AMETEK®
PROCESS INSTRUMENTS

CLEAN ENERGY SOLUTIONS

Real-Time Measurement for Process Optimization, Safety, and Emissions Compliance

Gas analysis solutions to improve process efficiency, reduce greenhouse gas emissions, and ensure equipment uptime.



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Reducing the emissions of greenhouse gases and other harmful pollutants is an increasing priority for power producers, hydrocarbon processing plants, and many other industries.

Operators want to improve the efficiency of their processes, making them more ecologically responsible, and meet environmental regulations focused on reducing emissions. Others are seeking new, alternative energy sources that allow their process to operate cleaner, with fewer greenhouse gas emissions such as carbon dioxide (CO_2).

With more than 50 years of experience with gas measurement technologies, AMETEK Process Instruments can provide the optimal gas analysis solutions for applications that support cleaner energy, including:

- Combustion efficiency to reduce emissions and fuel consumption
- Emissions monitoring to ensure regulatory compliance
- Gas quality measurements to optimize the safe removal of CO_2 through carbon capture
- Process measurements in the production of cleaner energy products such as hydrogen fuel, biofuels, and solar power

Our analyzers are considered the industry standard, and are known for their excellent reliability and high quality. Once installed, our global team of field service engineers provides local technical support for commissioning, start-up, and maintenance.

In addition, our technical sales and service teams provide strong applications and service expertise to ensure the right solution is engineered to meet the needs of your unique process.



AMETEK, Inc.

AMETEK Process Instruments is a worldwide manufacturer of process analyzers and instrumentation. We focus our experience on designing new, innovative analyzers that help our customers achieve higher levels of productivity and quality. By seeking out ways to overcome the limitations of current methods of process monitoring, control, and quality assurance, we have created some of the most capable, unique technologies in the world.

A business unit of the Process and Analytical Instruments division of AMETEK, Inc., we are part of a global corporation with a growth plan founded on four key strategies: Operational Excellence, Strategic Acquisitions, Global & Market Expansion and New Products.



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BIOMETHANE/BIOFUEL

Biofuels are derived from recently living biological material such as crops (either high in sugar or vegetable oil) or from materials such as wood or landfill gas. Biomethane is a near-pure source of methane produced from biogas or solid biomass.

The increased environmental costs of traditional fuels and the uncertainty of their supply has prompted greater use of biofuels for power generation. However, such fuels have varying energy content and gas composition, making it challenging for gas processing, transportation, and end use.

As the number of biomethane/biofuel injection points grows, the need for gas quality measurements becomes more critical.

Required gas quality measurements include measurements of impurities or undesired components, such as moisture (H_2O) content, carbon dioxide (CO_2) content and concentrations of sulfur compounds – including hydrogen sulfide (H_2S), carbonyl sulfide (COS), and methyl mercaptans (CH_3SH).

Key applications for measurement: Transmission pipelines, dehydration, sweetening, landfill gas.



Key considerations

- Compliance with gas quality requirements
- Safe operation of process assets
- Protection of the pipeline from low-quality gas

AMETEK ADVANTAGE

- Proven, reliable, non-contact technology solutions for low maintenance requirements
- Multiple measurement capabilities from a single manufacturer, including tunable diode laser absorption spectroscopy (TDLAS), UV photometric, and quartz crystal sensing technologies
- Quartz crystal moisture analyzer provides reliable on-line verification
- Rapid speed of response to changes in concentrations of critical gas constituents, allowing users to quickly assess gas quality and maintain pipeline flow
- Highly accurate measurements ensure gas quality parameters meet pipeline or tariff requirements

PRODUCT SOLUTIONS

5100

MEASURES: H_2O

Using TDLAS technology, the 5100 delivers fast response and accurate moisture measurements, combining a single absorption cell and integrated sample system into a compact, cost-effective package. The use of a sealed reference cell containing the target analyte enables the 5100 to line-lock on the correct wavelength, ensuring accurate measurements. This line-lock feature also allows the analyzer to continuously verify its optical performance, delivering high specificity and sensitivity for the analyte of interest.



