



LGA-4000 (In-Situ Model)

Laser Online Gas Analysis System

The Process Gas Analysis System of LGA-4000 series (In-Situ model), based on the technology of the diode laser absorption spectroscopy (DLAS), is the gas laser analysis system with integrated design and high integration. The system, by in-situ measurement that needs no sampling pretreatment, is able to rapidly, accurately and reliably measure various industrial process gases and flue gases emitted for environmental protection, to provide the best solution for the on-line gas monitoring in various industries.

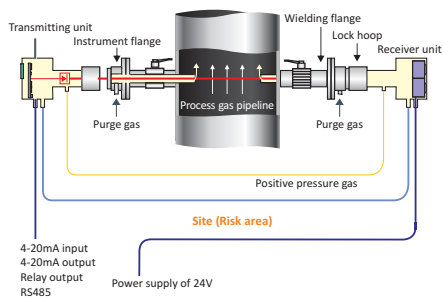


Product Features

- Laser In-Situ measurement, rapid response, high measurement precision
- Integrated positive pressure explosion-proof design, safe and reliable
- Modular design, with the possibility to renew all functional modules on site, easy to maintain
- High intelligent degree, convenient for operation

System Composition

The transmitting unit of the Process Gas Laser Analysis System of LGA-4000 series (In-Situ model), consisting of the man-machine interface, the laser drive module, the central processing module, the diode laser and other modules, mainly realizes diode laser driving, spectral data processing, human-computer interaction and other functions. The receiver units, consisting of the photoelectric sensor, the signal processing module, the positive control module and other modules, mainly realizes signal processing, power control and other functions.



Technical Specifications

Technical indexes

Linearity error: $\leq \pm 1\%$ F.S.
 Span drift: $\leq \pm 1\%$ F.S./half-year
 Repeatability: $\leq \pm 1\%$ F.S.
 Explosion-proof grade: Expmrd IIC T5
 Protection grade: IP65

Response time

Warm-up time: ≤ 15 Min
 Response time: $\leq 1s$ (T90)

Interface signals

Analog output: 2-path 4-20mA, isolation, maximum load of 750 ohm
 Relay output: 3-path relays, 24V, 1A
 Analog input: 2-path 4-20mA (used for temperature and pressure compensation)
 Digital communication: RS485 (RS232 or GPRS optional)

Electrical characteristics

Power supply: 24V DC (18-36V DC), 220V AC may be selected
 Power consumption: $< 20W$
 EMC: IEC 61000-4-2 IEC 61000-4-4 IEC 61000-4-5
 Electrical safety: IEC 61010-1

Operation conditions

Work environment temperature: $-30^{\circ}C \sim 60^{\circ}C$
 Storage temperature: $-40^{\circ}C \sim 80^{\circ}C$
 Purging gas: $0.3 \sim 0.8MPa$ industrial nitrogen or instrument air (99.99% purity for low range O_2)

Parameters of Measured Gases

gas	Detection limit	Measuring range
O_2	100 ppm	(0-1)%Vol., (0-100)%Vol.
CO	0.6 ppm	(0-60)ppm, (0-100)%Vol.
CO_2	1.4 ppm	(0-140)ppm, (0-100)%Vol.
H_2O	0.3 ppm	(0-30)ppm, (0-100)%Vol.
H_2S	20 ppm	(0-2000) ppm, (0-100)%Vol.
HF	0.02 ppm	(0-2)ppm, (0-10000) ppm
HCl	0.1 ppm	(0-10) ppm, (0-100)%Vol.
HCN	0.3 ppm	(0-30)ppm, (0-1)%Vol.
NH_3	0.2 ppm	(0-20) ppm, (0-100)%Vol.
CH_4	0.4 ppm	(0-40)ppm, (0-100)%Vol.
C_2H_2	0.1 ppm	(0-10) ppm, (0-100)%Vol.
C_2H_4	0.6 ppm	(0-60)ppm, (0-100)%Vol.
CH_3I	0.6 ppm	(0-60)ppm, (0-100)%Vol.

Notes: 1. Consult FPI for alternative gases and ranges
 2. Detection limit refers to below conditions: $20^{\circ}C$, 1 atm, 1 meter optical path

LGA-4000 (Bypass Model)

Laser Online Gas Analysis System

The Process Gas Laser Analysis System of LGA-4000 series (Bypass model), the bypass process gas analysis product based on the technology of diode absorption spectroscopy (DLAS), is able to make on-line analysis on various process gases with high dust or high pressure after the bypass treatment and is with such features as strong adaptability and high reliability.



Product Features

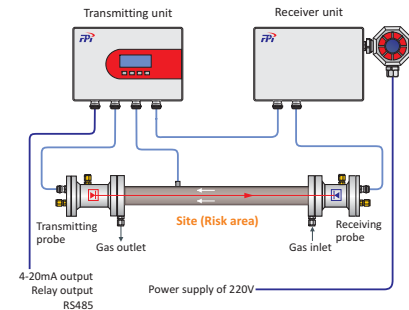
- Laser bypass measurement, high measurement accuracy, strong anti-interference ability
- Optical non-contact detection, with the ability to direct measure gas with high temperature and strong corrosion
- Simple and reliable bypass treatment equipment, with the possibility to be directly installed at the process pipeline
- While system explosion-proof, supporting the automatic compensation of gas temperature and pressure



(Corrosion Resisting High Temperature Type Bypass Pipeline)

System Composition

The Process Gas Laser Analysis System of LGA-4000 series (Bypass model) consists of the transmitting unit, the receiver unit, the measurement gas chamber and others. The detecting laser, emitted by the transmitting probe, shall pass through the measurement gas chamber, shall be received by the optical sensor of the receiving probe and shall be transmitted to the transmitting unit to process and to display after the receiver unit making spectral analysis.



