



Process Gas Monitoring Solution

Cubic Instruments (Wuhan)Ltd.

CUBIC INSTRUMENTS PROFILE

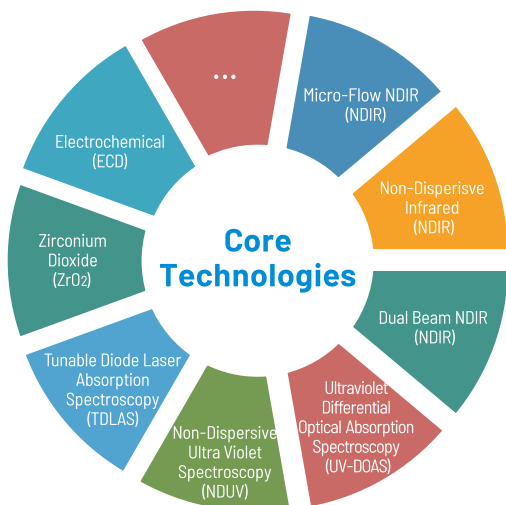
Cubic Instruments (Wuhan) Ltd. (hereinafter referred to as "Cubic Instruments") is a wholly-owned subsidiary of Cubic Sensor and Instrument Co., Ltd. (stock code 688665.SH). Established in 2010, Cubic Instruments is a high-tech enterprise specializing in providing gas composition and gas flow measurement solutions in the fields of environmental monitoring, process gas monitoring and smart metering.

Based on the advantages of Cubic core gas sensing technology platform, Cubic Instruments has developed a series of gas analyzers that utilize advanced technical principles such as non-dispersive infrared (NDIR) technology, ultraviolet differential absorption spectroscopy (UV-DOAS) technology, laser Raman (LRD) technology, ultrasonic technology, thermal conductivity (TCD) technology, and light scattering detection (LSD) technology. Cubic Instruments gas analyzers are widely used in environmental monitoring, metallurgy, coal chemical, biomass energy, and other industries, playing an important role in energy conservation and emission reduction. Cubic Instruments independently developed and produced portable infrared biogas analyzers, micro-flow infrared flue gas analyzers, and infrared gas analyzers that had successively obtained the national key new product certificate. The infrared gas analyzer has won the honor of the outstanding product award of the Chinese Instrument and Control Society, and its core technology won the Hubei Province Invention Patent Gold Award. In 2019, the Ministry of Industry and Information Technology awarded Cubic Instruments "Research and Industrialization of Micro-flow Infrared Flue Gas Sensors" for the "key product and process" one-stop application program demonstration project. Cubic Instruments was also recognized as the "one-stop" application program demonstration enterprise for its contribution to the project.

With decade-long dedications in technical innovations, strict quality control, and global business strategies, Cubic Instruments products have been exported to many countries and regions. Besides, Cubic Instruments is moving towards a higher target to be the international brand in the field of high-end and value-added applications of gas analysis instruments.



