

KANE456

Flue Gas Analyser with direct CO₂ measurement



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KANE456 OVERVIEW

The KANE456 Combustion Analyser measures carbon dioxide (CO₂), carbon monoxide (CO), differential temperature and differential pressure. The direct measurement of CO₂ is achieved using a Kane designed infra-red sensing system. Below 1% CO₂ the readings of CO₂ are displayed to two decimal places

CO₂ is set to zero in fresh air automatically after the initial countdown. The countdown varies between 90 and 30 seconds dependent on ambient temperature.

If “RESET GAS ZERO” is indicated ensure that the unit is in fresh air before pressing the button with an “Enter” symbol.

It calculates oxygen (O₂), CO/CO₂ ratio, losses, combustion efficiency (Net or Condensing Gross).

The KANE456 Combustion Analyser can also measure CO levels in ambient air - useful when a CO Alarm is triggered. It can also perform a Room CO Test for up to 30 minutes duration.

A structured Commissioning Test has been included for the installation of boilers.

The analyser has a protective rubber cover with a magnet for “hands-free” operation and is supplied with a flue probe with integral temperature sensor.

A low flow detection system warns of low flow and switches the pump off. This also helps to prevent water ingress from overfilled water traps. Its LCD display is protected with a toughened screen.

The large display shows 6 readings at a time and all data can be printed via an optional infrared printer. The printed data can be 'live' data or 'stored' data.

The memory can store up to:

- 60 combustion tests
- 20 AUX tests
- 20 let-by/tightness tests
- 20 temperature & pressure tests
- 20 room CO tests
- 20 commissioning Tests

Two lines of 20 characters can be added to the header of printouts. Printouts can be made on the optional Kane IRP printers with 'fast print' capability using the IRP2 printer. Alternatively the analyser can be equipped with optional wireless communications to either Android or Apple devices.

The analyser is controlled using 4 function buttons and a rotary dial.

The four buttons (from left to right) switch on and off the analyser, switch on and off the torch light, switch on and off the pump and send data to a printer or to the memory. The buttons with UP, DOWN and ENTER arrows also change settings such as date, time, fuel, etc. when in MENU mode.

ANALYSER LAYOUT & FEATURES

Tasklight and infra-red emitter

Battery Compartment
(behind rubber cover)

Function buttons x 4

Menu controls
Scroll up/down

On/Off * Pump Send

Enter

Rotary Switch

Particle Filter

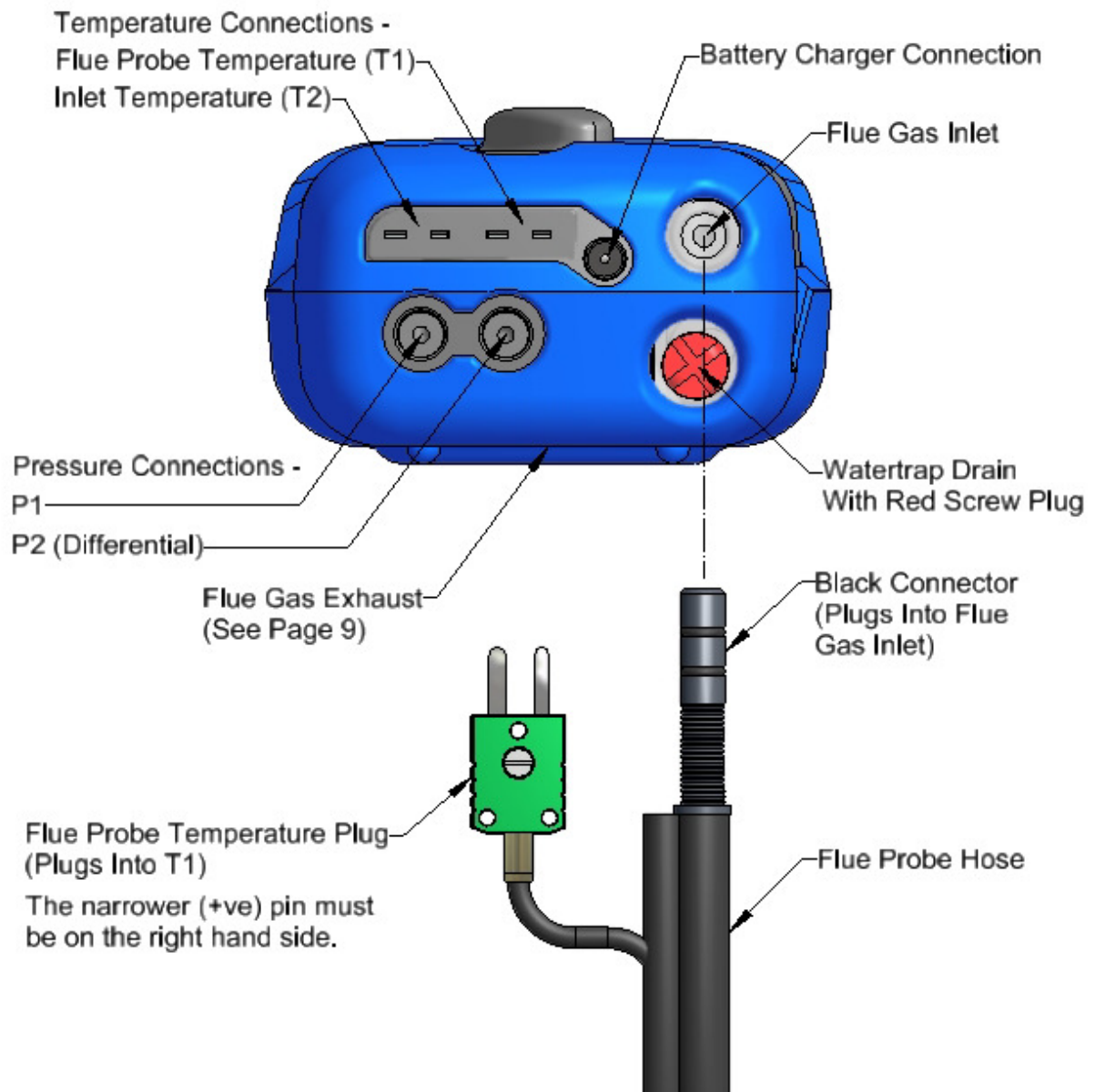
O2/Eff Ratio Com Test
Aux Prs/Temp
Status Tightness
Menu Room CO

Water Trap

"Battery Charging"
indicator

Flue Gas Inlet





1. BATTERIES

Battery Type

This analyser has been designed for use with disposable alkaline batteries or rechargeable Nickel Metal Hydride (NiMH) batteries. No other battery types are recommended.



WARNING

The battery charger unit must only be used when NiMH batteries are fitted. Do not mix NiMH cells of different capacities or from different manufacturers. All four cells must be identical

Replacing Batteries

Turn over the analyser, remove its protective rubber cover and fit 4 “AA” batteries in the battery compartment. **Take great care to ensure they are fitted with the correct battery polarity.** Replace the battery cover and protective rubber cover.

Switch the analyser on and check that the analyser’s time and date are correct. To reset see **USING THE MENU, Section 5.**

Charging NiMH Batteries

Ensure that you use the correct charger. The part number is 19278.

To fully charge NiMH batteries:

The charger must be connected and switched on.

When charging, the red Battery Charging Indicator will illuminate.

After a few seconds, the display will show “CHARGING BATTERY” if they need extra charge.

The first charge should be for 12 hours continuously. NiMH batteries are suitable for top up charging at any time, even for short periods.

An in-vehicle charger can be used to top up the analyser's batteries from a 12 volt vehicle battery. The part number is 18342.

Battery Disposal

Always dispose of depleted batteries using approved disposal methods that protect the environment



2. BEFORE USING THE ANALYSER EVERY TIME:

Check the water trap is empty and the particle filter is not dirty:

- To empty water trap, unscrew the red screw plug and re-tighten once it is empty.
- To change the particle filter, remove protective rubber cover, slide the water trap unit from the analyser, remove the particle filter from its spigot and replace. Reconnect the water trap unit and rubber protective cover.

Connect the flue probe hose to the analyser's flue gas inlet and connect the flue probe's temperature plug to the T1 socket – check the plug's orientation is correct - see Page 6.



2.1 FRESH AIR PURGE


Position the flue probe in fresh air, then press  / . The analyser's pump starts and the analyser auto-calibrates. When complete:

Select "Ratio" on the dial. *In fresh air the CO reading should be zero.*

Select "O₂/Eff" on the dial. *In fresh air the O₂ reading should be 20.9% ± 0.3%.*


**FRESH AIR
PURGE
REMOVE
PROBE
FROM FLUE
PRESS ↓**

This message indicates that the analyser needs to be reset in fresh air. To do so, ensure that the analyser is in fresh air and press  / .

