

TRACE GAS MONITOR

GA-370



Continuous and Ultrasensitive
Measurement of Trace Impurities
(CO, CO₂, CH₄) in High-Purity Gas



For Quality Assurance of High Purity Gases and Process Optimization at Air Separation Plants, Hydrogen Production Facilities etc.

GA-370 provides continuous ultrahigh-sensitivity and high-precision monitoring of trace impurities (CO, CO₂, and CH₄) in high purity gases. It contributes to quality assurance of the final product, as well as to optimization of the production processes at air separation plants, in on-site hydrogen stations and at gas manufacturing facilities for semiconductor industry.

Ultrasensitive Measurement

- ▶ A cross-modulation dual-beam non-dispersive infrared (NDIR) analyzer provides continuous and stable zero drift-free measurement.
- ▶ Lowest detection limit (LDL) of 10 ppb supports applications where high accuracy measurement is required.

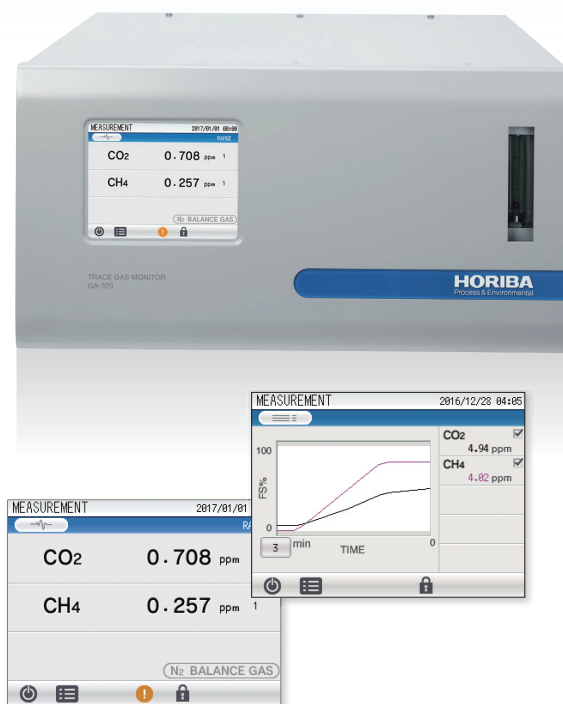
Measurement of Trace Impurities in a Balance Gas

- ▶ Representative gases such as N₂, O₂, He, Ar, H₂ and Air are supported.

* For other balance gases, please contact HORIBA.

Easy Maintenance-free Operation

- ▶ User friendly interface simplifies analyzer's operation, calibration and measurement.
- ▶ No optical alignment ever required.
- ▶ A color touch screen LCD allows operator to view accumulated data as trend graphs.



Measurement Principle

Cross-Modulation Dual-Beam Non-Dispersive Infrared Method

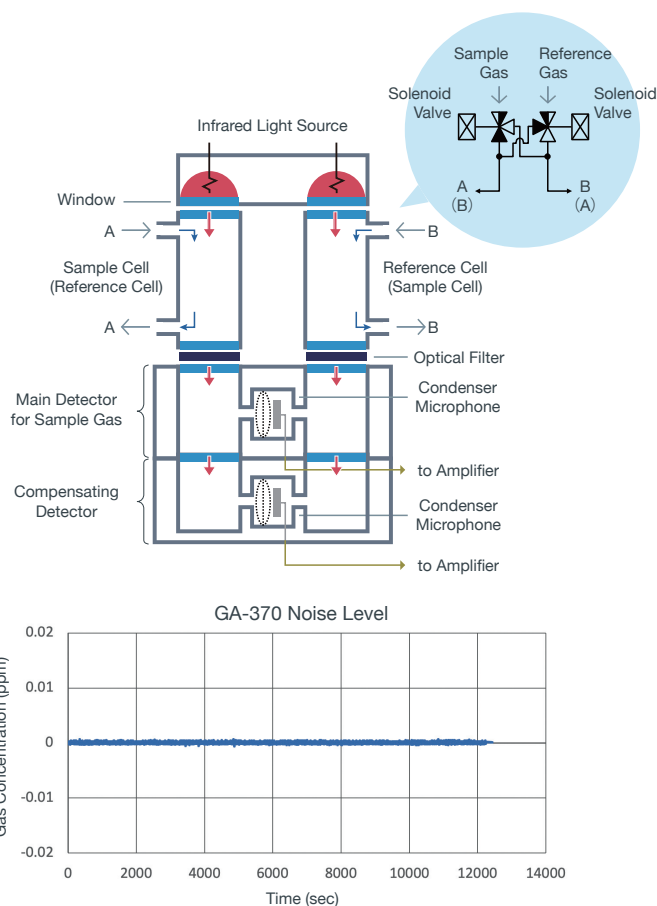
Cross-Modulation NDIR method uses a solenoid valve that switches at a fixed cycle (e.g., 1 Hz) to synchronously and alternately flow a sample gas and a reference gas into the one gas cell to obtain a modulated concentration signal of the gas to be measured.