5100HD

MEASURES: H_2O, O_2, CO_2, H_2S

The 5100HD hosts a dual-laser platform, enabling two separate lasers to share a common optical path. This allows non-contact, dual-stream analysis of H_2O and CO_2 in the pipeline. The analyzer's TDLAS technology is highly sensitive, with a fast response speed, and provides an extremely specific measurement for each analyte. As a non-contact analyzer, the 5100HD has very low maintenance requirements and uses sealed reference cells to line-lock the lasers and continuously verify the optical system performance.



5100P

MEASURES: H_2O, CO_2

A transportable, easy-to-use TDLAS analyzer, the 5100P is optimized to measure either H_2O or CO_2 in select gas streams. It offers the fast response, high accuracy benefits of TDLAS technology in a lightweight, durable and mobile platform that is certified for use in hazardous areas including Class I, Division 2, and both ATEX and IECEx Zone 2. Its integrated sample system makes the 5100P fast and easy to use – simply connect the sample tubing, power up the analyzer and begin the sample gas flow through the system.



3050-OLV

MEASURES: H_2O

The 3050-OLV moisture analyzer combines quartz crystal accuracy with on-line verification in a cost-competitive package. The analyzer features an internal moisture generator, allowing users to quickly confirm analyzer performance on schedule or on demand by comparing to a known moisture standard. It is designed for applications that require continuous and reliable measurement of parts per million by volume (ppmv) moisture in gases.





9933

MEASURES: H_2S, COS, H_2, CH_3SH, CO_2

The 9933 is a unique ultraviolet (UV) photometric analyzer system designed for the low-level measurement of H_2S, COS, CH_3SH, CO_2, and H_2. Capable of unattended operation for an extended time period, the 9933 is wall mountable, with integrated heater and sample conditioning system, and designed to operate within a wide ambient temperature range. A rack mounted version of the 9933 is also available, when a shelter or protective enclosure is already present.



CARBON CAPTURE

Carbon capture and storage (CCS) involves the sequestration of large amounts of carbon dioxide (CO_2) emitted from the industrial burning of fossil fuels. Carbon capture technologies typically use an amine-based solvent scrubbing system to directly absorb CO_2 from the flue gas or process stream. These carbon capture systems can remove 80 to 95% of the CO_2 emitted from a power plant.

There are many technological approaches to CCS, but a common requirement for nearly all large-scale schemes is a system for transporting CO_2 from capture sites to storage sites. Pipelines are the most common method for transporting large quantities over long distances.

Maintaining a very low level of water in the transported CO_2 is very important. If water is present, it will react with the CO_2 to form carbonic acid. While carbonic acid is relatively weak, its presence will result in corrosion of the pipeline over time. Likewise, underground storage sites may also be affected by corrosion if the stored CO_2 is contaminated by moisture.

Key applications for measurement: Absorber inlet and outlet, regeneration unit outlets, transmission pipelines, underground storage.

AMETEK ADVANTAGE

- Choice of TDLAS and quartz crystal sensing technologies
- Non-contact TDLAS technology eliminates exposure to contaminants, for reduced maintenance requirements
- Real-time verification algorithms and an internal reference cell provide a continuous indication that the TDLAS analyzer is operating properly
- Quartz crystal moisture analyzer provides reliable on-line verification
- Highly specific data collection, eliminating any concentration effects resulting from moderate cell contamination

Key considerations

- Monitor absorber and regenerator efficiency
- Minimize damage to mechanical infrastructure
- Meet gas quality requirements

PRODUCT SOLUTIONS

5100/5100HD

MEASURES: H_2O, CO_2

Using TDLAS technology, these analyzers deliver fast response and accurate moisture measurements with reliable, low maintenance performance.



5100P

MEASURES: H_2O, CO_2

A transportable, easy-to-use TDLAS analyzer, the 5100P is optimized to measure moisture in select gas streams.



