

# Applied Analytics™

## ETA Process Instrumentation

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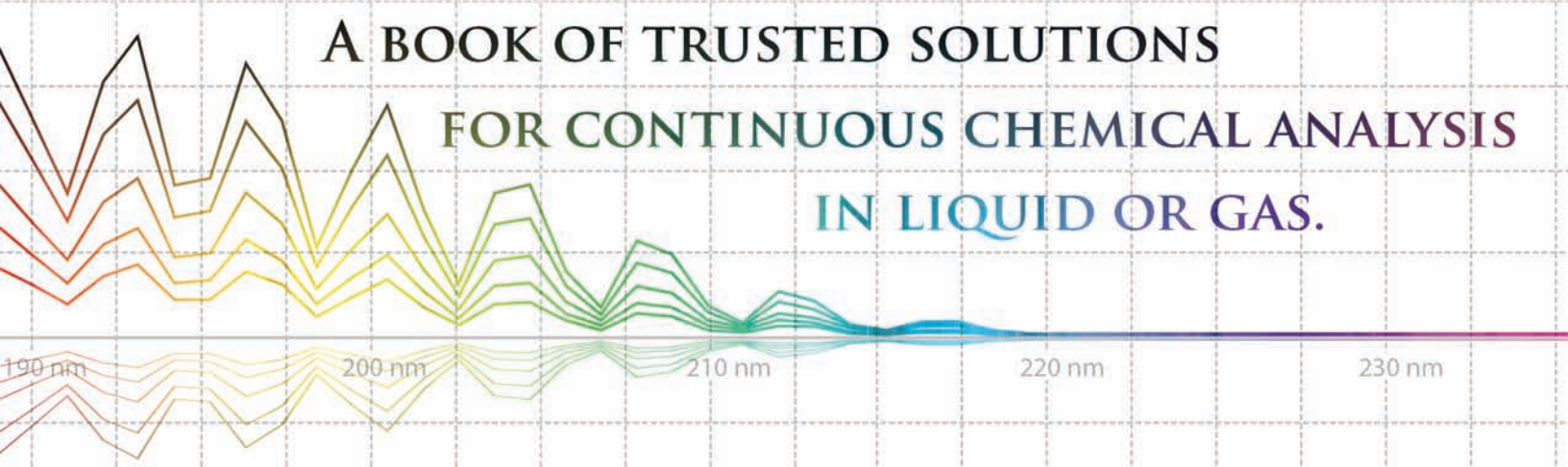
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## A BOOK OF TRUSTED SOLUTIONS FOR CONTINUOUS CHEMICAL ANALYSIS IN LIQUID OR GAS.

An absorbance spectrum is a language within nature. Each peak and valley signifies the quantified presence or absence of a specific chemical species. If you can read that language, you can read the composition of your process stream at a glance — providing a window into your process.

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# Applied Analytics™

We are a global manufacturer of industrial process analysis equipment. Our customers depend on our systems to keep a vigilant watch over the quality of their product, illuminate hidden phenomena occurring in their process, reduce their harmful emissions into the environment, and ensure the safety of their workers in hazardous industrial environments.

We are proud to serve the industries that keep the world running — the oil refineries, the power plants, the wastewater treatment facilities, the chemical producers, the pharmaceutical innovators, the breweries, the environmental protection agencies — and meet their analysis needs with modern, automated solutions.

Applied Analytics has been operating in the greater Boston area since our incorporation in 1994. All of our products are designed and manufactured in the USA.



## » OUR TEAM

AAI's specialized role as a provider of process analysis means that 100% of our focus is permanently dedicated to ensuring successful lifetime performance of every analyzer that we ship. Our project engineers have enormous experience with all types of applications and will guide you honestly towards the most practical and cost-effective analytical solution for your process.

## » OUR TECHNOLOGY

We believe that, in the modern industrial plant, there is no longer a place for analyzers with moving parts, toxic consumables, or high costs of operation. All of our analyzers adhere to solid state design and use absorbance spectroscopy, the definite future of industrial process analysis.

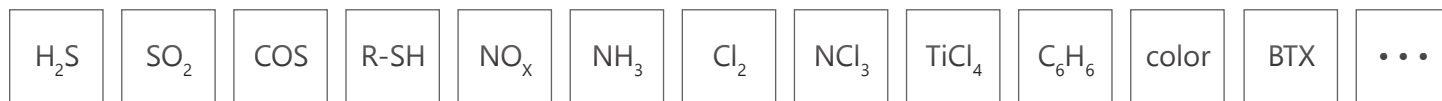
## » OUR SUPPORT

AAI maintains a comprehensive global support network. Our certified field engineers will always be available for site visits to assist with installation and commissioning, train personnel, and service the systems. Technical support by phone/email is included for the lifetime of the instrument.