Technical Specifications

Technical indexes

Linearity error: $\leq \pm 1\%$ F.S.
 Span drift: $\leq \pm 1\%$ F.S./half-year
 Repeatability: $\leq \pm 1\%$ F.S.
 Explosion-proof grade: Expmrd II Ct5
 Protection grade: IP65

Response time

Warm-up time: ≤ 15 Min
 Response time: $\leq 5s$ (T90)

Interface signals

Analog output: 2-path 4-20mA, isolation, maximum load of 750 ohm
 Relay output: 3-path relays, 24V, 1A
 Digital communication: RS485 (RS232 or GPRS optional)

Electrical characteristics

Power supply: 100-240V AC/48-63Hz
 Power consumption: $< 15W$ (with no heat tracing)
 EMC: IEC 61000-4-2 IEC 61000-4-4 IEC 61000-4-5
 Electrical safety: IEC 61010-1
 Fuse: 250V AC/1A

Sample gas's conditions

Sample gas's pressure: 0.5-3 bar (absolute pressure)
 Sample gas's temperature: $-30^{\circ}C \sim 140^{\circ}C$

Operation conditions

Work environment temperature: $-30^{\circ}C \sim 60^{\circ}C$
 Storage temperature: $-40^{\circ}C \sim 80^{\circ}C$
 Purging gas: $0.3 \sim 0.8MPa$ industrial nitrogen or instrument air (99.99% purity for low range O_2)

Parameters of Measured Gases

gas	Detection limit	Measuring range
O_2	100 ppm	(0-1)%Vol., (0-100)%Vol.
CO	0.6 ppm	(0-60)ppm, (0-100)%Vol.
CO_2	1.4 ppm	(0-140)ppm, (0-100)%Vol.
H_2O	0.3 ppm	(0-30)ppm, (0-100)%Vol.
H_2S	20 ppm	(0-2000) ppm, (0-100)%Vol.
HF	0.02 ppm	(0-2)ppm, (0-10000) ppm
HCl	0.1 ppm	(0-10) ppm, (0-100)%Vol.
HCN	0.3 ppm	(0-30)ppm, (0-1)%Vol.
NH_3	0.2 ppm	(0-20) ppm, (0-100)%Vol.
CH_4	0.4 ppm	(0-40)ppm, (0-100)%Vol.
C_2H_2	0.1 ppm	(0-10) ppm, (0-100)%Vol.
C_2H_4	0.6 ppm	(0-60)ppm, (0-100)%Vol.
CH_3I	0.6 ppm	(0-60)ppm, (0-100)%Vol.

Notes: 1. Consult FPI for alternative gases and ranges
 2. Detection limit refers to below conditions: $20^{\circ}C$, 1 atm, 1 meter optical path

LGA-4500 IC

Laser Trace Gas Analyzer

Laser trace gas analyzer LGA-4500IC is the latest achievement of FPI in the field of laser gas analysis, which combines diode laser absorption spectroscopy (DLAS) and integrated cavity output spectroscopy (ICOS) perfectly and in turn enhances the measuring sensitivity hundreds folds. It provides the best solution for trace gas analysis in natural gas, petrochemical, chemical and steel industry and so on.

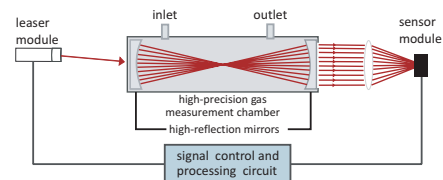


Product Features

- High detection sensitivity of the laser gas analysis
- Fast response
- Innovative design for flameproof, safe, reliable and convenient operation
- Low cost for long-term operation and maintenance

Operational Principle

The core components of LGA-4500IC Laser trace gas analyzer—high precision reflective optical cavity is comprised of the high reflectivity(R>99.99%) mirror of two sides. When the laser entered into high precision cavity full of measured gas, the laser will be reflected hundreds or even thousands times. By detecting the faint optical signal with the information of the spectroscopy absorption of the measured gas, online measurement of trace and even trace gas concentrations can be realized, fast, accurately and reliably.



LGA-4500IC Schematic Diagram

Technical Specifications

Technical indexes

Linearity error: $\leq \pm 1\%F.S.$
 Range drift: $\leq \pm 2\%F.S./3$ months
 Repeatability error: $\leq \pm 1\%F.S.$
 Explosion-proof levels: Ex pxmd IIB T4
 Protection grade: IP65

Response time

Warm-up time: ≤ 1 hour
 Instrument response time (T90): ≤ 1 second

Interface signals

Analog Output: 2 way 4-20mA, isolated, maximum load 750Ω
 Relay Output: 2 way relay, Specification 24V, 1A
 Digital communications: RS485 (RS232 or GPRS optional)

Electric features

Power supply: 220AC/48~63Hz
 Power consumption: $\leq 400W$
 EMC: IEC 61000-4-2
 IEC 61000-4-5
 IEC 61000-4-4
 IEC 61000-4-11
 Electric safety: IEC 61010-1

Operation environment

Sampling gas: no dust, no water, no oil (filter accuracy of 0.1μm)
 Operation temperature: -20°C~50°C
 Recommendation flow rate: 0.5~2L/min

Measurement Parameters

Gas	Standard measuring range	Minimum measuring range	Detection limit
H ₂ S	0-200ppm	0-20ppm	1ppm
CO	0-1000ppm	0-200ppm	5ppm
CO ₂	0-1000ppm	0-200ppm	5ppm
C ₂ H ₂	0-5ppm	0-0.5ppm	10ppb
O ₂	0-1000ppm	0-100ppm	1ppm

Notes: 1. Above is part gas indicator. Other gas is based on user needs.
 2. Specific range can be customized on demands, please consult FPI if you have special demands.

