

# **KANE 100-1**

## **Gas Analyzer and Logger for Ambient Carbon Monoxide and Ambient Carbon Dioxide**

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The Kane 100-1 tests for ambient CO and ambient CO<sub>2</sub> concentrations.

The large display shows 2 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 KANE 100-1 is controlled using 4 buttons and a rotary dial.

The four buttons (from left to right)

switch the instrument on and off,  
print actual or saved data, switch the backlight on and off,  
switch the pump on and off, change the top line data display,  
save data or temporarily hold or 'freeze' the current reading.

The buttons with UP, DOWN and ENTER arrows also change settings such as date, time, when in menu mode.

The rotary dial changes the display's 2<sup>nd</sup> line and selects access to the menu to make changes to the date, time, fuel, etc.

The KANE 100-1 can store up to 255 sets of readings.

The Kane 100-1 is powered by internal re-chargeable NiMH batteries. The internal battery will power the analyser for about 6Hr, from full charge.

The KANE 100-1 has a protective rubber sleeve with a magnet for "hands-free" operation.

**NOTE:** Fresh air is referred to in this manual. Sometimes it may be convenient to use thin flexible tubing (min ID. 3mm.) to supply fresh outside air, if a tube is used ensure that the inlet is at least 1 meter away from any possible source of CO<sub>2</sub> such as an open window.

Fuel combustion of any sort may cause high and fluctuating levels of CO<sub>2</sub> over surprisingly large areas. Exhaled breath can easily reach 10,000 to 20,000ppm.

## **1. BEFORE USING THE ANALYSER FOR THE FIRST TIME:**

The analyser may be supplied with either or both of the following chargers.

To fully charge the battery, you may use a Kane trickle charger, plugged into the base of the unit for 12-24 hours. Alternatively the Kane fast charger which plugs into the side will take about 1-2 hours, after which it will switch to low trickle charge. Do not fast charge the unit unless the battery charge indicator reads less than 70% otherwise over heating could cause an internal thermal cutout to operate. The unit will then not operate on its internal battery until it has cooled.

Avoid leaving the unit on charge and switched off for more than 1 –2 days at a time or the internal battery life could be reduced.

Set the correct time, date etc, after it is switched on and calibrated – See **USING THE ROTARY DIAL** below. These are stored when the analyser is switched off.

## **2. BEFORE USING THE ANALYSER EVERY TIME:**

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

- To empty the water trap, unplug its rubber stopper and re-plug once it is empty.
- To change the filter, remove protective rubber sleeve, pull out the water trap , remove the water trap's particle filter from the spigot and replace. Reconnect the water trap and rubber protective sleeve.

After switch on check that date and time are correct and battery power is sufficient.

Avoid exposing the instrument to sudden large temperature changes, and ensure that the unit reads zero for CO and approx. 400 ppm CO<sub>2</sub> in fresh air before use. If necessary re-zero (see: Menu Selection).

Avoid very close proximity to radio transmitting devices, otherwise readings may be affected.

## **SAFETY WARNING**

This analyser can be used to extract 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.**

### 3. USING THE ANALYSER AND ITS FOUR BUTTONS:

<p>Switching ON the analyser</p>	<p>Press the ① button to switch the unit ON in <u>fresh</u> air. This allows the analyser's sensors to be calibrated. This will set CO to zero and CO<sub>2</sub> may be set to 400 ppm if required.</p> <p>At switch on, the analyser beeps four times and displays the model number. The bottom line counts down from typically 45 .</p> <p>The Analyser will then indicate AIR ZERO NO?</p> <p>Select NO? using the push button marked with an enter symbol, the CO<sub>2</sub> setting will not be altered, CO is always set to zero at this stage.</p> <p>Select YES only if you are in fresh air and wish to adjust the CO<sub>2</sub> zero offset. Use the UP/DOWN buttons to set the required value (this should be 400ppm in fresh air), allow a few seconds after each button press for readings to settle, and then press ENTER to confirm.</p> <p>After ENTER is pressed it will take about 4 seconds before the unit is ready to respond to the controls.</p> <p>The sensors are now ready to use. If the analyser will not calibrate, one or more of the sensors may need to be replaced or recalibrated by an authorized repair centre.</p> <p>When countdown and zero is finished the display's top line shows the last selected function and the bottom line displays whatever the rotary dial is turned to.</p>
<p>Switching OFF the analyser</p>	<p>Press the ① button to switch the analyser OFF. The display counts down from 30 with the pump on to allow time for the sensors to be cleaned or purged with fresh air. If the probe is connected, make sure both analyser and probe are in fresh air.</p> <p>Press HOLD / ENTER if you want to stop the count-down to off and return to making measurements.</p>