# OMA Process Analyzers

Continuous liquid/gas analyzers for a wide range of industrial applications.

Available Measurements Include:



A window into your process since 1994. Through continuous optical analysis, the OMA translates the UV/UV-Vis / SW-NIR/NIR absorbance spectrum of a fluid to its real-time chemical composition and physical properties.

- » Dispersive high-resolution spectrophotometer
- » Solid state with no moving parts
- » Analyzes liquid or gas stream directly
- » Ultra-safe fiber optic design for handling toxic fluid
- » Scheduled Auto-Zero — no re-calibration in field
- » Measures up to 5 chemical species synchronously

## What is the OMA?

The OMA is an industrial device which measures a high-resolution absorbance spectrum in a continuously drawn sample from a liquid or gas process stream. Harvesting this rich data, the OMA provides real-time analytics for the process stream, including chemical concentrations, purity, and color.

### » What is Absorbance Spectroscopy?

One of the ways in which light interacts with matter is absorption: a molecule absorbs specific wavelengths of radiation as a function of its unique electronic and molecular structures. The energies (wavelengths) of radiation that are absorbed match the energy quanta that are required to move that molecule between two quantum mechanical states. This is why each molecule absorbs radiation in a unique, recognizable way.

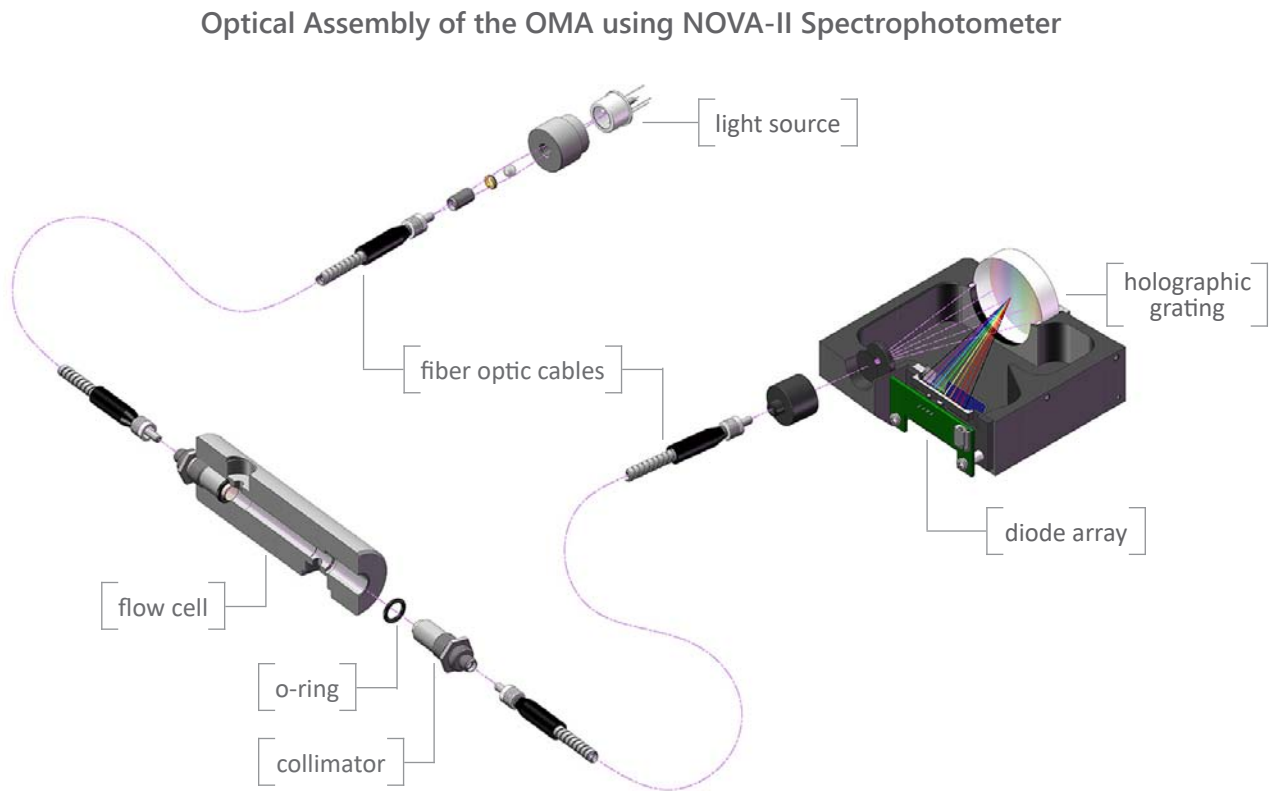
Absorption is quantified as absorbance, or the difference between intensity of the radiation entering the substance and the intensity of the radiation exiting the substance. Plotting the absorbance against wavelength creates an absorbance spectrum, which allows us to observe the shape (curve) of the absorbance. Each chemical species has a natural identifier in its absorbance curve that can be detected like a fingerprint.

