MOISTURE PROCESS INSTRUMENTS

ANALYZER SOLUTIONS FOR *YOUR* PROCESS!

PRELIMINARY LITERATURE

Model 3050-SLR for Super Low Range Moisture Analysis

Quartz Crystal Microbalance Technology: Accurate. Reliable. Verifiable. Responsive.

WELCOME TO THE NEW WORLD OF PROCESS MOISTURE ANALYSIS

The Model 3050-SLR provides extremely accurate measurement of trace levels of moisture in a gas through the use of a quartz-crystal oscillator sample cell. AMETEK is the leader in quartz-crystal technology, which for thirty years has offered significant advantages over other measurement techniques:

- *It is the most accurate trace moisture measurement technology available*
- *It responds far faster to both increasing and decreasing moisture levels*
- *It is specific to moisture in most applications*
- *It provides a much more rugged sensor*

Because of these advantages, the quartz-crystal oscillator has become the industry standard for applications ranging from ultrahigh purity semiconductor gases to natural gas streams containing 30% H_2S. Now, the 3050-SLR brings the benefits of quartz-crystal technology to a broad spectrum of low range moisture measurement applications.

DIRECT MEASUREMENT OF CONCENTRATION

The Model 3050-SLR measures moisture concentration directly, in parts per million by volume, parts per million by weight, or mass of water per standard volume without additional pressure or temperature compensation. For customers who wish to convert concentration to dew point, the 3050-SLR can be programmed for a live process pressure input or a fixed process pressure.

THE QUARTZ-CRYSTAL SENSOR

The heart of the 3050-SLR analyzer is a quartz-crystal microbalance (QCM) sensor and sampling system developed by AMETEK specifically for highly accurate moisture measurements. The sensor consists of a quartz crystal disc coated with a hygroscopic polymer. As the amount of moisture sorbed onto the polymer varies, the mass of the QCM changes, producing a corresponding change in the frequency of oscillation. The accuracy of the 3050-SLR is an amazing ±0.03 ppmv or 10% of reading whichever is greater over the calibrated range of 0.1 to 25 ppmv. Compare this to the typical accuracy of a hygrometer.

UNIQUE SAMPLING SYSTEM

The design of the 3050-SLR provides three operating modes: **gas saver**, **sensor saver**, and **high speed**. In the **high speed** mode the analyzer delivers a speed of response that's far superior to other analyzers while consuming just over one SLPM of sample gas. In some processes, the sample gas is very valuable, in which case the sample gas consumption of the 3050-SLR can be reduced to a mere 150 sccm by activating **gas saver** mode. If the analyzer determines that there is a contamination concern, the 3050-SLR will operate in its **sensor saver** mode. This provides both a continuing, accurate moisture analysis and a maintenance alarm to warn you of its concern about contamination. In this mode, the sensor is exposed to fewer contaminants by simply extending the contaminant-free reference period. Therefore, the sensor is exposed to less contamination while also allowing the reference gas a longer time to strip volatile contaminants from the sensor. These two factors work together to provide a longer cell life. In general, quartz is a far less reactive material than those used by other technologies and it is therefore more resistant to contamination. The reliability and stability of the QCM sensor and 3050-SLR's sampling system result in a complete lack of routine calibration requirements. The analyzer and its calibration are extremely stable. Building and maintaining your confidence in the analyzer's performance is easy because every 3050-SLR contains the ability to self-verify the QCM sensor's responsiveness and accuracy to moisture.

Actual Moisture Content PPMv	Model 3050-SLR Accuracy	Aluminum Oxide Probe Accuracy ±2°C for dew points ≥ -65°C and ±3°C for below
0.1	± 0.03 ppmv	+0.072 ppmv / -0.043 ppmv
1	± 10% of Reading	+59.6%/-38.2% of Reading
5	± 10% of Reading	+52.4%/-35.2% of Reading
10	± 10% of Reading	+30.9%/-24.0% of Reading
20	± 10% of Reading	+29.3%/-23.0% of Reading

