

**environmental  
emissions  
monitoring**



**LAND**  
instruments international

**Combustion & Environmental Monitoring**

# 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, TÜV 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.

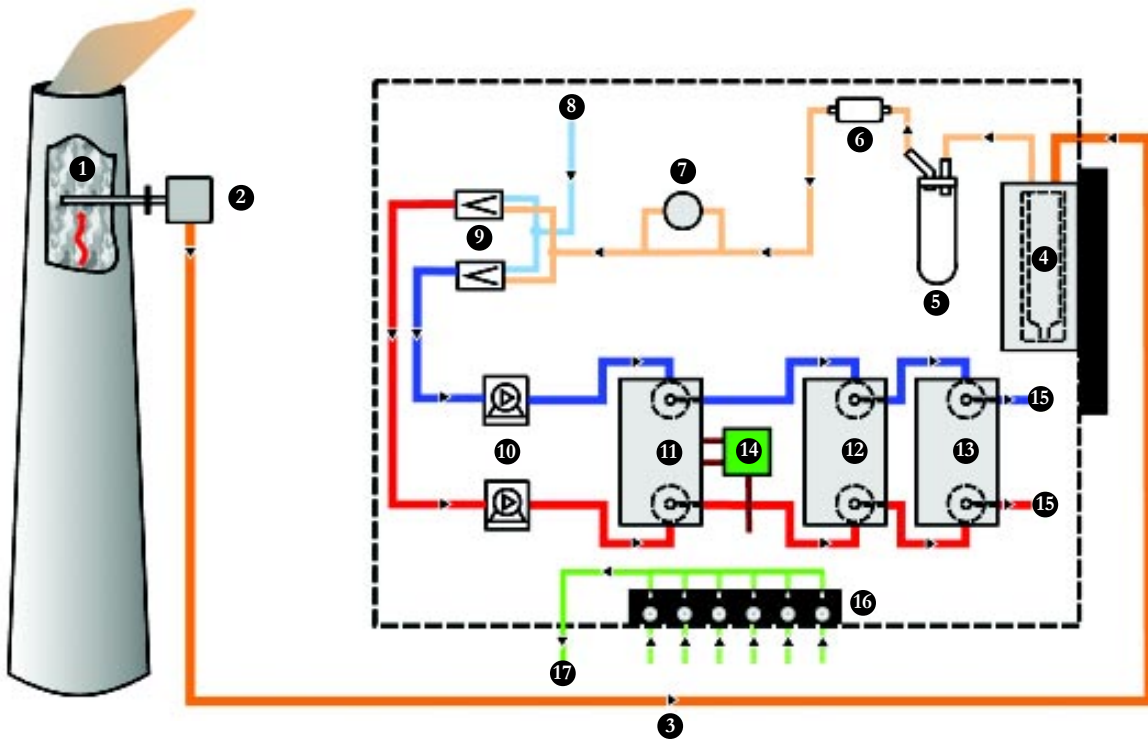
### Efficiency

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>
<b>Combustion</b>					
900	●				
930	●	●			
<b>Emissions</b>					
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

1. Flue Gas Stream
  2. Sample Probe
  3. Sample Line
  4. Peltier Sample Cooler Unit
  5. Catch Pot
  6. Particulate Filter
  7. Flow Indicator
  8. Air Inlet
  9. Solenoid Valves
  10. Sample Pumps
  11. Gas Sensor Pair #1
  12. Gas Sensor Pair #2
  13. Gas Sensor Pair #3
  14. CO Sensor Purge Unit
  15. Exhaust
  16. Automatic Calibration Gas Module (optional)
  17. Calibration Gas to Sample Probe (with automatic option)
- Hot Sample Gas  
— Cooled/Cleaned Sample Gas  
— Air  
— Measurement Channel #1  
— Measurement Channel #2  
— Calibration Gas

# 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 complex multiple-probe switching systems, 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
- Multiple probes with manual or automatic selection
- Explosion-proof systems
- 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

