

**combustion**

**efficiency**

**monitoring**



**LAND**  
combustion

*the total efficiency concept*

# Series 9000

## NEW, high accuracy monitor

The NEW Model 9100 and 9200 Mark II Carbon Monoxide Monitors break new ground in accuracy, performance and ease-of-use. Built upon the success of the original Series 9000 the Mark II models have the flexibility to meet all user requirements.



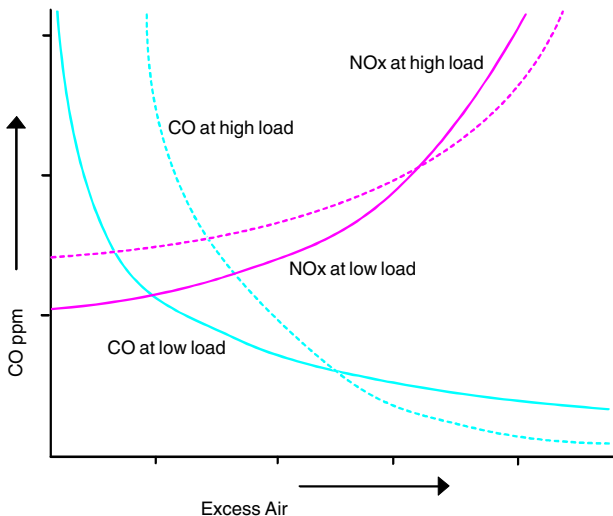
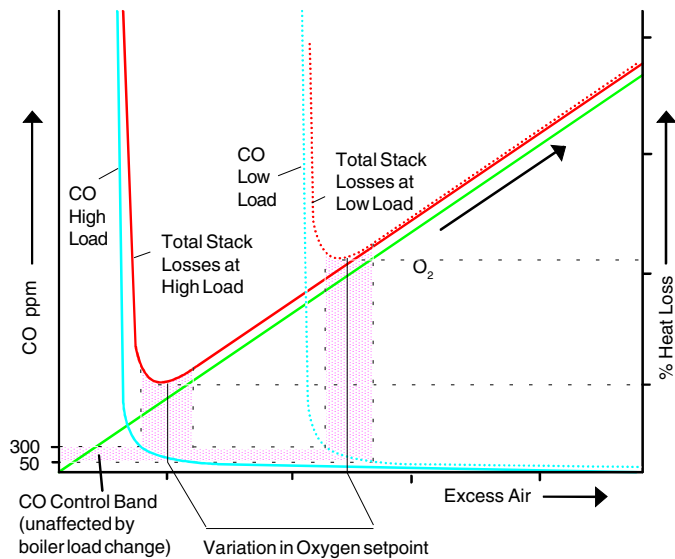
- Direct continuous measurement of Carbon Monoxide
- Long life infrared source
- Suitable for a wide range of duct sizes
- Interchangeable with existing CO monitors
- Continuous self diagnostics
- Alignment (signal strength) indication
- Fast response
- Not affected by dust or other particulates
- Robust design for high reliability and measurement stability

*The new Model 9100 has the accuracy and repeatability of an environmental analyzer and the simplicity and reliability of a combustion process monitor*

## Combustion Efficiency

Incomplete combustion of carbon based fuels, including coal, natural gas and oil will always result in the formation of Carbon Monoxide (CO) in place of Carbon Dioxide since this reaction consumes less Oxygen. Increased CO concentration equates to insufficient combustion. In practice it is not uncommon to run a boiler at a single load setting for long periods of time, thus there is a need for fuel/air ratio adjustment as the boiler load changes.