According to Beer-Lambert law, the absorbance of a chemical in a mixture is directly proportional to its concentration. By measuring the height of a chemical's absorbance curve, an instrument can determine that chemical's concentration.

Other scan peaks. OMA reads structure.

## » OMA Principle of Operation

The optical assembly of the OMA is depicted below, illustrating the complete path of the signal.



The signal originates in the light source and travels via fiber optic cable to the sample flow cell. Passing through the length of the flow cell, the signal picks up the absorbance imprint of the continuously drawn sample fluid.

While the single-wavelength photometer has only one data point and no contextual curve with which to verify the accuracy of that data point, the OMA uses statistical averaging of all the data points along the curve to immediately detect and ignore erroneous data from a single photodiode. By detecting the actual structure of the curve instead of peak absorbance, the OMA avoids false positives and provides superior accuracy.

## » Full-Spectrum Analysis

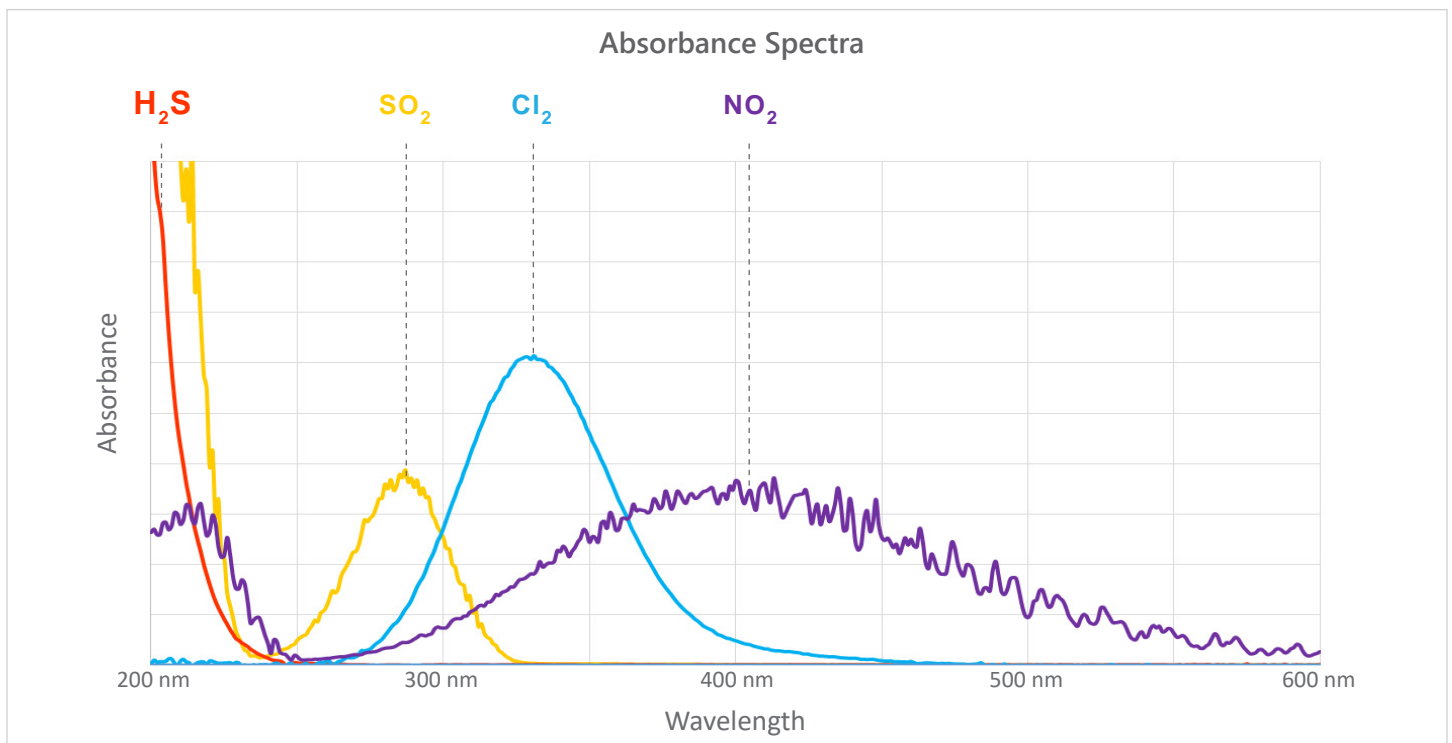
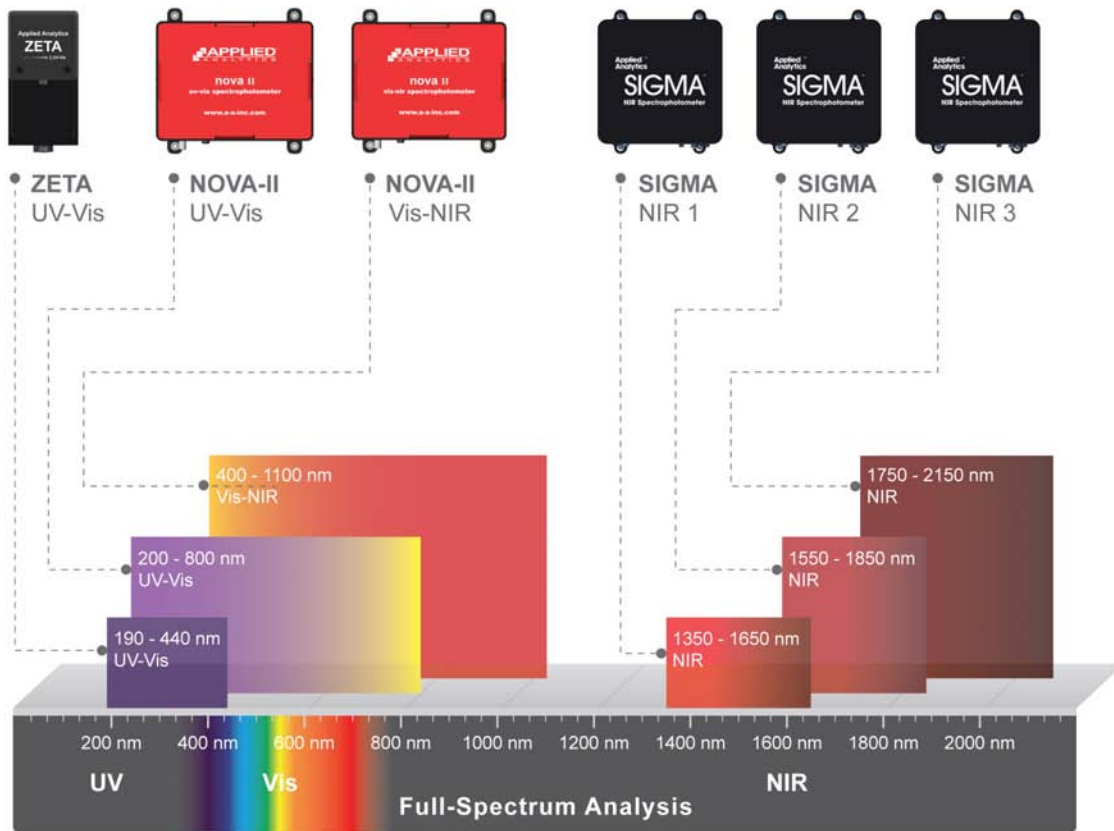
A conventional 'multi-wave' photometer measures a chemical's absorbance at one pre-selected wavelength with one photodiode. This 'non-dispersive' technique uses an optical filter or line source lamp to remove all wavelengths but the pre-selected measurement wavelength. By contrast, the OMA uses a dispersive spectrophotometer to acquire a full, high-resolution spectrum. Each integer wavelength in the spectral range is individually measured by a dedicated photodiode.

The OMA visualizes the complete absorbance curve; this rich raw data enables far greater accuracy by eliminating noise and allowing robust multi-component analysis.

## OMA Series Spectrophotometers

The OMA Series offer various of spectrophotometers to meet different measurements' needs, including Zeta UV-Vis, Nova-II UV-Vis, Nova-II Vis-NIR and Sigma NIR with three wavelength range options.

