FLUE GAS ANALYSER - UVDOAS

GAUV-01

Environment Online Monitoring/Industrial Process Control/Safety Monitoring



Brix Engineering Pte Ltd

190, Middle Road, #16-01, Fortune Centre, M: +65 9446 2236 Singapore - 188979.

sales@brixengg.com | www.brixengg.com

Overview

GAUV-01 flue gas analyzer is developed for online gas analysis of environmental protection and industrial Control. Based on UV Differential Optical Absorption Spectroscopy (DOAS) technology and chemometrics Algorithm(PLS). It is able to measure gas concentration of SO2, NO, NO2, NH3, CL2, O2, H2S, CH4 etc. With features of high measurement accuracy, high reliability, fast response time, wide application scope, It can be widely applied in environment online monitoring, industrial process control, safety monitoring etc. As a result of years of flue gas analyzer research and combined with practical experience of thousands of Successful application cases, the analyzer has derived multiple types (standard type, low emission type, Ultra-low emission type and customized type to meet diverse requirements in different working condition.

Technical Principle

GAUV-01 flue gas analyzer adopts UV DOAS technology. The optical platform consists of light source, gas chamber, optical fiber and spectrograph (inc. diaphragm, holographic grating, linear array detector) and other optical components. Refer the fig. 1,2,3.

Ultraviolet light emitted by light source enters gas chamber by optical window and absorbed by measuring sample gas flowing through the chamber. The light carrying sample absorption information will be gathered by lens and coupled into optical fiber and then transmits into spectrometer through fiber. After light splitting and photo-voltaic conversion, gas absorption spectrum is obtained.

The corresponding component concentration in gas can be calculated by analyzing spectrum.

Note: the difference amongst std. analyser, low and ultra-low analyzer is the optical path; for low emission, it adopts multiple return structure with 1m optical path; for ultra-low emission analyzer, it uses white cell structure with adjustable optical of 5-15m.

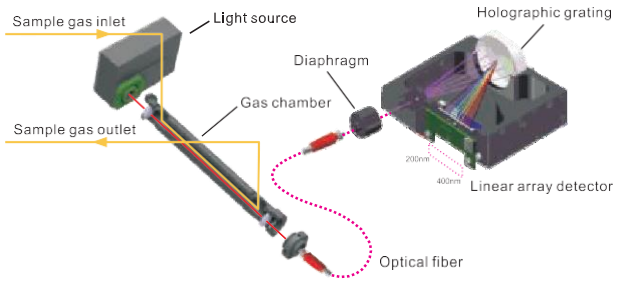

Fig.1 Standard (0.25m optical path)

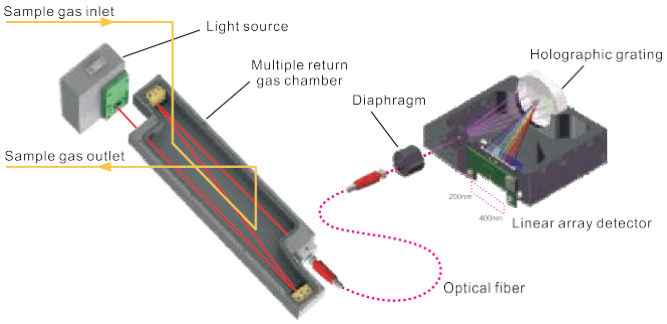

Fig.2 Low emission (1m optical path)

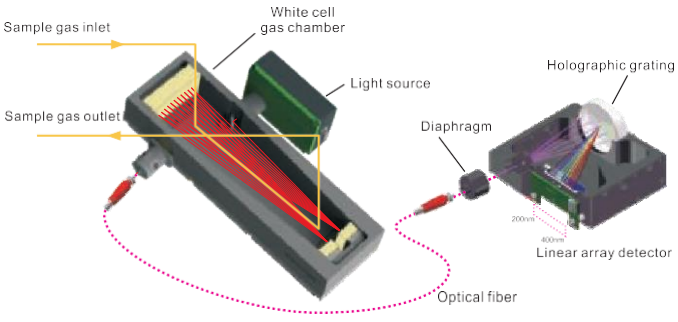

Fig.3 Ultra–low emission (5–15m optical path, adjustable)

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Technical Feature

High measurement accuracy

- Minimum detection limit of SO_2, NO, NO_2 can reach 1mg/m^3 (15m optical path)
- Ultraviolet has no moisture absorption, undisturbed by moisture and dust
- No cross interference between measured gases (refer to table 1)
- Measure NO and NO_2 simultaneously without converter
- Low detection limit

