

Model 931 Single-Gas Analyzer

Benefits

- ▶ No-moving-parts design
- ▶ Measurement of additional species optionally available (IR or thermal conductivity)
- ▶ Sample return to process (with HAG probe option)
- ▶ Minimal sample conditioning
- ▶ Low maintenance design
- ▶ Minimal calibration drift
- ▶ Stream switching capability

Introduction

The Model 931 is a rugged, single-component photometric gas analyzer housed in an explosion-proof package designed for a variety of gas monitoring and process control applications. Whether it's reliable high concentration H₂S analysis for feed-forward control of modern SRU plants, monitoring of sour gas pipelines, or process control of SRU tail gas treating plants, this single gas analyzer is the best choice for reliable, field-proven, and rugged single-species measurement applications.

The Model 931 analyzer system is available with a heated cell option to avoid any hydrocarbon or water condensation. A fully integrated AMETEK Process Instruments sample system ensures reliable dew point control without running the risk of plugging, contaminating, or flooding the analyzer. Many process applications require the detection of species which do not absorb ultraviolet light. The model 931 may optionally be incorporated with IR sensors for the measurement of hydrocarbons or CO₂, and a thermal conductivity sensor for the measurement of H₂. Model 931 can also be configured for SO₂ as the primary measurement. These sensors are incorporated with the

UV photometer and utilize the same proven flow and sample system. Typical applications include the measurement of hydrogen and H₂S (and optionally COS and CS₂) in amine-based tail gas treaters, SO₂ breakthrough from cobalt molybdate catalyst beds, as well as other sulfur recovery plant applications such as feed forward control by measuring hydrocarbons, H₂S and or carbon dioxide in acid plant inlet gas.

No matter what the need is, this flexible, low-maintenance analyzer design is the answer to many of today's complex process control requirements.

Benefits of Model 931

The Western Research® Model 931 uses AMETEK's proprietary high-resolution UV technology in a dual-beam, dual-wavelength configuration and no-moving-parts design. Instead of using a filter/chopper wheel to alternate between measure and reference wavelengths, the Model 931 uses a fixed optical configuration and pulsed UV lamps. This design leads to increased light throughput, reduced noise levels, and reduced maintenance. The dual-beam configuration, combined with the reference measurement, ensures low noise performance with minimal baseline and span drift.

Resolution of better than 0.02nm is achieved with high-intensity, low-energy hollow cathode UV source lamps. These lamps emit UV radiation at precise wavelengths, providing construction of the UV lamp determines the wavelength of interest,

making it possible to configure this analyzer to measure many components that absorb UV/VIS energy. This high resolution design enables unparalleled linearity over a wide dynamic range (less than 1% deviation over 3 to 4 orders of magnitude), which leads to simple, robust data analysis.

The Model 931 analyzer utilizes two onboard micro-processors that provide concentration calculations, data processing, temperature control, calibration and sophisticated self-diagnostics.

Typical Applications

- ▶ Amine-based tail gas treating (H₂S/COS + optional H₂)
- ▶ SRU feed gas analysis (H₂S + optional HC)
- ▶ Well head gas
- ▶ Sour gas pipelines



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Performance Specifications

Methodology: Dual wavelength, high resolution, non-dispersive UV/VIS

Full Scale Ranges: ppm and % vol are standard, other ranges are available

Standard Range

H₂S: 0 to 4,000 ppm min. to 0 to 100% max.

Other components and ranges are available upon request.

Other measurements include COS, CS₂, NH₃, SO₂, H₂, & CO₂.