To perform a manual 'Gas Zero', select 'Ratio' on the dial, hold down the  key and you will see the message above.

2.2 STATUS DISPLAY

Select “Status” on the dial to view the following:

NAT GAS	→	Current fuel selection
14:56:29	→	Current time. Can be re-set via the “Menu”
11/03/06	→	Current date. Can be re-set via the “Menu”
Ta 23.8C	→	Ambient temperature of the analyser
CAL 283	→	Shows number of days until next calibration is due
BAT 	→	Shows the charge level of the batteries









SAFETY 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 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).

3. USING THE FOUR FUNCTION BUTTONS:

<p>Switching ON the Analyser</p>	<p>Rotate the dial to the mode you want to use before switching on. This may eliminate the need for a full countdown in some of the modes and save you time.</p> <p>Press  /  button to switch the unit ON. This must be done in fresh air to ensure that the analyser auto calibrates its sensors properly.</p> <p>When switched on, the analyser beeps and briefly displays software version, date and time. Its bottom line counts down until the sensors are ready to use. If the analyser will not auto calibrate, its sensors need to be replaced or recalibrated by an authorised repair centre.</p> <p>If an inlet temperature probe (optional) is connected into the T2 socket during its countdown, the measured temperature from the inlet probe will be used as the inlet temperature.</p> <p>If an inlet temperature probe is not connected to the analyser during countdown the measured temperature from the flue probe will be used as the inlet temperature.</p> <p>If neither probe is connected during countdown the analyser's internal ambient temperature will be used as the inlet temperature.</p>
<p>Switching OFF the Analyser</p>	<p>Press  /  & hold for 2 seconds to switch the analyser OFF. The display counts down from 30 or less with the pump on to clear the sensors with fresh air – If the probe is still connected, make sure analyser and probe are in fresh air.</p> <p>Press  /  if you want to stop the countdown and return to making measurements.</p> <p>Note: The analyser will not switch off unless the CO reading is below 40ppm.</p>
<p>Torch Light</p>	<p>Press  /  to switch the torch light on and off.</p> <p>NOTE: Use of the torch light significantly increases the current drain on the batteries.</p>

<p>Switching PUMP on / off</p>	<p>The analyser normally operates with the pump on.</p> <p>Press  /  to switch the pump off and on.</p> <p>When the pump is switched off “-PO-” is displayed instead of the O₂, CO & CO₂ readings. The analyser also displays "PUMP OFF" on the top line approx every 40 seconds.</p> <p>NOTE:</p> <p>The pump will automatically switch itself off when the rotary switch is set to Menu, Status, Pressure, Tightness or Differential Temperature.</p>
<p>Zeroing the pressure sensor</p>	<p>To re-zero the pressure sensor when “Prs/Temp” is selected on the dial, press and hold  /  until the top line display shows CAL ZERO.</p> <p>Always disconnect the pressure hose before zeroing.</p>
<p>Printing Data</p>	<p>Press and quickly release  /  to start the analyser printing. The analyser displays a series of bars until this is completed. Press and release the key again to abort printing.</p> <p>Make sure the printer is switched on, ready to accept data and its infrared receiver is in line with the analyser’s emitter (on top of the analyser).</p>
<p>Storing a set of readings</p>	<p>Press and hold  /  for approx. 2 seconds.</p> <p>The top line briefly displays the log number.</p> <p>Note: This STORE function is inhibited in normal operation if the pump is switched off.</p>
<p>Using  /  /  Buttons</p>	<p>The function buttons below the symbols  /  /  are used to navigate through the menu when the rotary switch is set to MENU – See USING THE MENU, Section 5.</p>

4. USING THE ANALYSER:



4.1 COMBUSTION TESTS:



Insert the tip of the flue probe into the centre of the flue. The readings will stabilise within 60 seconds assuming the boiler conditions are stable.

The rotary switch can be used to display the following information:

RATIO Display



NAT GAS	→ Fuel type can be changed via “Menu”.
R 0.0008	→ CO/CO ₂ ratio.
CO 52p	→ Carbon monoxide (ppm).
CO2 6.3%	→ Carbon dioxide (%).
XAIR 88.7	→ Excess air %
PRS 0.01m	→ Pressure reading



Press  /  to print a full combustion test, (or send to PC via optional Wireless module).

Hold  /  for 2+ seconds to log a full combustion report.

O2/EFF display



NAT	GAS	→ Fuel type
O2	9.8%	→ Oxygen (%) left after combustion. Should be 20.9% ± 0.3% in fresh air.
Efg	81.1%	→ Gross efficiency
Tf	145.1C	→ Flue temperature (°C).
Ta	5.4C	→ Inlet temperature (°C). Normally set by flue probe during fresh air purge.
ΔT	139.7C	→ Differential temperature

Press  /  to print a full combustion test, (or send to PC via optional Wireless module).

Hold  /  for 2+ seconds to log a full combustion report.

AUX display



P	0.00	→ The AUX (auxillary) display can be customised via MENU / SCREEN / AUX.
R	0.0008	→ The parameters displayed on lines 1, 2, 3, 4, 5 and 6 can be set by the user.
CO	52p	→ They remain the AUX parameters until changed by the user.
CO2	6.3%	→
NO	-N/F-	→ NO sensor not fitted
NOx	-N/F-	→ NO sensor not fitted



Press  /  to print a full combustion test, (or send to PC via optional Wireless module).



Hold  /  for 2+ seconds to log a full combustion report.

Viewing / printing overview

The side lights on the display point to the active line.

Use  or  to change the pointer.

Press  /  to select a line. The side lights now flash.



Use  or  to scroll or change the selected line.



Press  /  to exit a line.

To view / print a logged report



Select MENU / REPORT / COMBUSTION / VIEW.

The side lights will point to the top line.



Press  /  to select this line. The side lights will flash.

Use  or  to scroll or change the Log No. (If only one report is logged, number will not change).

Press  /  to confirm a Log No. The side lights will stop flashing.

To view logged data press  or  to move the pointer to another line.

Press  / . Sidelights will flash on that line.



Use  or  to scroll through data.

To finish, press  / . Sidelights stop flashing.

Use  or  to scroll down to "PRINT"

Press  /  to print.

Viewing / printing a logged combustion test

Press  /  to print the test, (or send to PC via optional Wireless module).

4.2 COMMISSIONING TEST

The Commissioning Test is based on TB143

Rotate the dial to to COM TEST position and follow the instructions on the screen

TEST 1 check the boiler at Max Gas rate.

The boiler is switched on at Max rate.

The analyser is first zeroed in fresh air.

Once the boiler is stable at max gas flow rate the probe is inserted into the air inlet of the flue and the CO₂ level is measure. The reading needs to be stable and less than or equal to 0.20%.

TEST 2

The probe is then inserted into the exhaust outlet of the boiler and the RATIO, CO and CO₂ levels are measured. These levels must be as per manufacturers instruction. Where manufacturers instructions are not available the CO must be less than 350 ppm and the RATIO must be less than 0.0040.

TEST 3 checks the boiler at minimum gas flow rate where this is possible.



With the boiler operating stably at minimum gas rate the RATIO, CO and CO₂ levels are measured.

These levels must be as per manufacturers instruction. Where manufacturers instructions are not available the CO must be less than 350 ppm and the RATIO must be less than 0.0040.

TEST 4 Measures Flow and Return Temperatures from the boiler



All the measured readings are logged and can be printed or transmitted to PC if an optional wireless module is fitted.


4.3 PRESSURE/TEMPERATURE TESTING

Select "Prs/Temp". The pump stops automatically. Press  /  to auto-zero the pressure sensor. Using the black connectors and manometer hose, connect to P1 for single pressure or P1 and P2 for differential pressure.

PRS/TEMP display



PRS	0.01m	→	Normal response or smoothed (damped) response can be selected via "Menu".
m=	mbar	→	'High' or 'Low' resolution readings can be selected via "Menu".
T1	75.1C	→	Pressure units can be selected via "Menu".
T2	40.2C	→	Eg Flow Temp
ΔT	34.9C	→	Eg Return Temp
		→	Differential Temp



Press  /  to print a full pressure test, (or send to PC via optional Wireless module).

Hold  /  for 2+ seconds to log a pressure report.

