

**continuous  
emissions  
monitoring**



**LAND**  
**AMETEK®**  
PROCESS & ANALYTICAL INSTRUMENTS

# FGA

## Continuous Emissions & Combustion Efficiency Monitoring



The FGA range of analyzers use dual sensor technology to measure the levels of Nitrogen Oxides, Carbon Monoxide and Oxygen in flue gas.

Land's measurement technique ensures stable long-term operation with high accuracy and very low drift. Engineered for ease of maintenance and packaged for the industrial environment, FGA series analyzers are simple to install and trouble-free in operation.

**for stand-alone use or as part of a fully-integrated system**  
**- to meet the demands of modern environmental legislation.**

## Features & Benefits

- **Fully integrated system in a single compact box** - *no additional components required*
- **Suitable for a wide range of applications** - *up to 3 gases in a single analyzer*
- **Low maintenance** - *straightforward servicing without specialist skills*
- **Proven high performance** - *dual sensor measurement technique, MCerts approved/ Certified to US EPA standards*
- **True measured Total NO<sub>x</sub>** - *separate NO + NO<sub>2</sub> sensors for true NO<sub>x</sub> monitoring, no converters necessary*
- **Simple installation** - *locate the analyzer anywhere, including outside locations*
- **Automatic calibration option** - *for continuous unattended operation in compliance monitoring applications*
- **Combustion Efficiency measurement option** - *for optimizing process efficiency where conditions are changing*

## Compact Weatherproof Design

FGA analyzers are very compact. The choice of installation location and access is therefore made much simpler. They are packaged in weatherproof cabinets, intended for mounting directly on to a convenient wall or structure, inside or outside.

## True NO<sub>x</sub> Measurement

The analyzer measures both NO and NO<sub>2</sub> separately, these are combined to give a true NO<sub>x</sub> measurement output. The inherent problems with catalytic NO<sub>2</sub> converters are therefore completely avoided.



## Flexible Configuration

FGA analyzers are available in a range of configurations, as shown in the table.

### Automatic Calibration

Each analyzer is fitted with manual calibration as standard. Automatic calibration is optional and enables the analyzer to perform a calibration without operator intervention.

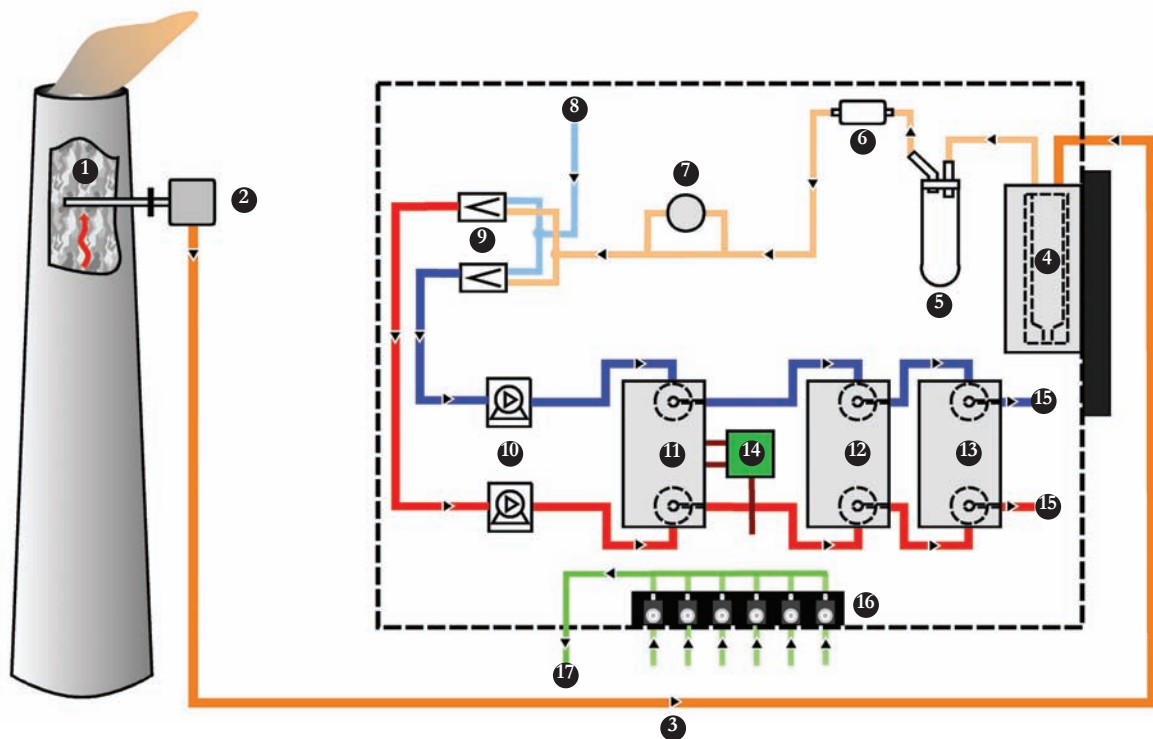
### Efficiency

A calculation of overall combustion efficiency can be made for process optimization. It is optional on analyzers fitted with Oxygen sensors.

