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 Michell's proven ceramic moisture sensor with sample conditioning system design engineering capabilities to provide a reliable and easy to operate, multi-channel online instrument for both flammable and non-flammable gases. Optional Oxygen Electrochemical sensors offer additional capability for percentage and ppm_V O_2 measurements.

H_2 READY

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/6526.7 psig)
- Moisture range from ambient to ppb level with exhaustive list of hygrometric units, including key parameters of natural gas
- Three 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
- Multi-channel with up to 4 independent measurement channels
- Optional, highly reliable and cost-effective 2-wire, loop-powered O_2 transmitter

Applications

- Natural gas production and processing
- Pipeline drying
- Offshore export pipeline natural gas
- Transmission pipeline monitoring
- Fiscal metering of gas
- Gas storage facilities
- Hydrogen production, storage and transportation including natural gas injection
- LNG production processing and receiving terminals
- Gas Generation industries

Michell Promet I.S. Process Moisture Analyzer

The Michell Promet I.S. is a rugged online instrument tailored to customers' specific application and technical requirements. Measurements can be made across a wide range from -100 to +20 °C (-148...+68 °F) dew point with an accuracy of ±1 °C (±1.8 °F) dew point and at process or pipeline pressures up to a maximum of 45 MPa (450 barg/6526.7 psi).

The rack-mounted Promet I.S. Control Unit provides real-time two-line displays 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 format can also include a moisture in liquid analysis or oxygen measurement function by combining with the Liquidew I.S. Moisture in Liquid Analyzer or the Minox-i O_2 transmitter.*

Rear panel input/output connections

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 (450 barg/6526.7 psi), 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. Each channel has a 2.8" color touch screen LCD with optional live pressure compensation, which provides unit conversions from dew point to an exhaustive list of moisture content units, so the user has the 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 (user definable).

The touch screen enables the user to scroll through the setup 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.

* For full PST Minox-i technical details, please refer to the relevant product datasheet.

Calibration integrity for accurate measurement

The Promet I.S. Ceramic Metal-Oxide Moisture Sensors are individually calibrated down to -100 °C (-148 °F) 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 the Promet I.S. sampling system.

Certified intrinsically safe

Promet I.S. sensors and sampling systems are designed for measurement of flammable and non-flammable gas and complete packages can be supplied for use in explosive atmospheres in accordance with the requirements of ATEX/IECEx/UKCA to II 1G Ex ia IIC T4 and meeting the equivalent NEC HazLoc requirements for Class I Div 1, and Class I ZONES.

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 metal-oxide moisture 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.

Flexible configuration: Total analyzer system tailored to specific customer requirements

The 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

Advanced Sensor Technology

combined with a Liquidew I.S. for moisture in liquid analysis or a Minox-i O_2 transmitter into an MCU to enable moisture measurement in both gas and liquid samples, along with O_2 measurement in 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 40+ years of expertise in online process gas analysis. There are three 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 vapor carried over from the dehydration process.
- 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.

Promet I.S Sampling system

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.

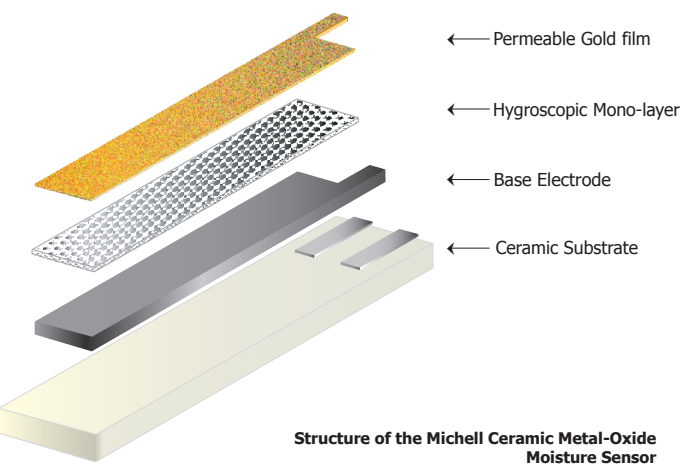
- For a long, trouble-free life, analyzers invariably require a clean, dry gas that is free from particulates and at a suitable temperature and pressure. In the real world, the process gas to be measured almost never fulfils these requirements. Michell Instruments offers a complete solution for this problem: The PS601 Sample Handling System is a modular system constructed in consultation with customers to ensure the best-possible solution for each individual O_2 application.

