CONTENTS

1. ANALYSER LAYOUT AND FEATURES ................................................. 4-8
   KEY FEATURES .............................................................................. 4
   OPTIONS ...................................................................................... 4
   INSTRUMENT FEATURES AND KEYPAD ...................................... 5
   INSTRUMENT LAYOUT (REAR) .................................................... 6
   STANDARD PROBE CONFIGURATION ........................................... 7
   ANALYSER CONNECTIONS ............................................................. 8

2. SAFETY WARNING ........................................................................ 9

3. FIRST TIME USE .......................................................................... 10

4. NORMAL START UP SEQUENCE .................................................. 11-17
   EVERY TIME YOU USE THE ANALYSER .................................... 11
   AUTOMATIC CALIBRATION .......................................................... 11
   MAIN DISPLAYS ............................................................................ 12
   4 PAGE MODE .............................................................................. 13
   LINE SCROLL MODE ....................................................................... 14
   8 PAGE MODE .............................................................................. 14
   SAMPLING THE FLUE GAS ............................................................ 15
   TAKING A PRESSURE READING ................................................... 16
   TAKING A FLOW READING ............................................................. 16
   REGULAR CHECKS DURING SAMPLING ..................................... 16
   NORMAL SHUTDOWN SEQUENCE .................................................. 17

5. MOVING THROUGH THE MENUS ................................................. 18-19
   THE MENU STRUCTURE ............................................................... 18
   BASIC OPERATION ......................................................................... 18

6. MENU OPTIONS AND SETTINGS .................................................. 20-26
   MAIN MENU .................................................................................. 20
   SUB MENU – 1. MENU ................................................................. 20
   SUB MENU – 2. UNITS ..................................................................... 22
   SUB MENU – 3. DISPLAY ............................................................... 23
   SUB MENU – 4. SELECT SET-UP ................................................... 23
7. PRINTING INFORMATION ....................................................... 27-28
   OPTIONAL INFRA-RED THERMAL PRINTER ................................. 27
   OPTIONAL WIRELESS MODULE ............................................. 27
   PRINTING A ‘LIVE’ TEST .................................................. 27
   STANDARD PRINTOUT ..................................................... 28
   SOFTWARE COMPATIBILITY .............................................. 28
8. STORING AND RETRIEVING DATA ........................................... 29-30
   STORING A ‘LIVE’ TEST .................................................. 29
   VIEWING AND PRINTING A ‘STORED’ TEST .............................. 29
   DELETING DATA ................................................................ 30
9. MAINTENANCE ...................................................................... 31
   EMPTYING AND CLEANING THE IN-LINE WATER TRAP .............. 33
   CHANGING THE PARTICLE FILTER ....................................... 33
10. PROBLEM SOLVING ............................................................. 32
11. ANNUAL SERVICE & RE-CERTIFY ......................................... 33-35
    RETURNING YOUR ANALYSER TO KANE ................................ 34
    PACKING YOUR ANALYSER ................................................ 34
    SENDING YOUR ANALYSER .............................................. 34
    WHEN WE RECEIVE YOUR ANALYSER ................................ 34
    SERVICE RETURNS .......................................................... 35
12. PRODUCT SPECIFICATION .................................................. 37

APPENDICES

A. MAIN DISPLAY PARAMETERS ............................................... 38
B. COMBUSTION EFFICIENCY CALCULATION ............................... 41
C. CALCULATION OF FUEL DATA ............................................ 44
D. ELECTROMAGNETIC COMPATABILITY STATEMENT ............. 45
   END OF LIFE DISPOSAL .................................................. 46

PRODUCT REGISTRATION ......................................................... 49-50
1. ANALYSER LAYOUT AND FEATURES

KEY FEATURES

Measures Temperature, Pressure, O₂ and CO as standard.
Stores 150 sets of test results.
Output to IR Printer (optional).

OPTIONS

(CO & any two other sensors)
High Range CO sensor
Low Range NO sensor
High Range NO sensor
NO₂ sensor
SO₂ sensor

Wireless upgrade (2.1)

Teflon Hose
INSTRUMENT FEATURES AND KEYPAD

ON/OFF

MENU
Allows access to all menu functions

PUMP
Turns pump on and off

ENTER
Accepts a command ie enters a menu option

UP
Scrolls up through options ie Fuel

DOWN
Scrolls down through options

STORE
Enters data storage menu

PRINT
Prints current data
NOTE: Do NOT cover exhaust port as this will severely affect analyser operation
ANALYSER CONNECTIONS

- Connector for optional inlet temperature probe
- Gas connection to instrument
- Particle filter
- In line water trap
- Neoprene hose
- Flue temperature connector
2. SAFETY WARNING

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

Users of portable gas detectors are recommended to conduct a “bump” check before relying on the unit to verify an atmosphere is free from hazard.

A “bump” test is a means of verifying that an instrument is working within acceptable limits by briefly exposing to a known gas mixture formulated to change the output of all the sensors present. (This is different from a calibration where the instrument is also exposed to a known gas mixture but is allowed to settle to a steady figure and the reading adjusted to the stated gas concentration of the test gas).

**Protection Against Electric Shock (in accordance with EN 61010-1 : 2010)**

This instrument is designated as Class III equipment and should only be connected to SELV circuits.

The battery charger is designated as:

Class II equipment
Installation category II
Pollution degree 2
Indoor use only
Altitude to 2000m
Ambient temperature 0°C-40°C
Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50%RH at 40°C
Mains supply fluctuations not to exceed 10% of the nominal voltage.
3. FIRST TIME USE

Charge the battery for 12 hours. Following this, an overnight charge should be sufficient for an average 8 hour day. See Main Parameter displays for Battery Indicator.

The KANE945 has a rechargeable NiMh battery which uses a different charger than other Kane analysers. **Ensure the correct charger is used or damage may occur to the instrument.**

Check that you have all the items you have ordered.

Take time to read this manual fully. **Be aware that the analyser configuration that you have purchased may not support all the features detailed in this manual.**

When using the analyser for the first time you will need to choose from:
- Language selection
- Calibration countdown time
- CO gas alarm
- NOx percentage for calculation
- Time and Date
- Printed header name and telephone number

The SET UP MENU gives details of how to change the above settings.
4. **NORMAL START UP SEQUENCE**

EVERY TIME YOU USE THE ANALYSER

BEFORE SWITCH-ON CHECK THAT:

- the particle filter is not dirty
- the water trap and probe line are empty of water
- all hose connections, etc, are properly made
- the probe is sampling CLEAN AMBIENT air
- the water trap is correctly fitted and the instrument upright
- the flue temperature is connected

Switch ON the instrument by pressing 

**AUTOMATIC CALIBRATION**

During this sequence the analyser pumps fresh air into the sensors to allow toxic sensors (if fitted) to be set to zero and the Oxygen sensor to be set to 20.9 %.