### Wavelength Ranges of the OMA Series Spectrophotometers





**Standard**  
OMA-300 w/ NEMA 4  
painted carbon steel enclosure



**Ultra Corrosion-Proof**  
OMA-300 w/ NEMA 4X fiberglass enclosure



**Portable**  
OMA-206P w/ copolymer suitcase enclosure



**Rackmount**  
OMA-406R w/ 19" rackmount enclosure

**OMA Series:** different form factors, same trusted technology.

**Available Certifications & Approvals**

- » IECEx, ATEX, PESO, TCRU 012
- » Other certifications available — please inquire





**Explosion-Proof (Ex p)**

OMA-300 w/ purge  
(NEMA 4X stainless steel enclosure shown)

**Explosion-Proof (Ex d)**

OMA-300 w/ NEMA 4X cast-aluminum enclosure



**Freestanding Structure**

OMA-300 w/ freestanding rack + sunshade

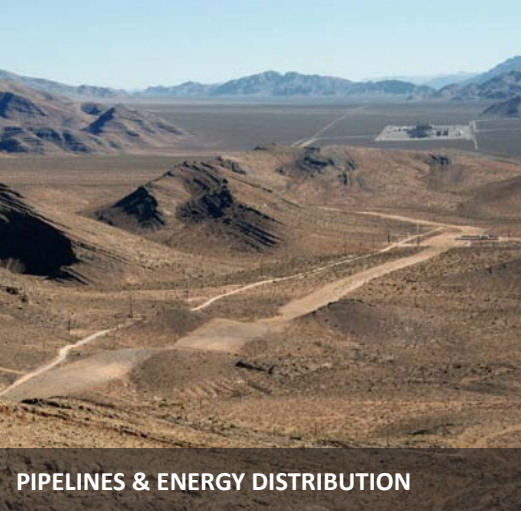


**Cabinet**

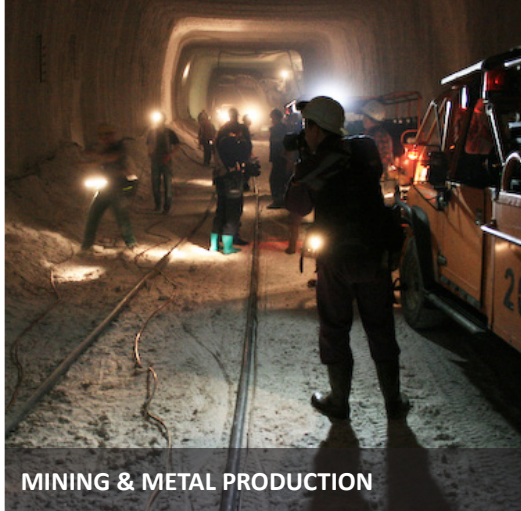
OMA-300 w/ total customization

**Communication Protocols**

- » 1x galvanically isolated 4-20 mA analog output per analyte
- » 2x digital outputs for fault/relay control
- » Optional: Modbus TCP/IP, RS-232, HART, and more



PIPELINES & ENERGY DISTRIBUTION



MINING & METAL PRODUCTION



FOOD & BEVERAGE INDUSTRY



AVIATION & FUEL SAFETY



OFFSHORE OIL & GAS PRODUCTION



PETROCHEMICAL REFINING



POWER GENERATION



PHARMACEUTICAL PRODUCTION



CHEMICAL PRODUCTION

# OMA Experienced Applications

### Petrochemical

- » crude oil
- » natural gas
- » sour water
- » acid/sour gas
- » lean/rich amine

### Environmental

- » emissions
- » DeNO<sub>x</sub>
- » wastewater
- » deicing fluid
- » pondwater

### Chemical

- » TiO<sub>2</sub> paint production
- » ethylene dichloride
- » product color
- » MEG
- » polymerization inhibitors

### Other Production

- » clean-in-place
- » vitamins
- » metal ions
- » seawater
- » jet fuel

# MicroSpec™ IR Analysis Module

A rugged and compact infrared photometer.

Available Measurements:

CO

CO<sub>2</sub>

CH<sub>4</sub>

C<sub>2</sub>H<sub>4</sub>

H<sub>2</sub>O



From the MicroSpec series of modular analyzers comes the model MCP-200 continuous monitor for chemical species that absorb IR radiation. This ruggedized device pairs an NDIR photometer with a proprietary-design flow cell for excellent performance as an integrated piece or as a reliable standalone.

- » Compact modular form — turnkey installation
- » Solid state with no moving parts
- » Analyzes liquid or gas stream directly
- » SS316L flow cell body for harsh environments
- » Scheduled Auto-Zero — no re-calibration in field
- » Optimized path length per analyte & range



## Standalone

includes controller and sample conditioning  
(pictured: 0-50 ppm water in EDC)



## Integrated

multiple units sharing one controller  
(pictured: 0-5% CO, 0-30% CO<sub>2</sub>, 0-30% O<sub>2</sub>)

# TLG-837 Tail Gas / Air Demand Analyzer

The world's safest tail gas analyzer for the sulfur recovery unit.

