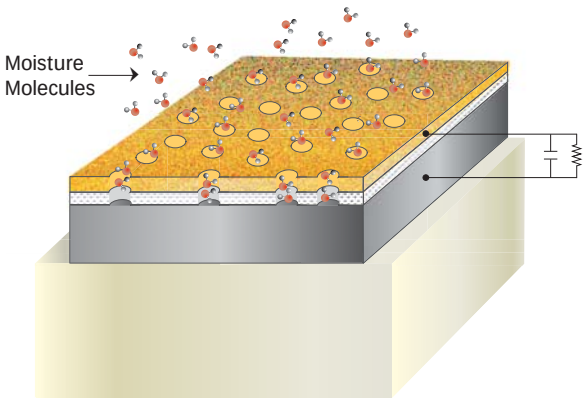
The Michell State-of-the-art thick- and thin-film semiconductor technology produces an exceedingly durable sensor, with superior measurement sensitivity to 10 ppb_V moisture content and high-pressure capability up to 45 MPa (450 barg).

Unlike older aluminium-oxide technologies, the inherent immunity to pressure shock of the Ceramic Sensor completely avoids any risk of sensor failure at commissioning or shut-down, whilst the unique inert nature of the sensor gives unrivalled long-term resistance to chemical attack, even in extremely sour gas with percentage level H_2S concentrations. The microprocessor electronics unit in the sensor stores the sensor calibration data and provides a stable linear 4-20 mA output over the wide dynamic °C dew-point range. All Michell Ceramic Moisture Sensors provide up to 1°C accuracy and excellent long-term stability in process applications. The unique Michell Calibration Exhange service enables all our customers worldwide to maintain traceable certified calibration of our process moisture analyzers at modest cost and with minimal spare stock and down-time.

The Ceramic Sensor responds to the partial pressure of water vapor in the gas being measured, which is directly related to the dew-point temperature. Every Promet I.S sensor is calibrated against fundamental dew-point measurement systems in Michell's world class laboratory, which is internationally accredited and directly traceable to both NPL (UK) and NIST (USA) base standards.



Structure of the Michell Ceramic Moisture Sensor



Operation of the Michell Ceramic Moisture Sensor

Technical Specifications

Sensors

Sensor technology	Michell Ceramic Moisture Sensor
Sensor version	Easidew PRO I.S.
Measurement range	-100 to +20°Cdp
Calibration range	-100 to +20°Cdp
Calibration	Traceable to British (NPL) and American (NIST) National Humidity Standards
Accuracy	Dew point: ±1°C between –60 and +20°Cdp Moisture content: ±10% of reading Dew point: ±2°C between -60.1 and -100°Cdp
Resolution	0.1°C between +20 and -100°Cdp
Analysis pressure	Up to 45 MPa (450 barg)
Operating temperature	-40 to +60°C
Sample flow rate	1 to 5 Nl/min
Optional pressure sensor	0-138 barg (other ranges available) Accuracy: ±0.25% FS

Certification

Hazardous area certification	ATEX - II 1 G Ex ia IIC T4 Ga (-20°C ≤ Ta ≤ +70°C) FM - IS / I / 1 / ABCD / T4 Ta = +70°C CSA - IS Class I, Division 1, Groups ABCD T4 +70°C IECEx - Ex ia IIC T4 (-20°C ≤ Ta ≤ +70°C) GOST Ex
Pattern approval	GOST-R, GOST-K

Control Unit

Display	Two line 6-digits LED, displaying moisture content / dew point (user toggle) and analysis pressure
Analogue output	Two 4-20 mA (max. load 500 Ω) User configured for parameter, unit and range
Digital output	RS485 Modbus RTU
Display mode	Moisture content (ppm_V) Moisture content in natural gas (ppm_V, LBMMSCF, mg/m³) Dew point (°C or °F) Pressure (psig, barg)
Pressure compensation	Fixed value (user programmed) or dynamic input from optional pressure sensor
Display resolution	0.1°Cdp, 0.1°Fdp, 0.1-0.001 ppm_V ideal gas (adjustable), 0.01 ppm_V natural gas, 0.01 mg/m³, 0.01 LBMMSCF, 1 psig, 0.1 barg
Alarms	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
I.S. barriers	Galvanic isolation type, integrated to Control Unit
Power supply	85-265 V AC 50/60Hz or 10-72 V DC 10 W max. power consumption
Interconnection cable	General instrument type, twisted pair, screened, single pair (two pairs with pressure sensor)
Enclosure	19" sub rack unit Dimensions 132 x 483 x 375mm (h x w x d) (100mm minimum clearance depth for cables and vents)
Operating environment	Indoor, safe area, 0 to +50°C, < 90% RH

Premium Sampling Systems

Enclosure	304 stainless steel (EN1.4301) enclosure; Option for complete enclosure in 316 stainless steel (EN1.4401); All fixtures stainless steel; Galvanised steel internal mounting plate; Open panel version available for indoor installation Dimensions 800 x 600 x 300mm (h x w x d)
Enclosure mounting	Stainless steel wall mounting brackets
Enclosure ingress protection	IP66
Enclosure temperature control	Heater/thermostat options for fixed set-point +20°C or adjustable set-point range 0 to control 50°C
Heater power supply	110/120 or 220/240/255 V AC, 47/63 Hz. Power consumption 100 W max.
Operating environment	Shaded position, on or off shore, -20 to +50°C (-40 to +60°C max transient) Enclosure cooling option recommended for climatic ambient > +45°C

Michell Instruments 48 Lancaster Way Business Park, Ely, Cambridgeshire, CB6 3NW
Tel: +44 1353 658000, Fax: +44 1353 658199, Email: uk.info@michell.com, Web: www.michell.com/uk

Issue no: Promet I.S_97150_V4_UK_0916