QMA601

Low-Range Process Moisture Analyzer

Fast, high-precision moisture measurements for hazardous areas.

The next generation Advanced Quartz Crystal Microbalance analyzer from Michell Instruments is designed to provide reliable, fast and accurate measurement of trace moisture content in a wide variety of process applications where keeping moisture levels as low as possible is of critical importance.

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H_2 READY

Highlights

- Reliable low-range measurement from 0.02 to 100 ppm_V
- Accuracy of ±0.03 ppm_V or ±10 % reading, whichever is greater
- Maintenance free for 3 years
- Built-in verification of customer process gas
- IECEx, ATEX, UKCA, TR CU Ex certified for Exd flameproof, cQPSus certified for explosion proof
- Intuitive, color HMI with touch-screen keypad; no 'hot work' permit required
- 14 internal alarms
- 21 predefined carrier gases and 3 user-defined gases
- Proven Michell Instruments quality: 40 years of expertise in moisture measurement built into the design

Applications

- Molecular sieve dehydration of natural gas
- LNG production
- NGL extraction
- Suitable for use with natural gas containing up to 20 % hydrogen with no further modification required

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MICHELL Instruments
A PST BRAND

40 Years of Experience with Moisture Measurement

The control of moisture is critical for the operational safety and efficiency of the plant equipment in upstream through to downstream processes. We at Michell Instruments have been developing expert moisture-sensing instruments and systems for 40 years. Over this time, we have developed the world's largest range of moisture and hydrocarbon dew-point analyzers for the oil, natural gas, refining and power industries. We have gained extensive knowledge of applications in these industries, with thousands of installations in sites across the globe.

Introducing the QMA601 Low-Range Process Moisture Analyzer

Precision Measurement

- High accuracy with lower detection limit of 0.02 ppm_v
- Low range of 0.02 to 100 ppm_v
- Sensitivity of 0.01 ppm_v

The low-range QMA601 is the result of Michell Instruments' continuous effort to improve Quartz Crystal Microbalance technology. The new analyzer brings higher precision to the already highly accurate measurement which is completely insensitive to changes in background gas composition.

While other moisture technologies are being stretched at sub-ppm trace moisture levels, the new QMA601 can offer reliability, simplicity and greatly reduced cost of ownership from trusted and proven Quartz Crystal technology.

Reliability

For maximum stability, all critical components of the QMA601 – the moisture generator, sensor and flow control devices – are precisely temperature controlled. This ensures that fluctuations in sample gas or environmental temperature have no influence on the measurement.

The analyzer utilizes a mass flow controller to ensure precise control of the sample and reference gas flows to ±0.1 ml/min. Coupled with a pressure transducer, this system ensures continued accuracy of measured and calculated parameters even during fluctuations in sample pressure.

Simplicity

Human Machine Interface (HMI)

The QMA601 provides a highly intuitive, menu driven color interface, utilizing a capacitive touch-screen keypad. This powerful HMI makes control, logging and configuration of analyzer parameters very simple. The main display also incorporates real-time trend graphing and alarm indicators based on the NAMUR 102 standard. This allows operation and interrogation of the analyzer in the field with no need for a 'hot work' permit.

Easy Integration into Existing Control Systems

The QMA601 is equipped with two analog outputs, configurable for either current or voltage scaling. It also provides both Modbus RTU Protocol over RS485 and Modbus TCP for easy connection to a SCADA or other user-defined data acquisition system.

Dedicated remote application software is also available.

Integrated Sampling System

The instrument can be supplied with a high quality, in-house designed, sample conditioning system that is optimized for the application, as well as for the requirements of the analyzer.

Reduced Cost of Ownership

Minimum Maintenance

Sophisticated instruments are often complicated and require experience and special care in use, increasing cost of ownership. The QMA601 differs through its very uncomplicated approach to field service; the desiccant dryer is easy to replace via its mounting on the sampling panel. The moisture generator has an average life span of 3 years before replacement is required. The analyzer will therefore perform reliably for many years with just basic maintenance and housekeeping.

Automated Verification

The QMA601 incorporates an automatic or manual verification system that can use either the internal traceable moisture generator or an external reference supplied by the user. Carried out on the process gas flow, these periodic validation-checks of sensor performance can be initiated on demand, or automatically (at user-defined intervals and time of day), providing a verification of analyzer performance and automatically adjusting out any change. The moisture generator at the core of the system is supplied with a calibration traceable to NPL and NIST.

Ease of Installation

Available with a choice of either AC or DC powered versions.* No barrier unit or safety earth are required, saving the user both cost and inconvenience.

*cQPSus version 24V DC only

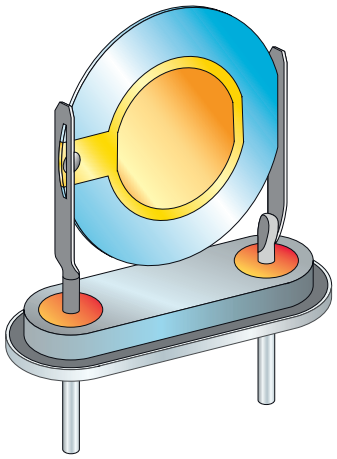
Technology:

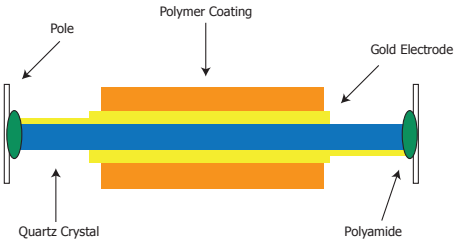
Quartz Crystal Microbalance

The Quartz Crystal Microbalance (QCM) technology for moisture measurement is based on monitoring the frequency modulation of a hygroscopic-coated quartz crystal with specific sensitivity to water vapor.