Measurements:

H<sub>2</sub>S

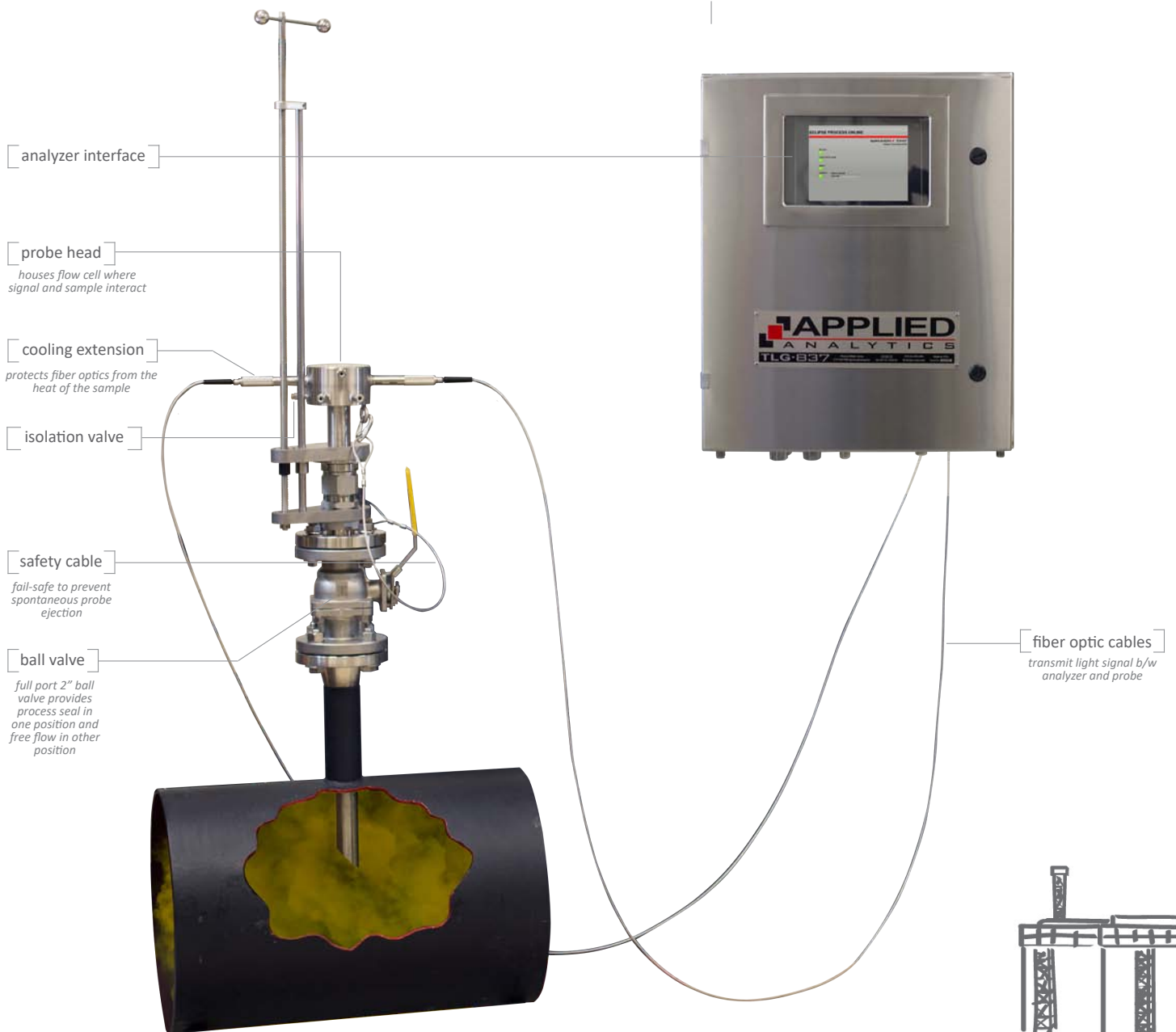
SO<sub>2</sub>

COS

CS<sub>2</sub>

air demand

The TLG-837 continuously measures **H<sub>2</sub>S/SO<sub>2</sub> ratio** in the Claus process tail gas stream to produce an always-reliable Air Demand signal with the industry's fastest response time.