After switch-on the analyser will briefly display header information :-

![Header Information]

And then show the countdown screen :-

![Countdown Screen]

The calibration time will count down in seconds to zero. Calibration time may be changed to 90, 120, 180, 300 seconds. See **SET-UP MENU**.

**Note!** Three minutes is recommended to allow the sensors to stabilise fully. Anything less than this may result in drift of the toxic and oxygen sensors in clean ambient air.
To obtain the quoted specification an instrument should be calibrated with clean ambient air at standard temperature and pressure (STP).

Once the time has reached zero an audible beep will be heard and will show the selected fuel on the following display:

### NATURAL GAS

*PRESS – MENU – KEY*

Press

This zeros the toxic sensor and sets Oxygen to 20.9%. The next screen is the MAIN DISPLAY of the analyser:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NETT C</td>
<td>0.0</td>
</tr>
<tr>
<td>O2 %</td>
<td>20.9</td>
</tr>
<tr>
<td>CO ppm</td>
<td>0000</td>
</tr>
<tr>
<td>EFF (G) %</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Use and to change the display.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2 %</td>
<td>0.0</td>
</tr>
<tr>
<td>FLUE C</td>
<td>0.0</td>
</tr>
<tr>
<td>INLT NOT FITTED</td>
<td></td>
</tr>
<tr>
<td>AMBIENT C</td>
<td>21.5</td>
</tr>
</tbody>
</table>

All parameters are detailed in APPENDIX A - MAIN DISPLAY PARAMETERS.

### MAIN DISPLAYS

The main display can be changed to show either 4 or 8 parameters at one time.

Two options are available when 4 parameters are selected.

- **4 Page Mode** displays 4 lines of data in set format, each page is predefined.
- **Line scroll mode** allows you to customise the display to show the data you require.

- **8 Page Mode** displays 8 parameters on 4 lines in set format, the bottom two can be changed.

Changing between the different modes is detailed in DISPLAY MENU.
4 PAGE MODE

Use the ▲ and ▼ keys to change the information that is displayed on the screen. The following pages are available:

1. **NATURAL GAS**
   - DATE: 23-05-15
   - TIME: 12:31:35
   - BATTERY: % 54

2. **NETT**
   - C: 0.0
   - O2: % 20.9
   - CO: ppm 0000
   - EFF (G): % 0.0

3. **CO2**
   - % 0.0
   - FLUE: C 0.0
   - INLT: NOT FITTED
   - AMBIENT: C 21.5

4. **CO/CO2**
   - R: 0.0001
   - P INDEX: % 0.01
   - XAIR: % 0.0
   - Prs: mbar 0.00

Screens 5 and 6 will vary dependent on sensors fitted:

5. **COn LOSSES**
   - NO2
   - NO2n

6. **NO**
   - NOx
   - NOn
   - NOxn

**TIP** - In 4 page mode only turns the backlight ON and OFF.
LINE SCROLL MODE

Line scroll mode allows you to customise the display.

Use the ▲ and ▼ keys to change the bottom line of the display.

Once the correct line is displayed press ◄ to confirm and move the line up. Select the next parameter and repeat until all lines display the desired parameters.

<table>
<thead>
<tr>
<th>NETT</th>
<th>C</th>
<th>0.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>O2</td>
<td>%</td>
<td>20.9</td>
</tr>
<tr>
<td>CO</td>
<td>ppm</td>
<td>0000</td>
</tr>
<tr>
<td>CO2</td>
<td>%</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Select next parameter. Repeat above until display reads desired data.

8 PAGE MODE

Displays 8 parameters on the screen at one time. Symbols used in this mode are different from those used in 4 page and line scroll modes and are detailed in APPENDIX A - MAIN DISPLAY PARAMETERS.

<table>
<thead>
<tr>
<th>O2</th>
<th>20.9%</th>
<th>CO2:</th>
<th>20.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>0ppm</td>
<td>Eff:</td>
<td>0000</td>
</tr>
<tr>
<td>PI</td>
<td>ΔT:</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>λ</td>
<td>Tf:</td>
<td>0.0001</td>
<td></td>
</tr>
</tbody>
</table>

The bottom line of the display can be changed to display other parameters.

Use the ▲ and ▼ keys to change this line.
SAMPLING THE FLUE GAS

Once the automatic calibration procedure has been completed and the specific fuel has been selected (See SELECT menu) the probe can be inserted into the desired sampling point.

It is recommended that the sampling point be located at least two flue diameters downstream of any bend and that the probe tip is in the centre of the flue. With balanced flues and other domestic units the probe should be positioned far enough into the flue so that no air can ‘back flush’ into the probe. This will be indicated by a low oxygen reading and/or a low ‘Poison Index’ reading.

The probe depth stop cone provided with the instrument allows the probe to be used in holes whose diameters range from 8 mm to 21 mm (5/16 to 13/16 inch).

The standard probe is rated at 650°C (1202°F). Temperatures of up to 1200°C (2200°F) can be accommodated using an optional high temperature probe.

TIP: To conserve battery power, switch off the pump when you are not taking a measurement. Use the key to turn ON and OFF the pump.
TAKING A PRESSURE READING

A flue draught measurement can be made at any time.

Connect the standard probe to the pressure sensor inlet and the probe in the flue.

The pressure reading will be displayed:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CO/CO2</td>
<td>R</td>
<td>0.000</td>
</tr>
<tr>
<td>P INDEX</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>XAIR</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Prs</td>
<td>mbar</td>
<td>2.00</td>
</tr>
</tbody>
</table>

To perform a combustion test and display draught pressure at the same time a special probe is required. Contact Kane International or Authorised Distributor for details.

TAKING A FLOW READING

In the UNITS menu set the pressure units to metres/sec (m/sec). These are the only units available for flow measurement.

This also set the pressure display to Pascal (Pa). There is a range limit for the Pitot calculation of 15Pa to 4600Pa (0.15mbar to 46mbar).

For most accurate flow measurement the flue gas temperature should also be measured. If a flue temperature probe is not fitted then the internal ambient measurement is used. ‘Flue’ temperature must be between -10°C to +650°C.

REGULAR CHECKS DURING SAMPLING

Care must be taken at all times not to exceed the analysers operating specifications, in particular ensure the following:

- Do not exceed the maximum temperature of the flue probe.
- The analyser internal temperature does not exceed normal operating range, typically 0-50°C.
- DO NOT PLACE THE INSTRUMENT ON A HOT SURFACE.
- The water trap is vertical at all times. Water condenses in the probe line and can quickly fill the water trap when the probe is moved. Take care and watch the water trap closely.
- The in-line particle filter is clean and does not become blocked.
NORMAL SHUTDOWN SEQUENCE

DO THIS EVERY TIME YOU USE THE ANALYSER

Remove the probe from the flue - **TAKE CARE! THE PROBE WILL BE HOT** - 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 press \( \text{\textcircled{10}} \) and the analyser will count down from 30 to switch off.