Bulk adsorption of water vapor onto the coated crystal causes an increase in effective mass. This change in mass modifies the oscillation frequency in a very precise and repeatable manner and the frequency change is in direct proportion to the water vapor pressure. The moisture concentration can therefore be measured as a change in the oscillation frequency, with respect to a reference crystal.

The sorption process is fully reversible with no long-term drift effect, giving a highly reliable and repeatable analysis. Rapid one-minute measurement cycling achieves close to instantaneous response to sample gas moisture changes.





The QMA601 Process Moisture Analyzer is designed to provide highly reliable, fast and accurate measurement of moisture content in a wide variety of carrier gases, but is particularly effective for gas molecular sieve dryer outlet applications. QCM technology can provide fast and accurate moisture breakthrough response and can therefore be used to extend dryer running times. This, in turn, can reduce dehydrator regeneration cycles over time, extending the life of the desiccant and reducing maintenance periods on downstream equipment.

Our products are also backed up by global service and support. With locations on six continents and in 56 countries, Michell Instruments offers an extensive network of factory-trained application engineers, ready to analyze your application and deliver the solution. This allows us to assure customer satisfaction throughout the product's lifetime.

If you can't find a product to fit your application, contact your local Michell Instruments office, or visit our website www.ProcessSensing.com – we're here to help.

The Moisture Specialists:

We have the solution for your moisture sensing needs

With 5 proprietary moisture sensing technologies, Michell Instruments will tailor our solutions to best fit the specifics of the your application, as well as the project budget.

Capacitive humidity sensors:

For quick and easy pipeline integrity measurement in low pressure town gas.

Michell Ceramic Metal-Oxide Moisture Sensor technology:

Third generation of metal oxide for natural gas applications at high pressure (CNG) and economical, easy gas processing applications.

Chilled Mirror:

For precise reference measurements at highest accuracy and NPL or NIST traceability.

Quartz Crystal Microbalance:

For fast, precise measurement at low ranges in changing backgrounds.

TDLAS:

For fast, precise and low maintenance measurement in both sweet and sour gases from 1000 ppm_v to 1 ppm_v.

Technical Specifications

Performace Specifications	
Measuring Technology	Fast-Response Quartz Crystal Microbalance
Calibrated Range	0.02...100 ppm_V, certified traceable to national humidity standards at NPL (UK) and NIST (USA)
Measurement Range	0.02...100 ppm_V, trending to 2000 ppm_V
Accuracy	±0.03 ppm_V or ±10 % reading, whichever is greater
Repeatability	±5 % of reading from 0.3 to 100 ppm_V
Limit of Detection	0.02 ppm_V
Available Units	ppm_V, ppm_W, mg/Nm^3, vapor pressure (Pa), dew point (°C/°F), lb/MMscf
Response Speed	Close to instantaneous response to sample gas moisture changes
Automatic Calibration	Internal moisture generator source, nominally 0.5 ppm_V, calibrated traceable to NPL and NIST
Sensitivity	0.01 ppm_V or 1 % of reading, whichever is greater
Electrical Specifications	
Supply Voltage	85...264 V AC, 47/63Hz or 24 V DC (ATEX / UKCA/IECEx) 24 V DC only (cQPSus)
Alarms	1 x system alarm, volt-free change-over (FORM C) 3 x process alarms, selectable for various parameters, volt-free changeover (FORM C)
Analog Signals	2 x 4...20 mA or 1...5 V (selectable) Maximum load resistance 500 Ω for 4...20 mA and minimum load of 1M Ω for 1...5 V
Digital Communications	RS485 ModBus RTU Modbus TCP
Data Logging	Available on analyzer (Limited number of values) or via Application Software
Local Interface	7" color LCD with intuitive HMI
Electrical Connections	M20 entries for cable glands

Operating Conditions	
Inlet Pressure	2 barg
Outlet Pressure	1 barg
Sample Flow	300ml/min total flow
Sample Gas Temperature	0...+100 °C
Operating Environment **Analyzer only**	+5...+45 °C up to 90 % rh -20...+55 °C up to 95 % rh (fitted with heater/ thermostat and/or enclosure cooling as appropriate to maintain +5...+45 °C internal temperature)
Analyzer in sampling system	
Mechanical Specifications	
Type	GUB Flameproof Exd
Enclosure	
Lid & body	Cast copper-free aluminum LM25 (EN AC-42000), less than 0.6 magnesium
Glass window	Heat resistant, explosion proof, polyester coated, IP66, NEMA 4
Analyzer Gas Connections	1/8" NPT
Weight	35 kg without sampling system
Sample System Enclosure	316L stainless steel
Certifications	
Hazardous Area Certifications	
ATEX/UKCA	II 2 GD Ex db IIB+H2 T6 Gb, Tamb -40 °C...+60 °C
IECEx	Ex db IIB+H2 T6 Gb, Tamb -40 °C...+60 °C
cQPSus	CLS I, Div 1, Group BCD T6 Tamb -25 °C...+55 °C CLS I, ZONE 1, AEx db IIB + H2 T6 Gb Ex db IIB + H2 T6 Gb Tamb -20ºC...+55ºC
TR CU	1Ex d IIB+H2 T4 Gb X, 1Ex tb IIIC 130 °C Db X and 1Ex d IIB+H2 T3 Gb X, 1Ex tb IIIC 195 °C Db X

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