Table1: Cross Interference between Gases Table

Interfering gas \ Measuring gas	SO_2	NO	NO_2	O_2
SO_2 (500ppm)	/	< 1ppm	no	no
NO (500ppm)	no	/	no	no
NO_2 (500ppm)	no	< 1ppm	/	no
H_2O (No dew)	no	no	no	no
CO (1000ppm)	no	no	no	no
CO_2 (20%)	no	no	no	no
O_2 (21%)	no	no	no	/

High reliability

- Small zero drift and span drift
- Modular design
- No optical moving parts, without vibration influence
- Strong gas chamber, low cost
- Automatic adjustment spectrum technology, long maintenance-free period
- Adopt pulse light source with 10-year service life

Wide application scope

- Coal-fired power plant
- Cement plant
- Industrial furnace
- $DeSO_X$ process monitoring
- $DeNO_X$ process monitoring
- Waste incineration plant
- PVC process in chlor-alkali plant
- Titanium dioxide production process
- Sulfur recovery process
- Natural gas purification process
- Methyl iodide analysis for the coal chemical industry
- On-line air monitoring

Technology Comparison

NDIR Technology	FTIR Technology	UVF + Chemiluminescence Technology	UV DOAS
Low cost	High cost	High cost	Low cost
Measure fewer components, generally, single gas chamber can only measure one kind	The largest advantage is able to measure over 10 components	Measure fewer components, different component adopt different measuring principle	The single gas chamber can measure 3-5 components
With optical moving parts, poor reliability	The interferometer is optical moving part	No optical moving parts	Adopt full spectrum electronic scanning, without optical moving parts
Single or dual wavelength	Full infrared spectrum measurement	Sensitive to some interferences, such as background fluorescence, quenching effect, and etc.	Full UV spectrum measurement technology, not affected by cross interference
Fast response, long preheating time	Restricted by scanning time, slow response, need preheating	Fast response, poor stability and reproducibility caused by high light background	Fast response, no preheating
Low measurement accuracy, large drift	High measurement accuracy and small drift	High measurement accuracy and large drift	High measurement accuracy, small drift
High requirements for measured gas, no dust and low dew point	High requirements for measured gas, no dust and low dew point	High requirements for measured gas, no dust and low dew point	Water and a small amount of dust will not affect measurement
Adopt continuous light source, service life is only thousands of hours	Adopt continuous light source, service life is only thousands of hours	Adopt continuous light source, service life is only thousands of hours	Adopt pulse light source, with service life of ten years
High detection limit	Low detection limit	Low detection limit	Low detection limit, the minimum can reach 1mg/m^3

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Technical Specification

		Standard		Low Emission		Ultra-low Emission	
Appearance							
Measurement Principle		UV-DOAS+PLS					
Typical measurement		Min range	Max range	Min range	Max range	Min range	Max range
Component	SO_2	0 ~ 300ppm	0 ~ 3000ppm	0 ~ 100ppm	0 ~ 300ppm	0 ~ 50ppm	0 ~ 100ppm
	NO	0 ~ 300ppm	0 ~ 3000ppm	0 ~ 100ppm	0 ~ 300ppm	0 ~ 50ppm	0 ~ 100ppm
	NO_2	0 ~ 500ppm	0 ~ 4000ppm	0 ~ 300ppm	0 ~ 1000ppm	0 ~ 100ppm	0 ~ 200ppm
	O_2	0 ~ 5%	0 ~ 25%	0 ~ 5%	0 ~ 25%	0 ~ 5%	0 ~ 25%
Linearity		≤ ±3%F.S.					
Repeatability		≤2%					
Zero Drift		≤ ±2%F.S./7d					
Span Drift		≤ ±2%F.S./7d					
Response Time(T90)		≤50s					
Working Temperature		–20℃ ~ +50℃					
Preheating Time		No preheating		20min		40min	
Sample Gas Interface		Φ6 Bi-Lok					
Sample Gas Flow		Range: (0.5 ~ 2)L/min, fluctuation < 25%					
Sample Gas Pressure		Current ambient pressure ±0.1Bar					
Sample Gas Temperature		0℃ ~ +50℃					
Sample Gas Humidity		No condensation (under sample gas temperature)					
4–20mA Input Interface		3 , configurable, 100Ω load					
4–20mA Output Interface		5, output content can be configured, maximum load capacity ≤800Ω					
Switch Input Interface		6 , configurable					
Relay Output Interface		14, output content can be configured. DC30V2A					
Communication Interface		1×RS232, 1×RS485 (Support Modbus protocol)					
Installation Method		Installed in 19 inch cabinet					
Supply Voltage		220VAC ± 10%					
Rated Power		About 100W		About 120W			
Dimension		132(H)x483(W)x375(D)mm		177(H)x483(W)x412(D)mm		177(H)x483(W)x492(D)mm	
Weight		About 10kg		About 15kg			