If you have not finished but press \( \text{\textcircled{10}} \) by mistake, you can press \( \text{\textcircled{14}} \) to return to normal operation and not switch OFF.
5. MOVING THROUGH THE MENUS

THE MENU STRUCTURE

MENU: SELECT →

FUEL
O2 REF
SMOKE
RESET
PITOT

UNITS →

TEMP
GAS
PRS
EFF

DISPLAY →

LIGHT
MODE
CONTRAST

SETUP →

LANG
CO MENU
CALENDAR
ZERO
NOX %
HEADER
PRINT

BASIC OPERATION

From the MAIN DISPLAY

<table>
<thead>
<tr>
<th>NETT</th>
<th>C</th>
<th>0.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>O2</td>
<td>%</td>
<td>20.9</td>
</tr>
<tr>
<td>CO</td>
<td>ppm</td>
<td>0000</td>
</tr>
<tr>
<td>EFF(G)</td>
<td>%</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Press \(\text{ }\) to access the MAIN MENU

Press \(\text{ }\) and \(\text{ }\) to move cursor up and down

MAIN MENU

1. SELECT  3. DISPLAY
2. UNITS   4. SETUP

MAIN MENU

1. SELECT  3. DISPLAY
2. UNITS   4. SETUP
Press \(\leftarrow\) to access selected Menu

Press \(\leftarrow\) to select parameter

Use \(\triangleup\) and \(\triangledown\) to change setting i.e. fuel selected

Press \(\leftarrow\) to enter value and move to next parameter

Press \(\leftarrow\) to save settings and return to the MAIN MENU

Press \(\leftarrow\) to return to the MAIN DISPLAY.

### MAIN MENU

1. SELECT  
2. UNITS  
3. DISPLAY  
4. SETUP

<table>
<thead>
<tr>
<th>FUEL</th>
<th>LIGHT OIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>O2 Ref</td>
<td>OFF</td>
</tr>
<tr>
<td>SMOKE</td>
<td>OFF</td>
</tr>
<tr>
<td>RESET</td>
<td>NO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FUEL</th>
<th>NATURAL GAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>O2 Ref</td>
<td>OFF</td>
</tr>
<tr>
<td>SMOKE</td>
<td>OFF</td>
</tr>
<tr>
<td>RESET</td>
<td>NO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FUEL</th>
<th>LIGHT OIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>O2 Ref</td>
<td>OFF</td>
</tr>
<tr>
<td>SMOKE</td>
<td>OFF</td>
</tr>
<tr>
<td>RESET</td>
<td>NO</td>
</tr>
</tbody>
</table>

### MAIN MENU

1. SELECT  
2. UNITS  
3. DISPLAY  
4. SETUP
6. MENU OPTIONS AND SETTINGS

MAIN MENU

The MAIN MENU consists of 4 sub menus:

<table>
<thead>
<tr>
<th>MAIN MENU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SELECT</td>
</tr>
<tr>
<td>2. UNITS</td>
</tr>
<tr>
<td>3. DISPLAY</td>
</tr>
<tr>
<td>4. SETUP</td>
</tr>
</tbody>
</table>

All sub-menus are accessed using ▲ and exited using ▼.

The ▲ and ▼ keys move the cursor within a menu and allow parameters to be changed.

**TIP:** Holding down one of these keys scrolls through the data quicker.

SUB MENU - 1. SELECT

**Page 1:**

- **FUEL:** NATURAL GAS
- **O2 Ref:** OFF
- **SMOKE:** OFF
- **RESET:** NO

**Page 2:**

- **PITOT:** 1.00

This menu allows selections to be made for the parameters detailed below.

**FUEL:** Select the fuel being used by the boiler from either a standard fuel stored in the analyser or by entering the user fuel. Once the correct fuel has been selected press ▼ to view the fuel constants.

**NATURAL GAS**

<table>
<thead>
<tr>
<th>K1g</th>
<th>K1n</th>
<th>K_2</th>
<th>K_3</th>
<th>K_4</th>
<th>O2r</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.350</td>
<td>0.390</td>
<td>11.89</td>
<td>9.83</td>
<td>32</td>
<td>3.0</td>
</tr>
</tbody>
</table>
Calculation of fuel constants are detailed in the APPENDIX. Fuel constants will have to be calculated before a user fuel can be entered.

To enter the user fuel select ‘User Fuel’ and Press

\[
\begin{array}{|c|c|c|}
\hline
\text{USER FUEL} & K_{1g} & 0.000 \\ 
& K_{1n} & 0.000 \\ 
& K_{2} & 0.00 \\ 
& K_{3} & 0.00 \\ 
& K_{4} & 00 \\ 
& O_2r & 00 \\
\hline
\end{array}
\]

Use \( \uparrow \) and \( \downarrow \) to select the correct value.

Use \( \leftarrow \) to move to the next parameter, repeat above until all parameters are correct. Press \( \rightarrow \) to return to SELECT menu.

**O2 Ref:** Toxic gas measurements can be referenced to defined oxygen levels. Reference values can be set from 1-20%, to AUTO or more normally to the default value - OFF. Setting to AUTO uses the figure in the FUEL constants data.

Once AUTO is set it remains active until O2 Ref is set to OFF or a user value. This means that if the fuel type is changed the O2 Ref will always be set by the value stored in FUEL Type.

Oxygen referencing is required by some regulations such as TA-LUFT. If a reference value is selected then toxic gas measurements will be displayed with the symbol (n) attached to the reading. i.e. CO(n)

What does Oxygen reference mean?

If 3 % \( O_2 \) reference is selected and 5 % \( O_2 \) is measured in the flue then toxic gas values will be recalculated as if 3 % were measured. The equation for referencing is detailed in the Appendix.

Oxygen referencing prevents false readings being submitted, e.g. allowing more air into the boiler will increase the oxygen level in the flue and hence dilute any toxic gas reading. Oxygen referencing gives readings as if they were undiluted.
SMOKE: Allows the user to enter a smoke test number from 0-9. This value will be printed on the standard printout. Default value is OFF.

RESET: Allows the user set the Oxygen to 20.9% and zero the toxic sensors without turning the analyser off.

Selecting YES and will display the following screen.