Accuracy:

Standard range (UV): ±1% of full scale

Optional (TCD) H₂ sensor for TGTU applications: ±2% on a 0-10% Range

Optional (IR) sensor for THC, CO₂: application specific, consult factory

Repeatability: Better than ±0.5% of full scale

Linearity: Better than ±1% of full scale for H₂S

Zero Drift: Better than ±2% of full scale, with auto zero disabled over 24-hour period

Speed of Response: Typically less than 30s to T90 (excluding sample system)

Number of Gases: one

Zero Gas: Nitrogen or instrument air

Maximum Sample Cell Pressure: 6.9 barg (100 psig)

Maximum Sample Gas Temperature: 165 °C (329 °F)

Typical Sample Flow: 2.5 L/min (5 SCFH)

Sample Transport: Application dependant (options include Heated Acid Gas probe)

Outputs: Up to 4 isolated 4-to-20 mA, loop or self-powered, 30 VDC Max; 4 non-isolated 1 to 5 VDC; 5 independent sets of SPDT, Form C, potential free alarm relay contacts, 2 A at 240 VAC

Digital Communication: RS485 Modbus port; RS232 / RS485 service port

Utility Requirements:

120 VAC (104 to 132 VAC), 47 to 63 Hz, <3A

240 VAC (207 to 264 VAC), 47 to 63 Hz, <2A

Power Consumption: 500 W max. (with heated probe and cell)

Ambient Temperature: 0 to 50 °C (32 to 122 °F)

Physical Dimensions: 1185 x 780 x 254 mm (46.65 x 30.7 x 9.97 in.)

Weight: Approximately 145 kg (320 lbs)

Approvals and Certifications:

CEC Class I, Division 1, Groups C&D; Ex dIIB T3

NEC Class I, Division 1, Groups C&D; AEx dIIB T3

ATEX II 2 G Ex d IIB T3 Gb

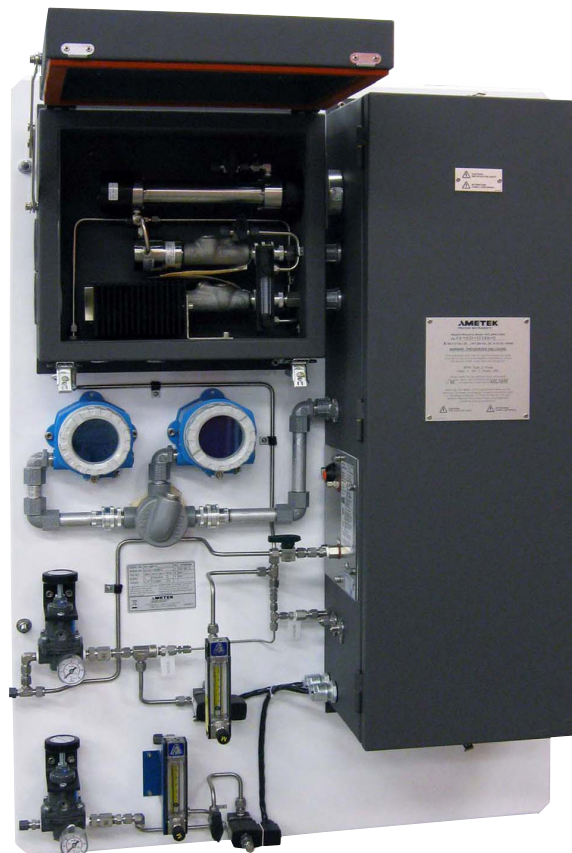
Russian Ex Proof Certification; 1ExdIIBT3 X

Russian Gosstandart Pattern Approval

Complies with all relevant European directives

Options

- ▶ Fully integrated, heated acid gas probe comes with heated aspirator and integrated sample and vent valves (see AMETEK Heated Acid Gas probe brochure for more details)
- ▶ Pressure compensation
- ▶ Heated cell for high water or acid dew point sampling
- ▶ Stream switching capability
- ▶ Optional thermal conductivity detector (TCD) for 0-5% or 0-10% H₂ for tail gas treating applications or 0 to 100% H₂ for hydrogen recycle applications
- ▶ Optional infrared cell / detector for 0-5% HC for SRU feed gas applications
- ▶ Optional infrared sensor for the measurement of hydrocarbons, carbon dioxide and/or water vapor with typical ranges from 0 to 2% to 0 to 100% by volume



Optional: NEC Class I Div. 2 Groups B-D

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