

GCEM 4000 Series Instu Gas Analyser

Instu Gas analyser wherever available, is the best available technique.
Ideal solution for Pollution Monitoring

For over six decades, Forbes Marshall has been building steam engineering and control instrumentation solutions that work for process industry. Today we have evolved into a leader in process efficiency and energy conservation through technology tie-ups and focused investments in manufacturing and research. Our joint ventures with the world's leading names enable us to deliver quality solutions in 14 countries. Forbes Marshall is probably the only company in the world to have extensive expertise in both steam and control instrumentation. The dual expertise has allowed us to engineer industry specific systems that focus on energy efficiency and utilities management for sectors as diverse as textiles, food processing, paper, power and chemicals.

Our highly trained professionals have developed innovative solutions and saved millions of dollars in process costs for our clients. Our business practices and processes have combined into a singular philosophy of being trusted partners who provide innovative solutions. It's a philosophy we are proud to live up to.

We have long standing partnerships with some of the best names in the control instrumentation industry such as Arca, Codel, Krohne and Shinkawa, to develop, design and supply innovative solutions for measurement and monitoring of process parameters. With a combination of specialist knowledge and the latest technology, we provide products and solutions to achieve optimum efficiency. Our products are a unique combination of hardware and software that make them reliable and accurate.

GCEM 4000 Series Insitu Probe type Flue gas analyser

The GCEM 4000 series Insitu gas analyzer is manufactured by Codel International Ltd .UK who is specialized in the design and manufacture of High Technology Instrumentation for Combustion Processes and Atmospheric Pollution Emissions.

The GCEM 4000 series Insitu gas analyser is an accurate, reliable Insitu flue gas analyser that measures gases by infrared absorption gas filter correlation (GFX) technology. It is capable of continuously measuring upto seven gases at a time. The GCEM 4000 series measuring probe is mounted on the stack / duct and uses an intrusive stainless steel measurement chamber equipped with sintered diffuser filter to allow flue gas excluding particulate into the measurement chamber. The probe incorporates a 1 m long measurement cell, into which the gas diffuses through an array of sintered filters. Infrared beam from transceiver unit passes through the probe measurement chamber and is reflected back to the infrared detector mounted within the transceiver unit through a gold coated mirror.

Analyser utilizing an Insitu probe arrangement allows analyser calibration to be verified quickly and easily by the injection of zero and span gases. Fully automated zero calibration using compressed air provides long-term accuracy with minimal maintenance.

For online normalization, GCEM 4000 series gas analyser can be offered with built in measurement of HP, CO₂, temperature and pressure parameters.

How the GCEM 4000 series analyser works

Although the heteroatomic gases (i.e. gases which have different atoms in their molecules) attenuate energy at specific wavelengths in some part of the electromagnetic spectrum, in combustion processes many of these species are often almost totally "masked" by the presence of other major products of combustion . Attempting to isolate the effects of these interfering species using conventional or DOAS infrared or ultraviolet spectroscopy is impossible. Under these circumstances, it becomes necessary to use the principle of infrared Gas Filter Correlation (GFX) for accurate analysis.

GFX requires two continuous measurements to be made to fully isolate the species of interest. If we consider the measurement of Nitric Oxide (NO), one of these measurements (the live channel) is made extremely sensitive to NO by limiting the waveband of energy we measure to that which is readily absorbed by NO. This is achieved by using a narrow bandpass optical filter which only passes energy at 5.3 microns. Although this waveband of energy is very sensitive to NO, other species may be present which also absorb energy in this band. Hence, a second (reference) channel is therefore necessary to measure the effect of these other interfering species.

Reference channel is made specifically insensitive to NO by placing a sealed, non-consumable gas cell in its optical path containing 100% NO. This saturates the reference channel with NO and leaves it sensitive only to the interfering species, but not sensitive to NO gas.

The difference between these live and reference measurements therefore provides the basis for a specific measurement of NO only.