<table>
<thead>
<tr>
<th>RESET SENSORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>O2 % : 20.9</td>
</tr>
<tr>
<td>CO &amp; NO = 0</td>
</tr>
<tr>
<td>PRESS ENTER</td>
</tr>
<tr>
<td>MENU TO ESCAPE</td>
</tr>
</tbody>
</table>

After pressing the analyser will count down for 10 seconds and then return to the main display.

WARNING: The sensors must only be reset if you are sure they have been sampling fresh air for at least 3 minutes. Errors in measurement will occur if the sensors are reset during or just after sampling.

PITOT: When pressure units set to m/s Pitot Mode is active, adjust the PITOT setting/value here.

SUB MENU - 2. UNITS

| TEMP : C |
| GAS : ppm |
| PRESS. : mbar |
| EFF. : GROSS |

Allows all displayed units to be changed.

TEMP: Choose from Centigrade, °C, or Fahrenheit, °F.

GAS: Changes the toxic gas measurement units. Select from volumetric readings, parts per million (ppm) or mass flow reading milligrams per cubic meter (mg/m³). When set to m/s, Pitot flow mode is active. FLOW will show on measure screen instead of XAIR.

PRESS.: Flue draught can be displayed in millibar (mbar), hectaPascals (hPa), millimeters water gauge (mmWG) or inches water gauge (in WG).
**EFF.:**  Efficiency can be selected for gross or net values. Gross efficiency assumes latent heat of vaporisation is lost in the boiler and hence will be lower than net efficiency. For natural gas the difference will be approximately 11%.

Efficiency is displayed as EFF (G) or EFF (N) respectively. Should the instrument detect that a condensing boiler is under test then it automatically switches to a third mode that is displayed as EFF (C).

**SUB MENU - 3. DISPLAY**

<table>
<thead>
<tr>
<th>LIGHT</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE</td>
<td>8-PAGE</td>
</tr>
<tr>
<td>CONTRAST</td>
<td>DEFAULT</td>
</tr>
</tbody>
</table>

Allows the configuration of the display to be changed.

**LIGHT:** Choose from ON or OFF.

**MODE:** Select 4 or 8 Page Mode or Line Scroll Mode as detailed in section MAIN DISPLAYS.

**CONTRAST:** The contrast is set to a DEFAULT value or can be adjusted

↑ LIGHTER or ↓ DARKER. Use the ▲ and ▼ keys to adjust.

**SUB MENU - 4. SET UP**

The set up menu allows the following parameters to be set / altered.

- Language.
- Automatic calibration time
- CO gas alarm
- NOx percentage for calculation
- Date and time
- Printout header
- Printer type
Page 1:

<table>
<thead>
<tr>
<th>Description</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANG: Changes the analysers displayed and printed language.</td>
<td>ENGLISH</td>
</tr>
<tr>
<td></td>
<td>SPANISH</td>
</tr>
<tr>
<td></td>
<td>DUTCH</td>
</tr>
<tr>
<td></td>
<td>FRENCH</td>
</tr>
<tr>
<td></td>
<td>ITALIAN</td>
</tr>
</tbody>
</table>

ZERO: Allows setting of the Autocalibration time in minutes. Care must be taken when changing this parameter as sensors may drift from zero if too short a time is used. Kane International advise 3 minute countdown.

- 90 seconds
- 120 seconds
- 180 seconds
- 300 seconds

NO REF: Displayed on the Nitric Oxide unit only. Allows the percentage P in the following calculation to be set. The default value set is 5%. Note the percentage allows for NO₂ in a typical boiler.

\[ \text{NO}_x = \text{NO} + \text{P\% NO} \]

CALENDAR: Allows the user to change the date and time. (24 hour clock).

This screen will be shown once the parameter is entered:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME</td>
<td>13 : 53 : 26</td>
</tr>
<tr>
<td>FORMAT</td>
<td>dd : mm : yy</td>
</tr>
<tr>
<td>DATE</td>
<td>23 07 : 15</td>
</tr>
</tbody>
</table>

Page 2:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx%</td>
<td>-</td>
</tr>
<tr>
<td>HEADER</td>
<td>KANE IRP2</td>
</tr>
</tbody>
</table>
FORMAT: Changes the date format for display and printing.

To change the time position the cursor on TIME and press .

The cursor will now be to the left of the 13:

<table>
<thead>
<tr>
<th>TIME</th>
<th>hh : mm : ss</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 : 53 : 26</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FORMAT</th>
<th>dd : mm : yy</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 07 : 15</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATE</th>
<th>yy : mm : dd</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 07 : 15</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATE</th>
<th>mm : dd : yy</th>
</tr>
</thead>
<tbody>
<tr>
<td>07 : 23 : 23</td>
<td></td>
</tr>
</tbody>
</table>

Using and scroll through the setting options i.e. 0-23.

Once the correct hour is set press to move to the next parameter, the cursor will move to the left of minutes (53). Move to each parameter until the correct time is set.

Pressing after setting the seconds will return the cursor to the left of the screen.

Format and Date are set in a similar manner.

Header: Allows two lines of 20 characters to be programmed into the analyser. The header appears on the top of the standard printout. This can be used to print your company name and/or phone number.

This screen shows the standard header setting with the cursor now shown underlining the K in Kane:

By using and any letter or number can be chosen.
Once the correct character is displayed, use \( \uparrow \) to move right to the next. Move along until all characters spell the desired name or phone number. If you need to go back and change a character use \( \downarrow \) to move left.

Press \( \leftarrow \) to return to the SET UP menu.

**CO MENU:** Once an alarm has been exceeded the display will flash every two minutes warning the user of an alarm state and display the gas concentration.

<table>
<thead>
<tr>
<th>CO ALARM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1010 ppm</td>
</tr>
</tbody>
</table>

A similar display will be shown during a RECHARGE BATTERY and PUMP OFF alarms.

Press \( \leftarrow \) to return to the SET UP menu.

**CO ALARM:** Allows an alarm level to be set on for the CO reading. This is set as a default at 1000 ppm.

**PRINT:** Allows printer type to be changed.

- **OFF**
- **0-4000ppm**
- **KMIRP** (default)
- **KMIRP2**
- **WIRELESS** (if fitted)

Note: Wireless passkey is 1111
7. PRINTING INFORMATION

Supplied as accessories for the KANE945 are infra-red thermal printers. Read the manual supplied with each printer prior to operation. Connections to the KANE945 are detailed below:

OPTIONAL INFRA-RED THERMAL PRINTER

This does not require a cable to transmit the data but uses an infra-red (IR) link similar to a TV remote control. The IR emitter is positioned on the top of the KANE945 and the bottom of the printer. Ensure they are pointing at each other and within 300 mm, with no obstructions in the way. Data may be lost if transmission is interrupted. Keep the KANE945 pointing at the printer until the printout has finished.

OPTIONAL WIRELESS MODULE

The KANE945 can communicate with a PC and mobile devices.

