

Model 933RM UV H₂S Analyzer

The Need

The measurement of hydrogen sulfide (H₂S) in natural gas is a critical quality control measurement. For many years lead acetate tape has been a very common technology for making this measurement. This approach results in a relatively slow speed of response and high maintenance effort associated with frequent change-out of tape cassettes. Additional problems associated with lead acetate paper tape analyzers is the inherent difficulty handling H₂S overload conditions during process or pipeline upsets, sensitivity of the technology to ambient conditions and used cassette disposal (toxic lead content). Tunable diode laser technology has recently been successfully applied to the analysis of H₂S in natural gas. This non-contact approach works well for concentrations greater than about 500 ppm. The AMETEK 5100 Series of tunable diode laser gas analyzers are a good choice for H₂S in natural gas at these relatively high H₂S levels.

AMETEK Western Research® provides a ultraviolet based analyzer, the Model 933 for H₂S analysis when present below 100 ppm in natural gas. The Model 933 uses AMETEK Western Research's proprietary frontal elution chromatography sampling technique, combined with the exceptionally high resolution, multi-wavelength AMETEK 900 Series UV optical bench to provide an accurate, interference free measurement of H₂S. The result is a unique low level H₂S analyzer that is designed to operate unattended for six to nine months, or longer. The Model 933 is now available in a rack mount version, for installation in General Purpose (GP) area metering stations or natural gas laboratories.



The Measurement

AMETEK Western Research's unique sample conditioning system uses frontal elution chromatography to separate and eliminate interfering species. This ensures an accurate analysis of the gas via direct-UV absorption spectroscopy. H₂S is the first absorbing specie to elute through the proprietary chromatography column and is measured by the UV photometer, followed by carbonyl sulfide (COS) and methyl mercaptan (MeSH), which are also independently measured. The sample analysis is terminated prior to the breakthrough of the interfering ethyl mercaptan. Two columns are employed in the 933.

While the first column is conditioning the gas sample, the standby column is automatically regenerated. AMETEK's unique frontal elution chromatography sampling system eliminates the need for carrier gas, as the natural gas is used as the carrier. The 933 may be configured to output the concentration values of just the H₂S or all three components. The Model 933 utilizes two onboard microprocessors that provide concentration calculations, data processing, calibration, sophisticated self-diagnostics, and column switching control.

Benefits

- || Extended, unattended operation for 6 – 9 months and longer
- || Self-recovery after high concentration H₂S events
- || Fast response time to increasing or decreasing H₂S concentrations
- || Multi-component capability (methyl mercaptan and carbonyl sulfide optionally available)
- || No consumables, reagents, or disposables other than zero gas
- || Rack-mount package for general purpose area mounting

Applications

- || Gas sweetening (amine contactor overhead)
- || Pipeline quality/custody transfer
- || Synthetic natural gas (SNG)
- || Blending stations

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Performance Specifications

Methodology: Proprietary frontal elution sampling; nondispersive ultraviolet analysis for hydrogen sulfide (H₂S), carbonyl sulfide (COS) and methyl mercaptan (MeSH)

Full Scale Ranges: ppm ranges are standard; mg/Nm³ and other ranges are available

Standard Range:

H₂S: 0 to 25 ppm min. to 0 to 100 ppm max.

COS option: 0 to 100 ppm min. to 0 to 500 ppm max.

MeSH option: 0 to 50 ppm min. to 0 to 250 ppm max.

Higher ranges are available upon request

Low Range:

H₂S: 0 to 5 ppm min. to 0 to 50 ppm max.

COS option: 0 to 25 ppm min. to 0 to 250 ppm max.

MeSH option: 0 to 15 ppm min. to 0 to 100 ppm max.

Accuracy:

Standard range: ±2% of full scale

Low range: ±5% of full scale

Repeatability:

Standard range: ±2% of full scale

Zero Drift:

Standard range: less than ±2% of full scale in 24 hours

Low range: less than ±5% of full scale in 24 hours

Response Time, Excluding Sampling System

H₂S: less than 30 seconds to 90% response

COS: less than 60 seconds to 90% response

MeSH: less than 180 seconds to 90% response

Zero Gas: Instrument zero purity carbon dioxide; UHP nitrogen, or UHP methane. Minimum auto-zero interval is once per 24 hours.

Sample Pressure Requirement: 830 kPag to 13790 kPag (120 psig to 2000 psig)

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

Outputs: Up to 4 isolated 4-to-20 mA, loop or self-powered; 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

Power Consumption: <500 W (analyzer only)

Power:

104 to 132 VAC, 47 to 63 Hz, <3A

207 to 264 VAC, 47 to 63 Hz, <2A

Ambient Temperature: 0°C to 40°C (32°F to 104°F)

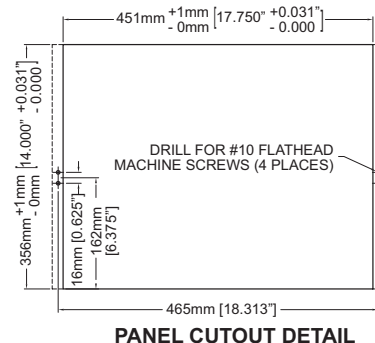
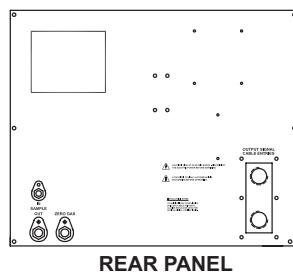
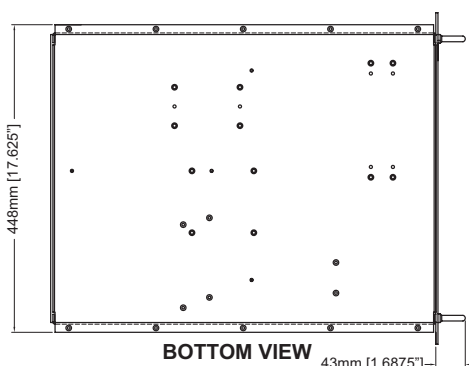
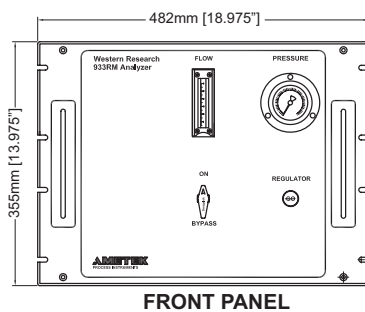
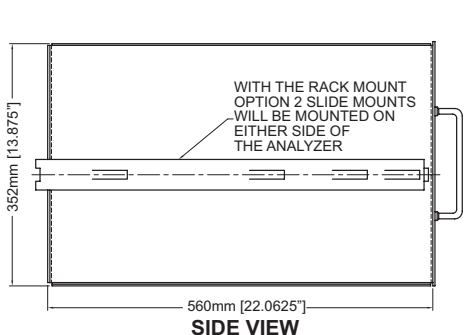
Dimensions (H x W x D):

355 x 482 x 560 mm (13.975 x 18.975 x 22.063 in.)

Weight: Approximately 28 kg (62 lbs)

Options: Gas/liquid (glycol) separating filter, other measuring ranges, COS and methyl mercaptan measurement, pressure compensation, and up to 4 V/I outputs

1. 0.6% maximum water content is based on a 35°C maximum water dew point temperature at 830 kPag (120 psig).



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