Salient Features:

- Insitu probe
- Works on gas diffusion technique -no sampling / no heating / no conditioning of flue gases
- Measures upto seven gases using IR gas filter correlation technique
- Field mounted analyser, no AC room / shelter required
- Highly accurate, negligible maintenance
- Online zero & span verification facility
- Real time normalization
- Optional -5 years remote data logging, reporting and remote diagnostics via PC software package
- Low power consumption-400 VA



GCEM 40XX probe with Peltier cooled weather cover

Technical specification

Series	GCEM 4000
Article no.	Refer Product codification chart
Measurement of	CO, SO ₂ , NO _x , HCL, CH ₄ , CO ₂ , H ₂ O Please refer Product codification chart
Type	Insitu probe type
Probe Insertion length	Refer product codification chart
Operating principle	Infrared absorption Gas filter correlation technique
Measuring range	CO, SO ₂ , NO _x , CH ₄ : 0 -3000 ppm HCL : 0 -1000 ppm CO ₂ , Hp: 0-25% Above ranges are fully site selectable. Other ranges available on request.
Measuring units	ppm, mg/m ³ and mg/Nm ³ (normalized to online temperature, pressure, Hp & CO ₂)please refer product codification chart.
Response time (T90)	Detector less than 10 seconds, Calibration response time less than 200 seconds
Accuracy	Refer product codification chart
Zero & span drift	+/- 2% per month (if auto zero calibration is inactive)
Linearity	Less than +/- 2 %
Repeatability	Less than +/- 2 % of span
Averaging	Selectable from 10 second to 1 Hr.
Path length	Suitable for more than 1 mtr duct size
Calibration	Automatic and manual Zero / span verification
Ambient temperature	Transceiver unit upto 70° C CEM Panel/Electronic unit upto 60°C
Flue Gas temperature	Dew point to 300° C standard, higher upto 500° C on request
Flue Gas pressure	+/- 510mm WC
Flue gas dust	Upto 50gm/m ³
Power supply	110/220VAC , 50Hz +/- 10%, 400VA
Purge requirement	Clean and dry plant instrument air, air consumption during normal operation SLPM, during calibration 10LPM @3-5 bar pressure
Construction	Probe : SS316L Transceiver unit -Corrosion resistance epoxy coated aluminum housing sealed to IP66 CEM Panel-Sheet steel corrosion resistance epoxy coated sealed to IP66 Electronic unit -Die-cast aluminum corrosion resistance epoxy coated sealed to IP66 Interconnecting cable / pneumatic tubing 10m standard, higher on request
Outputs	4-20mA, 500 output for the ordered measurement parameters (additional outputs on request) . Volt free contact SPCO rated at 50V/1A for the ordered measurement parameters (additional outputs on request) Volt free contact SPCO rated at 50V/1 A for system fault RS48S interface (optional)
Compliances	EMC -89/336/EEC directive compliant Low Voltage -73/23/EEC directive compliant
For hazardous area application	OPTIONAL : Positive pressure purged enclosure with flameproof purged control units

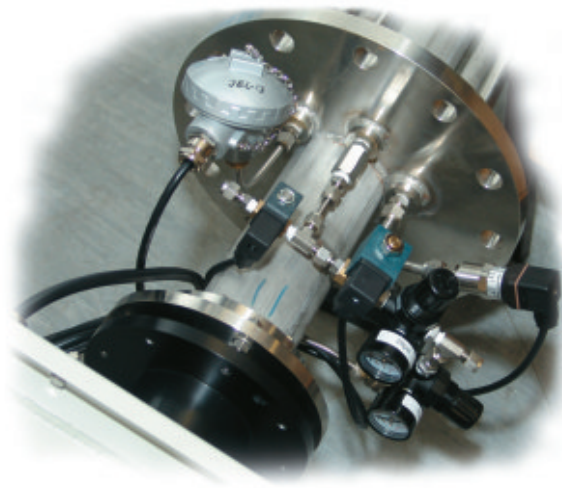
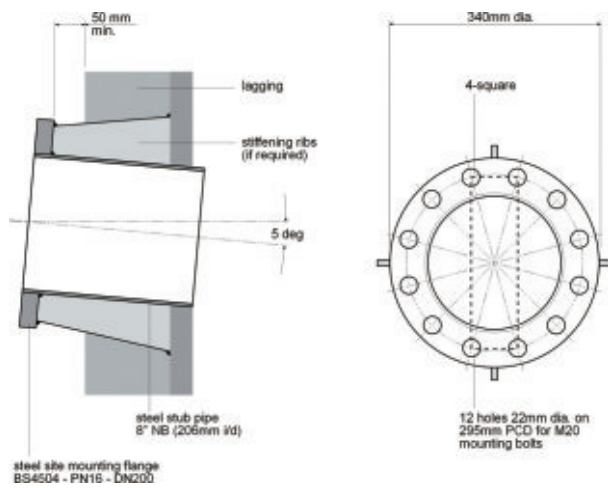
Product codification for Continuous Gas Emission Monitoring System (GCEM)

