



# SS2100 HYDROGEN SULFIDE IN REFINERY PROPANE/PROPYLENE MIX

Product Code 23502

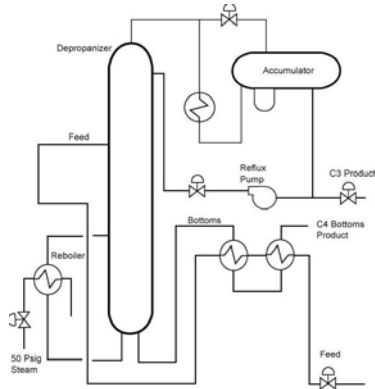
## KEY FEATURES

- Low Cost of Ownership – No Lead Acetate paper tape, carrier gases or flame fuel to buy
- No interference from changing background compounds – uses high resolution TDL and Differential Spectroscopy Technology
- Virtually maintenance free – No routine maintenance required
- Fast – Sensitive measurement of H<sub>2</sub>S



**Control H<sub>2</sub>S in Refinery Propane/Propylene Mix using Tunable Diode Laser technology.**

**PROPANE/PROPYLENE MIX** There are three major sources of pure Propylene for polypropylene feed: Refinery Fluidized Catalytic Cracking (FCC) byproduct, Ethylene Cracking Furnaces as a byproduct of Ethylene production and Propane dehydration; of these three, Refinery FCC byproduct is by far the largest source.



Sulfur compounds in the feed to the FCC unit are converted to H<sub>2</sub>S and follow the Propane/Propylene product.

Depending on the processing, there are three different products: an essential pure Propane, a 65/35 mix of Propane/Propylene and a 35/65 Propane/Propylene mix (see stream composition table). These products are further refined for their eventual use.

**CRITICAL CONTROL OF H<sub>2</sub>S** The primary method of H<sub>2</sub>S control is removal in the stripper section of the vapor recovery unit.

**TRADITIONAL MEASUREMENT SOLUTIONS** Lead Acetate paper tape analyzers have been used but they require frequent replacement of the paper tape

and many regard the paper tape itself as a handling and disposal problem due to its lead content. Gas Chromatographs have often been used but the desired measurements require Flame Photometric and other trace sulfur detectors that can be maintenance intensive.

**SPECTRASENSORS' SOLUTION** The SpectraSensors SS2100 offers a new solution to this challenging measurement. There are no cylinder gases or Lead Acetate tapes 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.

Only SpectraSensors employs Differential Spectroscopy to cope with the changes in background spectrum of the sample caused by changing operating conditions and feedstocks. The sample gas is passed through a copper nanoparticle scrubber to remove H<sub>2</sub>S, and the spectrum of the H<sub>2</sub>S-free sample is measured. The scrubber is then bypassed to measure the raw sample with H<sub>2</sub>S, and the H<sub>2</sub>S is measured by spectral subtraction. As the H<sub>2</sub>S-free background spectrum can be applied repeatedly to the sample, the scrubber is only used as needed, controlled by logic in the electronic controller.

The scrubber lifetime in normal service is a minimum of 18 months, so consumable costs and maintenance are low. Tunable Diode Laser technology means that analysis is fast; results can be updated every second if desired.

# SS2100 Hydrogen Sulfide Analyzer

## SPECIFICATIONS

### Application Data

Target Components	H <sub>2</sub> S in Propane/Propylene (C3) Product
Typical Measurement Ranges	0-10ppm* (other ranges available by request)
Typical Precision	±0.5ppm*
Measurement Response Time	1 to ~60 seconds*
Principle of Measurement	Differential Tunable Diode Laser Absorption Spectroscopy (H <sub>2</sub> S scrubber included)
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 <sub>2</sub> S in N <sub>2</sub> 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+H <sub>2</sub> T5; Tamb : -20 ÷ +60 °C
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\* Application specific; consult factory.



## THE ANALYZER

The Analyzer 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.

The controller and cell can be mounted remotely, with the controller inside an analyzer shelter and the cell mounted with the sample conditioning system on the outside of the shelter. Cable lengths of 3m, 5m and 10m may be added 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

Stream Composition	Background 1 - Propane		
Component	Minimum (Mole %)	Normal (Mole %)	Maximum (Mole %)
Ethane	0	1	2
Propane	65	78	100
Propylene	0	20	35
C4+	0	1	2.5

Stream Composition	Background 2 - 35/65		
Component	Minimum (Mole %)	Normal (Mole %)	Maximum (Mole %)
Ethane	0	1	2
Propane	0	20	35
Propylene	65	78	100
C4+	0	1	2

Stream Composition	Background 3 - 65/35		
Component	Minimum (Mole %)	Normal (Mole %)	Maximum (Mole %)
Ethane	0	1	2
Propane	65	78	100
Propylene	0	20	35
C4+	0	1	2.5

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 H<sub>2</sub>S, 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 - H<sub>2</sub>S IN REFINERY PROPANE/PROPYLENE MIX

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

## VALIDATION

SpectraSensors analyzers require no calibration in the field and the calibration is stable for the life of the analyzer, however, validation of the measurement is very desirable. At the SSI factory, the calibration is done by mixing a certified blend of H<sub>2</sub>S with pure gases using NIST traceable mass flow controllers to simulate the process gases.

In the Field, the analyzer can be validated by using a certified blend of H<sub>2</sub>S in a background of Nitrogen, available from a number of reliable specialty gas blenders.