combustion

efficiency

monitoring

LAND
instruments international

Combustion & Environmental Monitoring

Series 9000

High accuracy, Carbon Monoxide monitor

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

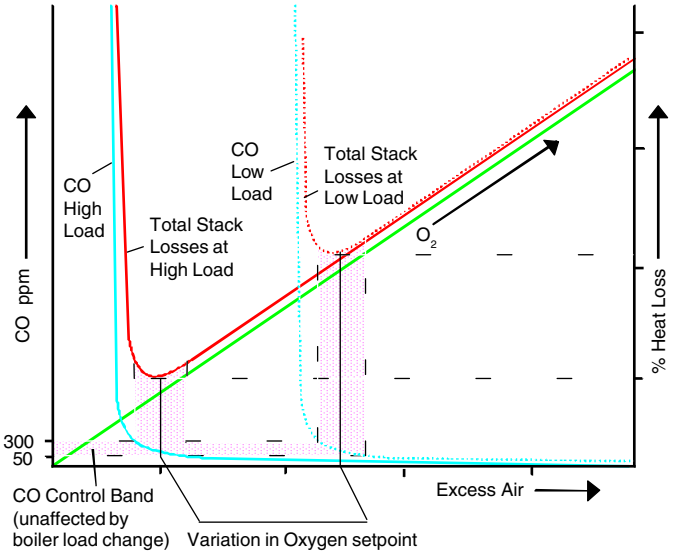
Features and Benefits

- **Direct continuous measurement of Carbon Monoxide -** *accurate and repeatable readings*
- **True representative measurement -** *average reading across entire duct*
- **Improved combustion control and efficiency savings -** *fast measurement response time*
- **Low running and maintenance costs -** *long life infrared source*
- **High reliability -** *robust design, continuous self diagnostics and calibration checking*
- **Simple installation -** *advanced alignment features*
- **Over 20 years of experience in CO monitoring -** *4th generation product*

Combustion Efficiency

Incomplete combustion of carbon based fuels, including coal and oil will always result in the formation of Carbon Monoxide (CO). Increased CO concentration equates to insufficient or inefficient combustion. It is not uncommon to have varying boiler loads and fuel quality. The greater the variation the most advantage can be gained by controlling with continuous monitoring of the levels of CO.

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

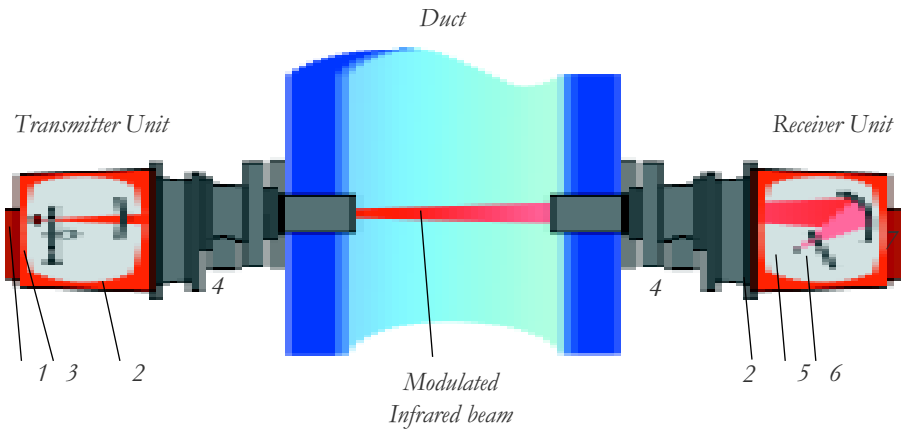


Reducing NOx using CO measurement

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. Close control of excess air levels through CO measurement is vital, as NOx level increases are non-linear.

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*



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.

Model 9200 Mk II

In addition to the extensive range of features of the Model 9100, the Model 9200 Mk II has in addition:

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

User keypad and CO measurement display

Advantages over a sampling system

The Series 9000 monitors across the entire duct width (not a single sample point) enabling a true, representitive measurement of the carbon monoxide levels to be made. Process control demands a fast responding system like the Series 9000. Extractive analyzers are often too slow, due to the sample gas transport time, and inaccurate due to the single sampling point.

Industries

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

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 Instruments International 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.

Applications

- Boiler Combustion Efficiency
- Low NOx Burner Performance
- Burner Performance Monitoring
- Process Control
- Precipitator Protection
- Explosion Preventation

Further Information

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Specifications

Measuring

Technique:	Infrared Gas Cell Correlation Technique with Automatic Cell Leak Detection (9200 Mk II only)

System Performance

Measuring range:	0 - 10000 ppm. m Other ranges selectable from the keypad	
Pathlength:	0.5 to 10 m / 1.6 to 32 ft	
	Model 9100	*Model 9200MKII*
Linearity:	± 3 % of range	±2 % of range
Resolution:	1 ppm	
Response time:	Adjustable between 2 and 250 secs.	
Calibration :	Calibration audit, Zero calibration (clear stack) Span calibration using 'live' calibration gas facility (9200 Mk II only)	

Control Panel

Display	2 x 16 character reflective backlit LCD with adjustable contrast control (receiver unit) signal strength indicator (transmitter unit)
Keypad	9 keys for data input, diagnostics, setup and calibration

Environmental

Temperature range:	-30 to +55 °C / -22 to 131 °F specified
Flue gas temperature range:	up to 370 °C / 700 °F
Environmental rating:	IP65 / NEMA 4

Compliance

Safety:	Conforms to EN61010
EMC:	Conforms to EN50 081 and EN 50 082

Inputs/Outputs

Flue gas temperature input:	Thermocouple, Type K Chromel/Alumel input into the Transmitter unit or 4-20 mA temp. input
Serial interface:	Isolated RS232 or RS485 communications (Modbus) for: CO concentration, Status, Signal strength, Initiate check cycle, Diagnostic data
Current loop (analog) outputs (2):	0, 2, 4 -10, 20mA user configurable for track or hold
Relay outputs (3):	Independently configurable as System OK, Maintenance, or Alarm (High or low)
Relay rating:	30 V d.c., 1 A

Electrical

Power supply:	85 - 132, 170 - 264 V a.c. (auto selects), 50 - 60 Hz
Power consumption:	200 W

Mechanical Data

Mounting Flange*:	ASA 3", 150 lb flange (supplied)
Dimensions (H x W x D):	264 x 212 x 475 mm / 10.4 x 8.4 x 18.7 in
(Transmitter and Receiver)	Note: 'D' includes purge
Weight:	9.4 kg / 20.7 lb (Receiver unit) 10.1 kg / 22.2 lb (Transmitter unit)

** Transfer flange available for Models 9000 and 9200 replacement*

Options

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 instruments international

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

Approval applies to products designed and manufactured in the UK

Approval applies in the USA

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