In this method, when the sample gas and the reference gas are the same gases (zero point), no modulation signal is generated. Absence of mechanical parts such as a rotating sector enables long-term stable output signal.

In cross-modulation dual-beam NDIR method, the use of double beam (light source) and a double cell allows the sample gas and the reference gas to flow alternately into the two cells, the diaphragm of the condenser microphone inside the detector moves to the left and to the right, providing twice the amount of signal comparing with the method when using a rotating sector, thereby improving the SN ratio.

The graph on the right shows the noise level of the cross-modulation dual-beam non-dispersive infrared method, which is extremely low and stable.

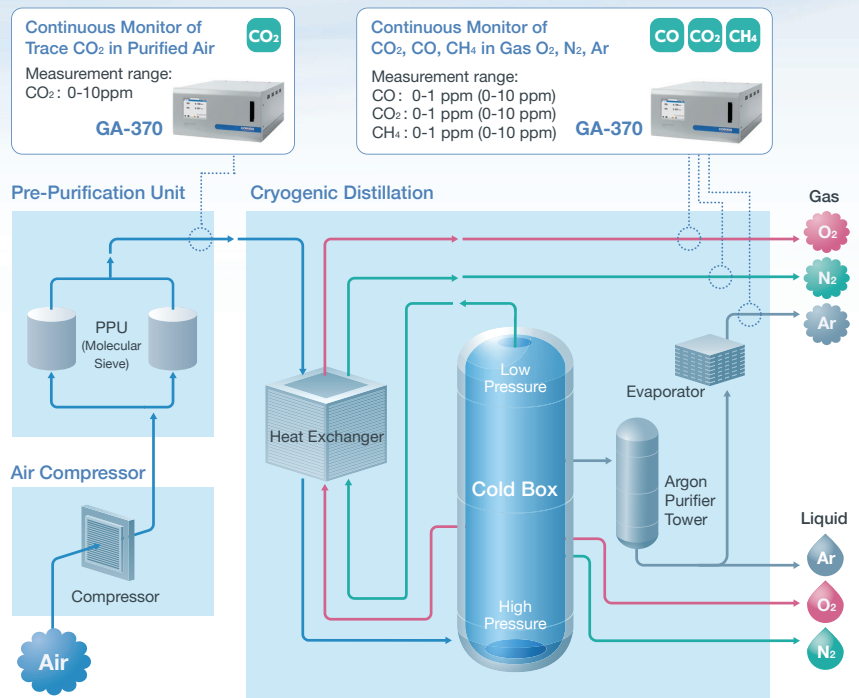
Thus, even in the measurement of trace concentrations of impurities in high-purity gases, this zero-drift free method provides long-term stability and low noise level.