Viewing / printing a logged pressure/temp test

Select MENU / REPORT / PRS-TEMP / VIEW

Use  or  to select the log number to be printed.

Press  /  to print the test, (or send to PC via optional Wireless module).

WARNING

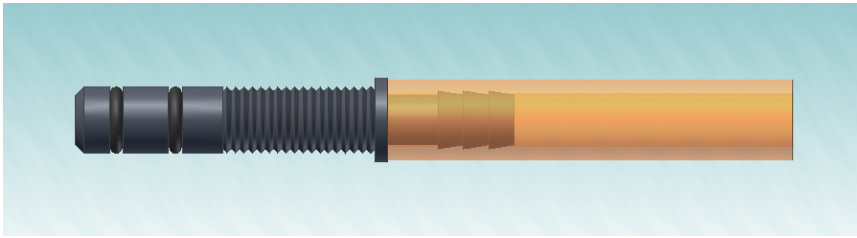
Before using the KANE456 to measure the pressure of a gas/air ratio valve, read the boiler manufacturer's instructions thoroughly. If in doubt contact the boiler manufacturer.

After adjusting a gas/air ratio valve it is essential that the CO, CO₂ and CO/CO₂ ratio readings are within the boiler manufacturer's specified limits.

If using larger bore tubing when performing pressure tests:






Push 'orange' tube over the rim of the spigot to ensure a gas tight seal.




This may not produce a gas tight seal.

4.4 LET-BY & TIGHTNESS TESTING


Select "Tightness". The pump stops automatically. Press  /  to auto-zero the pressure sensor. Connect from the test point to P1 using a black connector and manometer hose.

The display shows "LET BY?". Use ,  and  to select YES or NO.

If YES is selected set the let-by pressure then press  to start the let-by test. The display shows:

LET BY	→	The let-by test is automatically stored in the memory.
PR1 10.15m	→	Pressure at start of let-by test.
PR2 10.15m	→	Real time pressure reading.
	→	
	→	
TIME 59	→	Let-by default time is 1 minute. Can be changed via "Menu".

If the let-by test fails simply move the rotary switch to any position other than "tightness" to abort the test.


If the let-by test passes adjust the gas pressure for the tightness test and press  to start the stabilisation test. The display shows:

STABIL'N	→	
PR1 20.01m	→	Real time pressure reading.
TIME 59	→	Stabilisation default time is 1 minute. Can be changed via "Menu".

When complete press  to start the tightness test:


TIGHTNESS	→	
PR1 20.01m	→	Pressure at start of tightness test.
PR2 20.01m	→	Real time pressure reading.
TIME 119	→	Tightness default time is 2 minutes. Can be changed via "Menu".



When complete the display will show:


LOG 01	→	The tightness test is automatically stored in the memory.
PR1 20.01m	→	Pressure at start of stabilisation test.
PR2 19.98m	→	Pressure at end of stabilisation test.
PR1 19.98m	→	Pressure at start of tightness test
PR2 19.97m	→	Pressure at end of tightness test
PRINT ↓	→	Press  to print the complete test.

Viewing / printing a logged Let-by and Tightness test

Select MENU / REPORT / TIGHTNESS / VIEW

Use  or  to select the log number to be printed.

Press  /  to print the test, (or send to PC via optional Wireless module).

Note: The analyser's memory can store up to 20 tightness tests. Tightness tests are logged automatically therefore the tightness section of the memory will be full after the 20th tightness test is complete. Before the 21st tightness test can be performed the tightness section of the memory must be cleared. To do this select MENU / REPORT / TIGHTNESS / DEL ALL / YES then press .

4.5 ROOM CO TESTING

Select "Room CO" to measure and record CO readings for up to 30 minutes.



SELECT ROOM CO

TEST TYPE GENERAL

→

→

→

→ Use  /  to select the test type from the following:



TEST TYPES

GENERAL:	15 minute test with results stored every minute	LIMIT = 10ppm ALARM = 30 ppm
SWEEP TEST:	2 minute test with max reading stored at end	LIMIT = 10ppm ALARM = 30 ppm
MIGRATION TEST:	15 minute test with results stored every minute	LIMIT = 10ppm ALARM = 30 ppm
TYPE C SEALED APPLIANCE:	15 minute test with results stored every minute	LIMIT = 10ppm ALARM = 30 ppm
TYPE B BOILER OPEN FLUE:	15 minute test with results stored every minute	LIMIT = 10ppm ALARM = 30 ppm
TYPE A COOKER:	30 minute test with results stored every minute	LIMIT = 30ppm ALARM = 90 ppm
TYPE A WATER HEATER:	5 minute test with results stored every minute	LIMIT = 10ppm ALARM = 30 ppm
TYPE A SPACE HEATER:	30 minute test with results stored every 1 minute	LIMIT = 10ppm ALARM = 30 ppm

Press  /  to start Room CO testing.

ROOM CO display

ROOM	CO	→	CO readings are recorded every minute for up to 30 minutes.
CO	00p	→	Real time CO reading (ppm).
TEST	00	→	Test 00 = initial CO test in series. Test 30 = maximum of 30 tests in series.
LOG	01	→	The CO test series is automatically stored in the memory as a log number.

The user can stop the Room CO test at any time by pressing  / .

If not stopped earlier, the Room CO test will automatically end after the designated time.

The CO test series is automatically stored in the memory as a log number.

When completed the log can be printed immediately by pressing .



Viewing / printing a logged Room CO test

Select MENU / REPORT / ROOM CO / VIEW

When LEDs are not flashing



Use the  /  keys to change line.

Press  to cause the LEDs on that line to flash.

With the LEDs flashing, press  /  to allow the parameter on that line to be changed.



Press  to select that change.

The LEDs stop flashing and  / 



Use  /  to change the line again.



ROOM	CO	→
LOG	01	→
TEST	3	→
CO	Op	→
PASS		→
PRINT	↓	→





With no LEDs flashing



Use the  /  keys to move the lit LEDs to the line you want.



You can change the LOG number and the TEST number so that you can view individual test results.

Press  /  to select the line you want and the LEDs will start to flash.

Now use the  /  keys to change the number (the TEST number or the LOG number)

Press  /  when you are happy with the changes. The LEDs will stop flashing. Now use the  /  keys to move the LEDs to the PRINT line.

Sending to the printer or wireless device will only occur when you move the LEDs to the print line and press  / .

Press  /  to print the test, (or send to PC via optional Wireless module).

4.6 PRINTOUTS

COMBUSTION

KANE456	SW19392	V0.12
YOUR COMPANY NAME & PHONE NUMBER HERE		
SERIAL NO.	9876543210	
LOG NO.	01	
DATE	19/01/16	
TIME	11:06:09	

CAL DUE ON	18/12/16	
COMBUSTION		
FUEL TYPE	NAT GAS	
CO2	%	9.0
O2	%	5.1
CO	ppm	50
NO	ppm	-N/F-
NOx	ppm	-N/F-
FLUE	°C	65.2
INLET	°C	17.2
NETT	°C	48.0
CO/CO2		0.0005
NET	%	97.9
LOSS	%	2.1
XAIR	%	32
PRS	mbar	0.21

CUSTOMER		
APPLIANCE		
REFERENCE		

COMMISSION TEST

KANE456	SW19392	V0.12
YOUR COMPANY NAME & PHONE NUMBER HERE		
SERIAL NO.	9876543210	
LOG NO.	08	
DATE	19/01/16	
TIME	11:50:04	

CAL DUE ON	18/12/16	
COMMISSION TEST		
<u>ANALYSER ZERO</u>		
CO2	%	0.00
CO	ppm	0
<u>FLUE INTEGRITY</u>		
CO2	%	0.00
<u>MAX GAS FLOW</u>		
CO2	%	9.1
CO	ppm	50
CO/CO2		0.0005
<u>MIN GAS FLOW</u>		
CO2	%	9.0
CO	ppm	48
CO/CO2		0.0005
<u>FLOW & RETURN</u>		
T1	°C	65.5
T2	°C	48.2
ΔT	°C	17.3

CUSTOMER		
APPLIANCE		
REFERENCE		

PRS/TEMP

KANE456	SW19392	V0.12
YOUR COMPANY NAME & PHONE NUMBER HERE		
SERIAL NO.	9876543210	
LOG NO.	20	
DATE	19/01/16	
TIME	12:23:59	

