

# QMA601

## 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.



### Highlights

- Precision measurement from 0.1 to 2000ppm<sub>v</sub>
- Accuracy of  $\pm 0.1\text{ppm}_v$  at  $<1\text{ppm}_v$  and 10% of reading from 1 to 2000ppm<sub>v</sub>
- Maintenance-free for 3 years
- Built-in verification of customer process gas
- IECEx, ATEX, TR CU Ex certified for Exd flameproof, cCSAus (pending) 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

- Glycol dehydration of natural gas
- Molecular sieve dehydration of natural gas
- Natural Gas transmission and storage
- Refinery catalytic reforming — recycle gas monitoring
- Ethylene and propylene production
- LNG production / revaporization



### 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 Process Moisture Analyzer

### Precision Measurement

- High accuracy with lower detection limit of 0.1 ppm<sub>v</sub>
- Wide range of 0.1 to 2000ppm<sub>v</sub>

The QMA601 is the result of Michell Instruments' continuous effort to improve Quartz Crystal Microbalance technology. The new analyzer utilizes a new generation of precision crystal oscillators guaranteeing a 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 (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  $\pm 0.1$  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 Modbus RTU Protocol over RS485 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 is 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 simple 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

Just one, low-power single phase AC supply is required for both the analyzer and sampling system. No barrier unit or safety earth are required, saving the user both cost and inconvenience.

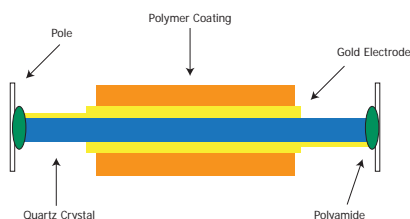
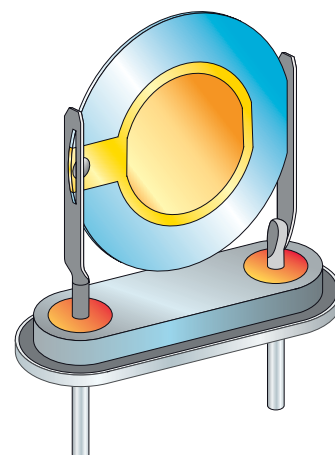
## Technology:

### 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 measurement.



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. Utilizing Quartz Crystal Microbalance technology, the analyzer incorporates automatic (or manual) verification using an integrated moisture generator reference source and, with its intuitive touch-screen operated color HMI, provides easy operation.

Our products are backed up by global service and support. With locations on 6 continents and 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.michell.com](http://www.michell.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 Sensor technology:

3rd 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 1000ppm<sub>v</sub> to 1ppm<sub>v</sub>.

## Technical Specifications

<b>Measuring technology</b>	Fast Response Quartz Crystal Microbalance
<b>Range</b>	Calibrated range 0.1 to 2000ppm <sub>v</sub>
<b>Accuracy</b>	±10% of reading from 1 to 2000ppm <sub>v</sub> ±0.1ppm <sub>v</sub> between 0.1 & 1ppm <sub>v</sub>
<b>Repeatability</b>	±5% of the reading from 1 to 2000ppm <sub>v</sub> ±0.1ppm <sub>v</sub> between 0.1 & 1ppm <sub>v</sub>
<b>Limit of detection</b>	0.1ppm <sub>v</sub>
<b>Available units</b>	ppm <sub>v</sub> , ppm <sub>w</sub> , mg/Nm <sup>3</sup> , vapor pressure (Pa), dew point (°C), lb/MMscf
<b>Response speed</b>	T63 <2 mins to step change in either direction T95 <5 mins to step change in either direction
<b>Self verification</b>	Internal moisture generator source calibrated traceable to NPL & NIST
<b>Sensitivity</b>	0.1ppm <sub>v</sub> or 1% of reading, whichever is greater
<b>Electrical Specifications</b>	
<b>Supply voltage</b>	85 to 264 V AC, 47/63Hz, 110 to 300 V DC
<b>Alarms</b>	1 x system alarm, volt-free change-over (FORM C) 3 x process alarms, selectable for various parameters, volt free changeover (FORM C)
<b>Communications</b>	RS485 Modbus RTU 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
<b>Data logging</b>	Logs adjustable from 1 to 10 min intervals for a 24hr period
<b>Local interface</b>	7" color LCD with touch-screen keypad
<b>Electrical connections</b>	M20 entries for cable glands

### Operating Conditions

<b>Inlet pressure</b>	3 barg (43.5 psig)
<b>Outlet pressure</b>	2 barg (29 psig)
<b>Sample flow</b>	300ml/min total flow
<b>Sample gas temperature</b>	0 to +100°C (+32 to +212°F)
<b>Operating environment</b>	<b>Indoor:</b> +5 to +45°C (+41 to +113°F) up to 90% RH <b>Outdoor:</b> -20 to +60°C (-4 to +140°F) up to 95% RH (enclosed analyzer with sample system)

### Mechanical Specifications

<b>Type</b>	GUB Flameproof Exd
<b>Enclosure</b>	<b>Lid &amp; body:</b> Cast copper-free aluminum LM25 (EN AC-42000), less than 0.6 magnesium <b>Glass window:</b> Heat resistant, explosion proof, polyester coated, IP66, NEMA 4
<b>Gas connections</b>	1/4" NPT(F)
<b>Weight</b>	35kg (77.2lbs) without sampling system
<b>Sample system enclosure</b>	316L stainless steel

### Certifications

<b>Hazardous area certifications</b>	<b>ATEX:</b> II 2 GD Ex d IIB+H2 T4 Gb Ex tb IIIC 130°C Db (-40 to +45°C) and II 2 GD Ex d IIB+H2 T3 Gb Ex tb IIIC 195°C Db (-40 to +55°C)  <b>IECEx:</b> Ex d IIB+H2 T4 Gb Ex tb IIIC 130°C Db (-40 to +45°C) and Ex d IIB+H2 T3 Gb Ex tb IIIC 195°C Db (-40 to +55°C)  <b>cCSAus (pending):</b> Class I, Division 1, Groups B, C, & D, T4 Class II, Division 2, Groups E, F & G, T4 (-40°C to +55°C)
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Michell Instruments adopts a continuous development programme which sometimes necessitates specification changes without notice.  
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