Trace Impurities Monitoring at Air Separation Plants

Air separation plant separates atmospheric air into its primary components oxygen (O_2), nitrogen (N_2), and argon (Ar) by distillation at cryogenic temperatures. Separation of air is performed using the difference in the boiling points of each constituent gas in the distillation unit, but the air must be treated in the pre-purification unit (PPU) before getting into cryogenic distillation process. PPU is designed to remove water vapor, carbon dioxide (CO_2), and other impurities contained in the air to ensure water and CO_2 does not enter into the distillation unit, where it could cause plugging in the process and create the risk of explosion.

The HORIBA GA-370 Trace Gas Monitor is a useful tool for continuous monitoring of impurities that might be present in the separated gas for safety control. Also, it could be used for measurement of impurities (CO , CO_2 , CH_4) in final product of O_2 , N_2 and Ar for quality assurance.



Trace Impurities Monitoring at On-site Hydrogen Stations

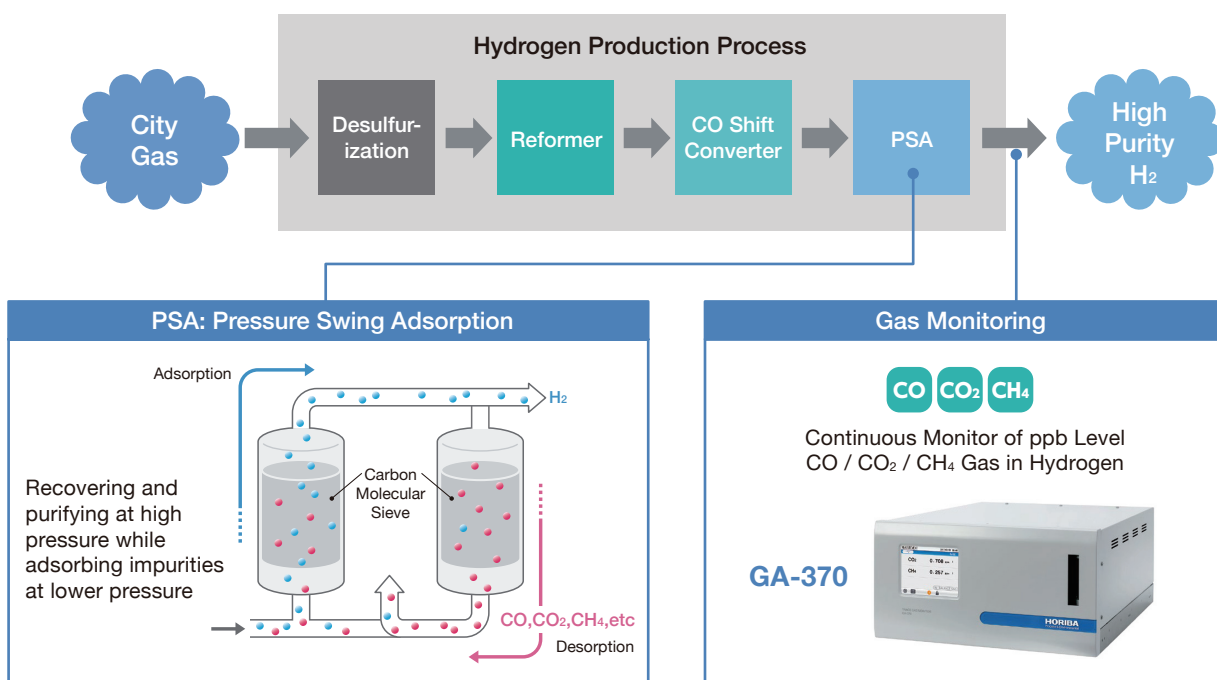
On-site hydrogen station is a facility that reforms city gas (LNG/LPG), methanol, etc. at the station and produce high-purity hydrogen, which is later supplied to the fuel cell vehicles (FCV/FCEV).

