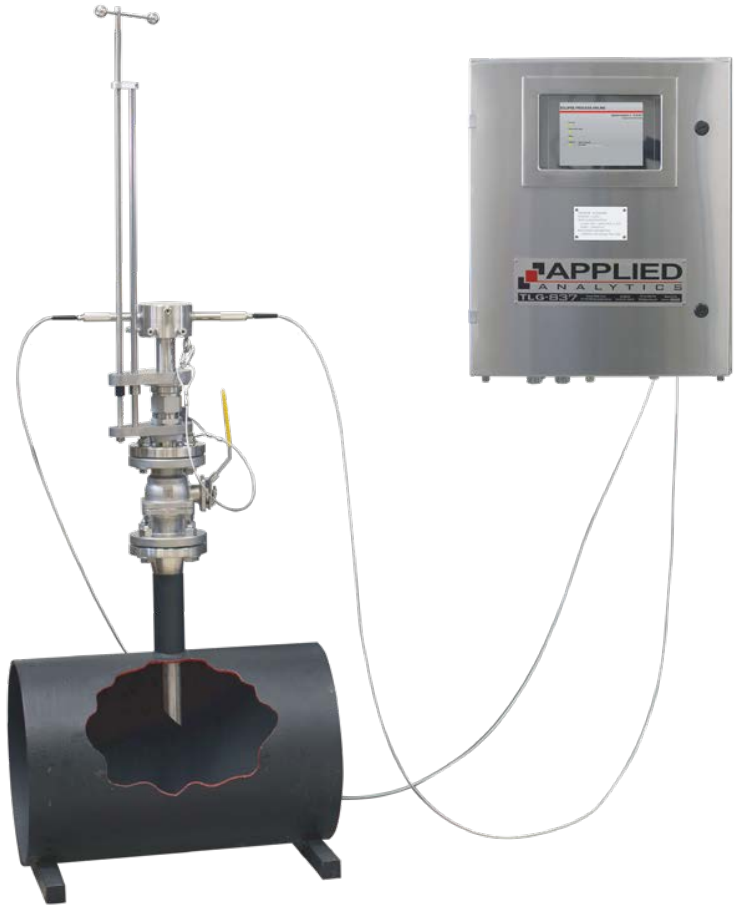
ASPROC

TLG-837 TAIL GAS / AIR DEMAND ANALYZER

+39 055 9705134 info@asproc.net www.asproc.net

H_2S | SO_2 | COS | CS_2

gray = optional analyte



The world's safest tail gas analyzer.

The TLG-837 continuously measures the chemical concentrations of H_2S, SO_2, COS, and CS_2 in the Claus process tail gas stream. Using the patented in situ DEMISTER sampling probe and a full-spectrum UV-Vis spectrophotometer, this system provides extremely fast, accurate response for tight process control.

Features

- Continuously measures concentrations of H_2S and SO_2 and outputs Air Demand signal (user-defined formula)
- Patented DEMISTER sampling probe with internal sulfur vapor removal
- Totally solid state with no moving parts, sample lines, or heat tracing — modern design for low maintenance
- Ultra-safe fiber optic design — no toxic/explosive sample gas in analyzer enclosure
- Superior Off-Ratio range (100:1 < H_2S/SO_2 ratio < 1:20)

The Claus Process Analysis Need

The sulfur recovery unit (SRU) of a refinery is dedicated to processing the H_2S stripped from the hydrocarbon fuel through a series of operations that convert it into water and harmless elemental sulfur, which can be sold and repurposed.

