



# SS2100 CARBON DIOXIDE IN RAW NATURAL GAS FEED

Product Code 34103

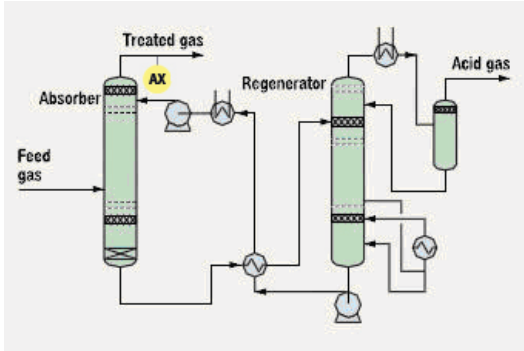
## KEY FEATURES

- No Consumables – Virtually Maintenance Free
- Tunable Diode Laser and Detector are isolated from the process Gas – No damage for process contaminants
- Fast - Responds to changes in CO<sub>2</sub> concentration in as little as 1 sec.
- Uses high resolution TDL technology - No interference from other compounds

**Tunable Diode Laser technology for the measurement of CO<sub>2</sub> in Feed Gas to Natural Gas Processing plants.**

### NATURAL GAS PROCESSING PLANTS

Regardless of the process downstream for Natural Gas Liquids extraction or Liquefied Natural Gas production, one of the first steps in a typical gas plant is acid gas (H<sub>2</sub>S and CO<sub>2</sub>) reduction and control.



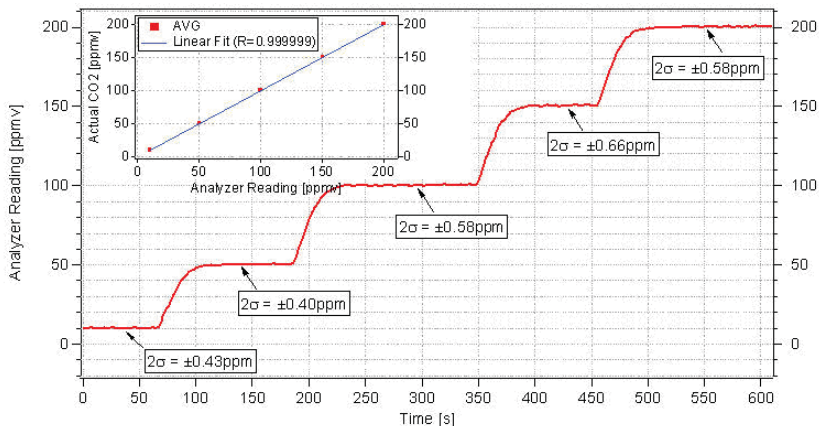
**CRITICAL CONTROL OF CO<sub>2</sub>** There are a variety of H<sub>2</sub>S and CO<sub>2</sub> reduction systems, some using liquid scrubbers such as amines or solvents, or fixed adsorbent beds, but the optimal operation of these systems requires an on-line measurement of the acid gas loading.

### TRADITIONAL MEASUREMENT SOLUTIONS

On-line gas chromatographs are the traditional method widely used for monitoring the levels of CO<sub>2</sub>. However, even with the latest in chromatography techniques and dedicating a GC to only the measurement of CO<sub>2</sub>, the analysis can take 3-6 minutes between measurement updates. Due to rapid changes in the acid gas concentration, this delay may not be acceptable. Gas chromatographs consume carrier gases, so the consumable costs of GC's are high. Non-dispersive IR Spectroscopic methods using broadband light sources and narrow band pass filters have been used but are prone to interferences from changing background concentrations.

**SPECTRASENSORS' SOLUTION** The SpectraSensors SS2100 offers a new solution to this control measurement. There are no cylinder gases to replace on a routine basis, so the analyzer is very low maintenance and has a low cost of ownership over the life of the analyzer. The high resolution that is inherent to TDL technology eliminates errors due to interferences that have hampered other spectrometric approaches. Tunable Diode Laser technology means that analysis is fast; results can be updated every second if desired.

**VALIDATION** The Analyzer measurement can be validated using a certified blend of CO<sub>2</sub> in a balance that matches the typical background of the sample.



# SS2100 Carbon Dioxide Analyzer

## SPECIFICATIONS

### Application Data

Target Components	CO <sub>2</sub> in Raw Natural Feed Gas
Typical Measurement Ranges	>0-100ppm* (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 <sub>2</sub> in a balance that matches the sample




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

**ANALYZER**

The Analyzer consists of the electronic controller, cell, and 1m long interconnecting cable (standard). Interconnecting cable lengths of 3m, 5m and 10m are also available for mounting the controller remotely, for example, with the controller mounted inside an analyzer shelter and the cell and sample system outside the shelter. The sample conditioning system and/or cell enclosure must maintain 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.

Select the measured range desired. Other ranges are available by special order.

**TYPICAL BACKGROUND STREAM COMPOSITION FOR RAW NATURAL GAS FEED**

Component	Minimum (Mole %)	Normal (Mole %)	Maximum (Mole %)
Hydrogen Sulfide	0.5 ppm	3 – 5 ppm	1000 ppm
Water	0.05 ppm	<1 ppm	10 ppm
Nitrogen	0	1 – 3	3
Oxygen	0	<1	1
Methane	75	75 - 95	100
Carbon Dioxide	0.05	100	1000
Ethane	0	0 - 10	10
Propane	0	0 - 5	5
Butanes	0	0 - 2	2
C5+	0	0 – 0.5	0.5

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 – CARBON DIOXIDE IN RAW NATURAL GAS FEED

For a complete analytical solution and to ensure the integrity of the sample stream and its analysis, SpectraSensors Gas Analyzers may be ordered with a Sample Conditioning System (SCS). Each SCS has been specifically designed to deliver a sample stream to the analyzer that is representative of the process stream at the time of sampling.

## SAMPLE SYSTEM FEATURES

The Sample Conditioning System provides the necessary features to complete the total analytical solution:

- Stable heated environment for the cell (50°C +/- 0.2°C)
- Sample supply and return shut-off valves
- Sample overpressure relief valve
- Analyzer guard particulate filter
- Validation gas inlet and automatic selection valve
- Cell pressure regulator
- Sample bypass pressure gauge
- Sample bypass flow valve and rotameter
- Cell flow valve and rotameter
- Outlet pressure gauge
- Outlet non-return valve
- Temperature gauge on cabinet
- Special Dilution System for Validation

## VALIDATION

SpectraSensors analyzers require no calibration in the field and the calibration is stable for the life of the analyzer, however, validation of trace H<sub>2</sub>S concentration is essential. At the SSI factory, the calibration is done by mixing certified blends of H<sub>2</sub>S at fairly high concentrations with pure gases through NIST-traceable mass flow controllers.

In the Field, the analyzer can be validated by using a certified blend of CO<sub>2</sub> in a background blended to match the normal stream composition, available from a number of reliable specialty gas blenders.