

KANE501C

Performance Tester



Stock No: 18708-2 June 2012

Registered Community Design No: 001051940

© Kane International Ltd

CONTENTS

Page No:

1.	GETTING STARTED	3 - 6
1.1	SAFETY	3
1.2	PRE-TEST CHECKLIST	3
1.3	STORING INLET TEMPERATURE	4
1.4	SELECTING FUEL	4
1.5	ANALYSER CONNECTIONS AND ZEROING	5
1.6	POST TEST	5
1.7	OVERVIEW	6
2.	MAINTENANCE	7 - 9
2.1	GENERAL MAINTENANCE	7
2.2	PERIODIC SERVICE	7
2.3	ANNUAL RE-CALIBRATION	7
2.4	CLEANING	7
2.5	WATER TRAP	8
2.6	CHANGING PARTICLE FILTER	8
2.7	BATTERY REPLACEMENT	8
2.8	ELECTROMAGNETIC COMPATIBILITY	9
3.	COMBUSTION INFORMATION	10
3.1	PROBLEM SOLVING	10
4.	GLOSSARY	11 - 13
4.1	SELECTOR AND DISPLAY PARAMETERS	11
4.2	SPECIFICATIONS	13

OWNERS MANUAL & MAINTENANCE

1. Getting Started

1.1 Safety Notes

Before using this analyser, read all safety information carefully. In this manual the word “WARNING” is used to indicate conditions or actions that may pose physical hazards to the user. The word “CAUTION” is used to indicate conditions or actions that may damage this instrument.



WARNING!

This analyser extracts combustion gases that may be toxic in relatively low concentrations. These gases are exhausted from the back of the instrument. This instrument must only be used in well-ventilated locations. It must only be used by trained and competent persons after due considerations of all the potential hazards.

1.2 Pre-test Checklist

- Clean particle filter
- Water trap and probe are empty of water
- All hose and thermocouple connections are properly secured
- Flue gas probe is sampling ambient FRESH air
- Water trap is fitted correctly to the instrument
- Flue temperature plug is connected

1.3 Storing Inlet Temperature

To correctly calculate net temperature and combustion efficiency it is important to have the correct inlet temperature set. Two methods are available to properly establish the inlet temperature.

- **Non-ducted Systems.** If the KANE501C is being used on a system that uses combustion air from the space near the appliance, simply turn the analyser on without the flue probe connected. The KANE501C will use an ambient sensor inside the handset as the inlet temperature to determine net temperature.

- Ducted Systems. If the KANE501C is being used on a system that brings in outside air for combustion air it is important to set up the inlet temperature prior to taking flue gas readings. To properly set inlet perform the following steps during start-up of the KANE501C:
 1. Connect the flue temperature connector only to the KANE501C.
 2. Place the flue probe in the combustion air inlet system
 3. Turn on and allow to complete the zero process.
 4. Connect the flue gas connector and proceed to combustion measurements.
 5. The temperature measured during the zero countdown has now been stored, and will be used to determine the net temperature.

1.4 Selecting Fuel

When powering on, simply rotate the selector to the desired fuel. The display will flash this on the display, and then it will complete the zero process.

NOTE: If you wish to use the same fuel as previously selected rotate the selector to “Stand By” at power on. The fuel in use will be displayed and then blink. If the fuel is not correct rotate the selector to the proper choice before the zero countdown starts.

1.5 Analyser Connections and zeroing

NOTE: Take care when inserting the temperature probes as the pins are polarized.



CAUTION!

Turning the pump off while the probe is in the flue will leave toxic gases inside the analyser. Once data has been read, it is advisable to purge the unit with fresh air as soon as possible. Always allow the readings to return to zero (0.0 for CO₂) prior to shutting the unit off.



CAUTION!

The probe will be hot from flue gases. Remove the probe from the flue and allow it to cool naturally. Do not immerse the probe in water, as this will be drawn into the analyser and damage the pump and sensors. Once the probe is removed from the flue and the readings have returned to

ambient levels rotate the selector to “OFF” and switch off the analyser. The instrument will count down from 10 to switch off.



CAUTION!

To optimise the measuring accuracy of the instrument, a zero should be performed after the first 20 minutes of use (either with the pump running or in the standby position). To do this, remove the probe from the flue/exhaust port, or disconnect the hose from the gas inlet on the analyser and turn the analyser off and on again in fresh air.

1.6 Post Test

- Remove the probe from the flue and allow the analyser to purge with fresh air until readings return to zero. (*Be careful as the probe tip will be HOT*)
- Drain water trap.
- Check particle filter.



WARNING!

This meter does not measure Carbon Monoxide (CO). Only measuring CO₂ does not indicate whether a combustion process is running fuel rich or fuel lean. A fuel rich combustion process can produce potentially dangerous levels of CO so other measurements must be made to ensure that the combustion process is running fuel lean and that the CO levels are acceptably low.