GCEM Gas analyser	Article no. : GCEM4	X	X	X	X	
Type	Description					Accuracy
	In situ	0				
Measuring Parameter	CO, SO ₂ , NO _x , CO ₂ , Hp temperature and pressure (NO ₂ , HCL, CH ₄ optional channel)		0			2 % of measured value
	CO and temperature		1			5 ppm
	SO ₂ and temperature		2			10 ppm
	H ₂ O and temperature		4			0.5%
	CO, CO ₂ , HP, temperature and pressure		5			CO - 5 ppm CO ₂ , Hp - 0.5%
	SO ₂ , NO _x , CO ₂ , HP, temperature and pressure		8			SO ₂ , NO _x - 10ppm CO ₂ , Hp - 0.5%
	CO, NO _x , CO ₂ , HP, temperature and pressure		9			CO, NO _x - 10ppm CO ₂ , HP - 0.5%
Flue Gas temperature	Dew point to 300°C			0		(Higher upto 500°C on request)
	Dew point to 400°C			1		
Probe insertion length	1.8mtr				A	Standard
	1 mtr				B	For smaller ducts or for low emission level measurement
	2.3mtr				C	For concrete stack mounting having wall thickness more than 300mm and less than 1 mtr

Many major consultants, end users actively state
 " In situ Gas analyser which avoids the need for sampling system, where available, may be the best available technique"

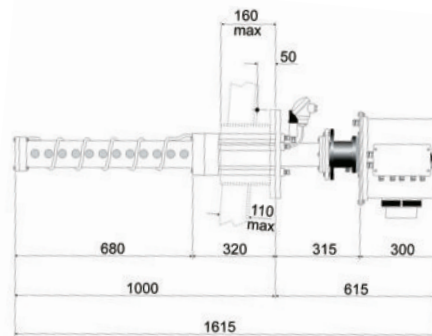
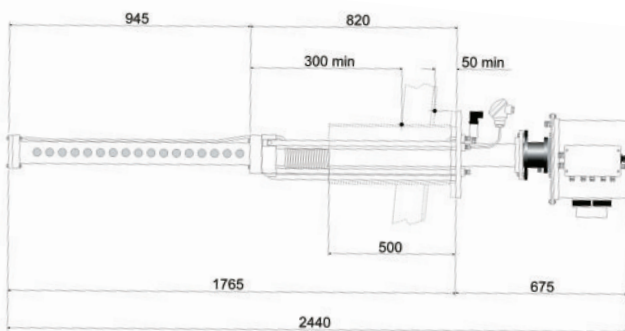
Why, here's a small comparison

In situ Probe Gas Analyser	Traditional Hot Extractive Gas Analyser
In situ measurement - no sampling, conditioning of gases required	Extraction of sample is highly prone to condensation, tube choking, leakages
Works on gas diffusion technique - hence no filter choking	Sample extraction always leads to sampling probe filter choking
Fast response	Sampling and conditioning of gases reduces speed of response time
Representative bulk measurement - probe measurement zone is 1 mtr long, straight length of 3 times of duct inner diameter is required	Single point sampling, so to get representative sample need straight length of 8-10 times of stack inner diameter is required
Low cost of installation maintenance. Less Power consumption (400VA max)	Capital cost of installation / maintenance very high. Needs AC Panel/shelter. Power consumption for analyser with 50m heated sample line is typically 8 to 10KW
Periodic auto zero,	Demands frequent zero and span calibration



1.8m probe version

1m probe version



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