### CO<sub>2</sub>

A calculated CO<sub>2</sub> output can be provided on all models that measure O<sub>2</sub>.

Model	Gas Type				
	CO	O <sub>2</sub>	NO	NO <sub>2</sub>	NO <sub>x</sub>
900	●				
930	●	●			
940		●	●		●
942		●	●	●	●
945			●	●	●
950	●	●	●		●



## How the Analyzer Works

FGA is an extractive sampling multi-gas analyzer system. The flue gas is extracted using a sample probe. The gas is then transported via a sample line, to the cooler unit fitted inside the analyzer, where the moisture is removed. The dry and cooled sample gas is then filtered to remove particulates before being directed into the measurement system. The measurement system is made up of pairs of sensors. Each sensor is fed alternately with sample gas and air. The sensors generate an electrical output in proportion to a specific gas component. Measured values are then displayed and output as analog signals (4-20 mA).

## Key

- Flue Gas Stream
  - Sample Probe
  - Sample Line
  - Peltier Sample Cooler Unit
  - Catch Pot
  - Particulate Filter
  - Flow Indicator
  - Air Inlet
  - Solenoid Valves
  - Sample Pumps
  - Gas Sensor Pair #1
  - Gas Sensor Pair #2
  - Gas Sensor Pair #3
  - CO Sensor Purge Unit
  - Exhaust
  - Automatic Calibration Gas Module (optional)
  - Calibration Gas to Sample Probe (with automatic option)
- Legend:
- Hot Sample Gas (Orange line)
  - Cooled/Cleaned Sample Gas (Light Orange line)
  - Air (Blue line)
  - Measurement Channel #1 (Dark Blue line)
  - Measurement Channel #2 (Red line)
  - Calibration Gas (Green line)

# FGA SYSTEMS

## CEM Systems - Tailored to your Needs

FGA series analyzers are extremely compact, and are ideal for incorporation into custom-built systems. Land can create solutions which conform with the most exacting specifications. From site-specific installation drawings to complete system engineering packages, Land Instruments International has the experience to produce designs which perform to the highest standards.

- Special mounting arrangements
- Gas bottle cabinets and regulators
- Termination boxes and isolation relays
- Systems for use in Hazardous Areas
- Customer-specific drawings and manuals



## Probes and Sample Lines for all Applications

Our experience will help determine which probe and type of sample line will give the best possible results in your application.

A full range of heated and unheated probes, filters and sample lines is available to meet all requirements; and more importantly, to keep operating continuously and very efficiently, with the minimum of maintenance.

- Heated filter probes
- Ceramic probes for hot or acidic conditions
- Regulated and self-regulating heated sample lines
- Unheated sample lines

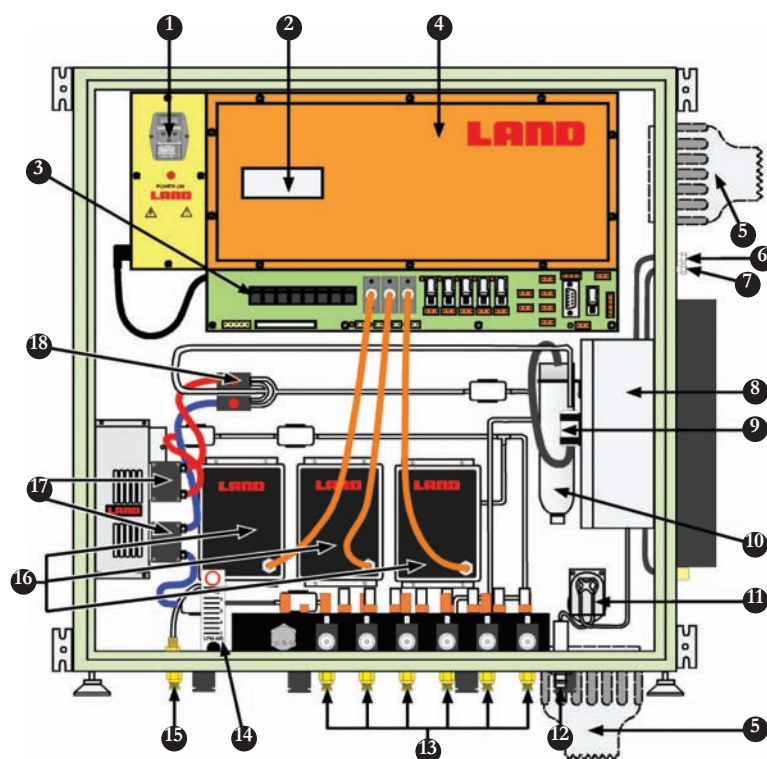
## Advanced Capability Systems

The FGA<sup>II</sup> series of analyzers can measure up to six gases (CO, NO, NO<sub>2</sub>, SO<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub>) in the same compact format. The ChillerProbe is a stack-mounted sampling system, which uniquely filters and cools the flue gas at the sampling point, before being transported to the FGA<sup>II</sup> for analysis.

