

BRIMSTONE ANALYZER SPECIFICATIONS**PERFORMANCE**

Zero drift	+/- 0.25% F.S. per day with auto-zero every 4 hours
Span drift	± 1 % of full scale for H ₂ S and SO ₂
Accuracy	± 1 % of full scale for H ₂ S and SO ₂
Repeatability	± 1 % of full scale for H ₂ S and SO ₂
Sensitivity	1 % of full scale for H ₂ S and SO ₂
Linearity	± 1 % of full scale for H ₂ S and SO ₂
Response time:	T-90, 10 seconds

ENVIRONMENT

Ambient temperature	0°C to +50°C (32°F to 122°F)
Dimensions	1100 mm H x 1448 mm W x 380 mm D (43.3"H x 57" W x 15" D)
Weight	125 kg (275 lbs)

UTILITIES

Power & consumption	100-240 VAC 50/60 Hz, 800 watts
Sample flow	2.3 L/min (5 SCFH)
Air requirements	5.5 to 8.3 barg, 623 L/min (80-120 psig 22 SCFM)
Steam	3.4 barg (50 psig) for probe heating > 10.3 barg (>150 psig) for oven (CSA units only)

COMMUNICATIONS

Digital Outputs	Modbus RS 485, Modbus TCP/IP
Digital Inputs	1 wet (12-24 VDC)
Analog Outputs	4 x 4-20 mA, user scalable, loop powered
Relays	4 x SPDT relay, 8 amps @300 VAC/25 VDC

APPROVALS & CERTIFICATIONS

CSA Class 1 Division 2, Groups CD, T3
ATEX Zone 1

Please note: we work continuously to improve the performance of our products – all specifications are subject to change without notice.

Galvanic assures flexible, headache-free installation and operation

Galvanic Applied Sciences' expert support team will work with you to determine the best, most cost-effective way for your facility to meet your sulfur-recovery and tail-gas-treatment-analysis needs. Galvanic's high-performance analyzers are calibrated to your exact specifications and custom-configured at the factory to integrate seamlessly into your existing infrastructure. Galvanic can also supply other key components and services for a total integrated solution – from custom designs and field commissioning for your systems – to analyzer shelters and sample-conditioning panels.

GALVANIC
APPLIED SCIENCES



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Application Insight: Brimstone H₂S & SO₂ Analyzer

Cost-Effective H₂S & SO₂ Analysis for Sulfur-Recovery & Tail-Gas-Treatment Units

The typical Claus process runs most efficiently with a 2:1 ratio of H₂S to SO₂ and efficiency is optimized by controlling the amount of available O₂ introduced into the furnace. Not only is the air demand critical for efficient sulfur-recovery unit (SRU) operation, but high SO₂ outputs can degrade the amine in the tail-gas-treatment (TGTU) absorber unit. Failure to control the SRU efficiently can have costly results.

Galvanic Applied Sciences put 25 years of applications know-how and engineering prowess into the rugged, user-friendly design of its Brimstone analyzer. A close-coupled sample probe eliminates the need for heated sample lines. Enhanced CCD UV spectroscopy delivers extremely fast, accurate results. Engineered for low-maintenance performance with no moving parts, the Brimstone analyzer frees up operators to focus on other critical functions. Together, these benefits make it the best value tail-gas analyzer on the market today.

The Claus SRU

The vast majority of sulfur-removal units use the Claus two-step process to extract elemental sulfur from H₂S-laden gases. First, H₂S-laden gases are combusted in a thermal step at temperatures above 850° C to create SO₂ and water (2H₂S + 3O₂ ↔ 2SO₂ + 2H₂O). The reaction continues with the formation of elemental sulfur (2H₂S + SO₂ ↔ 3S + H₂O), converting two-thirds of the H₂S to sulfur. A catalytic step to boost sulfur yield is next, where the reaction continues in the presence of a catalyst. Two common catalysts are aluminum activated with oxides of cobalt-molybdenum or titanium oxide. The chemical reaction is (2H₂S + SO₂ ↔ 3S + 2H₂O) and the sulfur formed can be of many species (S₆ thru S₈). Here, process control is

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critical to avoid inactivating the catalyst, which can happen when sulfur is allowed to condense out in the catalyst bed. The operating temperature of these catalyst stages will be higher in the beginning to hydrolyze COS and CS₂ and drop in subsequent stages. The sulfur-removal efficiency of a two-stage process is ~90 to 95%; a three-stage process is ~95 to 98%. Galvanic's Brimstone analyzer is ideal for all Claus processes, including sub-dewpoint applications.

