GOW-MAC®
INSTRUMENT CO.

Series 210 Sulfur Analyzer

Highly selective for sulfur in CO_2

Rugged, simple to use, low maintenance

Batch or continuous stream monitoring

Automatic, hands-free calibration, flow setting and analysis

Rack mount or bench-top

The GOW-MAC Series 210SA Sulfur Analyzer meets ISBT Method 14 General Requirements and Guidelines for selective measurement of Total Sulfur Content (TSC) in beverage-grade, vaporized liquid CO_2. A newly designed Flame Photometric Detector (FPD) and proprietary technology are used for the specific measurement of sulfur species without interference from other potential impurities in beverage-grade CO_2. The detector exhibits linearity over three orders of magnitude, with a detection limit of ≤ 5ppb COS.

The Series 210SA is specifically designed as a rugged, low cost, low maintenance, simple-to-use, turn-key system. Calibration and sample introduction are totally automated. The Series 210SA system is capable of PC-based control and data logging.

The analyzer is designed for hands-free application via the use of a computerized user interface. A VF display and tactile keypad allows for fast, easy, and constant monitoring and reporting of sulfur data.

Common Volatile Sulfur Compounds

Hydrogen Sulfide (H_2S)	*n*-Propyl Mercaptan
Carbonyl Sulfide (COS)	*t*-Butyl Mercaptan
Sulfur Dioxide ($SO_{2)}$	Dimethyl Disulfide
Methyl Mercaptan (CH_3SH)	*sec*-Butyl Mercaptan
Ethyl Mercaptan	Diethyl Mercaptan
Dimethyl Sulfide	*i*-Butyl Mercaptan
Carbon Disulfide (CS_2)	*n*-Butyl Mercaptan
Isopropyl Mercaptan	*t*-Amyl Mercaptan
Methyl Ethyl Sulfide	

Speciation System

The speciation system employed by the Series 210SA has been designed to provide rapid, interference-free identification of all common, volatile sulfur-containing compounds (VSCs) including H_2S, COS, SO_2, and CH_3SH in beverage grade, vaporized, liquid CO_2. The interfering carbon emission line of CO_2 is segregated from the sulfur analytes of interest, providing an unimpeded analysis of sulfur emission lines.

Each sulfur species is captured and analyzed interference-free by the software system and compared against a previous (automatic) standard run. The calibrated value is displayed digitally on the instrument's front panel as TSC in ppm (v/v) sulfur, as defined by ISBT Method 14.0.

Gas Flow System

The flow system combines transport, calibration and sample gas movement with discreet sample introduction capability.

The transport gas is internally regulated and factory set negating the need for operator intervention. Transport gas cylinders/regulators would be placed in areas where they will not be subjected to temperature variations greater than ± 3 °C. The transport gas may be supplied by cylinder or bulk vessel.

The calibration and sample gases are externally regulated by the user. As an option to the Series 210SA, GOW-MAC will design the calibration/sample flow control accessory to meet the needs of the specific environment of the customer. Gas flows may be monitored by the flow meters on the front panel of the instrument.

The automatic sample introduction system is comprised of two electrically actuated valves. The first valve is for stream selection of the calibration or sample gas. The second is a gas-sampling valve for discreet, constant-volume sample presentation. A solenoid valve, upstream from the sample loop, is included so that valuable calibration gas is not wasted during analysis cycles or idle time.

Software System

The on-board software package contained in the Series 210SA allows complete unattended, 24/7 operation of the analyzer with a few simple input commands to the keypad on the instrument's front panel. The user is left only to ensure that the appropriate gases are flowing to the instrument.

Functions

Calibration: Automatically initiates proper stream selection and calibration gas purge prior to sample introduction. The calibration captures and stores the detector output in the form of a mA current, which is proportional to the sulfur signals. The data is stored, and the calibration is immediately validated by a second inject. The validation run is compared to the stored calibration run. The calibration is validated when agreement is reached between the runs. The recommended calibration gas is 500 - 1500 ppb COS in N_2, He, or CO_2. The concentration value of calibration standard may be entered via the keypad.

Run: Automatically selects the correct sample stream, and can be configured for use with an external trigger or continuous analysis. The sulfur compound concentration, in ppm, is displayed on the front panel and updated upon the completion of each analysis.

Bake-out: Upon the user's command, the software system will initiate a timed bake-out sequence of the speciation system. The speciation oven will automatically elevate to a factory-set temperature for a specific period of time and automatically cool to resume operation.

All functions, including status notes, are clearly displayed on the front of the instrument so that the progress of each calibration, validation and/or analysis can be monitored.

Maintenance & Training

The Series 210SA is designed for modular maintenance in the field. All maintenance activities are "plug and play", and include detector assembly and speciation assembly replacement. Each activity requires minimum tools, and is accomplished in ten minutes or less.

No specialized training is required for operation of the GOW-MAC Series 210SA. It has been designed around the concepts of simplicity and human factors, and is intended to provide years of service with little operator intervention.

By following the recommended calibration and operation procedures, the 210SA provides proven, consistently accurate, low-cost analysis results that meet or exceed ISBT general requirements and guidelines for beverage-grade CO_2 sulfur analyzers.

Applications

The Series 210SA has been developed for both the CO_2 producer and the beverage bottler. It can accept samples from a variety of sources and perform continuous, unattended sampling and analysis.

Instrument Specifications

Gas Connections	1/8" Swagelok*
Mounting	EIA Standard 19" rack, 7U height or bench top
Transport Gas Flow Rate	≅ 30 ccpm
Transport Gas Pressure Required*	60 psig
Instrument Operating Temp.	5 - 40 °C
Detector Temperature	Factory set; adjustable
Oven Temp Regulation	Factory set w/ software controlled conditioning
Power Required	400 Watts
Sample Flow Rate Pressure Required*	5 psig (20 psig max)
Calibration Gas Pressure Required*	5 psig (20 psig max)
Sensitivity	≤ 5 ppb COS
Linear Range	5 ppb to 5 ppm COS (1 x 10^3)
User Interface	Keypad: Numerical, non-tactile Display: vacuum fluorscent 256 x 128 dot graphic 115 x 57 mm view area
Dimensions	16.90" W x 12.25" H x 23.00" D (42.93 x 31.12 x 58.42 cm)
Weight	Net: 50 lbs. (22.68 kg) Shipping: 60 lbs. (27.22kg)

* Sample, transport, and calibration gas inlet pressures up to 3000 psi with optional pressure regulators.

** Specifications and features will vary depending upon system configuration and are subject to change without notice. The above specifications are established during design, but are not to be construed as test criteria for every product.

Ordering Information

Series 210SA.....115 V, 60 Hz
Series 212SA.....230 V, 50 Hz

GOW-MAC INSTRUMENT CO.
Analytical instruments since 1935

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FM 581002

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