The Claus process is the industry standard for treating the H_2S-rich "sour" gas . In the reaction furnace, H_2S is combusted:

$$3H_2S + {}^3/_2O_2 \longrightarrow SO_2 + H_2O + 2H_2S$$

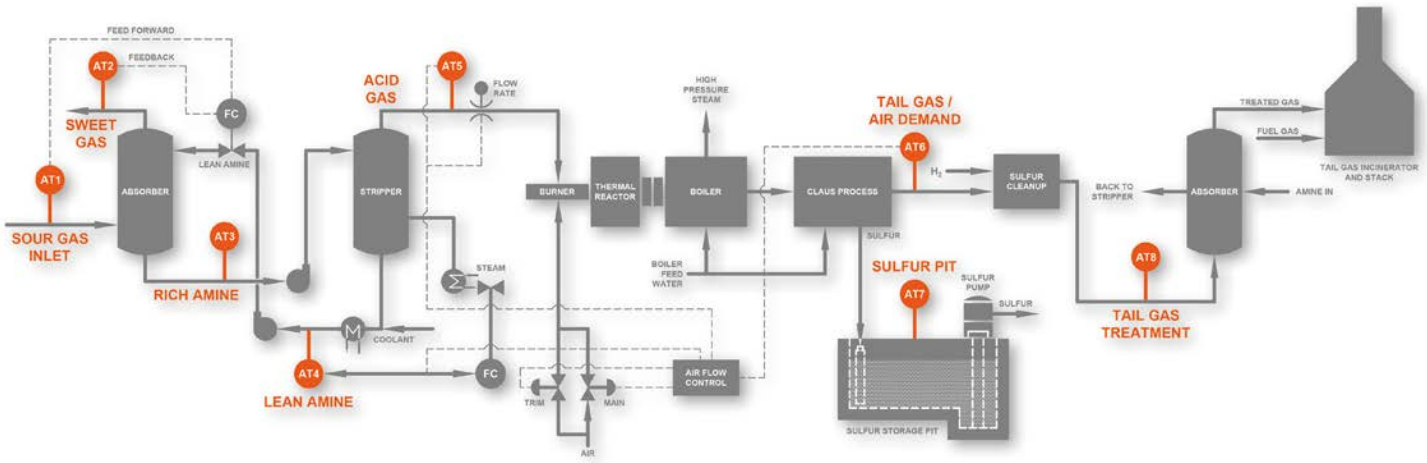
A catalytic converter reacts the products of the combustion to create elemental sulfur in it various crystalline forms:

$$2H_2S + SO_2 \longrightarrow 2H_2O + {}^3/_xS_x$$

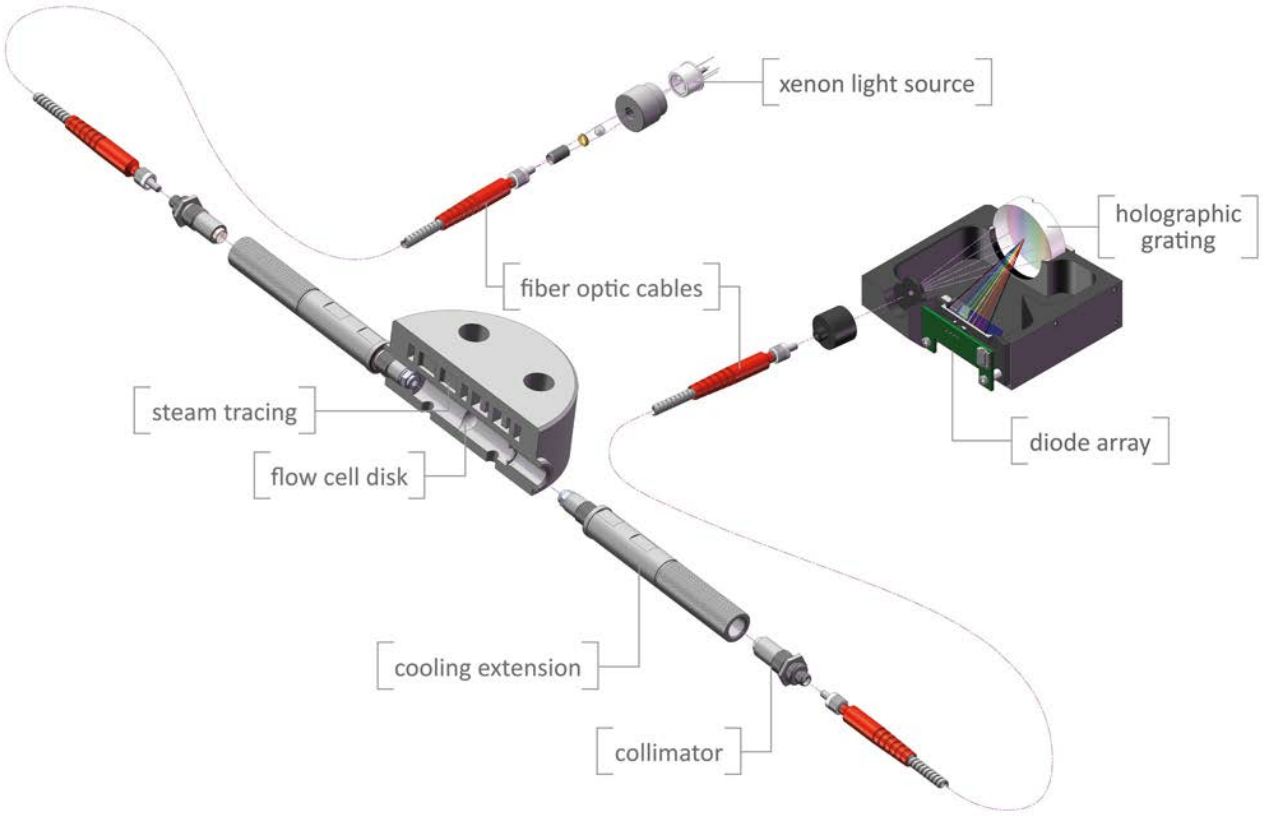
As can be deduced from the 2nd reaction above, the typical Claus reaction runs most efficiently when the stoichiometric ratio of H_2S to SO_2 is controlled at 2:1. The reactions above demonstrates that this ratio is controlled by adjusting available oxygen.

