



SS2100 TRACE CARBON DIOXIDE IN BULK GASES (N₂, HE, H₂, AR)

Product Code 65303

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

New Technology to measure CO₂ in Bulk Gases.

BULK COMPRESSED GASES

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

CRITICAL CONTROL OF CARBON DIOXIDE

Some of these bulk gases are manufactured by cryogenic processes. Others are cleaned of CO₂ using fixed bed molecular sieves or acid gas absorbents as part of the process. In any case, the CO₂ content of the gas must be measured to ensure purity of the final product.

TRADITIONAL MEASUREMENT SOLUTIONS

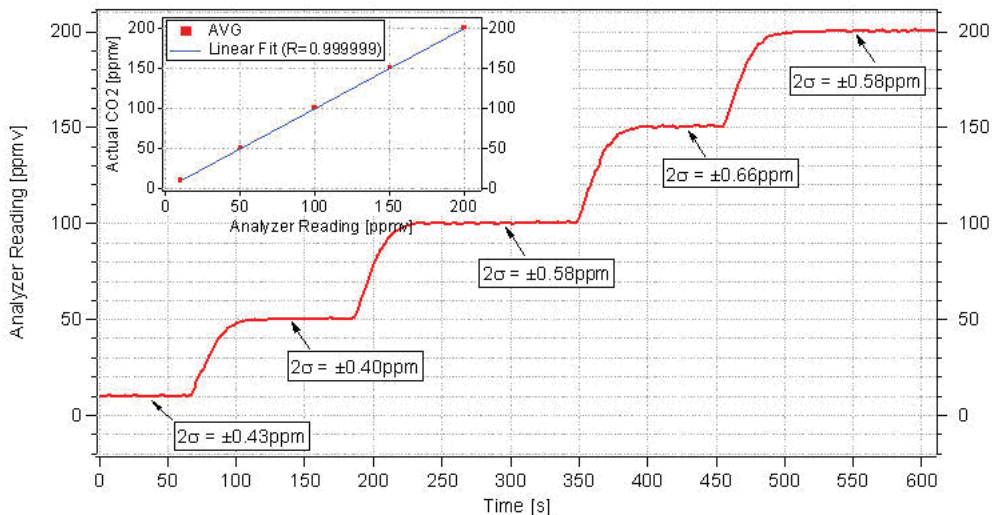
Trace gas analyzers based on chromatographic separations and helium ionization type detectors have been used, but the detectors required are notoriously sensitive to ambient air leaks in permeation in the columns and fittings, so that maintenance is often a problem. Methanation and measurement by Flame Ionization detectors is one approach, but the

high cost of consumables, such as columns, valves, carrier and detector gases makes the cost of these analyzer prohibitive, and GC measurements are inherently slow. Non-dispersive IR methods can be used, but long, folded-path cells to achieve the sensitivity required are expensive and the measurement is prone to interferences.

SPECTRASENSORS' SOLUTION

SpectraSensors SS2100 is the ideal solution for bulk gas applications. Tunable Diode Laser technology means 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. 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 The CO₂ measurements can be validated using a certified standard of CO₂ in a balance of Nitrogen.



Measurement Linearity and Repeatability for CO₂

SS2100 Carbon Dioxide Analyzer

SPECIFICATIONS

Application Data

Target Components	CO ₂ in Bulk Gases (N ₂ /He/H ₂ /Air) Specify Background Gas
Typical Measurement Ranges	≥ 0-200ppm (specify range)*
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	3-4 L/min (6.4 to 8.5 scfh)*
Recommended Validation	Certified blend of CO ₂ in Nitrogen balance



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	8m Herriott 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 Ex II 2G Ex d IIB+H2 T5; Tamb : -20 ÷ +60 °C
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* Application specific; consult factory.

SPECTRASENSORS SS2100 WATER IN HYDROGEN RECYCLE 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
Carbon Dioxide (CO ₂)	ppmv	100	4	1000
Water (H ₂ O)	Mole%	<0.01	0	0.5
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
Total	Mole%	100		

The background stream composition must be specified for proper calibration and measurement performance. If other than a high purity gas, please specify the normal composition, along with the minimum and maximum expected values for each component, especially CO₂, 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
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

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