CAL DUE ON	18/12/16	
PRS/TEMP		
PRS	mbar	18.01
T1	°C	75.5
T2	°C	65.2
ΔT	°C	10.3

CUSTOMER		
APPLIANCE		
REFERENCE		

SWEEP TEST

KANE456	SW19392	V0.12
YOUR COMPANY NAME & PHONE NUMBER HERE		
SERIAL NO.	9876543210	
LOG NO.	06	
DATE	19/01/16	
TIME	10:11:11	
CAL DUE ON		18/12/16
ROOM CO		
SWEEP TEST		
LIMIT	10ppm	
ALARM	30ppm	
TESTS	1	
M	CO ppm	
01	0	
MAXIMUM CO ppm	0	
CUSTOMER		
APPLIANCE		
REFERENCE		

TYPE C SEALED APPLIANCE

KANE456	SW19392	V0.12
YOUR COMPANY NAME & PHONE NUMBER HERE		
SERIAL NO.	9876543210	
LOG NO.	03	
DATE	19/01/16	
TIME	12:25:27	
CAL DUE ON		18/12/16
ROOM CO		
TYPE C SEALED APPLIANCE		
LIMIT	10ppm	
ALARM	30ppm	
TESTS	15	
TEST	CO ppm	
01	0	
02	0	
03	0	
04	0	
05	0	
06	0	
07	0	
08	0	
09	0	
10	0	
11	0	
12	0	
13	0	
14	0	
15	0	
MAXIMUM CO ppm		0
CUSTOMER		
APPLIANCE		
REFERENCE		

TIGHTNESS TEST

KANE456	SW19392	V0.12
YOUR COMPANY NAME & PHONE NUMBER HERE		
SERIAL NO.	9876543210	
DATE	19/01/16	
TIME	11:09:16	
CAL DUE ON		18/12/16
LET BY TEST		
PRS 1	mbar	10.80
PRS 2	mbar	10.78
LET BY	MINS	1:00
TIGHTNESS TEST		
PRS 1	mbar	20.14
PRS 2	mbar	20.13
ΔP	mbar	-0.01
STABILIS'N	MINS	1:00
TIGHTNESS	MINS	2:00
CUSTOMER		
APPLIANCE		
REFERENCE		

AUX

KANE456 SW19392 V0.12

YOUR COMPANY NAME &
PHONE NUMBER HERE

SERIAL NO. 9876543210

LOG NO. 01

DATE 19/01/16
TIME 09:46:53

CAL DUE ON 18/12/16

AUX

FUEL TYPE LIGHT OIL

CO2	%	0.53
CO(n)	ppm	02++
CO/CO2		0.0000
O2	%	20.2
FLUE	°C	-N/F-
INLET	°C	-N/F-

CUSTOMER

[Empty dotted box for CUSTOMER]

APPLIANCE

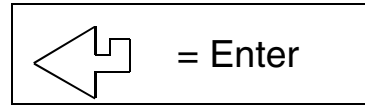
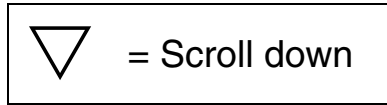
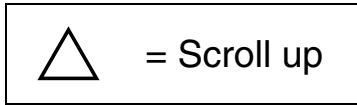
[Empty dotted box for APPLIANCE]

REFERENCE

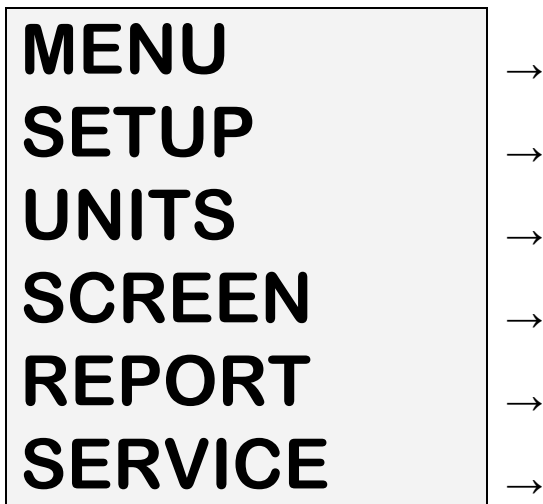
[Empty dotted box for REFERENCE]

5. USING THE MENU

Select "Menu" on the rotary switch and navigate using the function buttons:



NOTE: To EXIT the MENU at any time simply move the rotary switch to any position other than "Menu". Any changes that have not been "entered" will be ignored.



As you scroll up or down the side LEDs illuminate to point to the active line

MAIN MENU	SUB MENU	OPTIONS / COMMENTS
SETUP	Language	English
	SET TIME	HH:MM:SS format e.g. 7 am = 07:00:00, 7pm = 19:00:00
	SET DATE	DD/MM/YY format
	PRINTER	KM IRP KM IRP-2 WIRELESS SERIAL
	PASSKEY	1111 (wait 5 secs after entering last digit)
	BACK	

As you scroll up or down the side LEDs illuminate to point to the active line

NOTE: To EXIT the MENU at any time simply move the rotary switch to any position other than “Menu”. Any changes that have not been “entered” will be ignored.

MENU	SUB MENU	OPTIONS / COMMENTS
UNITS	Fuel Type	NAT GAS, PROPANE, BUTANE, LPG, LIGHT OIL, PELLETS
	Fuel Origin	UK, N AMERICA, FRANCE
	EFFICIENCY	GROSS, NET, GROSS COND, NET COND
	PRESSURE	See next table below
	GAS	ppm, ppm(n)
	TEMP	C , F
	O2 REF	Up/down to set value (3% default)
	NOx CALC	Up/down to set value (5% default)
	BACK	

As you scroll up or down the side LEDs illuminate to point to the active line

NOTE: To EXIT the MENU at any time simply move the rotary switch to any position other than “Menu”. Any changes that have not been “entered” will be ignored.

MENU	SUB MENU	OPTIONS / COMMENTS
PRESSURE	FILTER	OFF = normal response. ON = slower (damped) response
	RESOLUTION	LOW = e.g. 0.01mbar resolution. HIGH = displays to an extra decimal place
	UNITS	mbar, Pa, PSI, mmHg, hPa, InH ₂ O
	TIME	LET BY = Set duration of let-by test in minutes. Default = 1 minute STABIL'N = Set duration of stabilisation in minutes. Default = 1 minute TIGHTN'S = Set duration of tightness test in minutes. Default = 2 minute
	BACK	

As you scroll up or down the side LEDs illuminate to point to the active line

NOTE: To EXIT the MENU at any time simply move the rotary switch to any position other than "Menu". Any changes that have not been "entered" will be ignored.

MENU	SUB MENU	OPTIONS / COMMENTS
SCREEN	CONTRAST	Factory setting is 14
	BACKLIGHT	0 to 300 secs
	AUX	Enables users to customise the parameters on the AUX display: LINE 1, LINE 2, LINE 3, LINE 4, LINE 5, LINE 6, BACK
	BACK	

As you scroll up or down the side LEDs illuminate to point to the active line

NOTE: To EXIT the MENU at any time simply move the rotary switch to any position other than "Menu". Any changes that have not been "entered" will be ignored.

MENU	SUB MENU	OPTIONS / COMMENTS
REPORT	AUX	Stored AUX tests VIEW, DEL ALL, BACK
	COMBUSTION	Stored combustion tests: VIEW, DEL ALL, BACK
	COMMISSION	Stored commission tests: VIEW, DEL ALL, BACK
	PRS/TEMP	Stored pressure tests: VIEW, DEL ALL, BACK
	TIGHTN'S	Stored tightness tests: VIEW, DEL ALL, BACK
	ROOM CO	Stored room CO tests: VIEW, DEL ALL, BACK
	HEADER	LINE 1 LINE 2 BACK
	BACK	

As you scroll up or down the side LEDs illuminate to point to the active line

NOTE: To EXIT the MENU at any time simply move the rotary switch to any position other than "Menu". Any changes that have not been "entered" will be ignored.

MENU	SUB MENU	OPTIONS / COMMENTS
SERVICE	CODE	Password protected for authorised service agents only. Leave set to 000000.

As you scroll up or down the side LEDs illuminate to point to the active line

NOTE: To EXIT the MENU at any time simply move the rotary switch to any position other than "Menu". Any changes that have not been "entered" will be ignored.

6. USING THE KANE456 AS A THERMOMETER OR PRESSURE METER

Rotate the dial to the PRS/TEMP position.

The display will show:

P	0.00m	→ Real time pressure reading.
m=	mbar	
T1	21.3C	→ Use the T1 connection for the flow temperature sensor.
T2	21.3C	→ Use the T2 connection for the return temperature sensor.
ΔT	0.0C	→ Real time temperature difference.