The efficiency of sulfur recovery therefore hinges on the "Air Demand" signal which informs the oxygen adjustment in the DCS. The Air Demand is calculated by multiplying the expression ($2[SO_2] - H_2S$) by a scaling factor. Obtaining the real-time Air Demand value requires continuous, reliable measurement of the H_2S and SO_2 concentrations in the Claus tail gas. Additionally, COS and CS_2 levels in the tail gas can be indicators of reduced efficiency or potential catalyst issues.

In this diagram, the tail gas analysis point is identified by **AT6**.



TLG-837 Principle of Operation



The TLG-837 measurement cycle is instantaneous, but it can be helpful to visualize it in stages:

(1) The white light signal originates in the pulsed Xe lamp that functions as the light source.

(2) The signal travels via fiber optic cable to the flow cell. A collimator narrows the light beam.

(3) The signal travels directly across the flow cell, interacting with the continuously drawn process sample.

(4) The signal exits the flow cell through a collimator, now containing the distinct absorbance imprint of the current chemical composition of the sample.

(5) The signal travels via fiber optic cable to the nova II.

(6) The signal is dispersed by the holographic grating. Each differentiated wavelength is focused onto a designated photodiode within the diode array. The nova II provides this rich data to the HMI for real-time visualization of the absorbance spectrum.