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

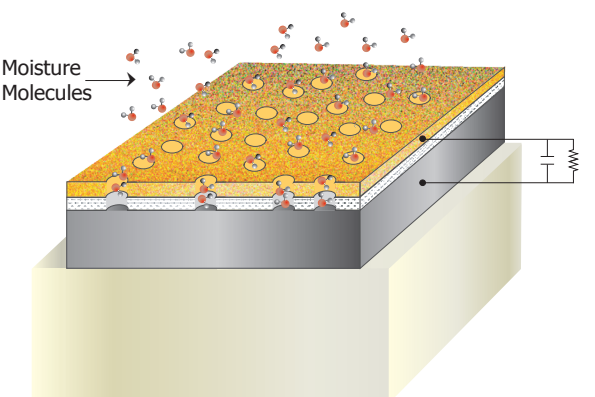
The Michell state-of-the-art thick- and thin-film semiconductor technology produces an exceedingly durable sensor, with superior measurement sensitivity to 10 ppb_V moisture content and high-pressure capability up to 45 MPa (450 barg/6526.7 psig).

Unlike older aluminium-oxide technologies, the inherent immunity to pressure shock of the Ceramic Metal-Oxide Moisture 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 Metal-Oxide Moisture Sensors provide up to 1 °C (1.8 °F) 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 Metal-Oxide Moisture 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 Metal-Oxide Moisture Sensor



Operation of the Michell Ceramic Metal-Oxide Moisture Sensor

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Technical Specifications

Sensors	
Sensor technology	Michell Ceramic Metal-Oxide Moisture Sensor
Sensor version	Easidew PRO I.S.
Measurement range	-100...+20 °C (-148...+68 °F) dew point
Calibration range	-100...+20 °C (-148...+68 °F) dew point
Calibration	Traceable to British (NPL) and American (NIST) National Humidity Standards
Accuracy	Dew point: ±1 °C (1.8 °F) between -60 and +20 °C (-76 and +68 °F) dp Moisture content: ±10% of reading Dew point: ±2 °C (3.6 °F) between -60.1 and -100 °C (-76.18 and -148 °F) dp
Resolution	0.1 °C (0.18 °F) between +20 and -100 °C (+68 and -148 °F) dp
Analysis pressure	Up to 45 MPa (450 barg/6526.7 psig)
Operating temperature	-40...+60 °C (-40...+140 °F)
Sample flow rate	1...5 Nl/min
Optional pressure sensor	0...138 barg (0...2001 psig) (other ranges available) Accuracy: ±0.25% FS
Certification	
Hazardous area certification	**ATEX/UKCA**: II 1 G Ex ia IIC T4 Ga (-20 °C...+70 °C) **IECEx**: Ex ia IIC T4 Ga (-20 °C...+70 °C) **TR CU**: 0Ex ia IIC T4 Ga (-20 °C...+70 °C) **cQPSus**: IS, Class I, Division 1, Groups A, B, C & D, T4 Class I, Zone 0, AEx ia IIC T4 Gb, Ex ia IIC T4 Gb Tamb +70 °C
Pattern approval	GOST-R, GOST-K
Control Unit	
Display	2.8" color touch screen LCD per channel, displaying moisture content / dew point or O_2 and analysis pressure
Analog output	Three 4...20 mA (max. load 500 Ω) user-definable outputs
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) % or ppm_V O_2
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 0.01 %/0.5 ppm_V O_2
Alarms	Four alarm relays. Control action and setpoint are user programmable Two Form C contacts rated 30 V DC, 5 A. Non-inductive load Two Form A contacts rated 30 V DC, 5 A. Non-inductive load
I.S. barriers	Galvanic isolation type, integrated to Control Unit
Power supply	85...265 V AC 50/60Hz or 18...28 V DC 30 V A 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 375 mm (5.2 x 19.01 x 14.76") (h x w x d) (100 mm/4" min. clearance depth for cables and vents)
Operating environment	Indoor, safe area, 0...+50 °C (32...+122 °F), < 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 300 mm (31.5 x 23.62 x 11.81") (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 (+68 °F) or adjustable set-point range 0 to control 50 °C (32 to control 122 °F)
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...+50 °C (-4...+122 °F) (-40...+60 °C/-40...+140 °F max. transient) Enclosure cooling option recommended for climatic ambient > +45 °C (113 °F)

Michell Instruments adopts a continuous development programme which sometimes necessitates specification changes without notice.
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