<p>Using UP / DOWN / ENTER Buttons</p>	<p>Once the “on” countdown has been completed:</p> <p>Press the DOWN button for more than 1 second after the short tone or “beep” to change the display’s top line, if you hold this button down there is an “auto repeat” on this function . The Rotary Dial changes the display’s bottom line.</p> <p>The top line display options are:</p> <ul style="list-style-type: none"> <li>Time</li> <li>Date</li> <li>CO<sub>2</sub></li> <li>CO</li> <li>TL ( -- or Logging interval in minutes if set)</li> <li>BAT %</li> </ul> <p>For example, the analyser will display CO<sub>2</sub> on the top line and CO on the bottom line if you turn the rotary dial to CO and hold down the DOWN button until CO<sub>2</sub> is displayed on the top line.</p> <p>Use the UP / DOWN / ENTER keys to change settings (such as time and date ) when the rotary dial is turned to MENU.</p>
<p>Enter key to Hold or Store readings</p>	<p>In normal operation (not MENU) the ENTER key is used to either HOLD the readings for printing (a short button press of about 1 second release the button on the first beep, the display flashes when held) or to save readings if memory locations are available (a long button press ... wait until after the second beep).</p> <p>The display will flash LOG xxx (or FULL) to give the store location of the saved data or will continue to flash if held until reset by a short button press.</p> <p>Note: the HOLD function is inhibited whilst AUTOSTORE is operating.</p>
<p>Switching on and off the backlight.</p>	<p>Press PRINT / BACKLIGHT for about 2 sec. and release to switch backlight on or off.</p> <p>Note: use of the backlight increases the drain on the battery.</p>

<p>Printing Data</p>	<p>Press print key quickly for about 1 sec. to start the analyser printing. The analyser displays "PRINTING" until this is completed.</p> <p>Make sure the printer is switched on, ready to accept data and its infrared receiver is in line with the emitter on top of the analyser.</p>
<p>Switching PUMP on / off</p>	<p>The analyser normally operates with the pump on. Press the PUMP key quickly to switch the pump off and on.</p> <p>When the pump is switched off, the analyser displays "PUMP OFF" approx every 20 seconds.</p>
<p>“Freezing” the display</p>	<p>Press HOLD / ENTER to freeze all readings. The display flashes and can be printed by pressing the PRINT key. Press HOLD / ENTER again for “live” measurements.</p> <p>Note: the HOLD function is inhibited whilst AUTOSTORE is operating</p>

## 4. USING THE ROTARY DIAL (starting from Menu):

Rotating the dial selects the display's 2<sup>nd</sup> line, unless MENU is selected.

Rotor positions are:

- Menu the MENU options are listed below
- Count displays time to next Autostore in minutes if set.
- Gas 1 displays CO reading in ppm
- Gas 2 displays CO<sub>2</sub> reading in ppm
- Date the date format is user defined
- Time military time format

### 4.1 MENU SELECTION (auto store must be off to access menu).

MENU	<p>Rotate the dial to MENU and use the UP, DOWN and ENTER buttons as described fully below to select and change the following functions:</p> <ol style="list-style-type: none"><li>1. Time – Uses “Military” time as standard: 7am = 07:00, 7pm = 19:00</li><li>2. Date with date format selection</li><li>3. Pump speed control: full speed or 'quiet' mode which reduces power consumption.</li><li>4. The display's contrast</li><li>5. Language (this product is configured for English only)</li><li>6. ZERO – AIR - to set apply fresh air then use up or down to set for about 400ppm ZERO -TRUE – to set use a CO<sub>2</sub> zero calibration module (or 'stripper') Press enter to start. Zero will run for about 45 seconds.</li><li>7. Alarm setting- user settable alarms to audibly warn of high readings. Pre-sets are 35 ppm for CO and 1000ppm for CO<sub>2</sub></li><li>8. Service – Password protected, for authorized service personnel only.</li><li>9. Memory functions</li></ol>
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Using up down and enter keys.