Analyzer Internal Components

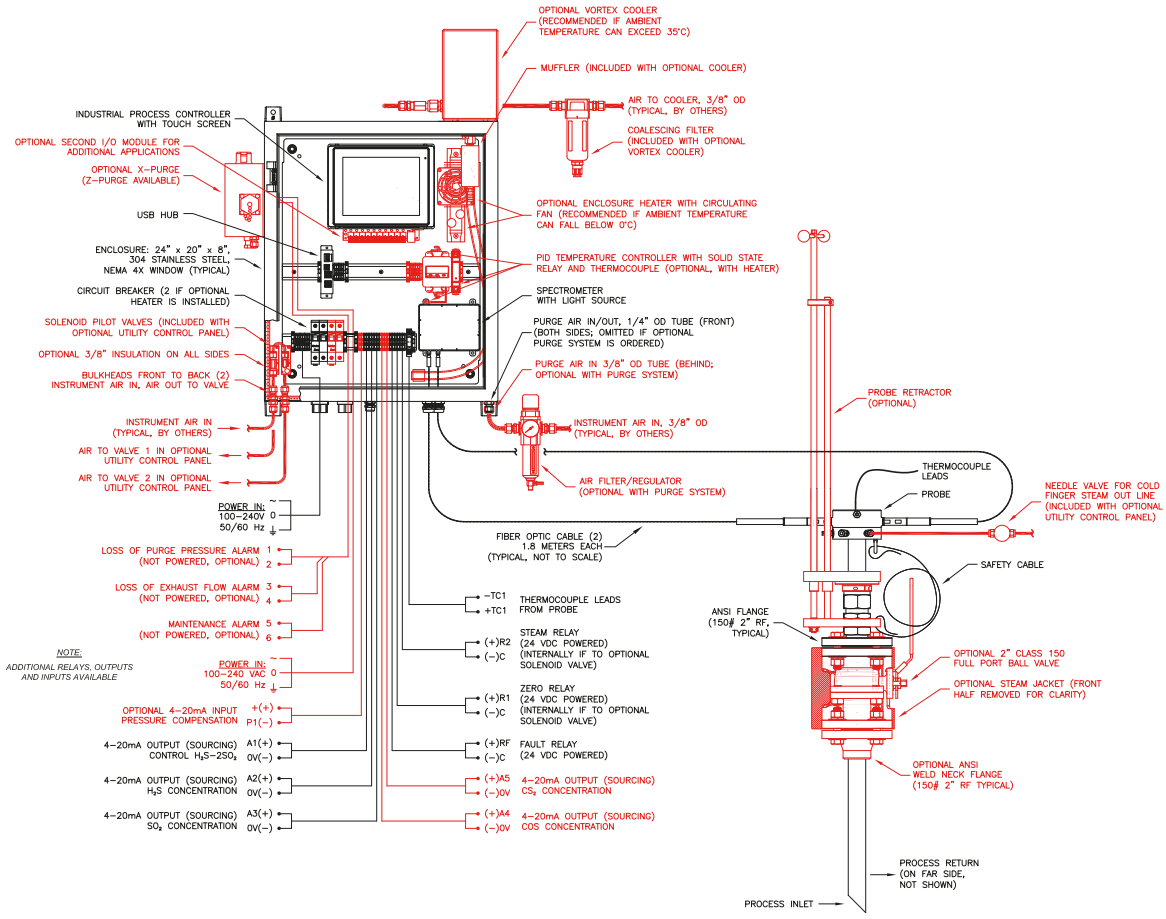
ECLIPSE™ Software User Interface

Normal Runtime: Real-time concentration data is displayed on the home screen.

Auto Zero: Runs on custom schedule to normalize the spectrophotometer readings on zero-absorbance fluid.

STANDARD TLG–837 ANALYZER
(DOOR WITH NEMA 4X WINDOW REMOVED FOR CLARITY)

COMMON OPTIONS SHOWN IN RED



All performance specifications are subject to the assumption that the sample conditioning system and unit installation are approved by Applied Analytics. For any other arrangement, please inquire directly with Sales.