CORE TECHNOLOGIES



20+ Years Focus

Emission Monitoring Solutions

Core Technologies

Professional Technical Engineers

Quick Service Response

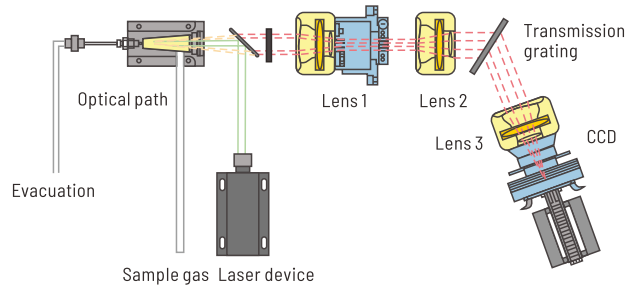
Technical Support

Intellectual Property

Numerous National Invention Patents

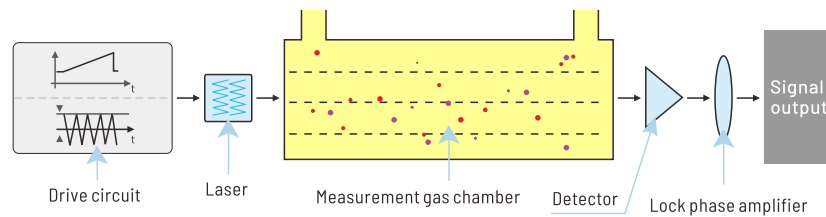
International PCT Patents

LASER RAMAN



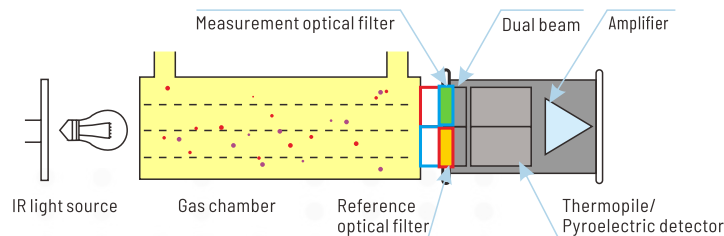
The Raman scattering is an inelastic spectroscopy technique meaning incoming light undergoes a change in color and is scattered with a different energy. The Raman process specifically describes the interaction of incident light with molecular vibrations and rotations in a material. Light can either excite vibrations and lose energy or pick up energy from present vibrations. As the shift in energy is mostly dependent on the material composition and structure and not the wavelength of the excitation light, Raman spectroscopy measures the energy shift of the Raman scattered light relative to the incident light energy which is characteristic to the sample that is being measured.

TDLAS



Tunable Diode Laser Absorption Spectroscopy (TDLAS) uses the narrow line width and tunable characteristics of semiconductor lasers to analyze individual absorption lines of gas molecules. The laser frequency is modulated by modulating the working current of the semiconductor laser, so that when the laser beam of a specific wavelength emitted by the semiconductor laser passes through the measuring pipeline, it is frequency-selectively absorbed by the measured gas, and the laser intensity is attenuated. The lock-in amplifier is used to photoelectricity at the receiving end. The optical signal detected by the detector is demodulated, and combined with the Beer-Lambert relationship between the gas concentration and the laser absorption spectrum, the concentration of the measured gas is obtained.

NDIR



The principle of non-dispersive infrared gas sensing technology is that the gas absorption of characteristic infrared wavelengths conforms to Lambert-Beer's law. The basic principle is that an infrared light source emits an infrared beam through the sampling gas chamber, and each gas component in the sample gas absorbs a specific frequency infrared rays. By the detector to receive and measure the infrared absorption of the corresponding frequency, combined with the algorithm analysis set in the embedded software, the concentration of the gas component can be measured. The reason why this technique is non-dispersive is that the wavelength passing through the sampling gas cell is not pre-filtered.

Laser Raman Gas Analyzer

LRGA-3100

LRGA-3100 laser raman gas analyzer is an advanced multi-gas analysis equipment independently researched and developed by Cubic-Ruiyi (a wholly-owned subsidiary of Cubic sensor and Instrument Co., Ltd). Based on the principle of laser raman scattering, which enhances, collects, processes and identifies the characteristic raman scattering spectra of the gas to be measured and quantifies the content, LRGA-3100 can provide online real time measurement for various gases simultaneously with the shortest response time in seconds. With optimized optical path and structure, the new generation laser raman gas analyzer LRGA-3100 is much more compact and transportable.



LRGA-3100



Features

- Adopting laser raman gas characteristic fingerprint spectroscopy technology, strong anti-interference ability.
- Capable of measuring multi-gases such as N₂, O₂, H₂, CH₄, C₂H₆, C₃H₈, H₂S etc.
- Online real time measurement, one instrument providing gas monitoring for whole industrial process gases.
- Wide detection range from 0~10% min and 0~100% max.
- Designed with intelligent software and full touch screen interface, data can be displayed intuitively, and PC keyboard can be connected externally.
- Replacement of GC and MS.