3050-OLV

MEASURES: H_2O

The 3050-OLV Moisture Analyzer combines quartz crystal accuracy with on-line verification in a cost-competitive package.





Real-time measurement solutions for clean energy production

BIOMASS

Biomass is a collective term for plant or animal material used to produce electricity or heat for direct use through combustion – for example, by burning wood, crops, or waste.

They are either used in their raw form – such as when wooden logs are burned – or converted into pellet fuel. The biomass fuel is burned in a boiler in a similar process to coal-fired power generation.

When controlling combustion, process efficiency depends upon achieving the best possible ratio of air-to-fuel.

This allows the heat capture of the boiler to be maximized, and the optimum amount of biomass to be used. Achieving the required air-to-fuel ratio is challenging, as this is constantly affected by changes in loading conditions, fuel composition, fuel particle size, and caloric content. Careful monitoring of excess oxygen (O_2) and combustibles ($CO+H_2$) can ensure efficient combustion of the biomass fuel.

Key applications for measurement:
Industrial boilers.

AMETEK ADVANTAGE

- Oxygen, combustibles ($CO+H_2$), and hydrocarbon measurements from a single analyzer for optimized combustion control
- Convective sampling design and blowback options for high-particulate applications
- Serviceable from the process flange and capable of operating in high process temperatures, up to 1648°C (3000°F)
- Emissions analyzers can be easily integrated into a continuous emission monitoring (CEM) system for a comprehensive solution

Key considerations

- Accurate excess O_2 measurements to set the burner air-fuel ratio
- Analyzer reliability in high particulate processes
- Ability to detect and minimize sample plugging
- Capability to operate at high temperatures
- Reduction of harmful emissions, including NOx and CO_2 through optimized combustion

PRODUCT SOLUTIONS

WDG-V

MEASURES: **O_2, Combustibles, CH_4**

SIL-2 capable for excess O_2 and combustibles*, the Thermox WDG-V combustion analyzer ensures safe, efficient combustion control.



*using the RTD combustibles detector

WDG-V Blowback

MEASURES: **O_2, Combustibles, CH_4**

The WDG-V analyzer is available with a durable, integrated blowback system to enable accurate, reliable operation in dusty, high-particulate conditions.



WDG-HPII

MEASURES: **O_2, Combustibles**

The WDG-HPII is a unique flue gas analyzer designed with a convective flow sampling technology to deliver accurate combustion measurements in high particulate applications.



COMBUSTION AND EMISSIONS

The key to fuel economy, lower operational costs, improved safety, and reduced emissions in combustion applications is to find the optimal combustion setpoint. Measuring excess oxygen (O_2) by itself can provide a control point for operation. Measuring combustibles ($CO+H_2$) as well can unlock the optimum control point for operation by minimizing the efficiency losses from too much and not enough air at the burner.

As combustion processes continue to be used for power generation and process heating, plant operators will increasingly focus on process efficiency and emission monitoring to achieve their sustainability targets. Flue gas measurement provides a mechanism to optimize combustion control and ensure safe operation of fired heaters, boilers, and thermal oxidizers. Accurate emission monitoring will continue to allow plant operators to demonstrate that their process remains within the permitted emissions limits, minimizing the risks to human health and the wider environment.

Key applications for measurement: Boilers, fired heaters, thermal oxidizers, reformers, recovery boilers, kilns, continuous emissions monitoring (CEM) systems.



Key considerations

- Safe, optimized combustion control
- Optimal air-to-fuel ratio to reduce fuel consumption
- Elimination of safety hazards
- Reduction of harmful emissions , including NOx and CO_2
- Continuous monitoring to maintain compliance

AMETEK ADVANTAGE

- Excess O_2, combustibles ($CO+H_2$) and hydrocarbon measurements from a single analyzer for optimized combustion control
- Convective sampling design and blowback options for high-particulate applications
- Emissions analyzers can be easily integrated into a CEM system for a comprehensive solution
- Serviceable from the process flange and available in versatile mounting configurations, including wall, floor, and remote mounting

