



SS2100 TRACE MOISTURE IN DRY COMPRESSED AIR

Product Code 65501

KEY FEATURES

- No consumables – Low Cost of Ownership
- No routine service needed
- High resolution laser-based measurement eliminates errors due to interferences
- Reliable Tunable Diode Laser lasts years
- Extremely fast analysis time – 1 second updates possible

Measure moisture in Instrument Air and other dry compressed air streams using Tunable Diode Laser technology, a maintenance-free alternative to traditional moisture monitors.

DRY COMPRESSED AIR Nothing is more critical to the safe and efficient operation of modern process plants than the purity and dryness of the Instrument Air. In plants where air is a reactant in the process, dryness may be even more critical.

CRITICAL CONTROL OF MOISTURE Various types of dryers have been used for compressed air. Refrigerative dryers will remove much of the water, but always leave the air at a dew point greater than 0°C at flowing pressure. Fixed bed desiccant dryers, either pressure-swing type or heated regeneration are probably the most common types of dryer. In every case to ensure dryness and to prevent damage to sensitive instruments and valve operators, the air dew point must be well below the ambient air temperature.

TRADITIONAL MEASUREMENT SOLUTIONS Aluminum Oxide capacitance probes, electrochemical and vibrating quartz crystal moisture analyzers have been the traditional method for monitoring the levels of H₂O at desiccant dryer outlets. Unfortunately, oil mists and other contaminants present in the air contaminate the capacitance and electrochemical probes, resulting in high maintenance costs due to the need to be constantly replaced.

Capacitance probes change their response over time 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 which

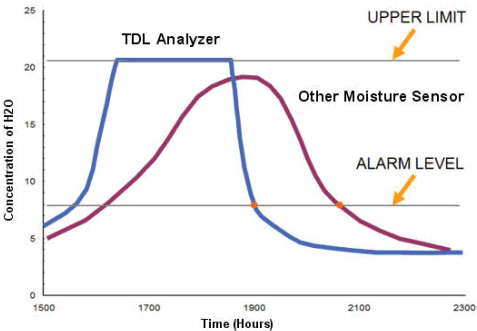


Figure 1: Fast Response of TDL Moisture Analyzer vs. Conventional Moisture Analyzer

are slow to detect break-through from the dryers.

SPECTRASENSORS' SOLUTION SpectraSensors SS2100 is the ideal solution for dry air applications. Its non-contact laser and detector are impervious to damage from contaminants. 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 put 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 Air
Typical Measurement Ranges	>10ppm (specify range up to 0-1000ppm)*
Typical Precision	±2% of Full Scale
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	1-2 L/min (2.1 to 4.2 scfh)*
Recommended Validation	Certified blend of H ₂ O in Nitrogen balance




Electrical Data

Power	100-240 VAC, 50-60 Hz standard
Max Current	Controller: 1 A @ 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

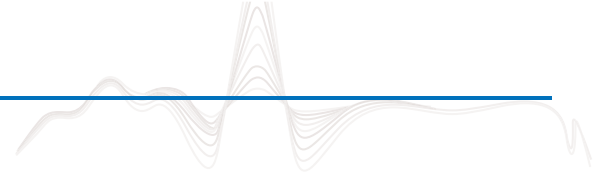
Physical

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 cell, 559 mm H x 127 mm W (22"H x 5"W)
Sample Cell Construction	316L Series Polished Stainless Steel Standard
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  II 2G Ex d IIB+H2 T5; Tamb : -20 ÷ +60 °C
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* 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.

Cable lengths of 3m, 5m and 10m may be substituted by specifying the corresponding part number. See spare parts and accessories list. Select the measured range desired. Other ranges are available by special order.

TYPICAL BACKGROUND STREAM COMPOSITION

Component	Unit	Typical Concentration	Min. for Application	Max. for Application
Water (H ₂ O)	ppmv	10	0.05	1000
Carbon Dioxide (CO ₂)	ppmv	320	0	1000
Oxygen (O ₂)	Mole%	20.9	0	25
Nitrogen (N ₂)	Mole%	7.8	75	90
Argon (Ar)	Mole%	0.92	0	1.0
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:

- o 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).
- o 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 (optional)
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 put 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. For ranges >50ppm a certified standard of water in Nitrogen can be used.