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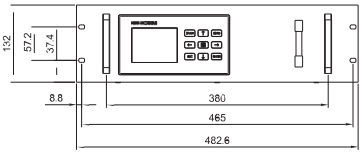
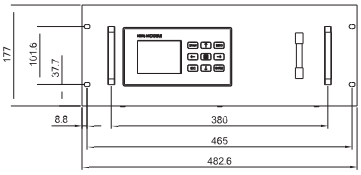
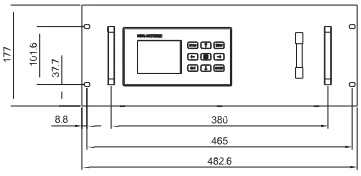
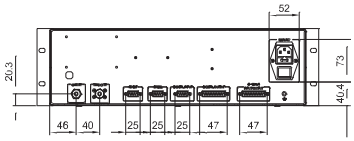
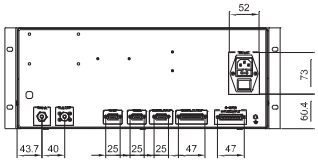
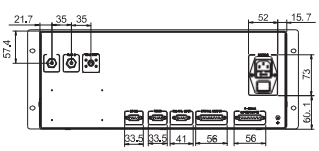
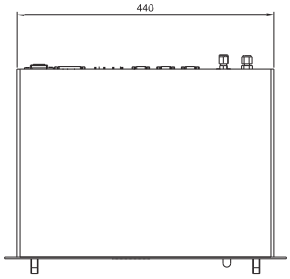
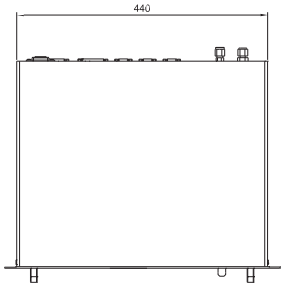
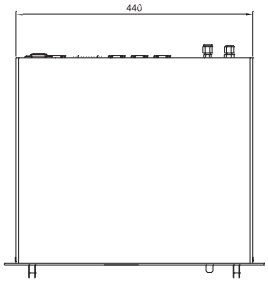
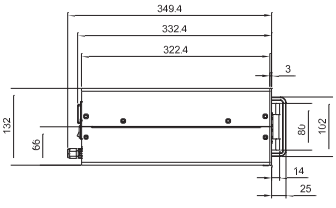
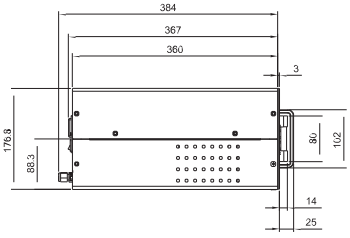
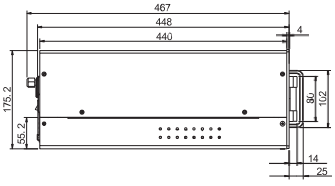
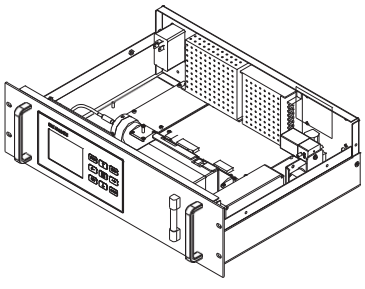
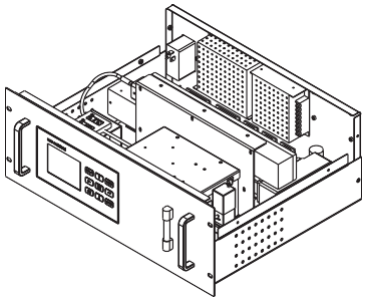
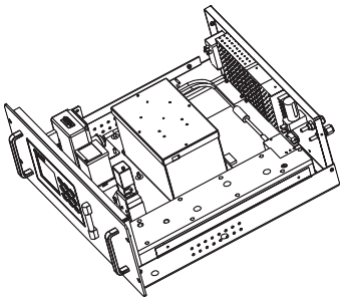
Product Dimension Comparison