LGA-3500 (Bypass Model)

Semiconductor Laser Gas Analyzer

LGA-3500 Series Semiconductor Laser Gas Analyzer, based upon the laser absorption spectroscopy (DLAS) and DSP digital technique, is a new-generation product with high value for money. It carries forward the unique tradition of DLAS technique and adopts the integrated design with small size, stability and reliability.

LGA-3500 can perform under such conditions as high temperature, high pressure, high dust volume and strong corrosion, and conduct online monitoring of gas concentration in industrial processes. It is widely used in such areas as chemical engineering, concrete, environment protection and metallurgy and provides the best solutions of the industry in view of all kinds of working conditions.

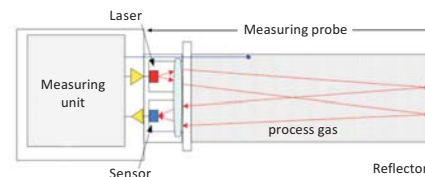


Product Features

- LGA-3500 takes semiconductor with stability and low noise as its light source and adopts
- Wide application for many different conditions
- High system stability and little need for maintenance
- Whole system anti-explosion

System Composition

LGA-3500 Series Semiconductor Laser Gas Analyzer consists of measuring unit and measuring probe etc. Laser light emitted by measuring unit passes through the gas compartment of measuring probe, and is received by the receiver in the measuring unit; after spectra data analysis, it is then displayed on the computer-human interface.



Technical Specifications

Technical indicators

linearity error: $\leq \pm 1\%F.S.$
 Span drift: $\leq \pm 1\%F.S./3$ months
 Repeatability error: $\leq \pm 1\%F.S.$
 Anti-explosion grade: Ex pxmd II CT5
 Protection grade: IP66

Response time

Warm-up time: ≤ 15 Min
 Response time: ≤ 1 S

Interface signal

Analog quantity output: two way 4~20mA, isolation and Max load 500Ω
 Relay output: 3 way relay, specifications: 24V DC, 1A
 Digital communications: RS485/RS232

Electrical characteristics

Power: 100~240AC/48~63Hz
 Power consumption: ≤ 12 W
 EMC: IEC 61000-4-2
 IEC 61000-4-4
 IEC 61000-4-5
 IEC 61000-4-11
 Electrical safety: IEC 61010-1

Sample gas conditions

Sample gas pressure: 0.5~3bar (absolute pressure)
 Sample gas temperatures: -30°C~100°C
 Recommended flow: 1~5L/Min

Working conditions

Temperature: -20°C~50°C
 Barotropic purging gas: 0.3~0.8MPa industrial nitrogen or instrument air (99.99% purity for low range O₂)



TPN-2000 Series

Total Phosphorus/Total Nitrogen Online Analyzer

Total phosphorus (TP) exists in water in the forms of orthophosphate, metaphosphate, organophosphorus pesticide and total nitrogen (TN) in water includes nitrite nitrogen, nitrate nitrogen, inorganic ammonium salt, dissolved ammonia and other organic nitrogen compound. Total phosphorus and total nitrogen in water are important indicators of water eutrophication.

With the years of experiences on process analysis and environmental monitoring instrument development, the Focused Photonics Inc has developed the TPN-2000 series total phosphorus/total nitrogen online analyzer, which is a new generation in the world. The instrument is mainly designed for automatic TP and TN monitoring and also provides chemical oxygen demand (COD) monitoring on several types of water matrix, such as industrial wastewater, municipal wastewater, industrial process water, etc. Such analyzer adopts advanced sequential injection platform, combining with national standard detection method, which ensures reliable and accurate results. With high level of robustness in the electronics, mechanics and hydraulics components, the analyzer requires very little maintenances. Such analyzer has some special features such as automatic calibration, automatic zero adjustment and automatic cleaning. The analyzer provides multiple standard interfaces, which are easy to combine other available instruments, such as flowmeter, pH meter, etc, therefore remote monitoring can be achieved.

The analyzer can be equipped selectively with corresponding pretreatment system for thoroughly meeting the demands of various working conditions and various customers.

Product Features

- High reliability, low maintenance
- Accurate measurement, wide applicable scope
- Safe operation, efficient analysis



Diagram of pretreatment system (optional)

Applications

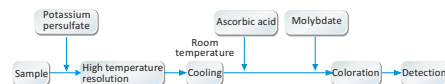
- Industrial Waste Water
- Surface Water
- Industrial Process Water
- Municipal Waste Water



Operational Principle

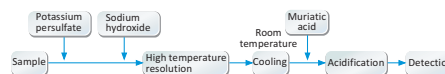
Total Phosphorus or Orthophosphate

Based on the standard ammonium molybdate spectrophotometry method and new technical platform, samples will be digested under the strong oxidant (potassium persulfate), high temperature (150°C) and high pressure. Meanwhile, various forms of phosphorus will be oxidized to orthophosphate and this digestion step can be skipped when analyzing orthophosphate. After digestion and a proper cooling time, in acid medium, the orthophosphate in samples, ammonium molybdate and antimony potassium tartrate will react to form phosphorus molybdenum heteropoly acid compound which is then decolorized by the reducer (ascorbic acid) to a blue complex. The final reaction product will be measured with a spectrophotometer and the absorbance is proportional to the total phosphorus or orthophosphate concentration.



Total Nitrogen

Based on the standard alkaline potassium persulfate oxidation-UV spectrophotometry method and new technical platform, samples will be digested under the strong oxidant (potassium persulfate), high temperature (150°C) and high pressure in alkaline medium. Meanwhile, various forms of nitrogen will be oxidized to nitrate nitrogen and after digestion and a proper cooling time, hydrochloric acid will be added to adjust the pH value of digestion solution. The final reaction product will be measured with a spectrophotometer and the absorbance is proportional to the total nitrogen concentration.