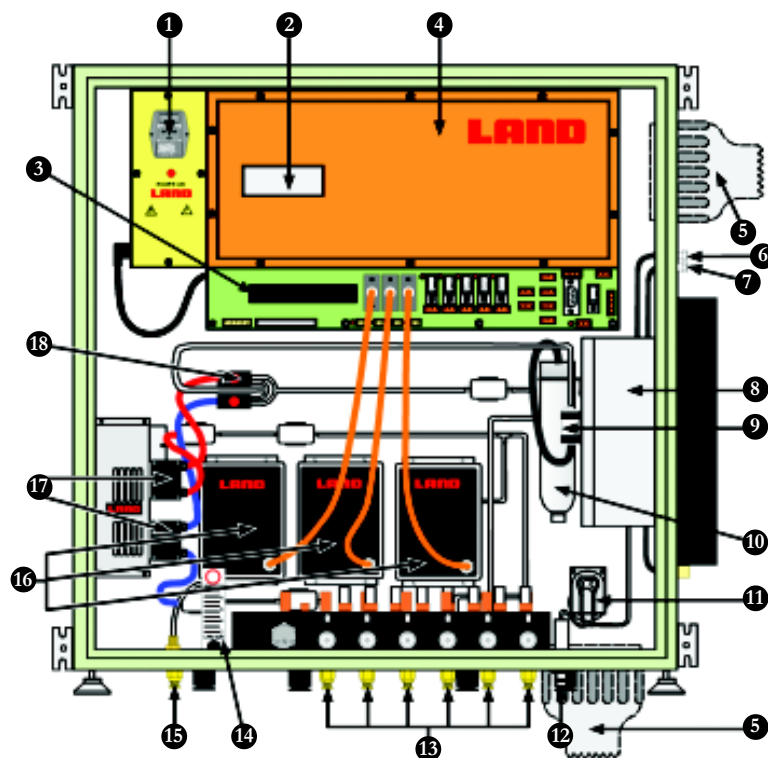
The FGA<sup>II</sup> series of analyzers can measure up to six gases (CO, NO, NO<sub>2</sub>, SO<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub>) in the same compact format. The ChillerProbe is a stack-mounted sampling system, which uniquely filters and cools the flue gas at the sampling point, before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

## Data Acquisition and Reporting

Comprehensive data acquisition and analysis systems are available with all FGA analyzers. The PC-based software is a highly flexible and fully configurable data acquisition and reporting system for continuous emissions monitoring systems. This inherent flexibility enables it to meet the requirements of Environmental Regulation Authorities throughout the world.

## 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 US EPA standards PS-2, PS-3, PS-4 and PS-4A; and are TÜV approved to the 13<sup>th</sup> and 17<sup>th</sup> BImSchV and TA Luft.



## 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

## Further Information

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## 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>x</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

**Calibration:** Microprocessor controlled  
**Standard:** Manual gas selection

**Display:** LCD with backlight  
**Indicators:** External "Power On" and "System OK" LEDs

### Outputs/Inputs

**Analog outputs:** Isolated current loop outputs  
One per gas measured plus NO<sub>x</sub> if NO & NO<sub>2</sub> measured  
Efficiency (on instruments with selected option)  
0, 2 or 4 to 10 or 20mA.  
System OK, Maintenance/Calibration  
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  
Current loop inputs for ambient & process temperatures  
(only needed for efficiency calculation)

**Relay outputs:**  
**Relay rating:**

**Inputs:**

### 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:** TÜV approved to the 13<sup>th</sup> & 17<sup>th</sup> BImSchV and TA Lüft  
USEPA certified to PS-2, PS-3, PS-4 and PS-4A  
**Electrical safety:** Conforms to EN-61010-2  
**EMC:** 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  
20 litres / 0.7 cu.ft. per calibration approx.  
**Calibration gas type:** Specific to each gas type and measurement span

**Dimensions (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

*Continuous product development may make it necessary to change these details without notice*

Land Instruments International has a comprehensive range of Combustion and Environmental Monitoring Instrumentation.

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[www.landinst.com/comb/](http://www.landinst.com/comb/)



**CE TÜV**

*Approval applies to products designed and manufactured in the UK*

*Approval applies in the U.S.A*

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