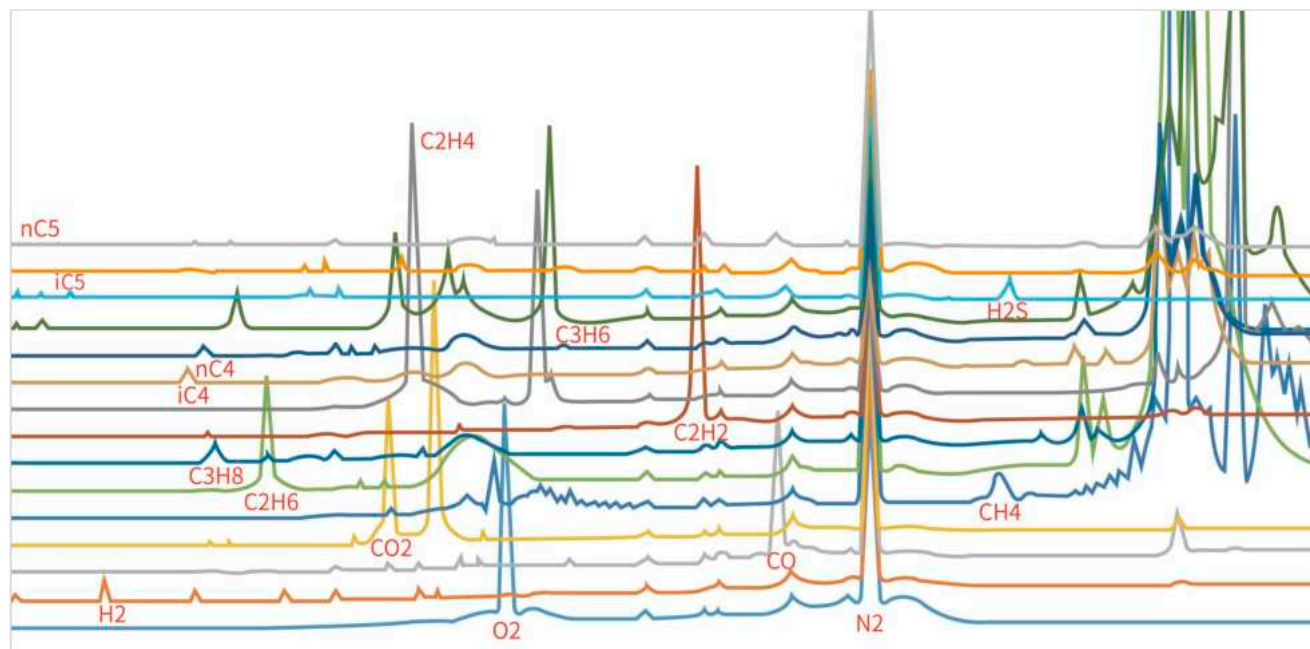
LRGA-6000



Specifications

Measurements	H ₂ , N ₂ , O ₂ , CO, CO ₂ , CH ₄ , C ₂ H ₂ , C ₂ H ₄ , C ₂ H ₆ , C ₃ H ₆ , C ₃ H ₈ , H ₂ S etc.
Measurement Range	0~100% (Can be customized based on actual application condition)
Accuracy	≤±1%F.S.
Response Time	100s
Repeatability	1%
Working Temperature	10°C~35°C
Power Supply	AC 220V/50Hz
Communication	USB, RS-232
Dimension	590*480*177mm (L*W*H)

Raman Spectra of Common Gases



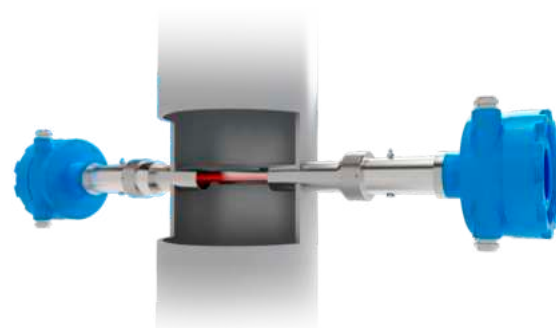
Comparison of Common Technical Principles