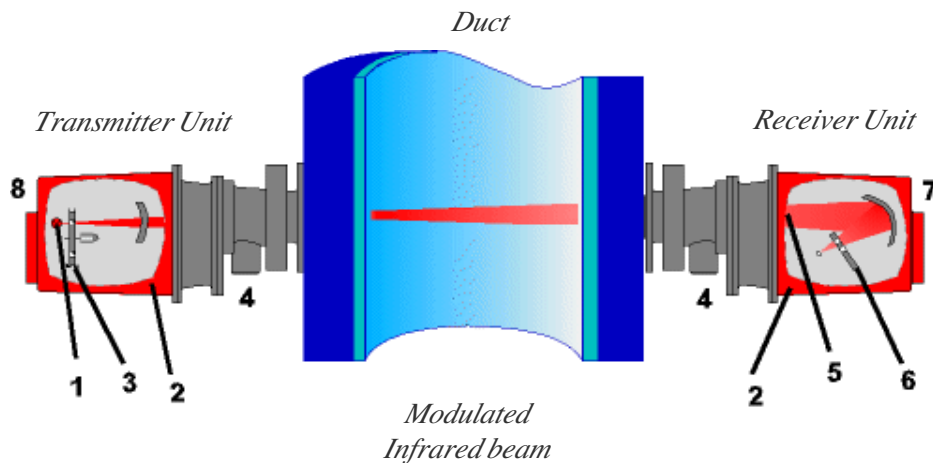
*The graph illustrates the relationship between CO, Oxygen and minimum heat loss. **The Carbon Monoxide control band is load independent.***



## Reducing NOx using CO measurement

NOx emission levels can be optimized by controlling the levels of excess air in the combustion process through continuous CO measurement. Maintaining low levels of CO minimizes NOx emission levels. The relationship between CO and NOx levels in combustion processes is clearly illustrated in the graph (adjacent). Close control of excess air levels through CO measurement is vital, as NOx level increases are non-linear.

# Carbon Monoxide



## Applications

- Boiler Combustion Efficiency
- Low NOx Burner Performance
- Burner Performance Monitoring
- Process Control
- Precipitator Protection
- Monitor Boiler Erosion

## Industries

- Utilities
- Refineries
- Chemical Plants
- District Heating Plants
- Waste Incinerators
- Cement Plants
- Process Industries
- Pulp & Paper Manufacture
- Tunnels

## Key to Schematic

1. Infrared source
2. IP65 / NEMA 4 enclosure(s)
3. Gas Cell Wheel
4. Advanced Air Purging System
5. High Sensitivity Infrared Detector
6. Measurement and Calibration Filters
7. User keypad and CO measurement display
8. Signal Strength Indicator



## Advantages over a sampling system

The demand for a fast responding system (typically 2 secs in the Series 9000) by utilizing the outputs for process control, excludes slow response sampling techniques for such applications.

The Series 9000 monitors across the entire duct width (not a single sample point) enabling a true, representative measurement of the carbon monoxide levels to be made.

## Measurement Principle

Radiation is emitted from an infrared source inside the Transmitter unit. The beam is modulated as it passes successively through measurement and reference gas cells. The beam then crosses the measurement duct containing the CO and is received by the high sensitivity detector. The receiver unit converts the signal into an electrical current and an output signal is generated which corresponds to the CO concentration.



## Advanced Air Purge

Many CO Monitor installations involve measurement in dirty flue gases. Dirt on the instrument's window results in signal loss and high maintenance requirements. Land Combustion have solved this problem by using their Advanced Air Purge. This provides a laminar flow of purge air giving full positive pressures and no voids.

## Model 9200MKII

The 9200 Mark II has all the facilities of the 9100 with the addition of:

- Clear stack, open path gas calibration
- Automatic cell leak detection
- 4 gas cell, TÜV approved measurement technique
- Automatic duct pressure correction

# Series 9000

## Further Information

Land Combustion

Dronfield

S18 1DJ

### UK

Telephone: +44 (0) 1246 417691

Facsimile: +44 (0) 1246 290274

E-Mail: [combustion.info@landinst.com](mailto:combustion.info@landinst.com)

Land Combustion

10 Friends Lane

Newtown, PA 18940 - 1804

### USA

Telephone: +1 215 504 8000

Toll Free: (in USA) 800 523 8989

Facsimile: +1 215 504 0879

E-Mail: [combsales@landinstruments.net](mailto:combsales@landinstruments.net)

Land Combustion

Via dell'Industria, 2

20037 Paderno Dugnano, Milano

### Italy

Telephone: +39 02 91 08 0020

Facsimile: +39 02 91 08 0014

E-Mail: [combustion@landinst.it](mailto:combustion@landinst.it)