Compatibility with 2.1 for Android / PC.

Please see the KANE945 software tab at:
https://www.kane.co.uk/products/kane945-commercial-flue-gas-analyser

Data can either be printed from a ‘live’ test or from stored data. Printing of stored data is detailed in STORING AND RETREIVING DATA.

PRINTING A ‘LIVE’ TEST

During a combustion test the KANE945 will print data on request. With the analyser showing the MAIN DISPLAY press and current data will be sent to the printer.

The display will show the following until data transmission is complete:

***** PRINTING *****
STANDARD PRINTOUT

The standard printout is:

KANE945
YOUR COMPANY NAME &
PHONE NUMBER HERE

SERIAL: 123456789
DATE: 27-07-2015
TIME: 10:26:12

NATURAL GAS
O2 20.7 %
CO ------- ppm
CO2 02>20 %
CO/CO2 0.0000 R
COn ------- ppm
P INDEX 0.00 %
FLUE ------- °C
INLT ------- °C
NETT ------- °C
AMBIENT 28.1 °C
prs 0.5 mbar
FLOW ------- m/s
XAir 02>20 %
EFF (G) 02>20 %
EFF (N) 02>20 %
LOSSES 02>20 %

O2 Ref OFF

SOFTWARE COMPATIBILITY

The KANE945 when fitted with the 2.1 module is compatible with:

ANDROID: Printer App

PC: KANE LIVE
8. STORING AND RETRIEVING DATA

The KANE945 can store combustion tests. Once stored, the data can be viewed on the display or downloaded to a PC or printer.

STORING A ‘LIVE’ TEST

While performing a test and viewing the data on the MAIN display access the STORE menu as follows:

Press \(\text{ }\) to access the STORE MENU

**STORE MENU**

<table>
<thead>
<tr>
<th>MODE</th>
<th>STORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>3</td>
</tr>
</tbody>
</table>

PRESS ‘STORE’ TO LOG

**Mode:** Select from the following:

- **STORE** - Allows data to be stored in memory.
- **VIEW / PRINT** - Stored data can be viewed or printed.
- **DELETE** - Clears all data in memory.

**Location:** Automatically allocates a location in the memory of the instrument for the next test. On the display shown above the next location will be 3.

To store a test set **MODE** to **STORE** and press \(\text{ }\). The current readings will be stored in the analysers memory.

**Tip:** Make a note of the location number for your particular test as it may be useful when downloading or printing.

VIEWING AND PRINTING A ‘STORED’ TEST

Multiple tests can be printed easily with the KANE945.

Select PRINT under **MODE** in the STORE menu. This feature is in addition to the VIEW/PRINT, STORE and DELETE options.

Press \(\text{ }\) to access the STORE MENU

**STORE MENU**

<table>
<thead>
<tr>
<th>MODE</th>
<th>PRINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCATION</td>
<td>1 TO 10</td>
</tr>
</tbody>
</table>

PRESS ‘PRINT’
The cursor will move to the first number, use the \( \uparrow \) and \( \downarrow \) to select the location and start printing.

Press \( \leftarrow \) to move the cursor to the second number, select the last location to print.

To print the data press \( \rightarrow \). In the screen shown above locations 1 to 10 will be printed.

During printing the following will be shown:

```
PRINT TESTS
1 TO 10
PRINTING TEST 1
```

**NOTE:** While the display above is shown (i.e. the instrument is printing a test) the keypad is disabled. To exit from printing wait until the current test has finished and the display below is shown:

```
PRINT TESTS
1 TO 10
PLEASE WAIT
MENU TO ESCAPE
```

DELETING DATA

To delete the data in stored memory press \( \) to obtain the STORE MENU (as above) :-

```
STORE MENU
MODE : DELETE
LOCATION : 3
PRESS ‘ENTER’ TO DELETE
```

Press \( \) to access delete data screen

```
Enter TO ERASE DATA
```

Press \( \leftarrow \) to delete data in memory, press \( \) to exit delete data screen.
9. MAINTENANCE

EMPTYING AND CLEANING THE IN-LINE WATER TRAP

The in-line water trap should be checked and emptied on a regular basis. Water vapour will condense and gather in the probe line. This may move suddenly to the trap when the probe is moved. Care should be taken at all times.

Emptying of the water trap is detailed below:

Carefully remove the end cap from the in-line 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.

CHANGING THE PARTICLE FILTER

This is a very important part of the analyser and should be changed regularly. It prevents dust and dirty particles entering the pump and sensors and hence causing damage. The filter MUST be changed when it is discoloured.

Remove the end cap from the in-line filter housing. Carefully remove the paper filter element and dispose of it. Clean the inside of the filter housing with a suitable soft cloth. Insert a new filter element onto the spigot in the filter housing and carefully replace the end cap.
10. PROBLEM SOLVING

The following is a list of problems that may occur on the instrument through its operating life. If the cause of the fault is not easy to identify then we advise you contact Kane International Service Department or an International Distributor for expert advice.

<table>
<thead>
<tr>
<th>Fault symptom</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Oxygen too high</td>
<td>• Air leaking into probe, tubing, water trap, connectors or internal to instrument.</td>
</tr>
<tr>
<td>• CO₂ too low</td>
<td>• Oxygen cell needs replacing.</td>
</tr>
<tr>
<td>• Oxygen Error (FAULT)</td>
<td>• Calibration time set too short and instrument not allowed to stabilise</td>
</tr>
<tr>
<td>• Toxic sensor Error (FAULT)</td>
<td>• Instrument has been stored in a cold environment and is not at normal working temperature.</td>
</tr>
<tr>
<td></td>
<td>• Oxygen cell or toxic sensors needs replacing.</td>
</tr>
<tr>
<td>• Analyser not holding charge</td>
<td>• Battery exhausted.</td>
</tr>
<tr>
<td>• Analyser not charging</td>
<td>• AC charger not giving correct output.</td>
</tr>
<tr>
<td></td>
<td>• Fuse blown in charger plug.</td>
</tr>
<tr>
<td>• Analyser does not respond to flue gas</td>
<td>• Particle filter blocked.</td>
</tr>
<tr>
<td></td>
<td>• Probe or tubing blocked.</td>
</tr>
<tr>
<td></td>
<td>• Pump not working or damaged with contaminants.</td>
</tr>
<tr>
<td></td>
<td>• Probe connected to pressure connector.</td>
</tr>
<tr>
<td>• Flue temperature readings erratic</td>
<td>• Temperature plug reversed in socket.</td>
</tr>
<tr>
<td></td>
<td>• Faulty connection or break in cable or plug.</td>
</tr>
<tr>
<td>• Analyser automatically switches off in</td>
<td>• Battery below alarm level.</td>
</tr>
<tr>
<td>operation.</td>
<td>• Ambient temperature above 50°C.</td>
</tr>
<tr>
<td></td>
<td>• Battery quickly discharging and is faulty.</td>
</tr>
<tr>
<td>• Display shows dark lines and no response from ON/OFF key.</td>
<td>• Fault has occurred on the instrument electronics and requires resetting. Contact Kane International or Distributor.</td>
</tr>
</tbody>
</table>

11. ANNUAL SERVICE & RE-CERTIFY

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

Kane International has service facilities at Atherton near Manchester Tel: 01942-873434 (the primary service centre for UK customers) and at Welwyn Garden City in Hertfordshire Tel: 01707-375550 (the primary service centre for non-UK customers).

