

PORTABLE FLUE GAS APPLICATIONS **APPLICATION NOTE**

Measuring flue gases – the exhaust gases produced when fuel or other materials are burned in industrial plants or power stations – is important for process control, efficiency and emissions monitoring.

As the most accurate, robust and flexible portable flue gas analyser available today, AMETEK Land's Lancom 4 provides an ideal solution for industries burning coal, natural gas, oil or biomass, including power generation, steel, glass and cement manufacturing.

PORTABLE FLUE GAS MONITORING WITH THE LANCOM 4

A compact, portable multi-gas analyser, AMETEK Land's Lancom 4 is capable of measuring up to eight flue gases simultaneously, with nine separate sensors, in a range of combustion and emission processes.

All the major flue gases are monitored, using a combination of sensor types – electrochemical (for O₂, CO, SO₂, NO, NO₂ and H₂S), infrared (for CO₂) and pellistor/catalytic (for hydrocarbon).

The Lancom 4 is simple to set up within minutes and is easy to operate, providing highly accurate spot and semi-continuous gas testing.

It can be configured for a wide range of applications to ensure full optimum combustion conditions and compliance with emissions requirements.

Easy to maintain and service, the analyser is customisable to specific measurements and process stream conditions. A resilient stainless steel probe extracts the gas sample while real-time processing techniques produce highly accurate combustion and emissions calculations.

The standard probe is suitable for most applications and is available in lengths ranging from 0.3m (1 ft) to 3m (10 ft).

Powered by a long-life, eight-hour battery charge, the Lancom 4 can be started up and ready to measure within minutes. It is supported by automatic zero calibration and continuous system diagnostics to maintain excellent analytical performance throughout its operation.

Robust and lightweight, the Lancom 4 is easy to transport and use, and can be upgraded in the field with a simple configuration file installation.

FEATURES

Monitors up to 17 combustion parameters

High-quality colour display

USB communications support

Robust, lightweight portable design

Large data-log memory

BENEFITS

One instrument meets all measurement requirements

Easy to carry around and operate

Multiple menu languages available

Configurable to ideally match application needs

Add features and options when required

LANCOM 4



GASES MEASURED:

Carbon monoxide (CO) – low and high ranges

Oxygen (O₂)

Nitric oxide (NO)

Nitrogen dioxide (NO₂)

Carbon dioxide (CO₂)

Hydrogen sulphide (H₂S)

Sulphur dioxide (SO₂)

Hydrocarbons (C_xH_y)

OPTIMISING COMBUSTION EFFICIENCY

Combustion processes are essential to a wide range of applications. Controlling the combustion reaction can improve safety and fuel economy, as well as reducing harmful emissions and operational costs.

The key to controlling this process is to find the optimum ratio between fuel and air. Typically, an O₂ measurement is used to determine air levels, and can provide a control point for operation by itself.

Excess oxygen reduces combustion efficiency and creates unwanted NO_x emissions. However, insufficient oxygen conditions mean incomplete combustion and can lead to a dangerous flameout condition.

Monitoring CO – which is created by incomplete combustion of the fuel – alongside the O₂ measurement can help to optimise the fuel-to-air ratio. It also fulfils a safety role by safeguarding against CO accumulation, which represents an explosion hazard.

The Lancom 4 analyser can provide simultaneous measurements for O₂ and CO. These can also be combined with true NO_x measurement (including both NO and NO₂) and SO₂ monitoring for emissions reduction and a hydrocarbons measurement to support safety.

The standard CO sensor is suitable for most purposes, but some applications require alternatives. A high-range CO sensor can measure concentrations up

to 10%, which allows useful readings to be made even when a burner is very far from correct operation, such as during boiler start-up. Where both sensors are fitted, the Lancom 4 switches automatically between the high- and low-range sensors.

In cases where significant concentration of hydrogen can be present, a hydrogen-compensated CO sensor improves accuracy by correcting for the cross-interference between the two species.

The Lancom 4 also offers the capability to measure flue gas temperature and flow velocity, providing a greater understanding of combustion conditions.