Technical Data				
General				
Measurement Principle	Dispersive UV-Vis absorbance spectrophotometry			
Detector	nova II™ Spectrophotometer Data sheet: https://aai.solutions/documents/AA_DS201A_novaII.pdf			
Spectral Range	200-800 nm			
Light Source	Standard: pulsed xenon lamp with average 5 year lifespan			
Fiber Optic Cables	Standard: 600 µm core 1.8 meter fiber optic cables (qty = 2) Data sheet: https://aai.solutions/documents/AA_DS206A_FiberOptics.pdf			
Sample Introduction	DEMISTER in situ sampling probe Data sheet: https://aai.solutions/documents/AA_DS004B_TLG837_Probe.pdf			
Analyzer Calibration	Calibrated with certified calibration fluids; no re-calibration required after initial calibration; measurement normalized by Auto Zero			
Reading Verification	Simple verification with sample gas			
Human Machine Interface	Applied Analytics standard HMI: industrial controller with touch-screen LCD display Data sheet: https://aai.solutions/documents/AA_DS202A_HMI.pdf			
User Interface	ECLIPSE™ Runtime Software Data sheet: https://aai.solutions/documents/AA_DS203A_Eclipse.pdf			
Data Storage	Solid State Drive Data sheet: https//aai.solutions/documents/AA_DS204A_SSD.pdf			
Enclosure	Standard: wall-mounted NEMA 4X stainless steel type 304 Enclosure Options in data sheet: https://aai.solutions/documents/AA_DS401X_Enclosures.pdf			
Certifications	Standard: General Purpose Available Options: ATEX, IECEx, EAC, PESO *Please inquire with your sales representative for additional certifications (CSA, FM etc.).*			
Measuring Parameters				
Accuracy & Repeatability	Analyte	Typical Range	Accuracy	Repeatability
	H_2S	0-2%	±1% of full scale	±0.4%
	SO_2	0-2%	±1% of full scale	±0.4%
	Air Demand	user-defined	±1% of full scale	±0.4%
	COS	0-2,000 ppm	±1% of full scale (±5% under 500 ppm)	±0.4%
	CS_2	0-2,000 ppm	±1% of full scale (±5% under 500 ppm)	±0.4%
Sensitivity	±0.1% full scale			
Noise	±0.004 AU at 220 nm			
Off-Ratio Range	100:1 < H_2S:SO_2 <20:1			
Response Time	1-5 seconds			

Ambient Conditions	
Analyzer Environment	Indoor/Outdoor (no shelter required)
Ambient Temperature	Standard: 0 to 35 °C (32 to 95 °F) With optional temperature control: -20 to 55 °C (-4 to 131 °F) *To avoid radiational heating, use of a sunshade is recommended for systems installed in direct sunlight.*
Physical Specifications	
Dimensions	Analyzer: 24” H x 20” W x 8” D (610mm H x 508mm W x 203mm D) Probe Average Dimensions: 36” length x 12“ widest diameter (914mm x 305mm) Optional Utility Control Panel: 24” H x 24” W x 8” D (610mm H x 610mm W x 203mm D)
Weight	Analyzer: 32 lbs. (15 kg) Probe Average Weight: 29 lbs. (13 kg) Optional Utility Control Panel: 25 lbs. (11 kg)
Wetted Materials	Standard: Stainless Steel 316/316L, Kalrez *Various custom materials available — please inquire.*
Probe Material	Standard: Stainless Steel 316/316L *Other materials available*
Utilities	
Utility Management	Optional: Utility Control Panel Data sheet: https://aai.solutions/documents/AA_DS004C_TLG837_UCP.pdf
Electrical Requirements	85 to 264 VAC 47 to 63 Hz
Power Consumption	65 watts
Instrument Air	70 psig (-40 °C dew point)
Steam Pressure	70 psig for DEMISTER chamber 30-50 psig for probe blowback function 75-100 psig for optional ball valve steam jacket
Outputs/Communication	
Outputs	1x galvanically isolated 4-20mA analog output per measured analyte 5x digital relay outputs for indication and control 1x K type ungrounded thermocouple input Optional: Modbus TCP/IP; RS-232; RS-485; Fieldbus; Profibus; HART; more
I/O Electronics	Voltage/Current Interface Module (i.e. I/O Board) Data sheet: https://aai.solutions/documents/AA_DS205A_VCIM.pdf

Further Reading

Subject	Location
TLG-837 DEMISTER Probe Data sheet	https://aai.solutions/documents/AA_DS004B_TLG837_Probe.pdf
TLG-837 Utility Control Panel Data sheet	https://aai.solutions/documents/AA_DS004C_TLG837_UCP.pdf
Advantage of Collateral Data Technical Note	https://aai.solutions/documents/AA_TN-202_CollateralData.pdf
Multi-Component Analysis Technical Note	https://aai.solutions/documents/AA_TN-203_MultiComponentAnalysis.pdf