The standard printout for this mode is as follows:

```

KANE456  SW19392  V0.12

YOUR COMPANY NAME &
PHONE NUMBER HERE

SERIAL NO.      9876543210

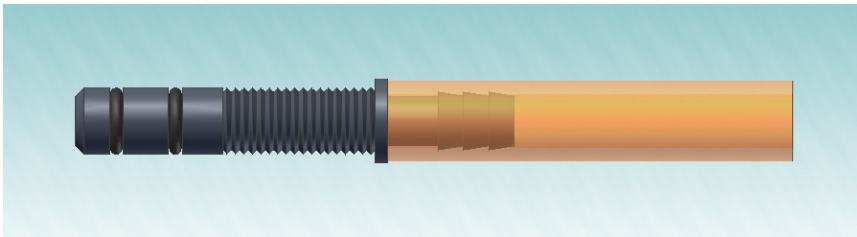
LOG NO.         20

DATE            19/01/16
TIME            12:23:59
-----
CAL DUE ON     18/12/16
-----
PRS/TEMP
PRS            mbar    0.01
T1             °C     17.6
T2             °C     17.4
ΔT             °C     0.2
-----
CUSTOMER
[ ]
APPLIANCE
[ ]
REFERENCE
[ ]
    
```

If using larger bore tubing when performing pressure tests:



Push 'orange' tube over the rim of the spigot to ensure a gas tight seal.



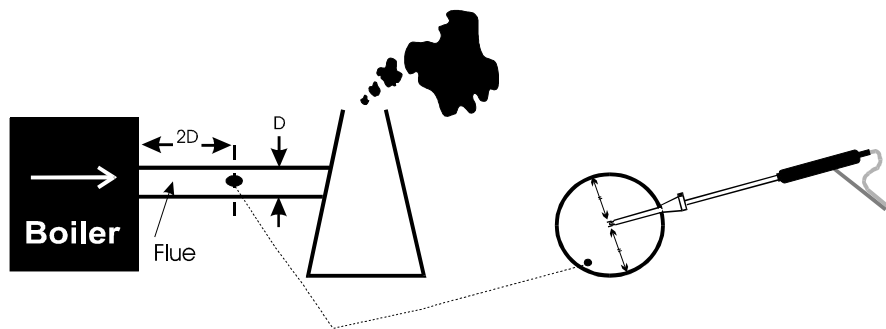
This may not produce a gas tight seal.

7. MEASURING FLUE GASES

After the countdown is finished and the analyser is correctly set up, put its flue probe into the appliance's sampling point. The tip of the probe should be at the centre of the flue. Use the flue probe's depth stop cone to set the position.

With balanced flues, make sure the probe is positioned far enough into the flue so no air can 'back flush' into the probe.



NOTE: Ensure that the flue probe handle does not get hot!



Make sure you do not exceed the analyser's operating specifications. In particular:

- Do not exceed the flue probe's maximum temperature (600°C)
- Do not exceed the analyser's internal temperature operating range
- Do not put the analyser on a hot surface
- Do not exceed the water trap's levels
- Do not let the analyser's particle filter become dirty and blocked

View the displayed data to ensure that stable operating conditions have been achieved and the readings are within the expected range.

Press and quickly release  /  to start the analyser printing. The analyser displays a series of bars until this is completed. Press and release the key again to abort printing.

Make sure the printer is switched on, ready to accept data and its infrared receiver is in line with the analyser's emitter (on top of the analyser).

8. ANALYSER PROBLEM SOLVING

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

Fault symptom	Causes / Solutions
<ul style="list-style-type: none"> • Oxygen too high • CO₂ too low 	<ul style="list-style-type: none"> • Air leaking into probe, tubing, water trap, connectors or internal to analyser.
<ul style="list-style-type: none"> • Batteries not holding charge • Analyser not running on mains adapter. 	<ul style="list-style-type: none"> • Batteries exhausted. • AC charger not giving correct output. • No fuse
<ul style="list-style-type: none"> • Analyser 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.
<ul style="list-style-type: none"> • Net temperature or Efficiency calculation incorrect. 	<ul style="list-style-type: none"> • Ambient temperature set wrong during Automatic Calibration.
<ul style="list-style-type: none"> • Flue temperature readings erratic 	<ul style="list-style-type: none"> • Temperature plug reversed in socket. • Faulty connection or break in cable or plug.
<ul style="list-style-type: none"> • T flue or T nett displays (-N/F-) 	<ul style="list-style-type: none"> • Probe not connected. • Faulty connection or break in cable or plug.
EFF or X-Air displays (- O2+-)	<ul style="list-style-type: none"> • CO₂ reading is below 2%. • O₂ > 18%
<ul style="list-style-type: none"> • Analyser just continually beeps 	<ul style="list-style-type: none"> • Turn dial back to MENU and press ENTER • Turn dial back to Tightness and press ENTER

9. FREQUENTLY ASKED QUESTIONS

Q: What is the countdown time on a KANE456

A: There are three levels of countdown (aka fresh air purge) on a KANE456.

From first switch on if 'cold' (more than 5°C from the temperature at which calibrated) = 90 secs.

From first switch on if 'warm' (within 5°C of the temperature at which calibrated) = 60 secs

If switched on within 10 minutes of last switch off and had been on for at least 10 mins and is still 'warm' = 30 secs

10. KANE DASHBOARD



We really want you to register your Kane analyser at www.kane.co.uk to create your dashboard - your personal online analyser portal

Benefits include:



An automatic reminder when it's time to Service - Calibrate – Recertify



Our new simple online booking in procedure ensures you receive the fastest turnaround times possible



Easy access to your analyser's calibration certificates & service history



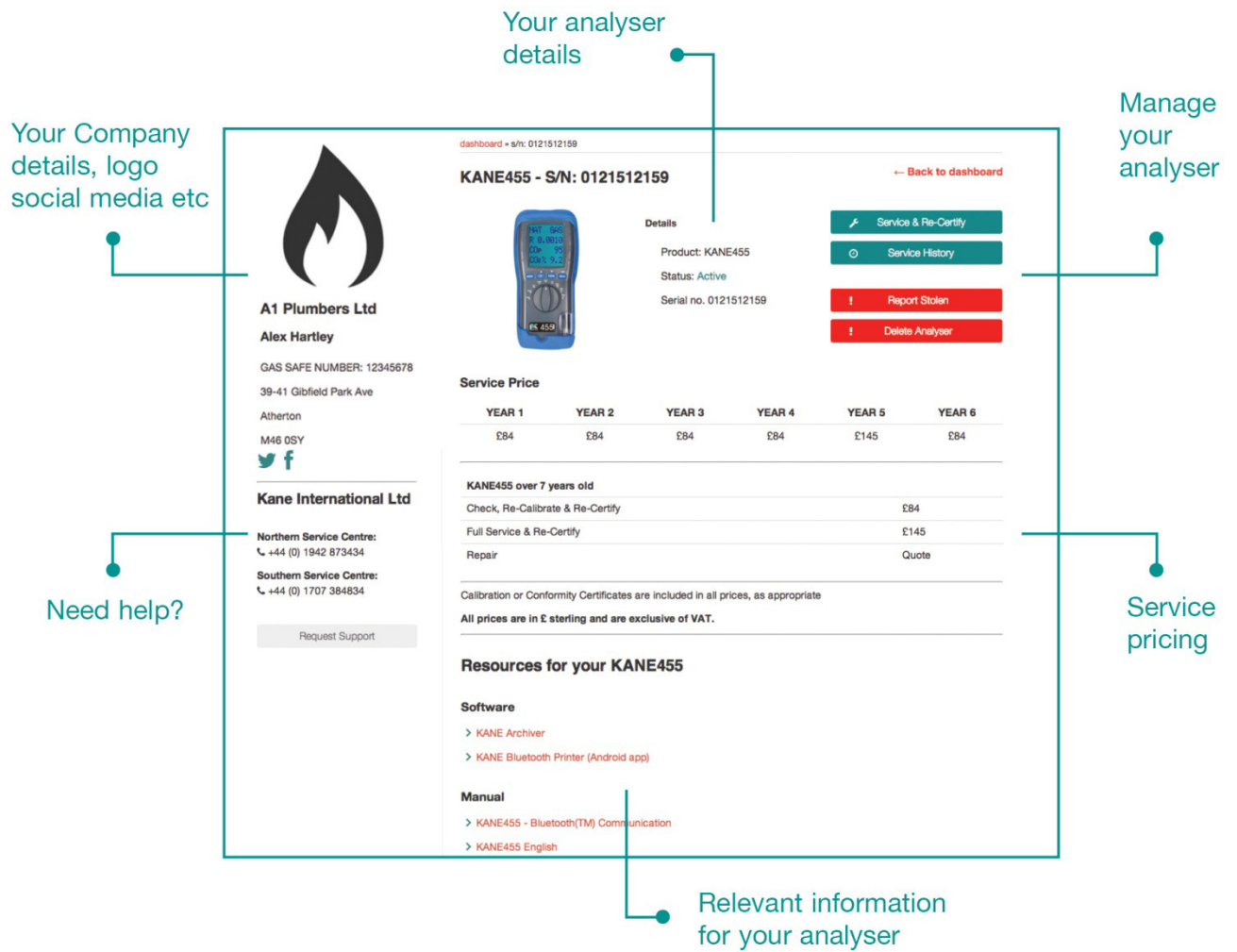
A record of your model & serial number with ability to report your analyser stolen



Product specific information & resources all in one place



Fixed service prices are always visible



An out of calibration analyser may mean your combustion reports are invalid.