APPLICATIONS

The Lancom 4 supports combustion efficiency measurements for flue gases in the stack or duct for a wide range of applications, including:

Power generation plants

Industrial and commercial boilers

Process heaters

Reciprocating engines

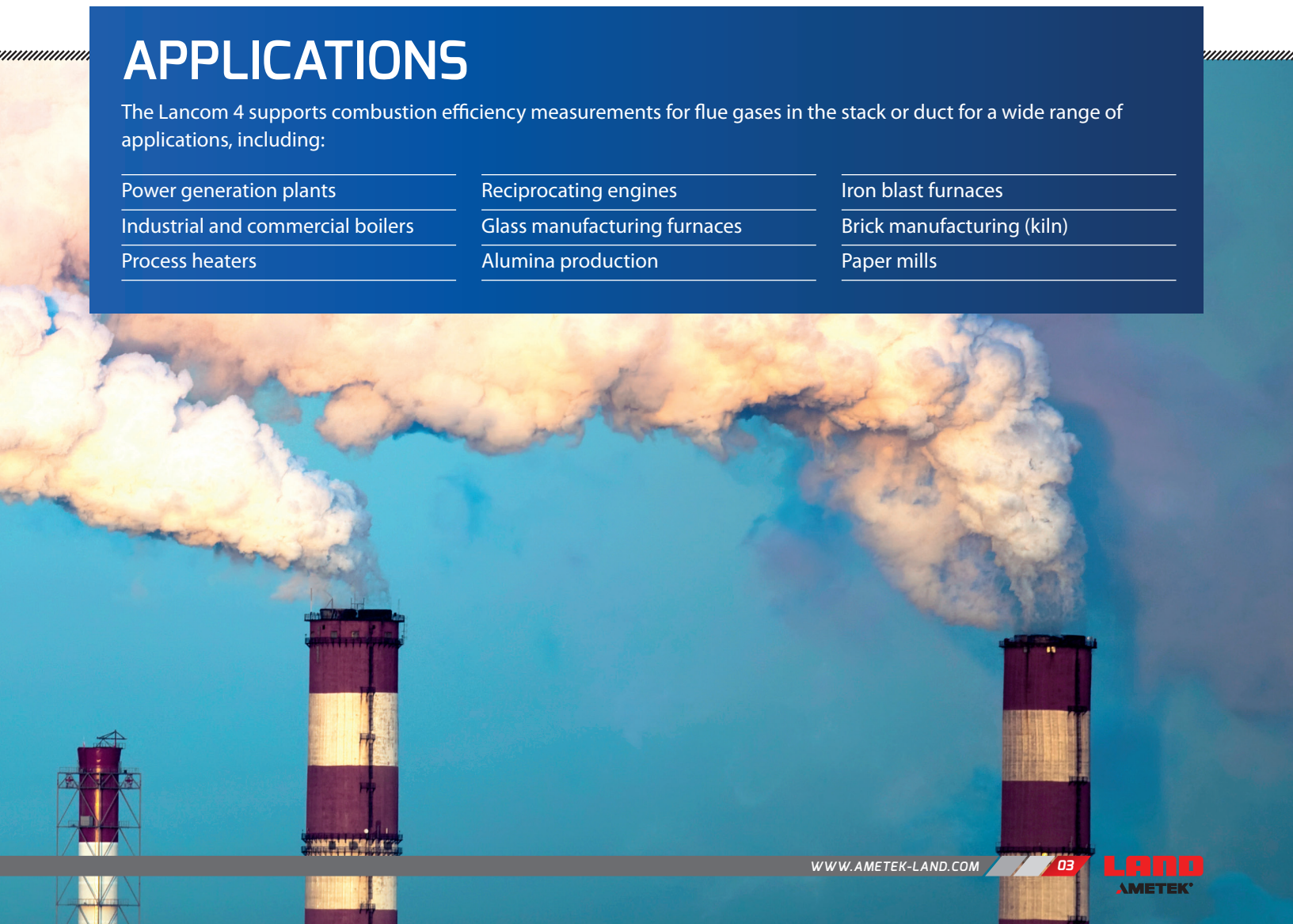
Glass manufacturing furnaces

Alumina production

Iron blast furnaces

Brick manufacturing (kiln)

Paper mills



PERIODIC EMISSIONS TESTING

Many industrial sites are required to demonstrate compliance with air pollution regulations. For smaller processes, it is often uneconomic and unnecessary to use a continuous emissions monitoring system (CEMS).