By sending your analyser back to Kane for an annual fixed price service (check www.kane.co.uk for details) you have the opportunity to extend the warranty on your analyser to 5 years.
RETURNING YOUR ANALYSER TO KANE

When returning your KANE945, please always ensure that you enclose:

✓ Your full contact details
✓ A daytime telephone number
✓ Details of faults you might have experienced

PACKING YOUR ANALYSER

When returning your analyser, please pack it appropriately to prevent any damage during transit.

Before sealing your package, please ensure that you have enclosed the items listed above and that it is clearly marked for the attention of:

Northern Service Centre
Kane International Ltd
Gibfield Park Avenue
Atherton
Manchester
M46 0SY

Southern Service Centre
Kane International Ltd
Kane House, Swallowfield
Welwyn Garden City
Hertfordshire
AL7 1JG

SENDING YOUR ANALYSER

Once the analyser has been securely packed then your package is ready for shipment back to Kane. If you do not have an account with a courier company you can take your package to your local Post Office. It is advisable to send the package by Special Delivery so that it is insured and traceable while in transit.

WHEN WE RECEIVE YOUR ANALYSER

On receipt of your package, our Service Engineers will inspect the analyser and any accessories and confirm to you the total service cost. Once you have accepted this the work will be carried out, and upon completion the analyser returned to you.

If you have any questions that we haven’t answered, please feel free to contact our Northern Service Centre:

Tel: 01942 873434          Tel: 01707 384834
Fax: 01942 873558          Fax: 01707 384833
Email: nservice@kane.co.uk Email: sservice@kane.co.uk
SERVICE RETURNS (Simply cut out and attach to your package)

Northern Service Department
Kane International Ltd
Gibfield Park Avenue
Atherton
Manchester
M46 0SY

Southern Service Department
Kane International Ltd
Kane House, Swallowfield
Welwyn Garden City
Hertfordshire
AL7 1JG

Northern Service Department
Kane International Ltd
Gibfield Park Avenue
Atherton
Manchester
M46 0SY
# 12. PRODUCT SPECIFICATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Resolution</th>
<th>Accuracy</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp Measurement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flue Temperature</td>
<td>0.1°C/F</td>
<td>±2.0°C ±0.3% reading +1°C ±0.3% reading</td>
<td>0-1200°C/32 -2200°F with suitable probe 0-50°C/32-122°F</td>
</tr>
<tr>
<td>Inlet Temperature</td>
<td>0.1°C/F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas Measurement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td>0.1%</td>
<td>±0.2%</td>
<td>0-25%</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>1ppm</td>
<td>±5ppm &lt;100ppm ±20ppm &lt;400ppm⁻¹ +5% &gt;400ppm</td>
<td>0-4000ppm</td>
</tr>
<tr>
<td>H₂ compensated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon Monoxide, Low range</td>
<td>1ppm</td>
<td>±20ppm &lt;400ppm⁻¹ +5% &lt;5000ppm +10% &gt;5000ppm</td>
<td>0-100000ppm</td>
</tr>
<tr>
<td>Nitric Oxide, Low range</td>
<td>1ppm</td>
<td>+3ppm &lt;20ppm +5ppm&lt;100ppm</td>
<td>0-100ppm</td>
</tr>
<tr>
<td>Nitric Oxide, (optional)</td>
<td>1ppm</td>
<td>±5ppm &lt;100ppm⁻¹ +5% &gt;100ppm</td>
<td>0-5000ppm</td>
</tr>
<tr>
<td>Nitrogen Dioxide, (optional)</td>
<td>1ppm</td>
<td>+3ppm&lt;20ppm +5ppm&lt;100ppm</td>
<td>100ppm</td>
</tr>
<tr>
<td>Sulphur Dioxide, (optional)</td>
<td>1ppm</td>
<td>±5ppm&lt;100ppm +5%&gt;100ppm</td>
<td>0-5000ppm</td>
</tr>
<tr>
<td>Pressure</td>
<td>0.1mbar</td>
<td>±0.5% full scale</td>
<td>150 mbar</td>
</tr>
<tr>
<td>Carbon Dioxide²</td>
<td>0.1%</td>
<td>±0.3% reading</td>
<td>0-99.9%</td>
</tr>
<tr>
<td>Losses²</td>
<td>0.1%</td>
<td>±1.0% reading</td>
<td>0-99.9%</td>
</tr>
<tr>
<td>Efficiency²</td>
<td>0.1%</td>
<td>±1.0% reading</td>
<td>0-99.9%</td>
</tr>
<tr>
<td>Excess Air²</td>
<td>0.1%</td>
<td>±0.2%</td>
<td>0-2885.0%</td>
</tr>
<tr>
<td>Temp (Nett)²</td>
<td>1.0°C/F</td>
<td>+2°C ±0.3% reading +2°C ±0.3% reading</td>
<td>0-1200°C/32-2200°F</td>
</tr>
<tr>
<td>CO/CO₂ ratio²</td>
<td>0.0001</td>
<td>±0.0001</td>
<td>0-0.9999</td>
</tr>
<tr>
<td>Poison Index²</td>
<td>0.01%</td>
<td>±0.01</td>
<td>0-99.99</td>
</tr>
</tbody>
</table>

### Pre-programmed Fuels
- Natural gas, Town gas, Gascor, Light Oil, Heavy Oil, Propane, Butane, Anthracite, Coke, Coal, Kinsale Gas.

### Dimensions
- **Weight:** 1kg
- **Handset:** 220mm x 55mm x 120mm
- **Probe:** L240mm x Dia8mm with 285mm long stainless steel shaft, type K thermocouple and 1.5m long neoprene hose

### Ambient Operating Range
- -5°C to +50°C/10% to 90% RH non condensing

### Power Supply (battery charger)
- **Input:** 110Vac/220 Vac nominal
- **Output:** 12 Vac off load

### Battery Life
- >8 hours from full charge

---

*1 Using dry gases at STP
*2 Calculated
APPENDICES

A. MAIN DISPLAY PARAMETERS

The parameters and their meanings are detailed as follows:

**DATE:** Analyser date. See SET UP MENU to change

**TIME:** Analyser time. Use SET UP MENU to change

**BATTERY:** Displays the battery level from 0-100%. The analyser will flash RECHARGE BATTERY at less than 10% of charge. With the charger connected the display shows AC ON.

