

QMA601

Moisture in CO₂ Analyzer

Fast, high-precision moisture measurements for hazardous areas.

The next in the family of Advanced Quartz Crystal Microbalance analyzers from Michell Instruments is designed to provide reliable, fast and accurate measurement of moisture content in carbon capture, utilization and storage (CCS/CCUS) and bioenergy with carbon capture and storage (BECCS) applications, where keeping moisture levels within specifications is of critical importance.



Highlights

- Reliable measurement from 1 to 1000 ppm_v with trending to 2000 ppm_v
- Accuracy of ± 1 ppm_v from 1 to 10 ppm_v
- Calibration traceable to national standards
- Low cost of ownership
- Globally certified for use in hazardous areas, e.g. ATEX, IECEx and cQPSus
- Intuitive, color HMI with touch-screen keypad; no 'hot work' permit required
- 14 internal alarms
- Proven Michell Instruments quality: 50 years of expertise in moisture measurement built into the design

Applications

- Post-dehydration monitoring of CO₂ for CCS/CCUS applications on power generation or industrial facilities
- Post-dehydration monitoring of CO₂ for BECCS processes on biorefineries
- CO₂ extraction on combined heat and power (CHP) plants
- CO₂ transmission pipeline inlet/outlet monitoring
- CO₂ rail/ship/truck transport and custody transfer facilities
- CO₂ storage facility injection processes



50 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 50 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.

Worldwide government initiatives on processes like Carbon capture and sequestration (CCS), carbon capture, utilization, and storage (CCUS) and Bioenergy coupled with carbon capture and storage (BECCS) which can play an important and diverse role in meeting global energy and climate goals, are driving the need for the application of analytical tools to help maintain quality and safety for these projects.

Introducing the QMA601 Moisture in CO₂ Analyzer

Precision Measurement

- High accuracy with lower detection limit of 1 ppm_v
- Measurement range of 1...1000 ppmV with trending to 2000 ppm_v
- Sensitivity of 0.05 ppm_v

This is the latest in the family of Michell Instruments' Quartz Crystal Microbalance analyzers. The new analyzer brings fast and accurate moisture measurement to operators in the quickly expanding carbon dioxide (CO₂) drying, transport, and sequestration project markets.

Accurate and continuous moisture measurement is a critical aspect of these projects, and this new analyzer 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 analyzer will therefore perform reliably for many years with just basic maintenance and housekeeping. If necessary, major analyzer components can be exchanged onsite quickly and the analyzer put back into service with minimum downtime.

Traceable Calibration – Accurate Measurements

The QMA601 is factory calibrated in CO₂ in a novel process using a reference instrument traceable to NPL and NIST. This guarantees measurement performance for these critical processes. 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 and can be used for periodic verification of analyzer performance and automatically adjusting out any change.

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

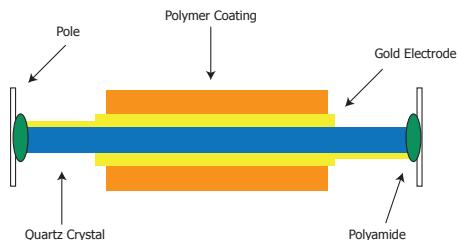
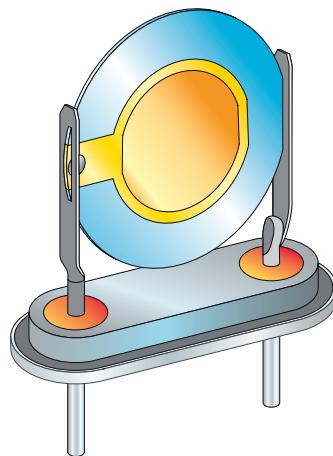
Technology:

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. The technology offers a fast response time to changes in moisture levels, which is essential for quickly addressing any deviations from desired conditions. The QMA601 can be used in various stages of CCS/CCUS and BECCS processes from monitoring moisture in the captured CO_2 streams to ensuring the dryness of storage sites, ensuring integrity and efficiency of these processes.

PST has a global network of sales, service, and support teams that can work closely with customers and partners to deliver applications specific products and solutions from our operational centers of excellence. 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 PST 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 five proprietary moisture sensing technologies, Michell Instruments will tailor our solutions to best fit the specifics of 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

Performance Specifications		Operating Conditions	
Measuring Technology	Fast-Response Quartz Crystal Microbalance	Inlet Pressure	2 barg
Calibrated Range	1...1000 ppm _v certified traceable to national humidity standards at NPL (UK) and NIST (USA)	Outlet Pressure	1 barg
Measurement Range	1...1000 ppm _v trending to 2000ppm _v	Sample Flow	300ml/min total flow
Accuracy	Accuracy ± 1 ppm _v between 1 and 10 ppm _v ± 10 % of reading from 10 to 2000 ppm _v	Sample Gas Temperature	0...+100 °C
Repeatability	± 0.5 ppm _v or 5 % of reading, whichever is greater	Operating Environment Analyzer only	+5...+45 °C up to 90 %rh
Limit of Detection	1 ppm _v	Analyzer in sampling system	-20...+55 °C up to 95 %rh (fitted with heater/thermostat and/or enclosure cooling as appropriate to maintain +5...+45 °C internal temperature)
Available Units	ppm _v ppm _w mg/Nm ³ , vapor pressure (Pa), dew point (°C/F), lb/MMscf	Mechanical Specifications	
Response Speed	Close to instantaneous response to sample gas moisture changes	Type	GUB Flameproof Exd
Sensitivity	0.05 ppm _v or 1 % of reading, whichever is greater	Enclosure	
Electrical Specifications		Lid & body	Cast copper-free aluminium LM25 (EN AC-42000), less than 0.6 magnesium
Supply Voltage	85...264 V AC, 47/63Hz or 24 V DC (ATEX / UKEx / IECEx) 24 V DC only (cQPSus)	Glass window	Heat resistant, explosion proof, polyester coated, IP66, NEMA 4
Alarms	1 x system alarm, volt-free changeover (FORM C) 3 x process alarms, selectable for various parameters, volt-free changeover (FORM C)	Analyzer Gas Connections	1/8" NPT
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	Weight	35 kg without sampling system
Digital Communications	RS485 Modbus RTU Modbus TCP	Sample System Enclosure	316L stainless steel
Data Logging	Available on analyzer (Limited number of values) or via Application Software	Certifications	
Local Interface	7" color LCD with intuitive HMI	Hazardous Area Certifications	
Electrical Connections	M20 entries for cable glands	ATEX/UKEx	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 -20°C...+55°C
		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.
Issue no: QMA601_97490B_V1_EN_Datasheet_0225