When you have selected the function to change, press ENTER to select.

Repeat this to scroll through the menu and select (using the ENTER key) and change (using the UP / DOWN keys) the function.

The final, logical ENTER returns you to the main menu display.

To exit the Menu function at any time, rotate the dial to another position  
- Unless the final logical ENTER is pressed, no changes are made.

Note: in AIR ZERO this mode will continue until terminated by the pressing of ENTER..

You can choose from the menu, fresh air zeroing which allows CO<sub>2</sub> to be set to a user defined value (normally 400 ppm in fresh air) and CO to 0 ppm, Allow a few seconds after each button press for readings to settle, and then press ENTER to confirm.

Alternatively you can make a menu selection for, and use a TRUE zero calibration module (if available), which is used to set CO<sub>2</sub> to 0 ppm (and also CO to 0 ppm).

This mode will take about 40 seconds to operate.

## 4.2 MEMORY Functions

With the rotor pointing to MENU use the UP/DOWN keys to select MEMORY and press ENTER

The UP/DOWN keys can then be use to select :

VIEW	
AUTO STO	(Auto store)
PRINT	(Summary print of stored readings)
CLEAR	

Press ENTER to choose.

### VIEW

The top line displays VIEW

The bottom line displays LOG 0000

Use UP/DOWN to select next view number ( within the range of data stored up to 255 maximum )

In view mode only stored readings “wrap round” so that using the up key you pass from maximum reading back to the first reading or using the down key directly from the first reading to maximum.

Press ENTER to select

The top line displays for example : V 01

The bottom line displays the stored information as selected on the rotary dial.

Use UP/DOWN to scroll to later or earlier data.

Hold down the print button to print one set of stored data ( example shown as Manually logged print ).

Press ENTER to exit back to start.

## AUTOSTORE

Hold will be inhibited during auto store. If you push the Hold button during auto store AUTO STO will be indicated on the top line. It is recommended that you select ZERO via the menu and perform a zero before starting a series of Auto stored readings.

Memory is always cleared before a new autostore sequence is initiated. Be sure to print out your previous results before starting a new sequence.

When store intervals greater than one minute are set and the pump is switched off it will power up automatically one minute before a reading is due to be stored. The pump will run whatever speed (high or low ) was previously set. Where the store interval is set to 1 minute the pump momentarily switches off every minute.

You can maximize the number of stored readings by switching the pump to low speed (QUIET) and after initiating store switch the pump off. Typically if the batteries are fully charged you will be able to store 255 readings at up to 3 minutes interval.

To store for longer periods above 12 hours you should connect the Kane trickle charger.

The top line displays AUTO STO  
Use the UP/DOWN keys to select from OFF or ON  
Press ENTER to select

The display will show:

AUTO STO  
TIME 01  
Use the UP /DOWN keys to set any store interval  
between 1 and 10 minutes.

The display top line will then revert to MENU  
Select any required position on the rotary dial.

Every time readings are stored the top line will flash LOG and the STORE number until the memory is full or until the autostore is switched off. There will also be a beep for every store to a maximum of 255 sets of readings.

You can only exit AUTOSTORE by returning to MENU mode and setting AUTOSTO to OFF.

## **SUMMARY PRINT**

The bottom line displays PRINT  
Press ENTER to select and EXIT  
Maximum, minimum and average readings are shown.

## **CLEAR**

The top line will display CLEAR  
The bottom line will display NO  
Use the UP/DOWN keys to toggle between NO and YES  
Press ENTER to select and exit .