The Lancom 4 analyser is ideally suited to the periodic testing of emissions. Being portable, a single analyser can be used to measure emissions at different points in a process, or from different processes altogether.

It meets a number of test protocols, including ASTM D6522 for nitrogen oxides (NO_x), carbon monoxide and oxygen concentrations. It can also monitor species not commonly measured by CEMS, such as hydrocarbons and hydrogen sulphide.

Using the Lancom 4 is not a substitute for CEMS; however, it offers a flexible solution for processes that do not require continuous monitoring but must still comply with emissions regulations.

One example is reciprocating engines, which are often used to power electricity generators in remote locations and as back-up power generators for small communities. Engines in the 100 kW to 6 MW range may be subject to emissions regulations, but usually do not require a CEMS.

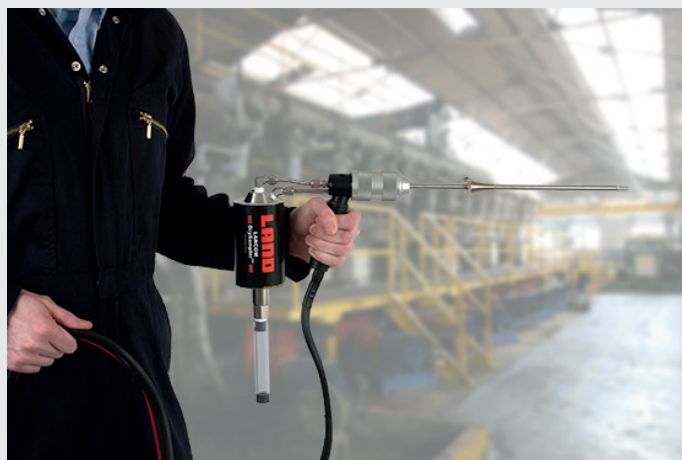
Emissions measurements are also needed in the glass industry. This monitoring often has to be performed at several different measurement points, so a portable solution is cost-effective.

A special high-temperature probe is available for such applications, and an ultrafine external filter removes selenium fumes which can cause a blockage within the analyser.

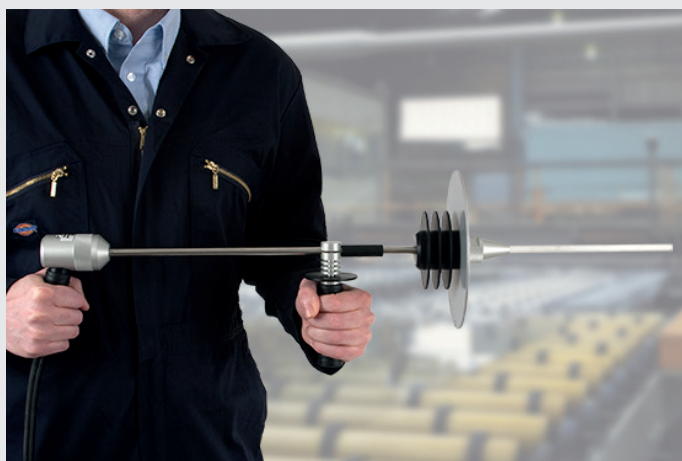
The range of sample probes available enhance the flexibility of the Lancom 4 by increasing its suitability for measurements in different processes and environments.



FLOW PROBE



DRYSAMPLER PROBE



HIGH TEMPERATURE PROBE



GAS SAMPLING PROBE

NATURAL GAS COMPRESSOR STATIONS

Because of their relatively small-scale, natural gas compressor stations do not have the potential to emit large amounts of pollution, so periodic measurements are acceptable. The O₂ measurement provides a combustion efficiency check.

The Lancom 4 can be used for emissions measurements in this application by using a permanently installed drop tube near to the top of the stack. The Lancom 4 can be connected to this tube for periodic measurements of CO, NO_x and O₂.