Chemical Oxygen Demand

Based on the ultraviolet absorption spectrophotometry principle and new technical platform, samples will be measured with a spectrophotometer and the absorbance is proportional to the chemical oxygen demand concentration.



Technical Specifications

TPN-2000 Series	TPN-2000-TP total phosphorus online analyzer	TPN-2000-TN total nitrogen online analyzer	TPN-2000-PN total nitrogen/ phosphorus online analyzer
Measuring Parameters	Total phosphorus /orthophosphate	Total nitrogen	Total nitrogen/phosphorus/chemical oxygen demand
Measuring Principle	Spectrophotometric, ammonium molybdate spectrophotometry	spectrophotometric,alkaline potassiumpersulfate oxidation -UV spectrophotometry	spectrophotometric, TN: alkaline potassium persulfate oxidation -UV spectrophotometry, TP: ammonium molybdate spectrophotometry, COD: ultraviolet absorption spectrophotometry
Technical Platform	Sequential injection analysis		
Colorimeter/ Spectrophotometer	LED light source, silicon detector	Xenon light source, spectrometer	
Measuring Range	0-1/5/50 mg/L TP, other ranges available on request	0-4/50/200 mg/L TN	TN: 0-4/50/200 mg/L, TP: 0-1/5/50 mg/L, COD: 0-50/500 mg/L
Accuracy	±10%		
Repeatability	≤3%		
Resolution	0.001mg/L		
Measuring Interval	Selectable: continuous, periodic, timing or triggered by the external switch signal		
Digestion Time	Selectable according to actual situation		
Measuring Time	Total phosphorus: 30 minutes, orthophosphate: 15 minutes	50 minutes	60 minutes
Data storage	One year		
Maintenance	0.5 to 1 hours per month, typical		
Input	2 paths of 4-20 mA input, 2 paths of switch signal collection, and analog signal collection unit can be added according to demand		
Output	2 paths of 4-20 mA output, 8 paths of switch signal output	3 paths of 4-20 mA output, 8 paths of switch signal output	
Operation Temperature	10°C-40°C		
Power Supply	220 VAC±10%, 50 Hz±5%, not over 100 W		
Dimensions	500mm×700mm×365mm (W×H×D) without pretreatment system		
Weight	30 kg without reagents and pretreatment system	35 kg without reagents and pretreatment system	

COD-2000 Series

COD Online Analyzer

With the years of experiences on process analysis and environmental monitoring instrument development, the Focused Photonics Inc has developed the COD-2000 series chemical oxygen demand online analyzer, which is a new generation in the world. The instrument is designed for automatic COD monitoring on several types of water matrix, such as industrial wastewater, municipal wastewater, industrial process water, etc. Such analyzer adopts advanced sequential injection platform, combining with national standard detection method, which ensures reliable and accurate results. With high level of robustness in the electronics, mechanics and hydraulics components, the analyzer requires very little maintenances. Such analyzer has some special features such as automatic calibration, automatic zero adjustment and automatic cleaning. The analyzer provides multiple standard interfaces, which are easy to combine other available instruments, such as flowmeter, pH meter, etc, therefore remote monitoring can be achieved.

The analyzer can be equipped selectively with corresponding pretreatment system for thoroughly meeting the demands of various working conditions and various customers.

Operational Principle

Based on the standard potassium dichromate oxidation method and new technical platform, samples will be digested under the strong oxidant (potassium dichromate), catalyst (silver sulfate) and high temperature (165°C). During digestion, the hexavalent chromium will be reduced to trivalent chromium and the solution's color will change. The digested solution will be measured with a colorimeter and the absorbance is proportional to the COD concentration.

Technical Specifications

Measuring principle	Colorimetric, high temperature digestion of potassium dichromate	Measuring range	0-1000/5000/10000 mg/L COD, other ranges available on request
Technical platform	Sequential injection analysis	Measuring Interval	Selectable: continuous, periodic, timing or triggered by the external switch signal
Colorimeter	LED light source, silicon detector	Digestion Time	Selectable according to actual situation
Accuracy	When >100 mg/L, it is < 5%	Measuring Time	45 minutes
	When < 100 mg/L, it is < 5 mg/L	Data Storage	One year
Repeatability	When >100 mg/L, it is < 3%	Maintenance	0.5 hours per month, typical
	When < 100 mg/L, it is < 5 mg/L	Inputs	2 paths of 4-20 mA input, 2 paths of switch signal collection, and analog signal collection unit can be added according to demand
Resolution	0.1 mg/L COD	Outputs	2 paths of 4-20mA output, 8 paths of switch signal output
Power Supply	220V AC±10%, 50 Hz±5%, not over 100 W	Operation Temperature	10°C-40°C
Dimensions	500mmx 700mmx 365mm (W×H×D) without pretreatment system		



Product Features

- High reliability, low maintenance
- Accurate measurement, wide applicable scope
- Safe operation, efficient analysis

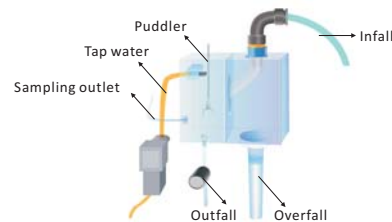


Diagram of Pretreatment System (Optional)

NH₃N-2000 Series

Ammonia Nitrogen Online Analyzer

With the years of experiences on process analysis and environmental monitoring instrument development, the Focused Photonics Inc has developed the NH₃N-2000 series ammonia nitrogen online analyzer, which is a new generation in the world. The instrument is designed for automatic ammonia nitrogen monitoring on several types of water matrix, such as industrial wastewater, surface water, municipal wastewater, industrial process water, etc. Such analyzer adopts advanced sequential injection platform, combining with national standard detection method, which ensures reliable and accurate results. With high level of robustness in the electronics, mechanics and hydraulics components, the analyzer requires very little maintenances. Such analyzer has some special features such as automatic calibration, automatic zero adjustment and automatic cleaning. The analyzer provides multiple standard interfaces, which are easy to combine other available instruments, such as flowmeter, pH meter, etc, therefore remote monitoring can be achieved.