1.7 Overview



2. Maintenance

2.1 General Maintenance

- Check calibration of your instrument annually to ensure it meets original performance specifications.
- Keep your instrument dry. If it gets wet, wipe dry immediately. Liquids can degrade electronic circuits.
- Whenever practical, keep the instrument away from dust and dirt that can cause premature wear.
- Although your instrument is built to withstand the regions of daily use, it can be damaged by severe impacts. Use reasonable caution when using and storing the analyser.

2.2 Periodic Service



CAUTION!

Repair and service of this instrument is to be performed by qualified personnel only. Improper repair or service could result in physical degradation of the instrument. This could alter the protection from personal injury this analyser provides to the operator. Perform only those maintenance tasks that you are qualified to do.

2.3 Annual Re-Calibration

While the sensors have an expected life of more than five years in normal use it is recommended that the analyser is re-calibrated at least annually, this is so that long-term drift on the electronics can be eliminated. Local regulations may require more frequent re-calibration and users should check with appropriate authorities to ensure they comply with relevant guidelines.

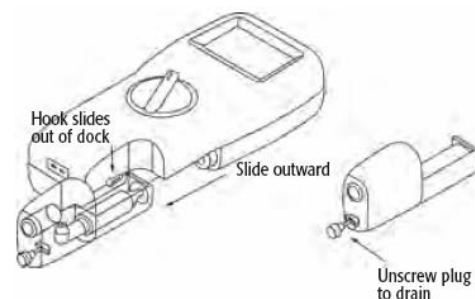
2.4 Cleaning

Periodically clean your instrument case using a damp cloth. DO NOT use abrasive, flammable liquids, cleaning solvents, or strong detergents as they may damage the finish, impair safety, or affect the reliability of the structural components.

2.5 Emptying and Cleaning the In-Line Water Trap

The integral water trap should be checked and emptied on a regular basis. Water vapour will condense in the probe line, which may cause the water trap to fill suddenly if the probe is moved. Care should be taken at all times.

Carefully unscrew the plug from the bottom of the water trap housing. Dispose of the condensate in a suitable drain, care must be taken as it could be acidic. If condensate spills onto the skin or clothing, clean off immediately using fresh water, seek medical advice if problems occur. Ensure plug is replaced before performing combustion tests.

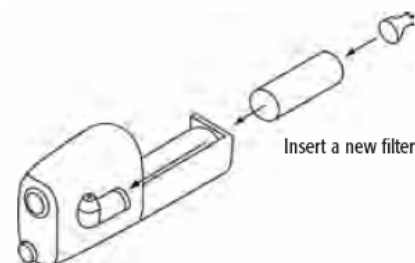


NOTE: CO₂ reading will be low if the Water Trap Plug is not in place.

2.6 Changing the Particle Filter

This is a very important part of the analyser and should be changed regularly. It prevents dust and dirt particles from entering the pump and sensors that will cause damage. The filter **MUST** be changed when it appears discoloured.

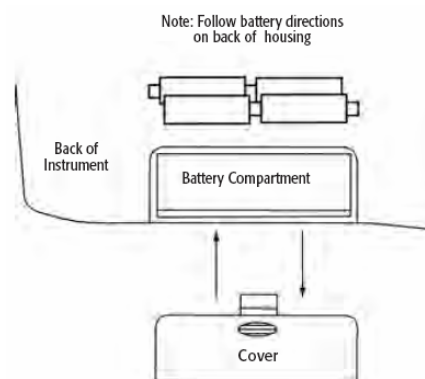
Remove water-trap assembly from the analyser as shown above. Remove the filter and plastic holder from the housing. Discard the filter element but keep the holder to fit to the new filter. Clean the inside of the filter housing with a suitable soft cloth. Fit the holder onto the new filter element and then insert into the housing. Refit the housing onto the analyser.



2.7 Batteries Replacement

This meter has been designed for use with alkaline batteries. No other types are recommended. The analyser is supplied with 4 "AA" size alkaline batteries.

These should be installed into the instrument as shown in the diagram to the right and indicated on the back of the unit.



CAUTION!

Take great care when installing the batteries to observe the correct polarity. Always check the meter for operation immediately after installing new batteries.

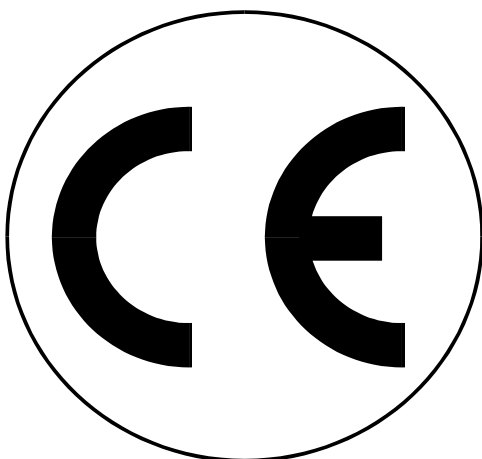
2.8 Electromagnetic Compatibility (EMC)

The European Council Directive 89/336/EEC requires that electronic equipment does not generate electromagnetic disturbances that exceed defined levels and has an adequate level of immunity to enable it to be operated as intended.