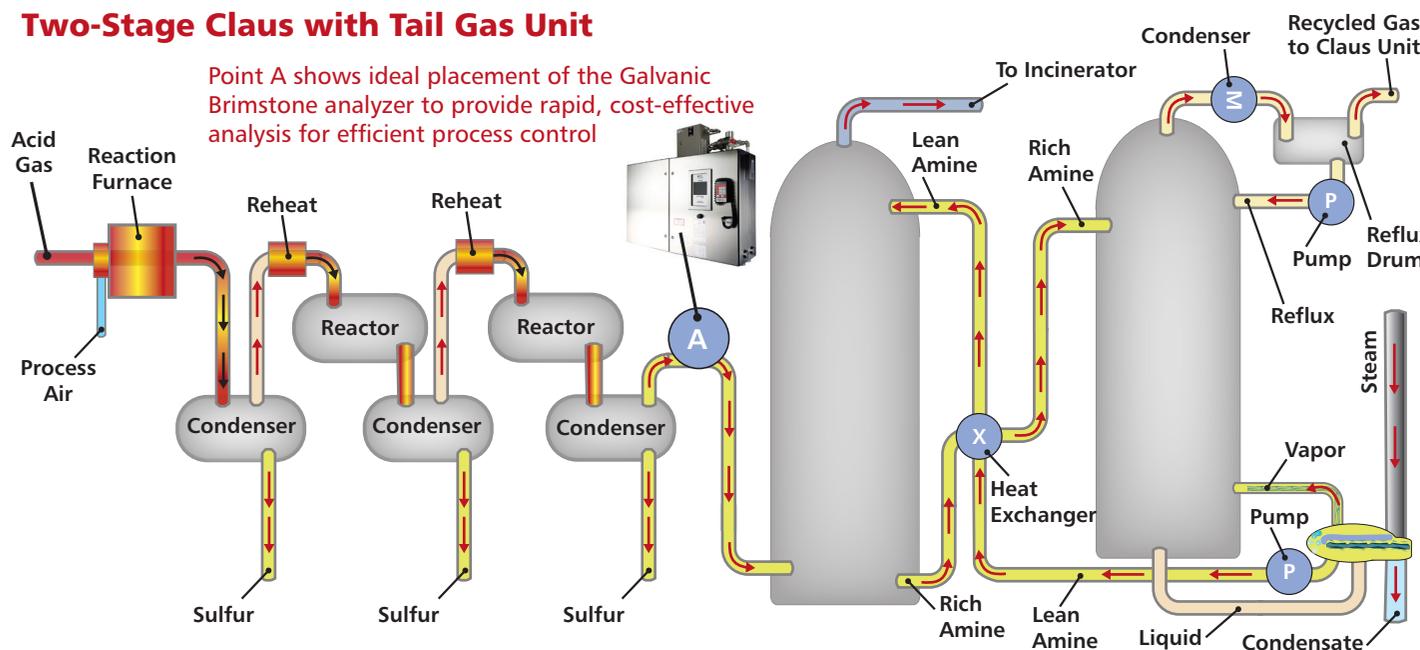
TGTU Process

The TGTU is typically an amine-based H₂S removal process, where the amine strips the H₂S from the tail gas released from the Claus process. See schematic below. A TGTU can increase the process efficiency of sulfur removal to ~99.8 % as well as reduce the number of catalytic stages required. The lean H₂S gas output from the absorber is sent to the incinerator and the rich H₂S gas outlet from the stripper is fed back into the Claus SRU. Operators must take care to prevent SO₂ breakthrough as low ppm levels can degrade the amine. Monitoring the H₂S to SO₂ ratio with the Brimstone analyzer makes it easy, delivering the critical information necessary to control the process precisely to prevent SO₂ breakthrough.

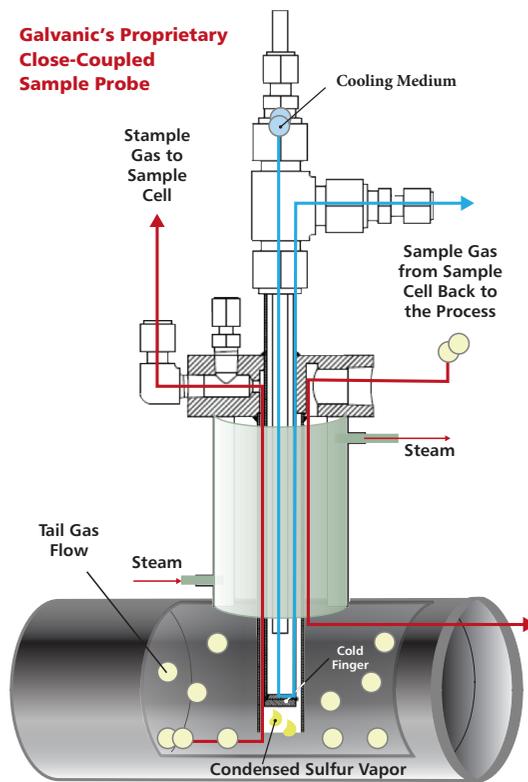
Brimstone Air Demand, H₂S, & SO₂ Analysis in

Two-Stage Claus with Tail Gas Unit

Point A shows ideal placement of the Galvanic Brimstone analyzer to provide rapid, cost-effective analysis for efficient process control



Galvanic's Proprietary Close-Coupled Sample Probe



the Sulfur Removal Process

The Brimstone analyzer's air demand analysis output provides a very fast response time to permit highly efficient control of the air inlet. The air demand is a calculation derived from accurate analysis of the H₂S & SO₂. The analyzer's user-friendly controls enable flexibility should process conditions require optimization at a ratio other than 2:1; the Brimstone analyzer allows the operator to enter different control factors as appropriate.



The Brimstone analyzer delivers all you need for fast, accurate analysis & process optimization in sulfur recovery & tail gas units:

- Proprietary close-coupled sample probe eliminates need for heated sample lines
- Single sampling point provides entry & exit of process gases
- Integrated back-purge of sample probe prior to maintenance increases operator safety
- Fully automatic performance with auto calibration interval timing allows complete hands-off operation
- Rugged design with no optical filters and no moving parts delivers reliable, low-maintenance operation with minimal downtime
- Advanced internal startup and operational diagnostics
- Web-based password-protected user interface allows full operational & diagnostic control from remote locations
- Near-instantaneous analysis-response times with total system response of < 10 seconds enables fast process control
- UV absorption method with enhanced 2048 pixel CCD delivers the utmost in accurate determinations