Advantages of Laser Raman Spectroscopy	Compare with Other Gas Analysis Technologies
▶ Adopting laser raman gas characteristic finger print spectroscopy technology, online measuring and monitoring concentration of gases like N₂, O₂, H₂, CO, H₂S etc in real time. ▶ Strong anti-interference ability, effectively avoiding the influence of water. ▶ Response time as fast as 30 seconds. ▶ No carrier gas or chromatographic column needed, low maintenance cost.	Gas Chromatograph Analyzer ▶ The detection time is as long as 15 minutes each measurement. ▶ Not only consumables such as carrier gas and chromatographic column are required, but also professional training is required. ▶ Water vapor has a great influence on the measurement, and it is not suitable for the analysis of high boiling point, non-volatile and unstable substances.
	Online Mass Spectrometer ▶ Difficult to distinguish isomer gas, complicated operation. ▶ Large, heavy, slow and expensive. ▶ Easy to be polluted, high operation and maintenance costs, not suitable for online analysis of industrial sites.
	Fourier Transform Infrared Spectroscopy ▶ Moving parts inside, poor stability. ▶ Only analyzing a single component at one time, narrow measurement range . ▶ No measurement of diatomic molecules, such as H₂, O₂, N₂, etc.

In-situ Laser Process Gas Analyzer

GasTDL-3100

GasTDL-3100 in-situ laser process gas analyzer is a high-performance laser gas analyzer based on tunable diode laser absorption spectroscopy technology (TDLAS). With a cross-stack design, GasTDL-3100 can be used for industrial process gas control, the response time is fast, which is generally calculated in seconds in in-situ measurement. It can avoid the time delay caused by sampling. The gas component concentration can be reflected online and in real time.



Features

- Adopting TDLAS technology, no cross-interference from other gases.
- In-situ installation, no need for sampling or pretreatment system.
- Fast response time ($T_{90} \leq 4s$) for reflecting the gas concentration in real time.
- Real-time online measurement, minimal distortion of gas concentration, resulting in high measurement accuracy.
- Good adaptability in harsh measurement environments such as high temperature, high dust, high moisture, high corrosion, high flow rate, etc.
- Explosion-proof design, high safety factor.
- Simple structure, no consumables or moving parts, maintenance-free.