The analyzer can be equipped selectively with corresponding pretreatment system for thoroughly meeting the demands of various working conditions and various customers.

Operational Principle

Based on the standard method and new technical platform, the ammonia nitrogen which exists as the form of free ammonia ions in samples and the Nessler's reagent will react to produce yellowish brown complex in the alkaline medium.

The reaction product will be measured with a colorimeter and the absorbance is proportional to the ammonia nitrogen concentration in the sample.

Product Features

- High reliability, low maintenance
- Accurate measurement, wide applicable scope
- Safe operation, efficient analysis



Applications

- Industrial Wastewater
- Surface Water
- Industrial Process Water
- Municipal Waste Water



Diagram of Pretreatment System (Optional)

Technical Specifications

Measuring principle	Colorimetric, Nessler's reagent method	Measuring range	0-5/50/300mg/L, other ranges available on request
Technical platform	Sequential injection analysis	Measuring Interval	Selectable: continuous, periodic, timing or triggered by the external switch signal
Colorimeter	LED light source, silicon detector	Measuring Time	8 minutes
Accuracy	±3%	Data Storage	One year
Repeatability	< 2%	Maintenance	0.5 hours per month, typical
Resolution	0.01mg/L	Inputs	2 paths of 4-20 mA input, 2 paths of switch signal collection, and analog signal collection unit can be added according to demand
Power Supply	220V AC±10%, 50 Hz±5%, not over 100 W	Outputs	2 paths of 4-20mA output, 8 paths of switch signal output
Operation Temperature	10°C-40°C	Dimensions	500mmx 700mmx 365mm (W×H×D) without pretreatment system

OMA-3010

HCl Trace Cl₂ Analysis System

In the PVC production by calcium carbide process, improvement of the production benefit and guarantee of the production safety are always the two major problems of the enterprises, especially in the section of HCl synthesis. Due to the control of prior process etc, the process gas in the HCl main pipe will remain a little Cl₂. The remained Cl₂ will easily react with acetylene, and produce large amount of heat. Once the remained Cl₂ is beyond the standard, the reaction will intensify and cause explosion on the production device (such as mixer, pre-heater etc).

For preventing explosion, the chlor-alkali plants usually input superfluous H₂ in the HCl synthesis section, and the remained Cl₂ in the HCl process gas can be reduced by this method. This method can prevent explosions to some degree, but it will reduce the synthesis rate of HCl, and waste large amount of H₂ as well.

The production safety can be guaranteed and the enterprises' production benefit can be improved only when the HCl and trace Cl₂ in HCl main pipe are analyzed simultaneously in real time and the production is controlled.

Product Introduction

The OMA-3010 HCl purity and trace Cl₂ analysis system is an industrial solution promoted by FPI especially for the chlor-alkali industry. The system adopts ultraviolet full spectrum analysis technology and chemometric algorithm, uses the OMA-3000 series industrial process analyzer and high corrosion resistant pretreatment system.

The OMA-3010 analysis system can analyze the HCl and Cl₂ in the process gas in the same time, and adapt to the poor environment such as strong corrosive, dust containing; it can make the following profits to the PVC enterprises with calcium carbide process:

Prevents Explosion Accidents Guarantees Safe Production

The system can analyze the Cl₂ remained in the HCl main pipe in real time, and transmit the concentration signal to DCS in real time. Once the Cl₂ content is monitored beyond the set value, DCS can close the C₂H₂ delivery valve, for preventing explosion. In addition, customers can control the ratio of H₂ and Cl₂ by checking the content of remained Cl₂.

Improve the H₂ Utilization Ratio and HCl Synthesis Ratio

The system can also analyze the concentration of HCl in the main pipe aside from monitoring the trace Cl₂. The enterprises can improve the utilization ratio of H₂ by reducing the superfluous H₂ when the Cl₂ is guaranteed not beyond the standard. Statistics according to the production data of a chlor-alkali plant with annual output of 200,000 tons: once the HCl purity is improved by 1%, the vinyl chloride monomer will be produced 3,400 tons more per year. At present, the purity of HCl can still be improved by 2-3%, therefore the PVC resin can be produced at least 6,500-10,000 tons more per year, and a production value of over 60 million RMB/per year can be created, the profit will be at least 10 million RMB.

Optimizes the Ratio of HCl and C₂H₂ Raw Material Gas

In the VCM synthesis section, enterprises usually detect the HCl concentration by manual sampling, for controlling the ratio of HCl and C₂H₂. The system can measure online the HCl and trace Cl₂ continuously. It not only reduces the workload of manual operation, but also improves greatly the detection accuracy and timeliness of HCl.

In addition, the OMA-3010 also provides significant control parameters for optimizing the ratio of HCl and C₂H₂, improving the utilization ratio of HCl and reducing the cheap product hydrochloric acid.



Product Features

- High precision trace Cl₂ measurement, dynamic measuring range switching
- Measures HCl and Cl₂ at the same time, the investment value is high
- Pretreatment adopts high corrosion resistant parts and anti-corrosion design, with high reliability and strong adaptability
- The core instrument uses ultraviolet spectrophotometer analyzer, with high reliability

Technical Specifications

Measuring principle: Ultraviolet spectroscopy
 Measuring composition: HCl measurement range 0-100%
 Cl₂ measurement range 0-150-5000ppm

Zero drift: <±1%F.S.
 Repeatability: <±1%F.S.
 Linearity: <±1%F.S.
 Response time (T90): <10s
 Flow: 1-10L/min

Analogue output: 2-way 4-20mA (configurable)
 Analogue input: 2-way 4-20mA (configurable)
 Communication interface: RS485, RS232/GPRS
 Explosion-proof grade: Expxm IIC T4
 Protection grade: IP65
 Display: 8"STN color screen, 320x240 pixel
 Ambient temperature: -20°C~50°C
 Environmental pressure: 86kPa~116kPa
 Environmental humidity: 5%RH~95%RH
 Power supply: 200~240V AC, 47~63Hz, 0.5kW
 Instrument air: 90L/min maximum
 Dew point: under the pressure of 0.7MPa(g) <-40°C
 Oil-free, dust-free

Note: The measurement range of HCl and Cl₂ can be customized on demands, please consult FPI if you have special demands.