THE LANCOM 4 AND (RIGHT) THE RANGE OF SAMPLE PROBES AVAILABLE



LANCOM 4

ASTM D6522 COMPLIANCE

The core of this internationally-recognised measurement standard is to confirm the instrument's calibration before making a set of measurements, using bottled gas mixtures. Once the measurements have been made and the data recorded, the calibration is again verified. As long as the instrument is in compliance at the start and end of the session, the measurements made in between can be regarded with confidence.

A forthcoming standard from the Pipeline Research Council International (PRCI) aims to simplify the ASTM D6522 measurement methodology, reducing the time spent verifying the quality control measurements.

AMETEK Land has worked with the PRCI to support this new standard, which will increase productivity without degrading the quality of the measurement data.



CHECKING CEMS

On power utility boilers, fixed flue gas analysers are used to monitor gases for combustion efficiency and emissions. The portable Lancom 4 analyser is a useful tool for checking the performance of fixed flue gas analysers used to monitor gases on power utility boilers. This makes it an ideal maintenance tool for CEMS operators

and service providers since it allows a quick check of the measurements from a fixed system.

In some regions, a portable analyser can be used as a back-up in case the CEMS installation fails. The semi-continuous “wake-and-sleep” function is essential in these applications.

WAKE AND SLEEP MODE

The Lancom 4 offers “wake and sleep” semi-continuous monitoring as a standard function. This allows use for an extended period of operation.

Once configured, the analyser wakes at a set time, then zero-calibrates the sensors by drawing ambient air

through the sample path. It then switches to the sample probe input and draws sample gas into the analyser.

The Lancom 4 takes a fixed number of readings at user-specified intervals, logs the data, then purges the analyser with ambient air and shuts down. At a pre-configured time, the analyser reawakens and repeats the sequence.



COMMON APPLICATIONS

REFINERIES

In this application the Lancom 4 is typically used in the exhaust stack, to monitor flue gases from combustion or process plants where fuel is burnt. Lancom 4 analysers are not designed for hazardous area use, so should only be operated in safe areas or with a hot works permit.



PIPELINES

Oil and gas pumping plants are essential to ensure fuel flow over long distances. While these plants are typically small and remotely located, regular emissions checks are required. A portable solution such as the Lancom 4 is ideal for these periodic checks.

PAPER MILLS

To provide steam, paper mills have large boiler houses, with emissions monitoring often required on a shift basis. The Lancom 4 provides an economic solution to this, and allows the opportunity to trim boiler controls for maximum efficiency and lower fuel costs.



GLASS INDUSTRY

Melting materials for glass production requires a large refractory tank with regenerator burner arrangement. Lancom 4 analysers are widely used to monitor emissions to optimise combustion efficiency and reduce emissions of pollution. Because of the extreme temperatures involved, thermal NOx production is an important consideration for glass processes.

CEMENT INDUSTRY

A Lancom 4 with high temperature probe can check NOx levels in rotary kiln exhaust gases. Cement production can also generate high CO levels which, are an indication of poor combustion conditions. In addition, stack emissions can be monitored and fixed installations verified by the Lancom 4.



COMBINED CYCLE GAS TURBINES

Gas turbines are increasingly being used for power generation, many of these with waste heat recovery for steam generation. These plants can effectively use a portable Lancom 4 analyser for monitoring emissions, which are typically at very low levels.

AMETEK LAND SOLUTIONS FOR PORTABLE FLUE GAS MONITORING

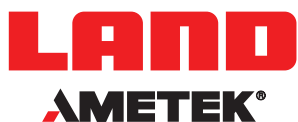


Our in-house service centres provide after-sales services to ensure you get the best performance from your system. This includes technical support, certification, calibration, commissioning, repairs, servicing, preventative maintenance and training. Our highly trained technicians can also attend your site to cover planned maintenance schedules and repair emergency breakdowns.

Lancom 4

A portable flue gas analyser featuring up to nine sensors for emissions measurement and combustion optimisation.

 COMBUSTION & EMISSION MONITORING



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