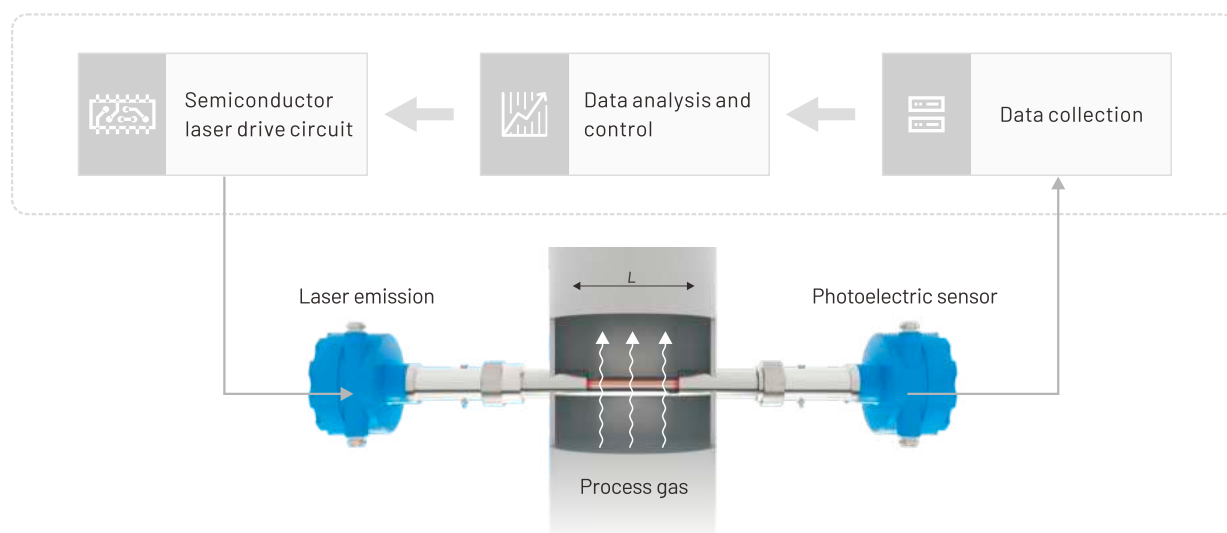
Specifications

Measurements	O ₂ , CO, CO ₂ , CH ₄
Measurement Principle	TDLAS
Measurement Range	O ₂ : (0~5)%Vol (100% can be customized) CO: (0~100)%Vol CO ₂ : (0~100)%Vol CH ₄ : (0~20)%Vol
Accuracy	$\leq \pm 1\%F.S.$
Repeatability	$\leq \pm 1\%F.S.$
Drift	$\leq \pm 1\%F.S.$
Resolution	0.01%Vol
Response Time	$T_{90} \leq 4s$
Ex-proof Grade	Exd II CT6
Installation Method	In-situ Installation
Working Temperature	-20°C~60°C
Power Supply	24V DC, 24W
Purge Gas Source	(0.3~0.8) Mpa Industrial N ₂
Communication	RS-485/RS-232
Analog signal	2 channels 4~20mA output 3 relay outputs

Measurement Gas and Available Measurement Range

Gas	Measurement Range	Measurement Limit
C ₂ H ₂	0~10ppm, 0~50%Vol.	0.1ppm
C ₂ H ₄	0~100ppm, 0~50%Vol.	1.0ppm
C ₂ H ₆	0~100ppm, 0~50%Vol.	1.0ppm
HF	0~2ppm, 0~2500ppm	0.01ppm
H ₂ O	0~3ppm, 0~70%Vol.	0.03ppm
H ₂ S	0~200ppm, 0~30%Vol.	2ppm
HCL	0~10ppm, 0~5000ppm	0.01ppm
NH ₃	0~10ppm, 0~5000ppm	0.1ppm
HCN	0~20ppm, 0~1%Vol.	0.2ppm
C ₂ H ₄ O	0~500ppm, 0~10%Vol.	10ppm

Advantages of In-situ Technique



- Fast response: the response speed to the control system is calculated in seconds.
- Direct gas analysis on site.
- Customized for different measurement process.

- Providing real and representative measured gas concentration.
- Simple structure, no consumables or moving parts, maintenance-free.
- Only laser irradiation is used for detection, suitable for high temperature, strong corrosion, and dusty environment.

Online Infrared Syngas Analyzer

Gasboard-3100

Gasboard-3100 is a stationary syngas analyzer based on NDIR, TCD and electrochemical technology. It can simultaneously measure CO, CO₂, CH₄, H₂, O₂, CnHm, C₂H₂, C₂H₄ or any of their combination and calculate calorific value.

EU Authorization No.: EP2796856

US Authorization No.: US9857323



Features

- PCT approved product based on IR & TCD & ECD technologies to measure syngas composition.
- Economical replacement of gas chromatography, mass spectrometer.
- High-selectivity CH₄ gas sensor, no interference from other hydrocarbons.
- High precision H₂ sensor with intelligent correction based on readings of CO, CO₂, CH₄, CnHm and other background gases.
- Integrated RS-232/RS-485 digital output with 4~20mA analog output.
- Built-in auto-zero pump, efficiently decreasing the calibration frequency.
- Modular sensor design, easy maintenance.

Specifications

Measurements	CO/CO ₂ /CH ₄ /H ₂ /O ₂ /C ₂ H ₂ /C ₂ H ₄ /CnHm*/Calorific Value
Measurement Principle	CO/CO ₂ /CH ₄ /C ₂ H ₂ /C ₂ H ₄ /CnHm: NDIR H ₂ : TCD O ₂ : ECD
Measurement Range	CO/CO ₂ /CH ₄ /H ₂ : (0~5% to 0~100)% O ₂ : (0~25)% C ₂ H ₂ /C ₂ H ₄ /CnHm: (0~5% to 0~10)% (optional)
Accuracy	CO/CO ₂ /CH ₄ /C ₂ H ₂ /C ₂ H ₄ /CnHm: ±2%F.S. O ₂ /H ₂ : ±3%F.S.
Resolution	0.01%
Repeatability	≤1%
Response Time	T ₉₀ <15s (NDIR)
Optimal Flow Rate	(0.7~1.2) L/min
Inlet Gas Pressure	(2~50) kPa
Gas Condition	No Tar, No Dust and No Water
Communication	RS-485/RS-232, (4~20) mA
Power Supply	AC100~240V, 50/60HZ
Display	LCD Display

Note: CnHm is the sum of hydrocarbon gases except methane.