OMA-3110

SO₂ Analysis System

In the nonferrous metal smelting industry, they usually turn smelting smoke into sulphuric acid in order to prevent the air pollution (including a large amount of SO₂) in the smelting process. In the process of making sulphuric acid, it is necessary to conduct the online testing of the SO₂ concentration and is used in the process control.

The concentration of SO₂ is closely related to the smelting process, usually between 3% to 20%. Enterprises usually adopts the conventional nondispersive infrared analyzer in the online testing of SO₂ concentration. Due to the fact that nondispersive infrared analyzer is sensitive to changes in moisture, dust, and temperate, it needs the complex pre-process to perform condensation, dehydration, dedusting. In the process, part of SO₂ will be absorbed by water, resulting in low measurements. In addition, nondispersive infrared analyzer has such moving parts as optical filter, so its long-time stability and service life are not guaranteed.

Product Introduction

OMA-3110 analysis system is a gas analysis system for high concentration of SO₂, with OMA-3000 ultraviolet visible fiber-optical spectrum analyzer as its core. It adopts ultraviolet Full Spectrum analysis technique and integrated heat-humidity pre-processing technique, and can easily solve the above problem.

According to the different functions of the system, the whole system mainly consists of integrated searching unit, electric cabinet, central unit and data collecting and processing subsystem (optional):

- Integrated searching unit: mainly consisting of sampling probe, jet injector, heater box, blowback calibration unit etc. and is used for the heat-humidity measurement of the smoke;
- Central unit: wall-mounted OMA-3000 spectral gas analyzer;
- Electric cabinet: used for providing electricity for central unit and driving magnetic valve;
- Data collecting and processing subsystem (optional): performing the functions of data collection and storage, system remote control etc.



Product Features

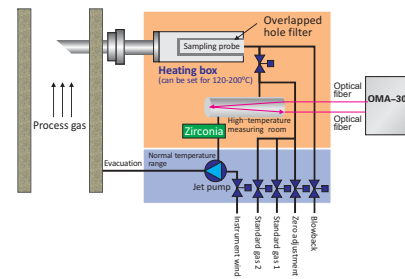
- Advanced all solid state in situ extraction thermal wet method technology
- High measurement precision
- Easy maintenance with low maintenance cost
- High reliability

Technical Specifications

Measuring principle: Ultraviolet spectroscopy
 Measuring composition: SO₂ measurement range 0-20%
 O₂ (selectable) measurement range 0-30%

Zero drift: <±1%F.S.
 Repeatability: <±1%F.S.
 Linearity: <±1%F.S.
 Response time(T90): <10s
 Analogue output: 5-way 4-20mA (configurable)
 Digital output: 8-way relay output
 Analogue input: 2-way 4-20mA (configurable)
 Digital input: 4-way
 Communication interface: RS485, RS232/GPRS
 Explosion-proof grade: ExpxmIIC T4
 Protection grade: IP65
 Ambient temperature: -20°C~50°C
 Environmental pressure: 86kPa~116kPa
 Environmental humidity: 5%RH~95%RH
 Power supply: 200-240V AC, 47-63Hz, 0.5kW
 Instrument air: 04MPa~0.7MPa(G), 90L/min maximum
 Dew point: under the pressure of 0.7MPa(g) <-20°C
 Oil-free, dust-free

Note: The measurement ranges of SO₂ and O₂ at position 1 can be customized on demands, please consult FPI if you have special demands.



As in the picture, the integrated searching unit in the OMA-3110SO₂ analysis system is installed directly in the process pipe. Under the conditions of jet injector, the sample gas passes into the gas compartment after being filtered by sampling probe(built-in three-layer filter with stacking holes), and the gas compartment is linked to the central unit by two optical fibers, producing the concentration of SO₂ in the gas; lastly, it is then expelled through the jet injector.

Integrated probe is divided into two chambers, in which the upper chamber is heated always to prevent the condensed water from corroding the gas passage, while the lower chamber is under normal temperature and used for installing such parts as magnetic valve with low high-temperature resistance.

All solid state in-situ extraction heat-humidity technique has filed for national patent protection.



OMA-3510

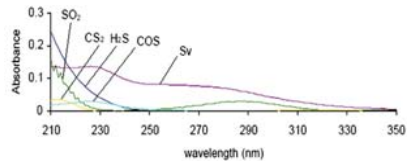
Sulfur Ratio Instrument

Sulfur reclaimer mostly adopts Claus technique in its sulfur recycling. After Reactor 1-3 in the Claus reclaimer, it is necessary to conduct real-time concentration testing of H₂S and SO₂, and feedback the H₂S-2SO₂ to DCS to control oxygen input, in order to reach the optimum desulfuration effects.

The measuring methods of this technique has two methods, namely sampling method and in-situ method; these two methods adopt Non-Dispersive infrared absorption measurement, 150°C whole process heat tracing(liquid sulfur, avoiding the water condensation at the same time), using spray catcher to prevent sulfur from entering measuring chamber.