11. ONLINE BOOKING PROCEDURE @ www.kane.co.uk

To organise your Kane analyser's Service & Recertification online it must be registered.

To register, click

[Register Analyser](#)

If you have already registered, click

[Already Registered](#)

to sign in

From your dashboard, click

[Manage](#)

for the analyser you wish to


organise Service & Recertification, then click

[Service & Re-Certify](#)

& follow our simple online booking process:

1. This page confirms if a service/recertification is required & how much it will cost

1.



A1 Plumbing Supplies
Alex Hartley
39-41 Gibfield Park Ave
Atherton
Grt Manchester
M46 0SY

Kane International Ltd
Northern Service Centre:
☎ +44 (0) 1942 873434
Southern Service Centre:
☎ +44 (0) 1707 384834

[Request Support](#)

dashboard - start order

Book online Service / Recertification

According to our records your **KANE455 - S/N: 0121512159** is now in year four of its service plan, and will require a service/recertification procedure in order to maintain a valid calibration certificate.

The cost will be **£84** exc VAT.

We have no record of this analyser previously being booked in online.


If you feel this is incorrect or you have any additional questions, please contact us directly on: **+44 (0) 1707 384834** of via the online [contact form](#).


If you're happy to proceed, please click continue:

[Continue](#)

2. Book your service/recertification & order any additional spare parts you need

2.




A1 Plumbing Ltd
Alex Hartley
 GAS SAFE NUMBER: 12345678
 39-41 Gibfield Park Ave
 Atherton
 M46 0SY



Kane International Ltd
 Northern Service Centre:
 ☎ +44 (0) 1942 873434

dashboard = start order = step 1 = step 2 = step 3


To add any spare parts for your analyser, select quantity required. If not, click next.



ASP2KIT £99.00
 Appliance Sampling Probe Kit - 3 Probes with Handle/Hose Assembly




PF400-5 Filters £15.00



PRD1 £20.00

3. Once happy with your order just confirm & pay

3.



A1 Plumbing Supplies
Alex Hartley
 39-41 Gibfield Park Ave
 Atherton
 Grt Manchester
 M46 0SY

Kane International Ltd
 Northern Service Centre:
 ☎ +44 (0) 1942 873434
 Southern Service Centre:
 ☎ +44 (0) 1707 384834

Request Support

dashboard = start order = step 1 = step 2 = step 3

Step 2 - Confirmation

Delivery Address

A1 Plumbing Supplies
 39-41 Gibfield Park Ave
 Atherton
 Grt Manchester
 M46 0SY
 United Kingdom
 ☎ 01942 873434

Billing Address

A1 Plumbing Supplies
 39-41 Gibfield Park Ave
 Atherton
 Grt Manchester
 M46 0SY
 United Kingdom
 ☎ 01942 873434


[Change delivery/billing address](#)

Description	Quantity	Amount (per item)
KANE455 - 0121512159 Year four Service / Recertification We have no record of this analyser previously being booked in online.	1	£84.00
Service Centre: Southern Service Centre		
	(1 items)	£84.00 ex VAT £100.80 inc VAT

[Pay with Card](#)

4. See your order & print out the return to Kane label

4.



A1 Plumbing Supplies
Alex Hartley
39-41 Gibfield Park Ave
Atherton
Grt Manchester
M46 0SY

Kane International Ltd

Northern Service Centre:
☎ +44 (0) 1942 873434

Southern Service Centre:
☎ +44 (0) 1707 384834

[Request Support](#)

dashboard » Order Summary

Order Summary

Thanks for your order.

We've charged your Visa card ending 4242 the amount **£100.00** for 1 x Service / Recertification. The charge will appear on your bank statement as **KANE INTERNATIONAL LTD.**

Your RMA number/s is **54842**.

Please quote this number in any correspondence with us.

So what's next?

- 1. Print delivery label**

[Print Label](#)

If you don't have access to a printer please make sure you write the RMA number/s (54842) so that it's clearly visible on your container.

If you can't print this label immediately, it will always be available to print from the RMA payment history detail section [\[HERE\]](#).

- 2. Package Analyser**

Securely pack analyser with probe, charger and any other products requiring our attention.

Once securely packed, please send back to the Kane Service Center address via your local post office or a courier company such as [myHermes](#) or [Collect+](#).

It is advisable to send the package by Special Delivery so that it is insured and traceable while in transit.

Your analyser MUST be returned directly to Kane and not through a third party otherwise additional charges may apply.

[Finish](#)



Don't forget to put the label on your package and send it to us

12. ANALYSER ANNUAL SERVICE & RE-CERTIFY

Although sensor life is typically more than five years, the analyser should be serviced and re-certified annually to counter any long-term sensor or electronics drift or accidental damage.

Local regulations may require more frequent re-certification.

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).

12.1 SERVICE - CALIBRATE - RECERTIFY

YOU CAN COUNT THE REASONS WHY ON ONE HAND!

1. Fixed prices ensure you know the full cost of ownership before you buy.
2. Flue Gas Analysers will drift out of calibration over time – only Kane can adjust them back to the manufacturers' specification & return them as accurate as when they were purchased.
3. Analysers always seem to require a service when you need them most! Kane's two UK Service Centres pride themselves on their fast service turnaround times.
4. Every Kane analyser is returned with a fully traceable calibration certificate & another 12 months warranty. After 6 years, warranty becomes limited to replacement parts only.
5. In some cases an out-of-calibration analyser means any combustion reports you produce are invalid, so it is very important you get your analyser recertified

KANE IS NOW THE UK'S LARGEST, FASTEST & MOST RELIABLE FGA AFTER SALES SERVICE PROVIDER

- ✓ Our Northern & Southern Service Centres are the UK's only locations authorized to Service - Calibrate - Recertify & Repair Kane analysers
- ✓ You can organise your Kane analyser's Service & Recertification online via your Dashboard on www.kane.co.uk, send it or call us to arrange a pre-booked while-you-wait service, saving you time & potential lost revenue

We pride ourselves on our fast turnaround for a fixed price, which includes:

- Inspecting your analyser & accessories, testing its functionality & adjusting it to our original specification
 - Free software upgrades, where applicable
 - Parts & labour on these replaceable parts as required: CO & CO₂/O₂ sensors, pump & battery
 - Parts not included are optionally fitted toxic cells, cases & probes
 - All internal tubing, water trap, particle & chemical filters
 - Recertifying to national standards & issuing a fully traceable calibration certificate to confirm your analyser's performance
 - A complimentary Service Pack comprising PF400/5 (pack of five) replacement filter elements, Thermal Printer Roll, Water Trap Plug & Probe Connector (RRP for filters & roll = £17.40)
 - Return carriage via Next Day delivery service (UK mainland only)
- ✓ Kane is the only UK manufacturer of hand-held gas analysers granted UKAS accreditation to ISO / IEC 17025:2005 for its Welwyn Garden City calibration laboratory, covering a range of gases, temperature & pressure. Kane is certified to ISO 9001, ISO 14001 & BS OHSAS 18001
 - ✓ Our Northern Service Centre offers service & repair for your other instruments, including: thermometers, pressure meters & multimeters

12.2 RETURNING YOUR ANALYSER TO KANE

Before returning your analyser to Kane, please ensure that you enclose:

- RMA label if you have used our new simple online booking in process
- Your full contact details
- A daytime telephone number
- Details of faults you might have experienced
- Any relevant accessories (eg. probe, printer, adaptor & leak detectors).
Any accessories that are returned will be checked

PACKING YOUR ANALYSER:

When returning an analyser with its probe, please send them back in their carry bag. The bag should be put into a suitably sized box (approx. 45cm x 20cm x 23cm)

When only returning an analyser, use a container as big as a shoe box & pack out empty space with newspaper

Before sealing your package, please ensure you followed our procedure above & have clearly marked your box for the Kane Service Team

If you do not have an account with a courier company, take your package to your local Post Office – we recommend Special Delivery so that it is insured & traceable in transit

WHEN WE RECEIVE YOUR ANALYSER:

Our Service Engineers will inspect the analyser & accessories. If you haven't booked in & paid online, they will confirm the total service cost.