EX-proof Online Infrared Gas Analysis System

Gasboard-3500

Gasboard-3500 ex-proof online natural gas analyzer is an online monitoring system with wall-mounted ex-proof enclosure, mainly used for continuous measurement of O₂, CO, CO₂, CH₄, CnHm, H₂ and etc. in natural gas, syngas and biogas.



Features

- Flexible technologies combination of NDIR, ECD, PMD, TCD to measure process gases like O₂, CO, CO₂, CH₄, CnHm, H₂ and etc.
- High measurement accuracy, no cross interference between the multi-component measurement gases.
- Temperature-constant system and auto air-zeroing function ensuring high stability.
- Modular sensor design with self-diagnosis function.
- All the parts in contact with sample gas being made of special stainless steel, PTFE and other materials with good heat corrosion resistance.
- Configurable gas sampling and conditioning solution for different application and process conditions.
- Ex-proof type applicable to Zone 2 hazardous area.



Specifications

Measurements	Measurement Principle	Min. Range	Max. Range	Accuracy	Resolution
O ₂	Paramagnetic/ Electrochemical	0~5%	0~100%	1%F.S. (PM) 3%F.S. (EC)	0.01%
CO	NDIR	0~5%	0~100%	2%F.S.	0.01%
CO ₂	NDIR	0~5000ppm	0~100%	2%F.S.	0.01%
CH ₄	NDIR	0~5%	0~100%	2%F.S.	0.01%
CnHm	NDIR	0~5%	0~20%	2%F.S.	0.01%
H ₂	Thermal Conductivity	0~5%	0~100%	3%F.S.	0.01%

**Note: Measurement range can be defined as per request.

Response Time (T ₉₀)	<15s (NDIR)
Warm-up Time	800s
Communication	RS-232, (4~20) mA
Power Supply	110~230VAC 50/60Hz
Dimension	400*400*250mm (H*W*D)
Material	Cast Aluminium, IP 65
Ex-proof Grade	Ex db IIC T6 Gb

Portable Infrared Syngas Analyzer

Gasboard-3100P

Gasboard-3100P is a portable syngas analyzer based on NDIR, TCD and electrochemical technology. It can simultaneously measure CO, CO₂, CH₄, H₂, O₂, CnHm, C₂H₂, C₂H₄ or any of their combination and calculate calorific value.

EU Authorization No.: EP2796856

US Authorization No.: US9857323



Features

- PCT approved product based on IR & TCD & ECD technologies to measure syngas composition.
- Economical replacement to gas chromatography, mass spectrometer.
- High-selectivity CH₄ gas sensor, no interference from other hydrocarbons.
- High precision H₂ sensor with intelligent correction based on readings of CO, CO₂, CH₄, CnHm and other background gases.
- Built-in sample pump, flow meter and filters and battery for portable operation.
- Internal data record and RS-232 COM port for data output.
- Modular sensor design, easy maintenance.



Specifications

Measurements	CO/CO ₂ /CH ₄ /H ₂ /O ₂ /C ₂ H ₂ /C ₂ H ₄ /CnHm*/Calorific Value
Measurement Principle	CO/CO ₂ /CH ₄ /C ₂ H ₂ /C ₂ H ₄ /CnHm: NDIR H ₂ : TCD O ₂ : ECD
Measurement Range	CO/CO ₂ /CH ₄ /H ₂ : (0~5% to 0~100)% O ₂ : (0~25)% C ₂ H ₂ /C ₂ H ₄ /CnHm: (0~5% to 0~10)% (Optional)
Accuracy	CO/CO ₂ /CH ₄ /C ₂ H ₂ /C ₂ H ₄ /CnHm: ±2%F.S. O ₂ /H ₂ : ±3%F.S.
Resolution	0.01%
Repeatability	≤1%
Response Time	T ₉₀ <15s (NDIR)
Optimal Flow Rate	(0.7~1.2) L/min
Inlet Gas Pressure	(2~50) kPa
Gas Condition	No Tar, No Dust and No Water
Communication	RS-485/RS-232
Power Supply	Internal Rechargeable Li-ion Battery, External 12.6V Charger
Display	LCD Display