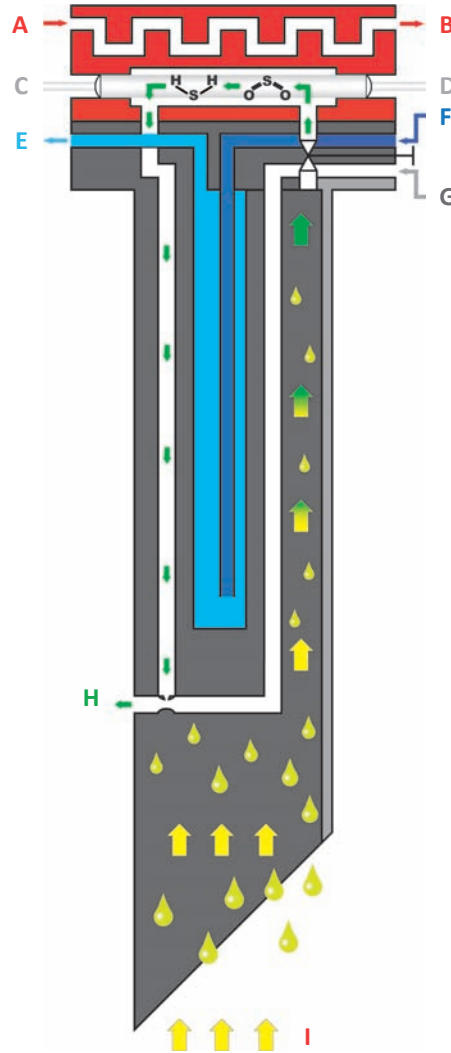
# Featuring the patented, sulfur-removing DEMISTER Probe

Tail gas contains elemental sulfur which is quick to condense and plug mechanical cavities or obstruct optical signals. The DEMISTER Probe removes sulfur from the rising sample as an internalized function within the probe body. Recycling the steam generated by the Claus process, the probe controls the temperature along its body at a level where all sulfur vapor in the rising sample condenses and drips back down to the process pipe.

## Automatic Sulfur Vapor Removal

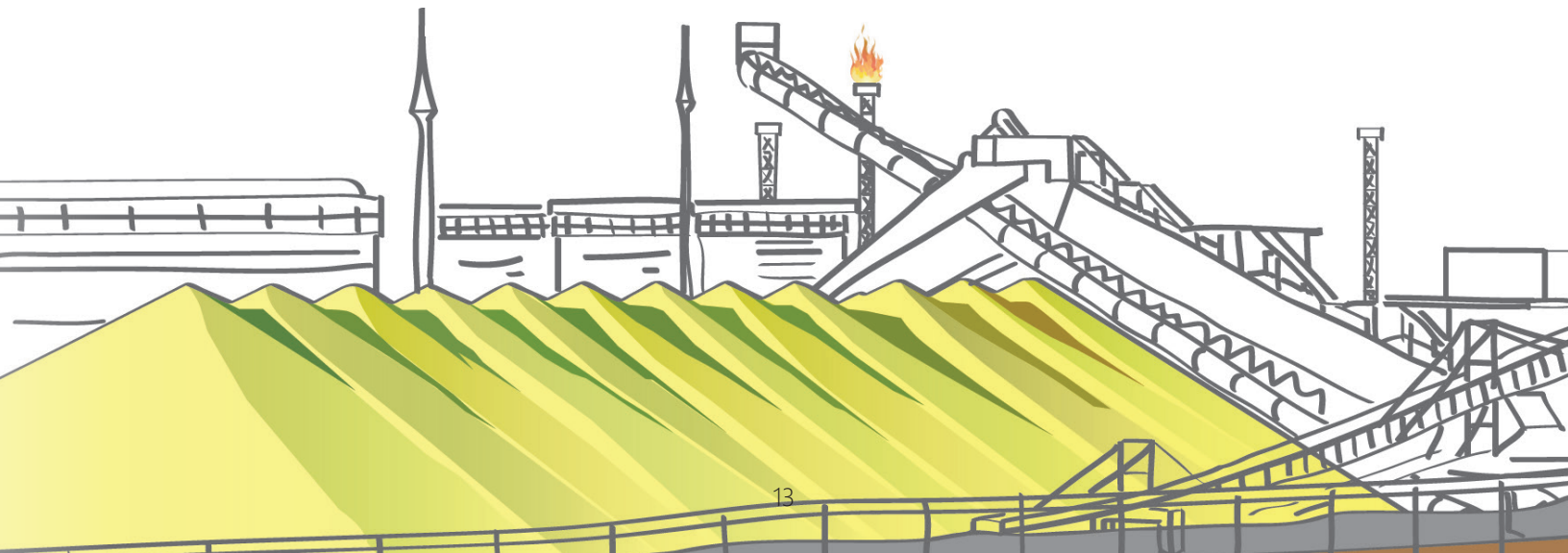
Inside the probe, an internal 'demister' chamber (concentric to the probe body) is fed with low pressure steam (see E & F). Since the LP steam is much cooler than the tail gas, this chamber has a cooling effect on the rising sample.