Once accepted, the work will be carried out & on completion, returned to you by Next Day delivery service (UK mainland only)

12.3 WHERE TO SEND YOUR ANALYSER

Northern Customer Service
Kane International Ltd
Gibfield Park Avenue
Atherton,
Manchester
M46 0SY, UK
t: +44 (0) 1942 873434
f: +44 (0) 1942 873558
e: nservice@kane.co.uk

Southern & International Customer Service
Kane International Ltd
Kane House, 11 Bessemer Road
Welwyn Garden City
Hertfordshire
AL7 1GF, UK
t: +44 (0) 1707 384834
f: +44 (0) 1707 384833
e: sservice@kane.co.uk

13. COLD WEATHER PRECAUTIONS

It is important you keep your flue gas analyser in a warm place overnight

Electronic devices that become really cold, by being left in a vehicle overnight, suffer when taken into a warm room the next morning. Condensation may form which can affect the analyser's performance & cause permanent damage

Electrochemical sensors used in flue gas analysers can be affected by condensation or water being sucked into the analyser, as the small apertures on top of sensors can become blocked with water, stopping sensors seeing flue gas. When this happens, oxygen or carbon dioxide reading will display as "—" & sensors may be permanently damaged

If you think that your analyser is affected by condensation or water ingress, it may be possible to rectify the problem yourself. Simple leave the analyser running in a warm place, with the pump 'ON' sampling fresh air for a few hours (use mains adapter/battery charger if needed). If, after doing this, you still experience problems please contact our Service Centres.

14. ANALYSER SPECIFICATION

(NOTE: MAY BE SUBJECT TO CHANGE)

Parameter	Range	Resolution	Accuracy
Temp Measurement			
Flue Temperature	0-600°C	0.1°C	±2.0°C ±0.3% reading
Inlet Temperature (Internal sensor)	0-50°C	0.1°C	±1.0°C ±0.3% reading
Inlet Temperature (External sensor)	0-600°C	0.1°C	±2.0°C ±0.3% reading
Flue Gas Measurement			
Oxygen ^{*2}	0-21%	0.1%	±0.3%
Carbon monoxide ^{*1}	0-20ppm 21-2,000ppm nom 4,000ppm max for 15 mins	1ppm	±3ppm ±5% reading
Carbon dioxide ^{*1}	0-20%	0.1%	±0.3% volume
Efficiency (Net or Gross) ^{*2}	0-99.9%	0.1%	±1.0% reading
Efficiency High (C) ^{*2}	0-119.9%	0.1%	±1.0% reading
Excess Air ^{*2}	0-250%	0.1%	±0.2% reading
CO/CO ₂ ratio ^{*2}	0-0.999	0.0001	±5% reading
Pressure (differential)			
Nominal range ±80mbar Maximum over range without damage to sensor is ±400mbar	±0.2 mbar ±1 mbar ±80 mbar	Maximum 0.001 mbar <25mbar	±0.005 mbar ±0.03 mbar ±3% of reading
Pre-programmed Fuels	Natural gas, Propane, Butane, LPG, Light Oils (28/35 sec), Wood Pellets		
Storage Capacity	60 Combustion tests 20 Pressure & Temperature tests 20 Tightness tests 20 Temperature tests 20 Room CO tests 20 Commissioning tests		

*1 Using dry gases at STP

*2 Calculated

Carbon Dioxide resolution is 0.01% below 1% measured value.

Ambient Operating Range	0°C to +45°C 10% to 90% RH non-condensing
Battery Type / Life	4 AA cells >8 hours using Alkaline AA cells
Chargers (optional)	220v charger, for NiMH batteries only 12v in vehicle charger, for NiMH batteries only
Dimensions Weight: Handset: Probe:	0.8kg handset with protective rubber cover 200 x 45 x 90mm 300mm long including handle. 6mm diameter x 240mm long stainless steel shaft with 3m long neoprene hose. Type K thermocouple

15. ELECTROMAGNETIC COMPATIBILITY

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 analyser 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 analyser before use by:

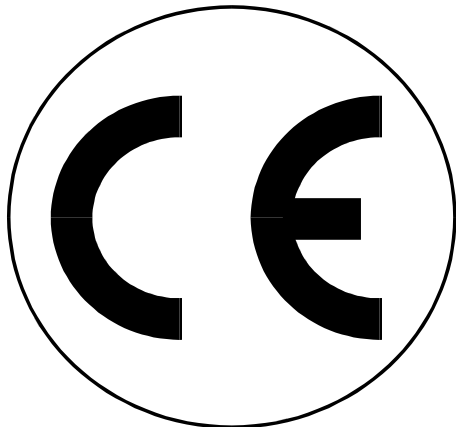
Use the normal start up sequence in the location where the analyser will be used.

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 analyser's position to minimize interference or switch off, if possible, the offending equipment during your test.

At the time of writing this manual (January 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/KANE456 details the specific test configuration, performance and conditions of use.

16. 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.

17. EN 50379 REGULATED INSTRUCTIONS

EN 50379 Section 4.3.2 “Instructions” defines a number of specific points that must be included in the relevant instruction manuals. The paragraph numbering below relates to that section of EN 50379.

- a) The KANE456 is compliant the EN 50379 Part 2 and Part 3.
- b) The KANE456 is intended to be used with the following fuels:
 - Natural gas
 - Light oil (28/35 sec)
 - Propane
 - LPG
 - Wood pellets
 - Butane
- c) The KANE456 is designed for use with either non-rechargeable alkaline AA cells or rechargeable NiMH AA cells. Four cells are needed. Types cannot be mixed. Under no circumstances should any attempt be made to recharge alkaline cells.

The battery charger supplied with the KANE456 is rated for indoor use only. Its voltage input must be in the range 100 – 240 V ac at 50 – 60 Hz with a current capability of 0.3 A. The chargers output voltage is 9 V dc at a maximum of 0.66A.

The charger has no user serviceable components.

Only a correctly specified and rated charger must be used with the KANE456.

- d) The KANE456 is not designed for continuous use and is not suitable for use as a fixed safety alarm.
- e) An explanation of all the symbols used on the analyser’s display is given in Appendix 1 of this manual.
- f) The recommended minimum time required to perform one complete measurement cycle and achieve correct indication of the measured values in EN 50379 Part 2 is 110 seconds. This is based on the T_{90} times defined in the standard, always assuming that parameters being measured have reached stability. This time is the summation of the times for a draught test (10 secs) and a combustion test (90 secs) plus the time to move the hose connection from the pressure input to the water trap (10 secs)
- g) The recommended minimum time required to perform one checking procedure in EN 50379 Part 3 is 110 seconds as described in section f) above.

- h) Some commonly occurring materials, vapour or gases may affect the operation of the KANE456 in the long or the short term though in normal use Kane International Ltd is not aware of any specific issues that have affected the product. The following list is included to satisfy the stated requirements of EN 50379:

Solvents
Cleaning fluids
Polishes
Paints
Petrochemicals
Corrosive gases

- i) The KANE456 is fitted with an electrochemical CO sensor and an infra-red CO₂ sensor which have an expected life of more than 5 years. The calibration of these sensors must be confirmed on an annual basis.

The batteries have an expected operational life of more than 500 re-charge cycles.

- j) The KANE456 is designed to operate at ambient temperatures in the range 0°C to +45°C with relative humidity of 10% to 90% non-condensing. Whilst it is recommended that the analyser is given the protection of a carry case during transportation it is not required for normal operation.

- k) The KANE456 has an initial start up delay following switch on of between 90 and 30 seconds dependent on ambient temperature. There is no additional delay after battery replacement.

- l) Most sensors used in combustion analysers give a zero output when they fail and it is widely recommended that analysers are regularly checked (also known as a bump test) using either a can of test gas or a known source of combustion products.

The KANE456 must have its calibration checked on an annual basis and be issued with a traceable Certificate of Calibration.