The purity of hydrogen for FCVs must be 99.97% or higher according to ISO 14687-2, the standards are also set for the concentration of each impurity gas. One of the challenges for on-site hydrogen stations is how to reduce carbon monoxide (CO), carbon dioxide (CO₂), and methane (CH₄) in the hydrogen production process. These are impurities in hydrogen that might degrade the fuel cells installed in the vehicle. The GA-370 contributes to the solving of this issue by continuous concentration

monitoring of the trace impurities in high purity hydrogen with high accuracy.

In particular, GA-370 can stably measure CO, which determines the quality of hydrogen for FCVs, with a minimum detection sensitivity of 10 ppb and a low range of 0-1 ppm. With a single unit, GA-370 can simultaneously measure CO and CH₄, which are used as indicators to detect in advance the presence of impurities in the hydrogen during the adsorption process (breakthrough) due to degradation of the PSA* adsorbent used in hydrogen purification.

*PSA: Pressure Swing Adsorption



GA-370 Specifications

Model		GA-370
Gases measured		CO, CO ₂ , and CH ₄
Balance gases		N ₂ , O ₂ , He, Ar, H ₂ , Air
Number of measurement components		1 component or 2 components (specify a measuring balance gas)
Measuring principle		Cross-modulation non-dispersive infrared (NDIR) absorption method
Measurement ranges		0 to 1/2/5/10 ppm
Lowest detection limit (2σ)		10 ppb
Repeatability		≤±2% of full scale
Indication error		≤±2% of full scale
Zero Drift		≤±0.02 ppm/day, ≤±0.03 ppm/week
Span Drift		≤±2% of full scale/day, ≤±3% of full scale/week
Response time (T ₉₀)		≤180 s
Gas flow rate *		Sample gas: approx. 3.5 L/min, reference gas: approx. 3.5 L/min, span gas: approx. 3.5 L/min Note: A delivery pressure of 50-100 kPa is recommended for both sample and reference gas.
Analog output		Max. 2 channels isolated output (2 components) Select one from 0 to 1 V, 0 to 10 V, 0 to 16 mA, 4 to 20 mA, or 0 to 20 mA Current output: Allowable load resistance 750Ωor less
Installation conditions	Ambient temperature	0 to 40°C
	Ambient relative humidity	≤85%
	Dust	Less than environmental standard
	Vibration	≤0.29 m/s ² , at ≤100 Hz
Dimensions, weight		430(W) × 221(H) × 555(D) mm (excluding protrusions), approx. 18 kg
Power supply		100 to 240 V AC, ≤±10%(max. voltage: 250 V AC)
Power consumption		Approx. 100 VA

* Note 1) Customers are required to provide reference and span gases. The purity of the measured bulk gas must be equal to or lower than 0.1% of the analyzer's minimum range. A 9 ppm span gas is recommended for most applications.

* Note 2) The GA-370 Trace Gas Analyzer is not intrinsically safe. When measurements are made in an explosive gas such as H₂, it is required to implement proper precautions by locating the analyzer within a purged enclosure to avoid explosive conditions.

Related Products



Portable Gas Analyzer PG-300 Series

Measurement of max. 5 different components by single portable, light weight and robust unit. Used for emission monitoring, R&D(fuel cell), stack cross check.

NOx SO₂ CO CO₂ O₂ CH₄ N₂O



Air Pollution Monitor AP-370 Series

Monitoring of ambient air pollutants: harmful oxides and particulate. Used for ambient air, clean room, indoor air and trace gas monitoring.

O₃ SO₂ NOx CO CO₂ NH₃ H₂S THC NMHC
CH₄ SPM PM_{2.5} PM₁₀



Multi-Component Gas Analyzer VA-5000 Series

Supports diverse needs from environmental problems to energy development. Up to 4 components can be measured by one unit.

CO CO₂ N₂O CH₄ SO₂ NO NOx O₂ NH₃



The HORIBA Group adopts IMS (Integrated Management System) which integrates Quality Management System ISO9001, Environmental Management System ISO14001, and Occupational Health and Safety Management System ISO45001. We have now integrated Business Continuity Management System ISO22301 in order to provide our products and services in a stable manner, even in emergencies.



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