Elemental sulfur has the lowest condensation point of all of the components in the tail gas. Due to the internal probe temperature maintained by the LP steam, all of the elemental sulfur in the rising sample is selectively removed by condensation while a high-integrity sample continues upward for analysis in the probe head.



## Schematic Legend

- (A) High-Pressure Steam In
- (B) Steam Out
- (C) Light Signal In
- (D) Light Signal Out
- (E) Steam Out
- (F) Low-Pressure Steam In
- (G) Aspirator Air In
- (H) Sample Return Point
- (I) Sample Entry Point
- (J) Process Isolation Valve
- ( ) Liquid Sulfur Droplet
- ( ) Sample Route
- ( ) Sulfur-free Sample Route



# Expert Sample Conditioning

Optical measurement systems typically require that the sample undergo some conditioning to make it fit for the analyzer's method. Applied Analytics' systems are built for direct analysis without cooling/drying the sample: the OMA Series models use flow cells rated for extreme temperature and pressure, while moisture is transparent to the UV signal. This allows us to build far simpler, more elegant sample conditioning systems that retain high sample integrity and optimal response time.

In our experience, applications can be similar but rarely identical. That is why we always work from the process realities to the drawing board, building custom sample conditioning for each project.

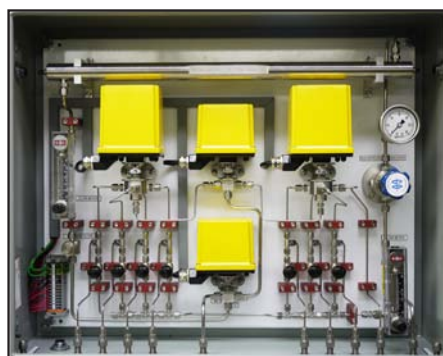
Our core specialties include:

- Headspace sampling for analysis of opaque liquids like crude oil or dark wastewater
- Multiplexed systems for analyzing multiple sample streams with a single analyzer unit
- Close-coupled systems which mount onto a stack as a hybrid of cross-stack design and extractive design
- In situ probes for fast system response



**Headspace SCS**

0-100 ppm  $H_2S$  in crude oil



**Multiplexed SCS**

0-20 ppm  $H_2S$  in 7 streams



**Ultra-Corrosive Sample SCS**

0-50%  $Cl_2$  and 0-30%  $NCl_3$

# Additional Solutions



## **OiW-200** Oil-in-Water Analyzer

The OiW-200 Oil-in-Water Analyzer is a compact UV fluorescence sensor and transducer for the purpose of measuring BTEX, PAHs, and oil in water. This sensor features a robust design allowing for it to be used in corrosive and high-pressure environments.



## **O2A-100** Paramagnetic Oxygen Analyzer

The O2A-100 Analyzer is a real-time monitor of oxygen concentration in a stream using the methodology of paramagnetic detection. Engineered to be compact and simple to use.



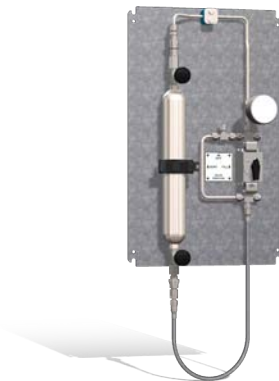
## **TSA-200** Total Sulfur Analyzer

The TSA-200 facilitates controlled pyrolysis of a gas sample, which oxidizes all present sulfur compounds to SO<sub>2</sub> for analysis. The oxidized sample enters the flow cells where it is continuously analyzed by the nova II UV-Vis Spectrophotometer and equated to a total sulfur measurement.



## **MIX-2000** Digital Gas Mixer

The MIX-2000 Digital Gas Mixer uses thermal mass flow controllers for accurate, repeatable production of complex gas mixtures. Designed for use by scientists and lab personnel, this device ships with a compact notebook PC loaded with MIX control software. The MIX-2000 enables you to mix up to 5 different gases simultaneously with no manual calculations.



## **SPA-525** Sampler

The SPA-525 Sampler is designed to allow the user to fill a sample cylinder easily and safely for lab analysis. The single valve configuration gives the user the ability to fill, close and depressurize the system. After the cylinder has been filled, quick connects allow for easy removal.



## **TDL-406** Rackmount Laser Gas Analyzer

The TDL-406 is a tunable diode laser for real-time monitoring of several components in gases. The system fits a standard 19" rack, designed for easy integration in analyzer shelters and laboratory settings.



## **Applied Analytics**

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