PRODUCT SOLUTIONS

WDG-V

MEASURES: **O_2, Combustibles, CH_4**

SIL-2 capable for excess O_2 and combustibles* ($CO+H_2$), the Thermox WDG-V combustion analyzer ensures safe, efficient operation of the burner management system. The close-coupled extractive design enables a fast response across a wide range of flue gas applications, up to 1648°C (3000°F). A methane (CH_4)/ hydrocarbons sensor is also available to monitor for flame out and fuel leaks during light-off and normal operation, and a blowback version is available for accurate, reliable operation in dusty, high-particulate combustion conditions.



*using the RTD combustibles detector

WDG-HPII

MEASURES: **O_2, Combustibles**

The WDG-HPII flue gas analyzer uses unique convective flow sampling technology that combines the advantages of in-situ probe high-particulate sampling with the high temperature and corrosion resistance of extractive analyzers. Proven zirconium oxide sensor technology delivers accurate excess O_2 measurements in ranges from 0-1% to 0-100%. This analyzer has an optional catalytic sensor to measure ppm levels of combustibles, including CO and H_2.



5100HD

MEASURES: **H_2S**

The 5100HD TDLAS uses a direct measurement technique, providing continuous H_2S measurements quickly and accurately. Other manufacturers use scrubbing techniques to establish a zero background, interrupting measurements for up to 20 minutes per hour, and failing to address frequently changing gas concentrations. To ensure the 5100HD continues to measure accurately, a sealed reference cell is integrated and line-lock verification is used.



993X

MEASURES: **H_2S, SO_2, NOx**

Using AMETEK's proprietary high-resolution ultraviolet (UV) technology in a dual-beam, dual-wavelength configuration, the 993X series of online process analyzers provides accurate single and multi-gas analysis with no expensive sample or chiller requirements. Utilizing the proven optical bench configuration from the 900 series of analyzers, the 993X adds features requested by our current users - longer lamp life, protection from the elements (analyzers are IP66 and NEMA4X compliant, and can operate in ambient temperatures ranging from -20C to 50C), various hazardous location certifications and comprehensive touch screen interface.



9900

MEASURES: **SO_2, NOx**

A single or multi-component gas analyzer, the 9900 operates as a standalone device or can be integrated into a CEM system. Available in rack mount (RM) and wall mount (WM) versions, it can be configured to measure most gas species that absorb in the ultraviolet (UV) range, and O_2, CO and CO_2 measurements can be added as options. Up to five components can be measured simultaneously, making the 9900 highly economical for multi-component gas analysis applications.



HYDROGEN PRODUCTION

Hydrogen is a cleaner burning fuel, as it does not contain carbon and so cannot form carbon dioxide as a by-product of combustion. This has led to an increase in the production of hydrogen, as well as its growing use as a fuel for industrial fired equipment.

Currently, hydrogen fuel can be generated in one of four production methods, and each method is commonly referred to by a specific color to delineate the production method:

- Green hydrogen, generated from renewable (non-fossil fuel) energy sources and electrolysis
- Blue hydrogen, produced using fossil fuel sources (such as natural gas) and post-combustion carbon capture
- Gray hydrogen, created from natural gas without carbon capture
- Brown hydrogen, generated from coal gasification

The purity of the hydrogen directly affects its quality as a fuel, so it is essential to monitor for contamination introduced during production. In particular, hydrogen will react with atmospheric oxygen to create moisture impurities.

Key applications for measurement: Product purity, gas quality.

Key considerations

- Continuous monitoring of contamination
- High product purity requirements

AMETEK ADVANTAGE

- Multiple measurement capabilities from a single manufacturer, including tunable diode laser absorption spectroscopy (TDLAS) and quartz crystal sensing technologies
- Non-contact TDLAS technology solution eliminates exposure to contaminants, for reduced maintenance requirements
- Real-time verification algorithms and an internal reference cell provide a continuous indication that the analyzer is operating properly
- Very low-level measurement of carbon monoxide (CO) using flame ionization detector (FID) gas chromatography technology
- Optimized combustion control of blue hydrogen fired heaters in Steam Methane Reforming (SMR) and Autothermal Reforming (ATR)

PRODUCT SOLUTIONS

WDG-V

MEASURES:
O_2, Combustibles, CH_4

SIL-2 capable for excess O_2 and combustibles* measurements, the Thermox WDG-V combustion analyzer helps ensure safe, efficient combustion control of SMR and ATR fired heaters.