* Dew point conversions are referenced to 14.7psia

AMETEK®

ON-LINE VERIFICATION CAPABILITY

The 3050-SLR is equipped with the ability to self-verify its accuracy and sensitivity to moisture. With a built-in zero module and internal moisture generator, the 3050-SLR gives you data you can have confidence in. On a programmed schedule, or whenever you feel it's necessary, you can route your process gas through the 3050-SLR's internal zero gas generator and its internal moisture generator, giving you a zero reference and a span calibration standard based upon the actual process gas. The 3050-SLR automatically zeroes itself then compares its moisture measurement with the NIST-traceable known value of the internal moisture generator. If necessary, the analyzer can make small corrections to its calibration automatically. If a severe calibration problem exists, the analyzer will provide an alarm. With the 3050-SLR, you will always be confident that the analyzer is responsive to the moisture present in the sample gas.

PERFORMANCE SPECIFICATIONS*

Technology: Quartz Crystal Microbalance

Range: Calibrated from 0.1 to 25 parts per million by volume (ppmv) with a trend indication up to 2500 ppmv. Readout capability in ppmw, lb/mmscf, mg/Nm $_3$, and dewpoint in °C or °F (requires process pressure as an input)

Reference Gas: Continuously produced using actual sample gas

On-Line Verification: Internal moisture source with NIST traceable calibration enables on-demand verification of analyzer accuracy and responsiveness without uninstalling the analyzer

Accuracy: ±0.03ppmv or ±10% of reading from 0.1 to 25 ppmv with standard calibration

Reproducibility: ±5.0% of reading from 0.1 to 25 ppmv

Limits of Detection: 0.1 ppmv

Moisture Generator: 1.0 ppmv nominal; calibration is NIST-traceable

Reliability: No routine factory calibration required due to highly stable and reliable nature of QCM sensor

QCM Response Time: Near real time. Computer enhanced response, which may lead to errors, is not required to obtain quick wet-up or dry-down response

Sensitivity: 0.01 ppmv or 1% of reading, whichever is greater

Allowable Inlet Pressure: 1.3 to 3.3 Bar (20 to 50 psig) (up to 200 Barg (3000 psig) with optional pressure reducer; analyzer performance is independent of process pressure

Exhaust Pressure: 0 to 1 Barg (0 to 15 psig)

Sample Gas Temperature: 0 to 100°C (32 to 212°F); analyzer performance is immune to changes in sample gas temperature

Gas Flow Requirements: Approx.150 sccm. Approx. 1.0 slpm bypass flow for increased speed of response

Outputs: Isolated 4 to 20 mA analog signal, keyboard selectable; 12 bit (0.025%) resolution, RS-232 and RS-485 serial communication ports

Alarms: Two contact closures; system and data invalid alarm

Ambient Temperature Limits -20 to 45°C (-4 to 113°F)

Voltage/Power Requirements

115 +10% VAC, 50/60Hz, 250 W maximum
230 +10% VAC, 50/60Hz, 240 W maximum

APPROVALS AND CERTIFICATIONS

UL/CSA/CE Class 1, Division 1, Group B, C, D T6 and CENELEC Zone 1 IIC T6

ADDITIONAL SAMPLE SYSTEM COMPONENTS

In order to derive the full advantages of the Model 3050-SLR, a well-designed sampling system is necessary.

AMETEK can supply a complete sampling system to include:

- Filters: In line or bypass filters to remove particulate from gas or liquid sample streams and small amounts of oil or other condensables from gas streams.
- Pressure Reducer: Required if sample sources are at pressures higher than 3.3 Bar (50 psig). Maximum input pressure is 200 Bar (3000 psig).
- Heated Pressure Reducer: Designed to prevent condensation of gases upon pressure reduction, or to vaporize liquefied gas streams with boiling points not exceeding 40°C (140°F). Maximum input pressure is 200 Bar (3000 psig). Suitable for NEC Class 1, Division 1, Groups B/C/D, and CENELEC IIC T3 areas.

*Specifications are preliminary and subject to change.

One of a family of innovative process analyzer solutions from AMETEK Process Instruments.

AMETEK®
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ISO 9001 REGISTERED CE

#3050-SLR (14/03/01)