**NETT:** Net temperature calculated by deducting the internal AMBIENT temperature from the measured FLUE temperature. Displays in either °C (C) or °F (F) and will display NOT FITTED (N/F) if flue probe is not connected. If an external INLET probe is used then INLET is deducted from FLUE.

**O2:** Oxygen reading in percentage %.

**CO:** Carbon Monoxide reading indicated in ppm or mg/m3. If the figures are referenced to oxygen then the display will show CO(n). See SELECT menu 5.2.2 for oxygen reference. The display will read ‘O2 > 20%’ if referenced values selected and instrument is in clean ambient air.

**EFF (G):** Combustion Efficiency calculation displayed in percentage. Gross G or Net N can be set see SELECT menu 5.2.3. The calculation is determined by fuel type see Appendix B for calculation. The efficiency is displayed during a combustion test, ‘- -’ is displayed while in fresh air.

**CO2:** Carbon Dioxide calculation determined by the type of fuel. This only shows a reading when a combustion test is being carried out. ‘- -’ is displayed while in fresh air.

**FLUE:** Temperature measured by flue gas probe in Centigrade or Fahrenheit. Will show ambient temperature after fresh air calibration and NOT FITTED (N/F) or FAULT (FLT) if probe disconnected.
INLET: (Ti) Temperature measured by the optional inlet air probe. This probe is plugged into the instrument through the RS232 socket. This figure is used to calculate the NET temperature instead of AMBIENT when fitted.

AMBIENT: (Ta) Temperature measured by the internal sensor, used in the NET temperature calculation if an INLET probe is not fitted.

CO/CO2 R: The CO/CO₂ ratio, is the ratio of measured CO divided by calculated CO₂.

It gives an indication of the following:
- How good a gas sample the instrument is reading.
- How clean the boiler is running.

For example:
A new or clean domestic boiler will display a ratio of less than 0.0040, a unit in need of cleaning 0.0040-0.0080 and a unit in need of major overhaul will show greater than 0.0080.

This only shows a reading when a combustion test is being carried out. ‘- -’ is displayed while in clean ambient air.

P INDEX: (PI) The CO/CO₂ ratio expressed as a percentage %, called the ‘Poison Index’ i.e. P INDEX % = 100 x CO/CO₂. ‘- -’ is displayed while in clean ambient air.

XAIR %: (λ) Excess air calculated from the measured oxygen and type of fuel used. During a combustion test ‘O₂ > 20%’ will be displayed while in clean ambient air.

FLOW: Pitot Flow Rate in m/s when m/s selected in pressure units

Prs: Flue draught pressure reading. Displayed when pressure sensor fitted. See UNITS menu for scales.

NO: Nitric Oxide reading in ppm or mg/m³. Displayed when Nitric Oxide sensor fitted. Also displayed as NO (n) when referenced to oxygen. The display will read ‘O₂ > 20%’ if referenced values selected and instrument is in clean ambient air.
**NOx:** Calculated total Nitric oxides displayed in ppm or mg/m³. Where $\text{NOx} = \text{NO} + P\%\text{NO}$, note $P$ can be set from 0-9%, default = 5%. See SELECT menu 5.2.2. Also displayed as $\text{NOx (n)}$ referenced to oxygen. The display will read ‘O2 > 20%’ if referenced values are selected and instrument is sampling clean ambient air.

**SO2:** Sulphur Dioxide reading in ppm or mg/m³. Displayed when Sulphur Dioxide sensor fitted. Also displayed as $\text{SO2 (n)}$ referenced to oxygen. The display will read ‘O2 > 20%’ if referenced values selected and instrument is in clean ambient air.

**O2 ref %:** Toxic gas measurements can be referenced to defined oxygen levels. See SELECT menu for details.
B. COMBUSTION EFFICIENCY CALCULATION

The efficiency calculation is based upon British Standard BS845.

This identifies three sources of loss associated with fuel burning:

**Losses due to flue gasses:**
- Dry Flue gas loss,
- Moisture and hydrogen
- Sensible heat of water vapour
- Unburned gas

**Losses due to refuse:**
- Combustible in ash
- Combustible in riddlings
- Combustible in dust

**Other losses:**
- radiation
- convection
- conduction
- other unmeasured losses

Net efficiency calculations assume that the energy contained in the water vapour (formed as a product of combustion and from wet fuel) is recovered and the wet loss term is zero. Gross efficiency calculations assume that the energy contained in the water vapour is not recovered.

Since the fuel air mixture is never consistent there is the possibility of unburned/partially unburned fuel passing through the flue. This is represented by the unburned carbon loss.

Losses due to combustible matter in ashes, riddlings, dust and grit, radiation, convection and conduction are not included.

**Efficiency Calculation:**

**Known Data - Fuel:**
- \( Q_{gr} \) = Gross Calorific Value (kJ/kg)
- \( Q_{net} \) = Net Calorific Value (kJ/kg)
- \( K_1 \) = Constant based on Gross or Net Calorific Value:
  - \( K_{1g} = \frac{(255 \times \% \text{Carbon in fuel})}{Q_{gr}} \)
  - \( K_{1n} = \frac{(255 \times \% \text{Carbon in fuel})}{Q_{net}} \)
- \( K_2 \) = % max theoretical \( \text{CO}_2 \) (dry basis)
- \( K_3 \) = % Wet Loss
- \( H_2 \) = % Hydrogen
- \( H_2O \) = % Water
Measured Data:

- $T_f$ = Flue Temperature
- $T_i$ = Inlet Temperature
- $O_{2m}$ = % Oxygen in flue gas
- $O_{2r}$ = Oxygen reference %

Calculated data:

- $T_{net}$ = Net Temperature
- % CO$_2$ content in flue gas
- % Dry Flue Gas losses
- % Wet losses
- % Unburned carbon loss
- % Efficiency

\[
T_{net} = T_f - T_i
\]

Dry flue gas loss %

\[
= 20.9 \times K_1 \times \frac{T_{net}}{K_2 \times (20.9 - O_{2m})}
\]

Wet loss %

\[
= 9 \times H_2 + H_2O \div Q_{gr} \times [2488 + 2.1T_f - 4.2Ti]
\]
simplified

\[
= \left[\frac{(9 \times H_2 + H_2O)}{Q_{gr}}\right] \times 2425 \times [1 + 0.001 \times T_{net}]
\]

Wet loss %

\[
= K_3(1+0.001 \times T_{net})
\]