*using the RTD combustibles detector

5100HD

MEASURES:
CH_4, H_2O, O_2

Using TDLAS technology, the 5100HD analyzer delivers fast response and accurate measurements with reliable, low maintenance performance.



3050-OLV

MEASURES:
H_2O

The 3050-OLV Moisture Analyzer combines quartz crystal accuracy with online verification in a cost-competitive package.



ta3000F

MEASURES:
CO

The Trace Analytical ta3000F FID configuration is widely used to determine very low levels of CO in hydrogen.



SOLAR

Due to the growing demand for renewable energy sources, the manufacture of solar cells and photovoltaic arrays has advanced dramatically in recent years. To ensure high-quality products, it is essential to accurately monitor any contaminants during the production process.

High purity silicon is integral to the creation of solar panels. Typically, 99% pure silicon is created from silicon dioxide in an electric arc furnace. This is then further purified using the floating zone technique, in which a rod of impure silicon is passed through a heated zone several times in the same direction, dragging the impurities toward one end which is then removed.

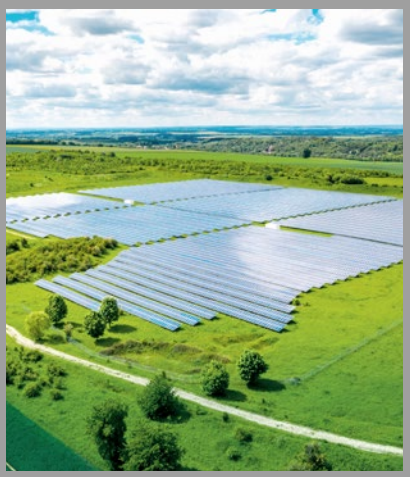
Moisture contamination, in particular, can affect the integrity and performance of solar cells, mainly during the encapsulation process when the finished solar cells are sealed into silicon rubber or ethylene vinyl acetate (EVA). Moisture can promote delamination, accelerating corrosion and leading to device failure.

By ensuring a high-purity supply gas for manufacturing processes, gas analyzers support the production of a high-quality solar panels.

Key applications for measurement:
Gas purification.

AMETEK ADVANTAGE

- Fast-response detection of H_2O, H_2, CO, CO_2, CH_4
- Ultra-low-level measurements
- Continuous monitoring
- Wide range of flexible and accurate solutions



Key considerations

- High-purity supply gases for manufacturing
- Prevention of corrosion and delamination

PRODUCT SOLUTIONS

Trace Analytical series

MEASURES: **H_2, CO, CO_2, CH_4**

Designed for ultra-high-purity (UHP) gas applications, this range can be supplied using either a reduction gas detector or flame ionization detector.



3050/5800 series

MEASURES: **H_2O**

These on-line process analyzers accurately determine trace moisture content using proven quartz crystal microbalance technology.



5910/5920 series

MEASURES: **H_2O**

With exceptional stability and sensitivity, these quartz crystal analyzers are ideal for continuous monitoring of UHP gases.