*For further information please refer to data sheets for FGA<sup>II</sup> Analyzer (pds 195) and FGA<sup>II</sup> ChillerProbe (pds 199).*



## Key Components of the Analyzer



## Dual Sensor Technology

FGA analyzers use Dual Sensor Technology to give high measurement accuracy and repeatability. The main advantage of this technology is the automatic zero drift correction the analyzer performs every 30 minutes. In addition, the analyzer performs a measurement verification during the drift correction cycle, ensuring a reliable, repeatable reading.

Continuous emissions monitoring systems using dual sensor technology are in use worldwide and have been certified to EN 15267 under the MCerts scheme and to US EPA standards PS-3, PS-4 and PS-4A.



## Key

1. Power Switch & Fuse
2. LCD Display
3. Menu Operation Keys
4. Electronics Panel
5. Sample Line Connection Boot (optional heated/ anti-freeze sample line)
6. Compressed Air Inlet
7. Sample Gas Inlet (standard sample line)
8. Peltier Sample Cooler Unit
9. Particulate Filter
10. Catchpot
11. Condensate Peristaltic Pump
12. Condensate Drain
13. Calibration Gases and Air Inlets<sup>#</sup>
14. Calibration Gas Flowmeter and Needle Valve<sup>#</sup>
15. Calibration Gas outlet to probe
16. Sensor Units 1, 2 and 3
17. Sample Pumps
18. Solenoid Valves

<sup>#</sup>Fitted on Automatic Calibration models only

## Specifications

### Measurement Ranges

CO Ranges:	0 - 50 ppm up to 0 - 2 000 ppm
NO Ranges:	0 - 50 ppm up to 0 - 2 000 ppm
NO <sub>2</sub> Ranges:	0 - 50 ppm up to 0 - 200 ppm
Resolution:	1 ppm / 1 mg/m <sup>3</sup>
Linearity:	< 2 % of range
Zero drift:	< 2 % of range per month
Span drift:	< 2 % of range per month

O <sub>2</sub> Ranges:	0 - 5 % to 0 - 25 %
Resolution:	0.1 Vol %
Linearity:	< 0.2 Vol %
Zero drift:	< 0.2 Vol % per month
Span drift:	< 0.2 Vol % per month

<b>Calibration:</b>	Microprocessor controlled
Standard	Manual gas selection

<b>Display:</b>	LCD with backlight
<b>Indicators:</b>	External "Power On" and "System OK" LEDs

### Outputs/Inputs

Analog outputs:	Isolated 4-20 mA current loop outputs One per gas measured plus NOx if NO & NO <sub>2</sub> measured Efficiency (on instruments with selected option)
Relay outputs:	System OK, Maintenance/Calibration
Relay rating:	Isolated changeover S.P. 1 A @ 240 V a.c. 5 A @ 24 V d.c. resistive for Alarm - one per gas measured Span and Zero Gas Relays for calibration gases
Inputs:	Current loop inputs for ambient & process temperatures (only needed for efficiency calculation)

### Environmental

Environmental rating:	IP65 / NEMA 4
Operating (ambient) temperature:	0 to +35 °C / 32 to 95 °F standard to -20 °C / -4 °F with optional case heater to +50 °C / 122 °F with optional air conditioner

### Compliance

Measurement standards:	Meets the requirements of ISO 12039, ISO 10849 & ISO 7935
Approvals:	CO, O <sub>2</sub> , NO measurements are MCERTS approved to EN 15267
Electrical safety:	USEPA certified to PS-3, PS-4 and PS-4A
EMC:	Conforms to EN-61010-2 Conforms to EN-50 081 & EN-50 082

### Power

Power supply:	110 V a.c. or 230 V a.c. ±20%, 50 - 60 Hz
Power consumption:	300 W

### Gas and Air Requirements

Instrument air (zero calibration):	2 bar / 30 psi clean and dry, 5 l/min / 0.2 cfm
Instrument air (cooling):	2 - 10 bar / 30 - 150 psi clean and dry, 90 l/min / 3 cfm
Calibration gas (recommended):	2 bar / 30 psi, 5 l/min / 0.2 cfm
Calibration gas type:	20 litres / 0.7 cu.ft. per calibration approx. Specific to each gas type and measurement span

<b>Dimensions</b> (H x W x D):	600 x 600 x 350 mm / 24" x 24" x 14"
Weight:	53 kg / 117 lb

### Options

Special Measurement Ranges  
Automatic Calibration  
Efficiency Measurement  
Probe Type  
Sample Line Type  
Case Heater  
Air Conditioner/Vortex Cooler

Land Instruments International has a comprehensive range of Combustion and Environmental Monitoring Instrumentation. To see our complete product range visit our website at [www.landinst.com](http://www.landinst.com)



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Applies in the UK

Applies in the USA