Existing Measuring Methods Can't Effectively Solve the Following Problems:

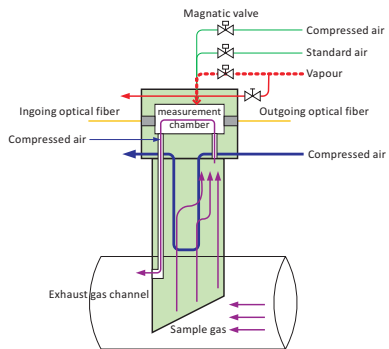
- Working conditions presents sulfur vapor and moisture, impacting on the measurement
- COS, CS₂ and sulfur vapor in Working conditions are also absorbed in ultraviolet band(See Pic 1), impacting on the measurement
- H₂S is poisonous, inflammable and explosive, difficulty in installation and maintenance
- This measurement point is in closed loop control, and the existing instrument's response time is low



Pic 1: Absorption diagram for gas in the UV region

Product Introduction

OMA-3510 is a new-generation sulfur ratio instrument developed by Focused Photonics. It adopts modularized and all-solid state ultraviolet process beam-splitting light spectrum measuring technique, sampling/measurement integration probe etc., and can easily solve these problems. (See Pic 2, diagram of the sampling/measurement integration probe, with the core of OMA-3510)



Pic 2: Structure Diagram for Integrated Probe

Product Features

- Integration probe design, in-situ measurement, quick response time
- Unique condensation measurement technique, effectively eliminating the disturbance of sulfur vapor;
- Measuring of many components at the same time, eliminating the disturbances of Sv and other sulfides;
- All solid state spectrometer, with no moving parts and is reliable;
- Easy installation and with strong environmental adaptation and little maintenance.

Technical Specifications

Measuring principle: Ultraviolet spectrometry
 Measuring composition: SO₂ range 0-1%
 H₂S range 0-2%
 COS range 0-2000ppm (selectable)
 CS₂ range 0-2000ppm (selectable)

Zero drift: $\leq \pm 1\%F.S.$
 Repeatability: $\leq \pm 1\%F.S.$
 Linearity: $\leq \pm 1\%F.S.$
 Response time (T90): $\leq 10s$
 Analogue output: 5-way 4-20mA (configurable)
 Analogue input: 2-way 4-20mA (configurable)
 Digital output: 2 way
 Communications port: RS485, RS232/GPRS
 Anti-explosion grade: Expxmd IIC T4
 Protection grade: IP65
 Environment temperature: -20°C~50°C
 Environment pressure: 86kPa~116kPa
 Environment humidity: 5%RH~95%RH
 Power: 200~240V AC, 47~63Hz, 0.5kW
 Instrument air: 0.4 MPa~0.7MPa(a), 90L/min max
 Dew point: under the pressure of 0.7mpa(g) $\leq -20^{\circ}C$
 Oil-free, dust-free
 Vapour: temperature: $\geq 140^{\circ}C$
 pressure: 0.55MPa(g)
 consumption: 45kg/hour

Note: In measurement range components, the range can be customized on demands, please consult FPI if you have special demands.

OMA-3020

NCl₃ Safety Monitoring System

In the electrolysis process of chlor-alkali enterprises, there is a little ammonium in the electrolytic brine, so a little NCl₃ will be produced by the electrolyzer anolyte in an acid environment. NCl₃ is an extremely unstable matter, it decomposes and explodes rapidly under the sunshine, and explosions can also be induced when it contacts ozone, nitrogen oxide, grease or organic compounds. The explosion of NCl₃ is quite devastating, when it explodes but the capacity remains the same, the temperature will be as high as 2,128°C, and the pressure can reach 536.1MPa.

In 2004, there was an explosion of NCl₃ in a chlor-alkali enterprise in China, resulted in large chlorine leakage, and caused many casualties, 150,000 people were evacuated. Such kind of accident is frequent in chlor-alkali enterprises.

Therefore, to control strictly the generation of NCl₃ and the NCl₃ content in chlorine during the chlor-alkali production is significant to safe production. Aside from controlling effectively the ammonium content in brine and optimizing the chlorine production process, make an online surveillance on the NCl₃ during the production process is also an important measure for explosion prevention.

At present, enterprises usually adopt manual test to detect the NCl₃, such method is with the shortcomings such as low accuracy, big workload and poor real-time etc. Once the NCl₃ is over standard, the technicians cannot adjust the production process in time, which may give possibility to the NCl₃ to gather in the follow-up sections.

Product Introduction

The OMA-3020 is an NCl₃ safety monitoring system promoted by FPI aiming at the electrolysis process in chlor-alkali industry. It uses the OMA-3000 series ultraviolet/visible optical fiber spectrum gas analyzer and high reliable pretreatment device, which can measure the concentration of NCl₃ and chlorine in the tested gas in real-time, with evident advantages such as high precision, fast response speed and high reliability etc.

OMA-3020 can provide the chlor-alkali enterprises with following values:

Monitors Online the NCl₃ Content, Eliminating the Hidden Danger

The OMA-3020 can analyze the NCl₃ in chlorine in real-time, and transmit the concentration signal to DCS in real-time. Once the NCl₃ content is discovered over standard, switch signal alarm signal will be made. The technicians can take measures accordingly, adjust the process and eliminate the hidden danger. Meanwhile, such data may help the technicians to find the law between the NCl₃ content and gather of NCl₃ in liquid chlorine vaporizer.

Analyzes Online the Chlorine Purity, Controlling the Product Quality

The OMA-3020 can also analyze the chlorine purity in dry chlorine at the same time, for product quality control. Such parameter can also be used in the production control of other process equipment. For instance, in the HCl synthesis section of PVC plants with calcium carbide process, the chlorine purity analysis can provide important reference to the ratio of hydrogen and chlorine.



