



SS2100 TRACE MOISTURE IN DRY BULK GASES (N₂, HE, H₂, AR, CO₂)

Product Code 65201

KEY FEATURES

- No Consumables - Low Cost of Ownership
- Virtually maintenance free - No routine maintenance requirements
- Fast – No wet-up or dry-down times - Responds to changes in H₂O concentration in as little as 1 sec.
- No interference from other compounds – uses high resolution TDL technology



Measure moisture in Bulk Gases using Tunable Diode Laser technology, a maintenance-free alternative to traditional moisture monitors.

BULK COMPRESSED GASES Moisture is one of the most important impurities in high purity gases such as Nitrogen, Helium Hydrogen, Argon and Carbon Dioxide.

These gases are frequently used because water from the atmosphere can damage equipment or a process.

CRITICAL CONTROL OF MOISTURE

Some of these bulk gases are manufactured by cryogenic processes. Others are dried using fixed bed desiccant driers as part of the process. In any case, the moisture content of the gas must be measured to ensure purity of the final product.

TRADITIONAL MEASUREMENT SOLUTIONS

Aluminum Oxide capacitance probes and vibrating quartz crystal moisture analyzers have been the traditional method for monitoring the levels of moisture at desiccant dryer outlets, or in the final product. Unfortunately, capacitance probes change their response over time even without contamination, and since they cannot be recalibrated in the field, they must be replaced. It's not uncommon for moisture probes to be replaced multiple times a year. Quartz crystal moisture meters have slow wet-up and dry-down times that are slow to detect break-through from the dryers.

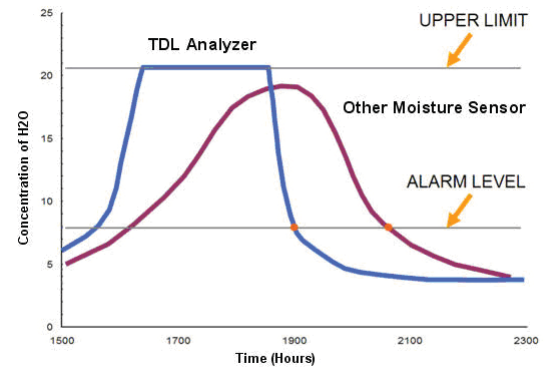


Figure 1: Fast Response of TDL Moisture Analyzer vs. Conventional Moisture Analyzer

SPECTRASENSORS' SOLUTION

SpectraSensors SS2100 is the ideal solution for dry bulk gas applications. Tunable Diode Laser technology means that measurement interferences from other infrared absorbing compounds are avoided. There are no wet-up or dry-down delays, resulting in fast updates even when the concentration changes dramatically (Fig. 1). The calibration is stable over the life of the analyzer. There are no consumable parts or supplies. The analyzer is virtually maintenance free and has a low cost of ownership.

VALIDATION

Validation of low level (<10 ppm) water measurements is essential, but also extremely difficult, as certified blends at such low levels are not readily available. Some have attempted to use permeation devices, but these require regular maintenance to prevent drying out, and there is no independent way to verify the accuracy of the permeation device. SpectraSensors employs a dilution system that dilutes a relatively high concentration certified standard of H₂O in Nitrogen using dried sample gas. Thus the validation is accurate and traceable.

SS2100 Moisture Analyzer

SPECIFICATIONS

Application Data

Target Components	H ₂ O in Compressed Gases (N ₂ /H ₃ /H ₂ /Air/CO ₂) Specify Background Gas
Typical Measurement Ranges	0-25ppm, 0-10ppm (other ranges available upon request)*
Typical Precision	±0.05ppm*
Measurement Response Time	1 to ~60 seconds*
Principle of Measurement	Tunable Diode Laser Absorption Spectroscopy Non-differential
Environmental Temperature Range	-20° to 50° C (-4° to 122° F) -10° to 60° C (14° to 140° F) <i>optional</i>
Sample Inlet Pressure	70kPag (10 PSIG) typical 210kPag (30 PSIG) maximum
Sample Cell Temperature Range	Maintain at 50° C ±2° C
Maximum Cell Pressure	70kPag (10 PSIG)
Sample Flow Rate	3-4 L/min (6.4 to 8.5 scfh)*
Recommended Validation	A certified blend of H ₂ O in Nitrogen balance is diluted with dried sample in the sample conditioning system under flow control