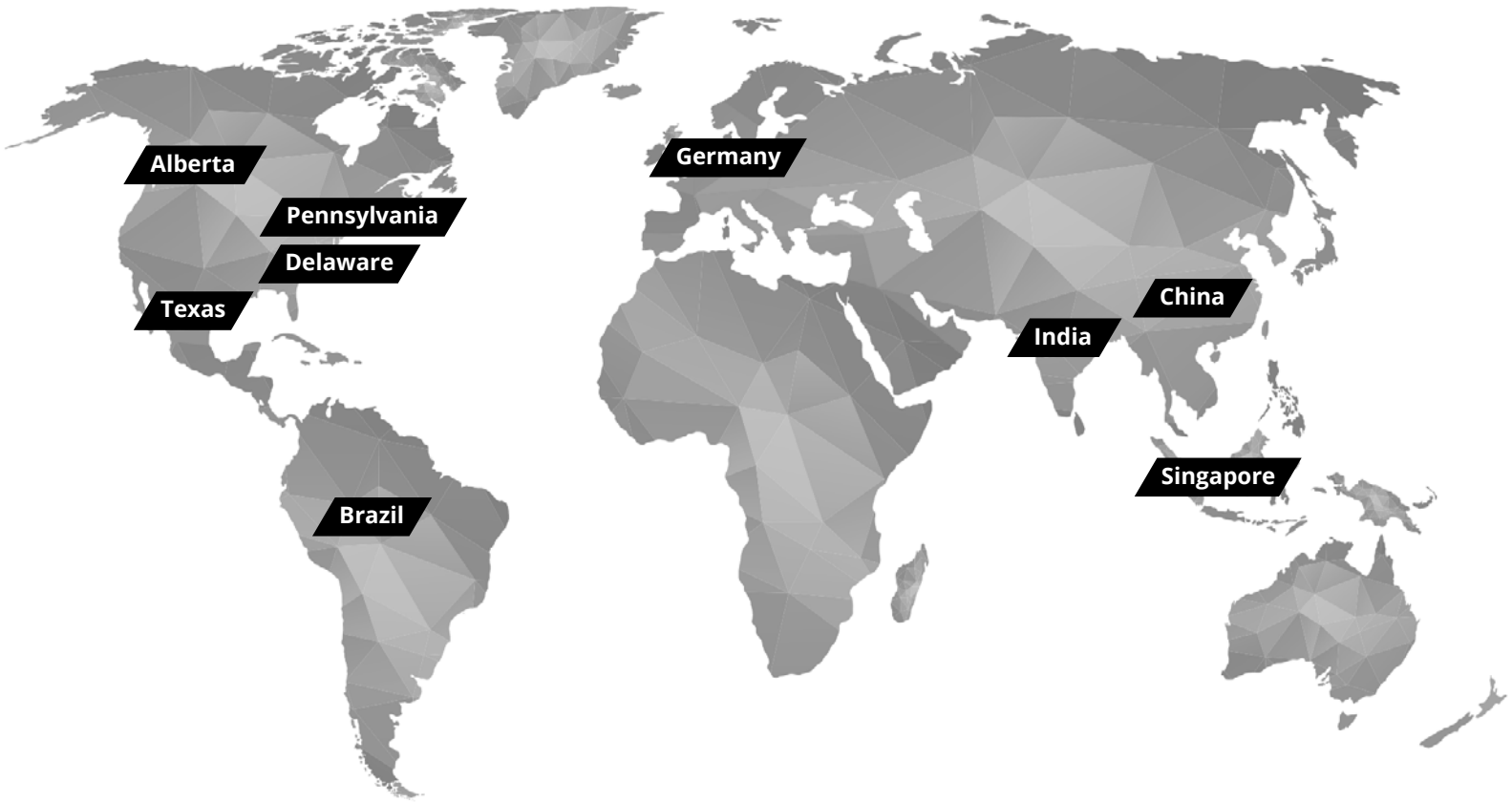


AMETEK Process Instruments delivers worldwide sales and service support through a network of direct and factory-trained global distribution channels.

AMETEK Service Assistance Program plans offer coverage up to 24 hours a day, 365 days of the year.

As worldwide experts in the manufacture of process analyzers and instrumentation, we have supplied solutions to industry since 1962, providing the widest range of analysis technology available.

Through process application consulting, we create custom-designed solutions that meet the needs of your specific application or process.



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AMETEK®
PROCESS INSTRUMENTS

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Real-time measurement solutions for clean energy production

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