External Dimension

	Standard	Low Emission	Ultra-low Emission
Front view			
Rear view			
Top view			
Side view			
Perspective View			

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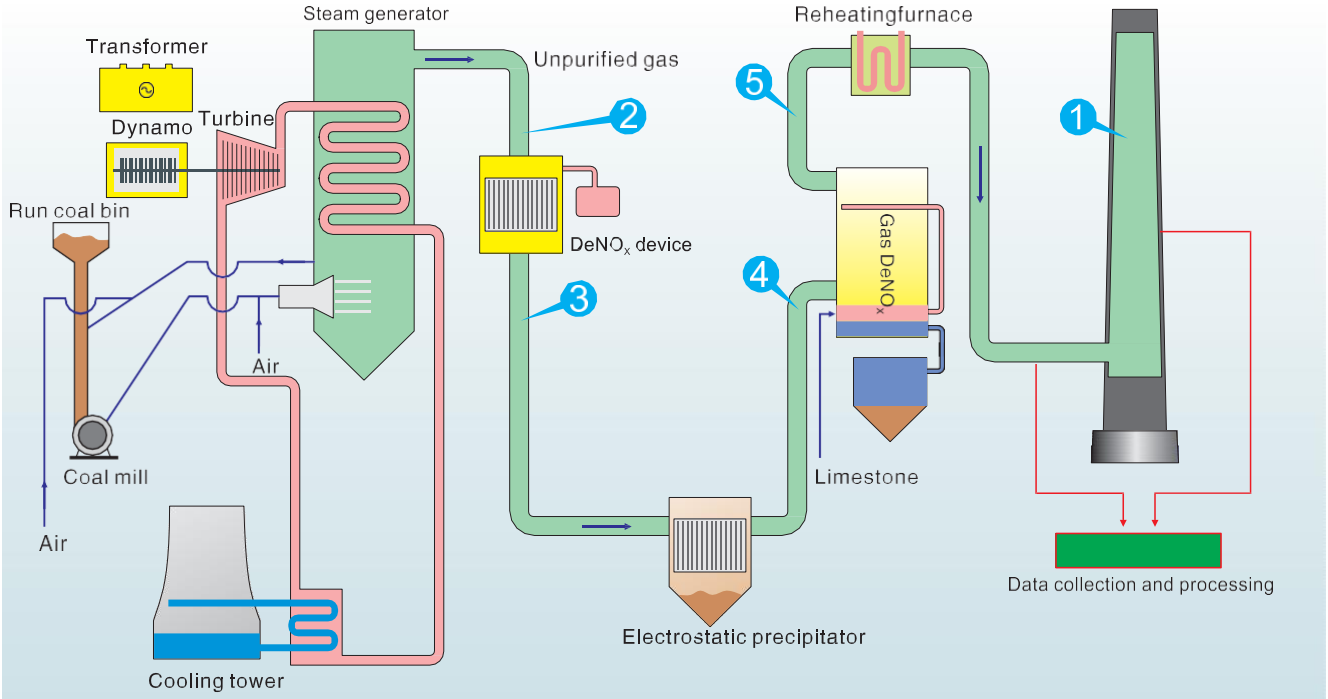
Typical Application

Coal-fired power plant is the major emission source of atmospheric pollution, including particulate matter, SO_2, NO_X and etc. It affects economic development and damages both living as well as ecological environment. The main method for controlling process and exhaust emission to reach ultra-low discharge standard and optimize process is through gas component monitoring.



Coal–fired Power Plant Measurement Point Diagram

Measurement Point No.	Detection Point	Temp	Pressure	Measuring component	Monitoring Purpose
Point 1	Main emission stack	Normal	Micro–positive pressure	CEMS (five–parameter)	Online monitor emission of each component in exhaust gas
Point 2	Before $DeNO_x$	Normal	Micro–positive pressure	NO_x, O_2	Monitor efficiency of $DeNO_x$ device in real time
Point 3	After $DeNO_x$	Normal	Micro–positive pressure	NO_x, O_2, NH_3	Monitor efficiency of $DeNO_x$ device in real time
Point 4	Before $DeNO_x$	Normal	Micro–positive pressure	So_2, O_2	Monitor efficiency of $DeNO_x$ device in real time
Point 5	After $DeNO_x$	Normal	Micro–positive pressure	So_2, O_2	Monitor efficiency of $DeNO_x$ device in real time

*For detail, please refer to selection our manual and product sample

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