Electrical Data

Power	100-240 VAC, 50-60 Hz standard
Max Current	Controller: 1A @ 120 VAC
Controller to Cell Cable Length	1m standard (3m, 5m & 10m available optionally)
Communication	Current Loop Output 4-20 mA Isolated, 1200 ohms @ 24 VDC max load. Serial: ASCII Text RS232C standard, Modbus RS232C
Digital Outputs	Four (4) 12 VDC for valve operations: Scrubber (if required), Process/Val, Val 1, Val 2, 5 SPDT (Form C) Dry Contacts: Common Fault, Val 1 Active, Val 2 Active, Val Fail, One user assignable DO to standard alarms
LCD Display	Concentration, Cell Pressure and Temperature, Diagnostic Data

Physical

Controller Enclosure	NEMA 4X – 304 stainless steel <i>standard</i>
Controller Dimensions	343 mm H x 305 mm W x 165 mm D (13.5" H x 12" W x 6 7/16" D)*
Weight Approximately	13.1 Kg (28.6 lbs)*
Sample Cell Dimensions	28m Herriott cell, 559 mm H x 127 mm W (22" H x 5" W)
Sample Cell Construction	316L Series Polished Stainless Steel Standard - SilcoNert® coated
Number of Sample Cells	1 (Single Channel SS2100) or 2 (Dual Channel SS2100)
Dimensions with Sample System	1678 mm H x 613 mm W x 427 mm D (66" H x 24-1/8" W x 16-13/16" D)
Weight with Sample System	68 Kg (150lbs)

Area Classification

Certification	CSA Certified for Class I, Div. 2, Groups ABCD T3C Ex II 2G Ex d IIB+H2 T5; Tamb : -20 ÷ +60 °C
---------------	--

* Application specific; consult factory.



ANALYZER

The Analyzer Scope consists of the Electronic controller, cell, and 1m long interconnecting cable. The customer or analytical systems integrator is responsible for providing a sample conditioning system and/or cell enclosure that maintains the sample and cell at a constant temperature (generally 50°C +/- 0.2°C) that is above the hydrocarbon and moisture dew points of the process stream. The sample flow, sample pressure, and temperature specifications listed above must be maintained at all times. Any departure from these specifications must be approved by SpectraSensors.

TYPICAL STREAM COMPOSITION FOR DRY BULK GAS AFTER DESICCANT DRYING:

Component	Unit	Typical Concentration	Min. for Application	Max. for Application
Water (H ₂ O)	ppmv	<10	0.05	100
Nitrogen (N ₂)	Mole%	99.99+	98.0	100
Helium (He)	Mole%	99.99+	98.0	100
Hydrogen (H ₂)	Mole%	99.99+	98.0	100
Argon (Ar)	Mole%	99.99+	98.0	100
Carbon Dioxide (CO ₂)	Mole%	99.99+	98.0	100
Total	Mole%	100		

The background stream composition must be specified for proper calibration and measurement performance. Specify the Normal composition, along with the minimum and maximum expected values for each component, especially water, the measured component. Other stream compositions may be allowable with approval from SpectraSensors.

RELAY CONTROL AND COMMUNICATIONS

All SS2100 Process Analyzers are supplied with 9 relays:

- Four (4) are 12 VDC powered and provided for driving switching valves associated with Process, Validation 1 and Validation 2 and a scrubber (for differential systems only).
- Five (5) SPDT (Form C) dry contact digital outputs are provided for common fault, Val 1 active, Val 2 Active, Validation Fail, and one (1) user-assignable DO to any standard alarm, such as high concentration, high cell pressure, low cell temperature, high cell temperature, low sample flow, etc. depending on the application.

Data Output is via 4-20 mA Isolated Analog Output.

Serial Communication via Modbus protocol is provided. See Modbus specifications for details.

MEASUREMENT SOLUTION

Proper sample conditioning is essential to an accurate and reliable measurement. SpectraSensors provides standard and custom engineered Measurement Solutions for all applications. Standard features include:

Inlet Pressure Relief Valve	Automatic Valve for Validation Gases
Inlet and Outlet Shut-off Valves	Cell Flow Rotameter and Control Valve
Sample Filter	Outlet Pressure Gauge
Sample Bypass Pressure Gauge	Cell Outlet Non-return Valve
Bypass Flow Rotameter and Control Valve	

VALIDATION

Validation of low level (<10 ppm) water measurements is essential, but also extremely difficult, as certified blends at such low levels are not readily available. Some have attempted to use permeation devices, but these require regular maintenance to prevent drying out, and there is no independent way to verify the accuracy of the permeation device. SpectraSensors employs a dilution system that dilutes a relatively high concentration certified standard of H₂O in Nitrogen using dried sample gas. Thus the validation is accurate and traceable.