The sensor within the KANE456 can only be replaced by Kane International Ltd or one of its trained and approved service partners.

The water trap should be checked on a regular basis whilst the analyser is in use (every few minutes) as the amount of condensate generated varies with the fuel type, atmospheric conditions and the appliances operating characteristics.

The particle filter should be checked at least on a daily basis when using 'clean' fuels and more often when using liquid or solid fuels.

Detailed instructions regarding the changing of the filter and the emptying of the water trap are given in Section 2 of this manual.

m) **WARNING!**

When using a KANE456 to test an appliance a full visual inspection of the appliance, in accordance with its manufacturer's instructions, must also be carried out.

Appendix 1 - Main Parameter:

Here are the legends used and what they mean:

O₂ :	Oxygen (Calculated) reading in percentage (%)
CO :	Carbon monoxide (Measured) reading displayed in ppm (parts per million). If '- - -' is displayed there is a fault with the CO sensor or the instrument has not set to zero correctly. Switch off instrument and try again.
CO_n	carbon monoxide normalised
CO₂ :	Carbon dioxide (Measured) reading in percentage (%).
Ra:	CO to CO ₂ ratio
Tf :	Temperature measured by the flue gas probe in centigrade (°C). It displays '- OC -' if the flue probe is disconnected or faulty.
Ti :	If an inlet temperature probe (optional) is connected into the T2 socket during its countdown, the measured temperature from the inlet probe will be used as the inlet temperature. If an inlet temperature probe is not connected to the analyser during countdown the measured temperature from the flue probe will be used as the inlet temperature. If neither probe is connected during countdown the analyser's internal ambient temperature will be used as the inlet temperature.
T Nett :	Nett temperature calculated by deducting the INLET temperature from the measured FLUE temperature. It displays '- OC -' if the flue probe is not connected or broken.
EFF :	Combustion efficiency calculation displayed in percentage either as Gross Ef(G) or Nett Ef(N) or Condensing Nett Ef(C) - Use MENU to change. The calculation is determined by fuel type and uses the calculation in British Standard BS845. The efficiency is displayed during a combustion test, '- - -' is displayed while in fresh air.
Loss :	Losses calculated from oxygen and type of fuel. Displays reading during a combustion test. '- - -' is displayed while in fresh air.
X - AIR :	Excess air calculated from the calculated oxygen and type of fuel. Displays reading during a combustion test. '- - -' is displayed while in fresh air.
CO/CO₂:	CO/CO ₂ Ratio: measured CO (ppm) divided by (CO ₂ (%) x 10,000).

- PRS :** Pressure reading, either single point or differential.
- BAT :** Displays the Battery power available.
Readings may be affected if used with low power batteries.
- DATE :** Date shown as day, month and year, DD/MM/YY. Date is recorded when each combustion test is printed or stored.
- TIME :** The time shown is expressed in “Military” time HH:MM:SS. Time is recorded when each test is printed or stored.


Note! When changing the batteries on the instrument the memory will store the date and time for up to one minute, if outside this time it may be necessary to re-enter the details. Date and time may also need to be reset if re-chargeable batteries are allowed to totally discharge.

- FULL :** The maximum number of tests have been stored in the memory. To delete the stored memory, Select Reports then select the tests to be deleted (see Page 23).

Pressure units:

- m: millibar
s: psi
h: hPa
P: Pa
g: mmHg
i: inH2O

SYMBOLS used on the display

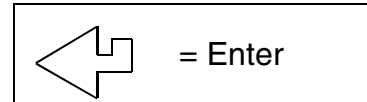
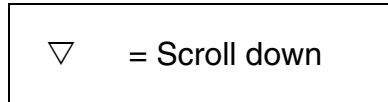
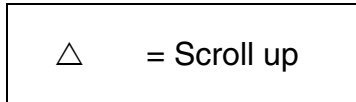
PRS	Pressure
Ra	CO/CO ₂
XAIR	Excess Air
Tf	Flue temperature
Ta	Inlet temperature
ΔT	Nett temperature / Differential temperature
EfG	Gross efficiency
EfCG	Gross condensing Efficiency
EfN	Nett efficiency
EfCN	Nett condensing efficiency
- PO -	Pump off
'O2++%	Calculated oxygen greater than 18% so calculation is disabled
N/F	Temperature input not fitted
CAL	Number of days left before recalibration is due
BAT	Battery level symbol 
N/F	Not fitted.
INT	Interval in seconds
ppm	parts per million
p	parts per million
ppm(n)	parts per million normalized
O2ref	reference level in % for normalization calculation

ADDENDUM

Instructions for KANE456 analysers fitted with optional Nitric Oxide (NO) sensors

DISPLAYING THE NO READING

Select "Menu" on the rotary switch and navigate using the function buttons:



Select SCREEN and then select AUX



Choose a line to display the required readings as below


AUX display



P	0.00
R	0.0008
CO	52p
CO2	6.3%
NO	100p
NOx	105p


- The AUX (auxillary) display can be customised via MENU / SCREEN / AUX.
- The parameters displayed on lines 1, 2, 3, 4, 5 and 6 can be set by the user.
- They remain the AUX parameters until changed by the user.

NOTE: To EXIT the MENU at any time simply move the rotary switch to any position other than MENU. Any changes that have not been "entered" will be ignored.

Use  or  to navigate to the main menu option SCREEN.


Press  .

Use  or  to navigate to the sub menu option **AUX**.


Press  .

The display will show



Press  and a third line will appear.

Use  or  to navigate to the desired parameter to be displayed on line 1.

Press  to select the parameter for Line 1 and repeat the process to select the display parameter for all four lines and then EXIT

Rotate the dial from MENU to AUX to display all your chosen settings.

PRINTING and STORING

The NO reading are printed and stored in the same way as the other combustion gas readings. On the printouts the NO readings appear directly below the flue CO readings.

Note the rotor needs to be in the AUX, O₂/Eff or Ratio positions to print or store flue combustion readings

NITRIC OXIDE SENSOR SPECIFICATION

Gas Measurement	Resolution	Accuracy	Range
Nitric Oxide (NO)	1ppm	$\pm 2\text{ppm} < 30\text{ppm}^{*1}$ $\pm 5\text{ppm} < 100\text{ppm}^{*1}$ $\pm 5\% \text{ reading} > 100\text{ppm}$	0 to 100 ppm Overrange to 1500 ppm

*1 Using dry gases at STP

PRODUCT REGISTRATION

Please register your Kane analyser at **www.kane.co.uk**
or complete, detach and return to: Kane International Ltd, Kane House,
11 Bessemer Road, Welwyn Garden City, Hertfordshire, AL7 1GF

Your Details	
Name:	
Job Title:	
Company Name:	
Company Address 1:	
Address 2:	
Town/City:	
County:	
Postcode:	
Country:	
Phone Number:	
Fax Number:	
Mobile Number:	
Email Address:	

Product Details	
<i>Note: Proof of Purchase may be required for warranty claims.</i>	
Date Purchased: as numbers (28.01.14):	
Purchased From:	
Model Number:	KANE456
Product Serial Number: located on the rear product label beneath the protective rubber sleeve	



Why did you buy a Kane Product? (Select all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Kane Brand | <input type="checkbox"/> Previous Owner |
| <input type="checkbox"/> Dealer Recommendation | <input type="checkbox"/> Our Fixed Price Servicing Programme |
| <input type="checkbox"/> Made in the UK | <input type="checkbox"/> Value for Money |
| <input type="checkbox"/> Not your Decision | <input type="checkbox"/> Other: |

What brand was your previous analyser?

- | | |
|--|--------------------------------|
| <input type="checkbox"/> 1 st time purchase | <input type="checkbox"/> Kane |
| <input type="checkbox"/> Testo | <input type="checkbox"/> Anton |
| <input type="checkbox"/> Telegan | <input type="checkbox"/> TPI |
| <input type="checkbox"/> Other: | |

Which magazines do you read?

- | | |
|--------------------------------|--------------------------|
| Registered Gas Engineer | <input type="checkbox"/> |
| Gas Installer | <input type="checkbox"/> |
| P.H.P.I. | <input type="checkbox"/> |
| P.H.A.M. News | <input type="checkbox"/> |
| Heating Ventilating & Plumbing | <input type="checkbox"/> |
| Heating & Plumbing Monthly | <input type="checkbox"/> |

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 buying this
analyser.

Before use, please register on
our website

www.kane.co.uk



Scan the QR code to go directly
to Register your Product on-line
or complete, detach and return
the Product Registration form in
this manual.