Product Features

- Measure the purity of NCl₃ and chlorine at the same time
- Double-range automatic switching, wide scope of NCl₃ measurement
- Full spectrum analysis and chemometric algorithm technology, with fast response speed and high measurement precision
- Perfect anti-corrosion design, highly adaptable to environment
- Multi-level alarm output, self-protection function
- Remote monitoring system, lesser maintenance workload

Technical Specifications

Measuring principle: Ultraviolet spectroscopy
 Measuring composition: NCl₃ measurement range 0-200-5000ppm
 Zero drift: $\leq \pm 1\%F.S.$
 Repeatability: $\leq \pm 1\%F.S.$
 Linearity: $\leq \pm 1\%F.S.$
 Response time (T90): $\leq 10s$
 Analogue output: 2-way 4-20mA (configurable)
 Analogue input: 2-way 4-20mA (configurable)
 Explosion-proof grade: Expxmd IIC T4
 Protection grade: IP65
 Ambient temperature: -20°C~50°C
 Environment pressure: 86kPa~116kPa
 Environment humidity: 5%RH~95%RH
 Power supply: 200~240V AC, 47~63Hz, 0.5kW
 Instrument air: 90L/min maximum
 Dew point: under the pressure of 0.7MPa(g) $\leq -40^{\circ}C$
 Oil-free, dust-free

Note: The measurement range of NCl₃ and Cl₂ can be customized on demands, please consult FPI if you have special demands.



GT Series Gas Monitor



Product Features

- It supports infrared intercommunication, provides the customers with strong and humanized functions
- You can achieve the following functions through the infrared bidirectional remote control:
 - Set the alarm parameters wirelessly, read the alarm status wirelessly, with easy operation and maintenance
 - "One-key calibration" and "one-key zero adjustment", which improve the operation efficiency evidently
- Built-in unique algorithm, which improves the measurement precision and accelerates the response speed evidently
- Unique, convenient installation device provided, easy installation and maintenance
- Unique temperature measurement and transformation function provided

Technical Specifications

Gas Types	Toxics
Temperature Range	
Oxygen and Toxics	-30°C to 50°C (typical, range on some models may differ)
Combustibles	-40°C to 70°C
Drift	
Zero Drift	< 5% / year, typical
Span Drift	< 10% / year, typical
Accuracy	
Repeatability	±1% Full Scale, typical
Linearity	±2% Full Scale, typical
Response Times	
T ₉₀ toxics	< 15s (CO, H ₂ S)
T ₉₀ oxygen	< 10s
T ₉₀ combustibles	< 30s
Humidity	15% to 95% RH, non-condensing
Sensor Life	
Oxygen and Toxics	2 years typical
Combustibles	3 years typical
Input Power	10 V DC to 30 V DC
Wiring Requirements	
Combustible	3-wire
Oxygen and Toxics	3-wire; LEDs, LCD and relays
Signal Output	4-20mA current source
Relay Contacts	
Rating	1 amp@ 220 VAC; 1amp@ 30 VDC
Conduit Entries	Two entries, G 1/2"
Defense Grade	IP 65
Explosion-proof Grade	Exd IIC T6
EMC	IEC 61000-4-2 IEC 61000-4-4

Brief Introduction

- The latest mechanical and electrical technologies offer a state-of-the-art design for any gas detection need. The GT Series Gas Monitors, developed by Focused Photonics (Hang Zhou) Inc. (FPI), provide continuous monitoring of hazardous gases.
- Advanced sensing technologies monitor against the threat of combustible and toxic gases and for oxygen deficiency, utilizing catalytic and electrochemical gas detection methods.
- GT Series Gas Monitors are suitable for indoor and outdoor applications in virtually any type of industry including refineries, chemical and petrochemical facilities, steel mills, water and wastewater plants, mining, and general industry.
- GT Series Gas Monitors, can operate completely stand-alone with a large LCD display, remote controller, or connected with a standard 4-20mA output to a control system (PLC, DCS, etc.).

GT-1030 (Combustibles)

Measured gas	Molecular formula	Measuring range
Hydrogen	H ₂	0~100LEL%
Methanol	CH ₄ O	0~100LEL%
Ethanol	C ₂ H ₆ O/C ₂ H ₅ OH	0~100LEL%
Dimethylbenzene	C ₈ H ₁₀	0~100LEL%
Toluene	C ₇ H ₈	0~100LEL%
Benzene	C ₆ H ₆	0~100LEL%
Aether	C ₄ H ₁₀ O/C ₂ H ₅ OC ₂ H ₅	0~100LEL%
Methane	CH ₄	0~100LEL%
Ethane	C ₂ H ₆	0~100LEL%
Propane	C ₃ H ₈	0~100LEL%
Butane	C ₄ H ₁₀	0~100LEL%
Ethene	C ₂ H ₄	0~100LEL%
Propylene	C ₃ H ₆ /CH ₃ CHCH ₂	0~100LEL%
Butadiene	C ₄ H ₈	0~100LEL%
Ethyne	C ₂ H ₂	0~100LEL%
Acetone	C ₃ H ₆ O/CH ₃ COCH ₃	0~100LEL%
Acetic acid	C ₂ H ₄ O ₂	0~100LEL%
Formaldehyde	CH ₂ O	0~100LEL%
Acetaldehyde	C ₂ H ₄ O/CH ₃ COH	0~100LEL%
Cyclopropane	C ₃ H ₆	0~100LEL%
Chloroethylene (VCM)	CH ₂ CHCl	0~100LEL%

GT-1020 (Toxics and oxygen)

Measured gas	Molecular formula	Measuring range
Carbon monoxide	CO	0-250-500-1000-2000ppm
Sulfured hydrogen	H ₂ S	0-50-100-200ppm
Oxygen	O ₂	0-25%-30%vol
Chlorine	Cl ₂	0-5-10-20ppm
Ammonia	NH ₃	0-50-100-300-500ppm