Land Combustion

7, Parc des Fontenelles

78870 Bailly

### France

Telephone: +33 (0)1 30 80 89 20

Facsimile: +33 (0)1 30 80 89 21

E-Mail: [combustion@landinst.fr](mailto:combustion@landinst.fr)

Land Instruments Sp. z o.o.

ul. Michalowskiego 5/2

31-126 Krakow

### Poland

Telephone: +48 (0) 12 632 82 62

Facsimile: +48 (0) 12 632 24 74

E-Mail: [landinst@medianet.pl](mailto:landinst@medianet.pl)

Land Combustion

Fixheider Str. 6

D-51381 Leverkusen

### Germany

Telephone: +49 (0) 2171/7673-40

Facsimile: +49 (0) 2171/7673-9

E-Mail: [combustion@landinst.de](mailto:combustion@landinst.de)

Land Combustion

Paseo de la Reforma

No. 350 Piso 11

Col Juarez, D.F. CP 0660

### Mexico

Telephone: +52 5 209 8438

Facsimile: +52 5 209 8584

E-Mail: [ventas@landinstruments.net](mailto:ventas@landinstruments.net)

## Product Specifications

### Model 9100/9200MarkII

#### Measuring Technique:

Infrared Gas Cell Correlation Technique with Automatic Cell Leak Detection (9200MarkII only)

#### System Performance

Measuring Range:

0 - 10000 ppm. meters  
Other ranges selectable from the keypad

Path Length:

0.5 to 10m / 1.6 to 32ft

Flue Gas Temperature:

0 to 250°C / 0 to 482°F

250 to 370°C / 482 to 700°F

*Model 9100*

*Model 9200MKII*

Accuracy:

± 3%

±2%

Repeatability:

< 1% of CO output < 1% of CO output

Response Time:

Adjustable between 2 and 250 secs.

Flue Gas Temperature Compensation:

Thermocouple, Type K Chromel/Alumel input into the Transmitter unit or 4-20mA temp. input

Calibration (9200MarkII only):

Live calibration gas facility

Electromagnetic

Compatibility (EMC):

Complies with EN50 081, EN50 082 and EN61010

#### Receiver Unit

Environmental Protection:

IP65 / NEMA 4

Mounting\*:

ASA 3", 150lb flange (supplied)

Dimensions:

475 x 264 x 212mm (l x h x w)

18.7 x 10.4 x 8.4inches

'l' includes purge and flange

Weight

9.4kg / 20.7lb

Receiver:

85-132, 170-264V a.c. (auto selects), 50-60Hz

Power Supply:

Isolated RS232/485

Outputs:

Modbus protocol(option)

Two current loops

0, 2, 4 -10, 20mA user configurable, track or hold configurable

Digital Alarms:

System OK, Maintenance, Alarm

Relay Rating 30V d.c., 1A

Ambient Temperature:

-30 to +55°C / -22 to 121°F

Display Panel:

Keypad interface for diagnostics, setup and calibration

#### Transmitter Unit

Environmental Protection:

IP65 / NEMA 4

Mounting\*:

ASA 3", 150lb flange (supplied)

Dimensions:

475 x 264 x 212mm (l x h x w)

18.7 x 10.4 x 8.4inches

'l' includes purge and flange

Weight:

10.1kg / 22.2lb

Power Supply:

Powered directly from Receiver unit

Ambient Temperature:

-30 to +55°C / -22 to 121°F

Display Panel:

Alignment (Signal Strength) indication

\* Transfer Flange available for Models 9000 and 9200 replacement

#### Accessories

Air Mover assembly for air purge

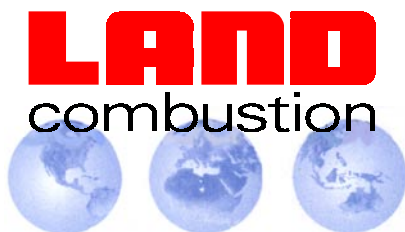
Air Purge Blower Unit

Transfer/Adaptor Flanges

Flue Gas Thermocouple with current loop transmitter

*Continuous Product Development may make it necessary to change these details without notice*

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



Land Combustion

Division of Land Instruments International

<http://www.landinst.com/comb/>



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



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