Where

\[
K_3 = \left[\frac{(9 \times H_2 + H_2O)}{Q_{gr}}\right] \times 2425
\]

Net Efficiency %

\[
= 100 - \text{dry flue gas losses}
\]

\[
= 100 - 20.9 \times K_{1n} \times \frac{T_{net}}{K_2 \times (20.9 - O_{2m})}
\]

Gross Efficiency %

\[
= 100 - \{\text{dry flue gas losses + wet losses}\}
\]

\[
= 100 - \{[20.9 \times K_{1g} \times \frac{T_{net}}{K_2 \times (20.9 - O_{2m})}] + [K_3 \times (1 + 0.001 \times T_{nett})]\}
\]

Excess Air

\[
= [(20.9\% / (20.9\% - O_{2m}\%)) - 1] \times 100\%
\]

CO$_2$%

\[
= [(20.9 - O_{2m}) \times K_2 / 20.9]
\]

Unburned fuel Loss %

\[
= K_4 \times \frac{CO}{(CO + CO_2)}
\]

Note: CO scaled in %
Where $K_4$ = 70 for coke
= 65 for anthracite
= 63 for Bituminous coal
= 62 for coal tar fuel
= 48 for liquid petroleum fuel
= 32 for natural gas

The formula for $K_4$ is based on the gross calorific value $Q_{gr}$. To obtain the loss based on net calorific value multiply by $Q_{gr}/Q_{net}$. Since this loss is usually small this conversion has been ignored. This loss is subtracted from the efficiency.

**Oxygen Reference**

$$CO(n) = CO \times \frac{(20.9 - O_{2r})}{(20.9 - O_{2m})}$$
C. CALCULATION OF FUEL DATA

For any fuel not specified by Kane International the net calorific value, gross calorific value and composition should be obtained from the fuel supplier.

The following fuel data has been calculated with reference to the efficiency calculation.

Example 1:

Chemical composition:  
C  25%  
H₂  3%  
H₂O  50%  
Q_net  8.35 MJ/kg  
Q_g  9.3 MJ/kg *  
Max CO₂  20.4%

K₁n = (255 x % carbon in fuel) / Q_net (kJ/Kg)  
= (255 x 25) / 8350  = 0.763

K₁g = (255 x % carbon in fuel) / Q_g (kJ/Kg)  
= (255 x 25) / 9300  = 0.685

K₂ = Max % CO₂  = 20.40

K₃ = Wet Loss = [(9 x %H₂ + %H₂O) / 9300] x 2425  
= [(9 x 3 + 50) / 9300] x 2425  
= (77 / 9300) x 2425  = 20.08

K₄ = 65 (an approximation for wood) *

The fuel values to program into the Analyser are as follows:

<table>
<thead>
<tr>
<th></th>
<th>NATURAL GAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>K₁g</td>
<td>0.763</td>
</tr>
<tr>
<td>K₁n</td>
<td>0.685</td>
</tr>
<tr>
<td>K₂ 2</td>
<td>20.4</td>
</tr>
<tr>
<td>K₃ 3</td>
<td>20.08</td>
</tr>
<tr>
<td>K₄ 4</td>
<td>65</td>
</tr>
<tr>
<td>O₂r</td>
<td>8.0</td>
</tr>
</tbody>
</table>

* Assumed values in the absence of supplied data.  
See previous appendix for other fuels.
D. ELECTROMAGNETIC COMPATIBILITY (CE) STATEMENT

European Council Directive 89/336/EEC requires electronic equipment not to generate electromagnetic disturbances exceeding defined levels and have adequate immunity levels for normal operation. Specific standards applicable to this meter are stated below.

As there are electrical products in use pre-dating this Directive, they may emit excess electromagnetic radiation levels and, occasionally, it may be appropriate to check the meter before use by:

Use the normal start up sequence in the location where the meter will be used.
Switch on all localized electrical equipment capable of causing interference.
Check all readings are as expected. A level of disturbance is acceptable.
If not acceptable, adjust the meter’s position to minimize interference or switch off, if possible, the offending equipment during your test.

At the time of writing this manual (May 2016) Kane International Ltd are not aware of any field based situation where such interference has 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 61000-6-3 : 2011
EN 61000-6-1 : 2007

and is certified to be compliant

Specification EC/EMC/KI/KANE945/1 details the specific test configuration, performance and conditions of use.
END OF LIFE DISPOSAL

The Waste Electrical or Electronic Equipment (WEEE) Directive requires countries in the EU to maximise collection and environmentally responsible processing of these items.

Products are now labelled with a crossed out wheeled bin symbol to remind you that they can be recycled.

Please Note: Batteries used in this instrument should be disposed of in accordance with current legislation and local guidelines.
## PRODUCT REGISTRATION

Please complete, detach and return to: Kane International Ltd
Kane House, Swallowfield, Welwyn Garden City, Hertfordshire, AL7 1JG

### Your Details

<table>
<thead>
<tr>
<th>Name:</th>
<th></th>
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<tbody>
<tr>
<td>Job Title:</td>
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<td>Company Name:</td>
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<td>Company Address 1:</td>
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<td>Mobile Number:</td>
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<td>Email Address:</td>
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</table>

### Product Details

*Note: Proof of Purchase may be required for warranty claims.*

<table>
<thead>
<tr>
<th>Date Purchased:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>as numbers (28.01.15):</td>
<td></td>
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<tr>
<td>Purchased From:</td>
<td></td>
</tr>
<tr>
<td>Model Number:</td>
<td><strong>KANE945</strong></td>
</tr>
<tr>
<td>Product Serial Number:</td>
<td></td>
</tr>
<tr>
<td>located on the rear product label beneath the protective rubber sleeve</td>
<td></td>
</tr>
</tbody>
</table>
Why did you buy a Kane Product?

- Made in the UK
- Value for Money
- Kane Brand
- Not your Decision
- Previous Owner
- Our Fixed Price Servicing Programme
- Dealer Recommendation
- Other:

What brand was your previous analyser?

How did you hear about Kane?

- Magazine Advert
- Training School
- Personal Recommendation
- Exhibition
- Trade Counter
- Previous Owner
- Internet Search
- Other:

Your feedback is important to us, please add any additional comments you would like to make with regard to your recent Kane purchase:

Thank you for completing this survey.
All the information we have collected is confidential.
We do not sell or share data with any other company or organisation.
Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.

UK Office
Keison Products,
P.O. Box 2124, Chelmsford, Essex, CM1 3UP, England.
Tel: +44 (0)330 088 0560
Fax: +44 (0)1245 808399
Email: sales@keison.co.uk

Please note - Product designs and specifications are subject to change without notice. The user is responsible for determining the suitability of this product.