Since there are many electrical products in use that pre-date this Directive and may emit electromagnetic radiation in excess of the standards defined in the Directive there may be occasions where it would be appropriate to check the analyser prior to use. The following procedure should be adopted.

- Go through the normal start up sequence in the location where the equipment is to be used.
- Switch on all localised electrical equipment that might be capable of causing interference.
- Check that all readings are as expected. (A level of disturbance in the readings is acceptable)
- If not, adjust the position of the instrument to minimise interference or switch off, if possible, the offending equipment for the duration of the test.

At the time of writing this manual (December 2008) KANE is not aware of any field base situation where such interference has ever occurred and this advice is only given to satisfy the requirements of the Directive.



This product has been tested for compliance with the following generic standards:

EN 50081-1
EN 50082-1

and is certified to be compliant.

3. Combustion Information

3.1 Problem Solving

If any problems are not solved with these solutions, contact us or an authorised repair centre.

Fault Symptom	Causes / Solutions
CO ₂ too low	<ul style="list-style-type: none">▪ Air leaking into probe, tubing, water trap or connectors.
Meter does not respond to flue gas	<ul style="list-style-type: none">▪ Particle filter blocked.▪ Probe or tubing blocked.▪ Pump not working or damaged with contaminants.
Net temperature or Efficiency calculation incorrect	<ul style="list-style-type: none">▪ Ambient temperature set wrong during Automatic Calibration.
Flue temperature readings erratic	<ul style="list-style-type: none">▪ Temperature plug reversed in socket.▪ Faulty connection or break in cable or plug.
T flue or T net displays (----)	<ul style="list-style-type: none">▪ Probe not connected or faulty.
X-Air, EFF display (----)	<ul style="list-style-type: none">▪ CO₂ reading is too low.

4. Glossary

4.1 Selector and Display Parameters on KANE501C

“2Er0” – Analyser is performing the initial zero setting.

CO₂ (Carbon Dioxide) – Direct reading of the Carbon Dioxide Sensor displayed in percentage (%)

Eff (Efficiency) – Calculated combustion (not appliance) efficiency based on measurements of CO₂, Flue Temperature and fuel selected. The KANE501C calculates nett combustion efficiency and automatically determines if the combustion is in the condensing mode to make appropriate corrections.

X-Air (Excess Air) – Excess Air is calculated for each fuel type from the CO₂ measurement. It assumes that the combustion process is running fuel lean. It is important to make other measurements to confirm that this assumption is always correct.

O₂ (Oxygen) – O₂ is calculated for each fuel type from the CO₂ measurement. It assumes that the combustion process is running fuel lean. It is important to make other measurements to confirm that this assumption is always correct.

TFlue (Flue Temperature) – TFlue is a direct measurement of the temperature at the tip of the flue probe. This measurement is used to determine the net temperature for use in calculation of the combustion efficiency.

TNet (Net Temperature) – Differential temperature of TFlue and ambient (or inlet if set)

BAT symbol – Displays the Battery Power available.

Fuels Available

Selector Position	Display	Type
L Oil	LOIL	Light Oil
Propane	PrOP	Propane
Nat Gas	nGAS	Natural Gas
H Oil	HOIL	Heavy Oil
Wood	wOOD	Wood
Coal	COAL	Coal

4.2 Specifications

(NOTE: MAY BE SUBJECT TO CHANGE)

Parameter	Resolution	Accuracy	Range
Temp Measurement			
Flue Temperature	0.1 °C	± 2°C ± 0.3% Reading	0-600°C
Temp (Nett) ^{*2}	0.1°C	± 2°C ± 0.3% Reading	0-600°C
Gas Measurement			
Carbon Dioxide ^{*1}	0.1%	± 0.2%	0-20%
Oxygen ^{*2}	0.1%	-	0-25%
Efficiency ^{*2}	0.1%	-	0-110%
Excess Air ^{*3}	0.1%	-	0-250%

Pre-Programmed Fuels	Natural Gas Light Oil Propane Wood Heavy Oil Coal
Dimensions (Approximate) Weight Handset Probe	0.5 kg 175 x 45 x 80mm 6mm diameter x 250mm long Stainless Steel Shaft with 1m long Neoprene Hose
Ambient Operating Range	0°C to 45°C 10% to 90% RH Non-Condensing 850 to 1100 mbar Atmospheric Pressure
Battery Life	4 AA Cells > 8 Hours using Alkaline AA Cells
^{*1} Using Dry Gases at STP ^{*2} Calculated ^{*3} Calculated Assuming Fuel Lean Combustion	

Thank you for buying this
instrument.

Before use,
please register on our
website

www.kane.co.uk