Note: CnHm is the sum of hydrocarbon gases except methane.

Portable Infrared Natural Gas Analyzer

Gasboard-3110P

Gasboard-3110P is a portable natural gas analyzer based on patented NDIR technology. It can simultaneously measure CO₂, CH₄, CnHm, calculate calorific value and wobble index.



Features

- Replacement of gas chromatography, mass spectrometry.
- Patented NDIR technology for reliable measurement of CO₂, CH₄, CnHm.
- Real time calculation of calorific value and wobble index.
- High-selectivity CH₄ gas sensor, no interference from CnHm.
- Built-in battery for multi-site measurement.
- Data logging included.
- Built-in sampling pump, flow meter and filters.
- Self-diagnostic function allowing sensor status to be checked online.



Specifications

Measurements	CH ₄ , CO ₂ , CnHm*, Calorific Value
Measurement Principle	NDIR
Measurement Range	CH ₄ , CO ₂ : (0~100)%; CnHm: (0~10)%
Accuracy	±2%F.S.
Resolution	0.01%
Repeatability	≤1%
Response Time	T ₉₀ <15s (NDIR)
Optimal Flow Rate	(0.7~1.2) L/min
Inlet Gas Pressure	(2~50) kPa
Communication	RS-485/RS-232
Power Supply	Internal Rechargeable Li-ion Battery, External 12.6V Charger
Display	LCD Display

Note: CnHm is the sum of hydrocarbon gases except methane.

Portable Infrared Combustion Efficiency Analyzer

Gasboard-3400P

Gasboard-3400P is a portable gas analyzer based on dual beams non-dispersion infrared (NDIR) method for CO, CO₂, and electrochemical (ECD) for O₂. It is used for simultaneous measurement of the concentration of CO, CO₂, O₂ and calculation of combustion efficiency and Lambda in real time.



Features

- Simultaneous measurements of CO, CO₂, O₂ with automatic calculation of excess air coefficient.
- High measurement accuracy with wide measurement range.
- Portable design with integrated sampling probe, meeting the needs of industrial field measurement and laboratory air bag sampling and analysis.
- Convenient data management with data recording, query and delete functions.



Specifications

Measurements	CO, CO ₂ , O ₂ , Gas Temperature
Measurement Principle	CO, CO ₂ (NDIR); O ₂ (ECD) Gas Temperature: K type thermocouple
Measurement Range	CO: 0~5000ppm CO ₂ : 0~25% O ₂ : 0~25% Gas Temperature: (0~800~1200)°C (Note: measurement range can be customized.)
Resolution	CO: 1ppm CO ₂ /O ₂ : 0.01% Gas Temperature: 0.1°C
Accuracy	CO, CO ₂ : ≤2%FS O ₂ : ≤3%FS Gas Temperature: ≤3°C or 1% of reading
Repeatability	≤2%
Gas Flow	0.7~1.2 L/min
Inlet Gas Pressure	2~50kPa
Gas Condition	No Dust, No Water, No Tar
Response Time(T ₉₀)	<15s (NDIR)
Communication	RS-232
Power Supply	Built-in Rechargeable Lithium Battery
Working Temperature	0~50°C
Relative Humidity	≤95% (Non Condensing)
Ambient Pressure	86~108kPa
Dimension	410*150*290mm (L*W*H)
Weight	5 kgs

Continuous Syngas Analysis System

Gasboard-9021

Gasboard-9021 is a continuously monitoring system that consist of sampling unit and pretreatment unit which is specially designed for sample gas with vapor, dust and tar. It can provide unattended real time monitoring of CO, CO₂, CH₄, H₂, O₂, CnHm, C₂H₂, C₂H₄ or any of their combination for various synthesis gas applications.

