

Application Note

Moisture Measurement in the Industrial Gas Industry HALO-500-H₂O

Background

The industrial gas industry supplies gaseous and cryogenic liquid products to a wide variety of markets, including oil and natural gas extraction, steel manufacturing, petroleum processing, energy supply, food production and preservation, electronics fabrication, pharmaceutical production, healthcare, and more. Each of these diverse markets has exacting and individual demands for the gases it consumes, with specific needs relating to gas quality, usage volume, package types, and delivery frequency. Industrial gas suppliers therefore manage a tremendous range of gas products, from bulk atmospherics in direct access pipelines to very small volume lecture bottles of high-precision specialty mixes.

A broad spectrum of production activities is needed to make the entire portfolio of industrial gas products. Diverse factors affect the quality of the final product delivered by pipeline, on-site generation, merchant/bulk delivery, or packaged gas. To maintain efficient production, it is critical for the gas producer to monitor key process parameters, including pressure, temperature, and impurity levels. For moisture monitoring, the HALO-500-H₂O offers numerous features that make it a compelling choice for a variety of industrial gas applications.

Air Separation Technology

The reliability and robustness of the HALO-500 (Figure 1) make it an ideal choice for moisture monitoring in air separation processes.

Moisture, one of the earliest-removed components in any air separation scheme, is typically eliminated by an absorbent bed system. The dry air is then further processed via cryogenic distillation, adsorptive means, or membrane separation. At critical points in these processes, analyzers are employed to monitor key indicating molecules. Reliable long-term performance of these analyzers is essential since the majority of air separation plants use automated feedback controls and seldom have on-site personnel. Due to the HALO-500's durable materials of construction, lack of moving parts, outstanding accuracy, and remote communication capability, the Tiger Optics analyzer is well equipped to outperform and outlast products that rely on other moisture measurement technologies in air separation applications.



Figure 1. Tiger Optics HALO-500-H₂O Analyzer

Fill-Zone Quality Checks

Merchant products are delivered to customers in liquid form via refrigerated trucks. When a truck returns to its gas production facility for refilling, a quality-control check is frequently

required at the fill zone to confirm that the product meets specifications. When moisture measurement is needed, fill-zone testing demands a quick, reliable measurement with an easily interpreted result. The HALO-500 meets these needs with its ease of operation, rapid response, and outstanding accuracy over the entire 0.02 – 500 ppm range. Other moisture instruments can take over 10 times as long to reach a steady reading, thereby adding to the time and cost of deliveries.

Packaged Gas Facilities – Quality Control Laboratory

Quality control laboratories process tens to hundreds of gas packages per day. To detect different impurities, the labs rely on chromatographic, spectroscopic, mass spectrometric, and other analyte-specific instruments. The 0.02 – 500 ppm operating range of the HALO-500 covers the moisture specifications of a myriad of cylinder gas products. In addition to its exceptional accuracy, the HALO-500 is capable of measuring moisture in samples such as hydrogen, helium, nitrogen, oxygen, carbon monoxide, carbon dioxide, the noble gases, and clean dry air. The HALO-500's quick response allows switching between these different samples in a matter of seconds, not minutes. Even under conditions where the instrument is exposed to ambient air, the HALO-500 can achieve 90 percent of a reading in less than 3 minutes due to its low-wetted surface area and highly-polished wetted components. With the HALO-500, moisture measurement will never again be the bottleneck in packaged-gas analysis.

Packaged Gas Facilities – “House” Gas Monitoring

A typical packaged-gas facility has several high-usage gases plumbed throughout the work area. These gases are vaporized from cryogenic liquid form, and travel through a

significant distance of piping with numerous tees and connections to a final endpoint where the gas is used. Although the gas quality in the initial package may have been confirmed when the tank was filled, each connection along the distribution path offers an opportunity for ambient contaminants – including moisture – to infiltrate. In work areas where dry “house” gas is imperative, the HALO-500's quick, accurate response and user-programmable alarm can alert the user immediately in the event of a house-gas quality issue.

Packaged Gas Facilities – Cylinder Preparation

For any gas supplied from a cylinder source, the quality of the gas is limited by the quality of the cylinder in which it is packaged. In all high-purity cylinder gases, moisture is a key contaminant; the cylinder must be dry before the product gas is introduced. Cylinders, therefore, undergo time-consuming stages of heating, purging, and evacuation to remove adhered moisture. With its fast response, robust construction and ease of use, the HALO-500 is the ideal instrument to quickly and accurately confirm adequate moisture removal.