EU Authorization No.: EP2796856

US Authorization No.: US9857323



Features

- PCT approved product based on IR & TCD & ECD technologies to measure syngas composition.
- Economical replacement of gas chromatography, mass spectrometer.
- High-selectivity CH₄ gas sensor, no interference from other hydrocarbons.
- High precision H₂ sensor with intelligent correction based on readings of CO, CO₂, CH₄, CnHm and other background gases.
- Integrated with gas sampling & conditioning part, analysis part and controlling part, suitable for continuous unattended real time monitoring.



Specifications

Gas & Principle	CO, CO ₂ , CH ₂ , CnHm, C ₂ H ₂ , C ₂ H ₄ by NDIR sensor H ₂ by thermal conductivity detector O ₂ by electrochemical sensor (Paramagnetic O ₂ sensor available on request)
Measurement Range	CO/CO ₂ /CH ₄ /H ₂ : (0~5% to 0~100)% O ₂ : (0~25)% C ₂ H ₂ /C ₂ H ₄ /CnHm: (0~5% to 0~10)% (Optional)
Accuracy	CO/CO ₂ /CH ₄ /C ₂ H ₂ /C ₂ H ₄ /CnHm: ±2%F.S. O ₂ /H ₂ : ±3%F.S.
Resolution	0.01%
Repeatability	≤1%F.S.
Response Time	T ₉₀ <15s (NDIR)
Optimal Flow Rate	(0.7~1.2) L/min
Inlet Gas Pressure	(2~50) kPa
Gas Condition	No Tar, No Dust and No Water
Communication	4~20mA
Power Supply	AC100~220V, 50/60Hz
Weight	250kg
Dimension	1800*700*600mm (L*W*H)

Continuous Syngas Analysis System

Gasboard-9031

Gasboard-9031 is a continuously monitoring system that consist of sampling unit and pretreatment unit which is specially designed for sample gas with low dust load and no tar. It can provide unattended real time monitoring of CO, CO₂, CH₄, H₂, O₂, CnHm, C₂H₂, C₂H₄ or any of their combination for various synthesis gas applications.

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Measurement Range	CO/CO ₂ /CH ₄ /H ₂ : (0~5% to 0~100)% O ₂ : (0~25)% C ₂ H ₂ /C ₂ H ₄ /CnHm: (0~5% to 0~10)% (Optional)
Accuracy	CO/CO ₂ /CH ₄ /C ₂ H ₂ /C ₂ H ₄ /CnHm: ±2%F.S. O ₂ /H ₂ : ±3%F.S.
Resolution	0.01%
Repeatability	≤1%F.S.
Response Time	T ₉₀ <15s (NDIR)
Optimal Flow Rate	(0.7~1.2) L/min
Inlet Gas Pressure	(2~50) kPa
Gas Condition	No Tar, No Dust and No Water
Communication	4~20mA
Power Supply	AC100~220V, 50/60Hz
Weight	250kg
Dimension	1800*700*600mm (L*W*H)

Case 1 ▶ Rubber Pyrolysis & Gasification Project

Laser Raman Gas Analyzer
LRGA-6000



Case 2 ▶ Calorific Value of Heating Furnace Monitoring Project for Large Scale Rolling Mill

Laser Raman Gas Analyzer
LRGA-6000



Case 3 ▶ Steel Plant Coal Gas Monitoring Project

In-situ Laser Gas Analyzer
GasTDL-3100



Case 4 ▶ Online Monitoring Project of Coke CDQ Circulating Gas in Coking Plant

Ex-proof Continuous Syngas Analysis System
Gasboard-9031EX



Case 5 ▶ Biomass Gasification Monitoring Project

Continuous Syngas Analysis System
Gasboard-9021



Case 6 ▶ Alloy Plant Online Gas Monitoring Project

Continuous Syngas Analysis System
Gasboard-9031



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All products are in continuous development and therefore specifications
may be subject to change without prior notice.