## **4.3 CHANGING THE PUMP SPEED**

The pump speed is toggled using the UP or Down key.  
The choices are Full Speed or Quiet.  
Press ENTER to select and exit

## **4.4 MANUAL ZEROING**

From the MENU function you can choose to re-zero at any time except when auto storing.  
The zeroing options are fresh air zero or true zero  
Use the UP or Down button to chose and ENTER to select. Once zeroing has commenced it will continue until completed whatever you do with the rotary dial.  
Fresh air zero should be completed by pressing enter. The normal value of 400 for fresh air may be adjusted using the up or down keys. (The value first displayed when entering this mode is the analysers current measured value).

## **4.5 ALARMS**

Select ALARMS from the menu and use the UP or Down buttons and Enter to alter the alarm points if different alarm positions are required to the preset alarms. The instrument will store new alarm settings. The last CO<sub>2</sub> alarm point set will be recalled at switch on. As a safety measure the CO alarm will be set to 35ppm at switch on unless a lower level is set.

## 5. MEASURING GASES

After the countdown is finished and the analyser is correctly set up sampling can take place either by using a sampling tube/probe to reach into ducts or flues or simply by taking a direct ambient air measurement without a probe or hose connected.

**CAUTION:** Just by breathing you are emitting a relatively high level of CO<sub>2</sub> in the local area and this can affect the measurements. We do recommend that a probe or flexible hose is used so that the point where the ambient air is being sampled is at least 1 metre away from where anyone is breathing.

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

- Do not exceed the probe's maximum temperature (any plastic parts must not contact hot flues).
- Do not exceed the temperature operating range
- Do not put the analyser on a hot surface
- Do not exceed the water trap's levels
- Do not let the particle filter become dirty and blocked
- Ensure that the magnetic boot is free from metallic particles and any surfaces used when attaching the analyser are appropriate.

View data and rotate the dial to see changes as you make adjustments.

Press HOLD first to hold or 'freeze' the readings before printing. Press PRINT to print the results.

Before starting a test sequence it is recommended to check that the value for CO reads zero and CO<sub>2</sub> reads about 400ppm in fresh air, if required you can "re-zero" the sensors by using the ZERO functions in MENU.

## 6. EXAMPLE PRINTOUT IN AMBIENT AIR

The standard printouts are:

Instant print  
press print button.

KANE 100-1 CO & CO2 MONITOR		
DATE:	01-01-06	
TIME:	14:27:08	
.....		
CO2	ppm	950
CO	ppm	12

Manually logged print  
via VIEW stored data.

KANE 100-1 CO & CO2 MONITOR		
DATE:	01-01-06	
TIME:	16:27:08	
LOG NUMBER 123		
.....		
CO2	ppm	950
CO	ppm	12

Summary Print of autolog  
via MEMORY.

KANE 100-1 CO & CO2 MONITOR		
AUTOLOG REPORT		
DATE		01-01-06
TIME		18:27:08
Start Time		06-6-04
		14:00:00
Stop Time		06-6-04
		17:59:00
No of readings		255
.....		
Max CO2	ppm	950
		06-06-04
		14:10:00
Av CO2	ppm	650
Max CO	ppm	12
		06-06-04
		15:30:00
Av CO	ppm	06

## 7. WHEN YOU FINISH USING THE ANALYSER

Always try to switch the analyser off in fresh air .

The analyser counts down from 30 before switch off with the pump running to self clean its sensors. If the measured CO level is more than 30 ppm do not switch off the analyser. It will need to sample fresh air until the CO level falls below 30 ppm. This extends the sensor's life and helps to eliminate any unwanted offset on next start-up.

## 8. PROBLEM SOLVING

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

<b>Fault symptom</b>	<b>Causes / Solutions</b>
<ul style="list-style-type: none"><li>• Batteries not holding charge.</li></ul>	<ul style="list-style-type: none"><li>• Batteries exhausted.</li><li>• AC charger not giving correct output.</li><li>• Fuse blown in charger plug.</li></ul>
<ul style="list-style-type: none"><li>• Analyser does not respond to gas</li></ul>	<ul style="list-style-type: none"><li>• Particle filter blocked.</li><li>• Probe or tubing blocked.</li><li>• Pump not working or damaged with contaminants.</li><li>• Water Trap Bung not fitting tightly.</li><li>• Sensor fault</li></ul>

## TROUBLE SHOOTING

*I have set the analyser to AUTOLOG but it has stopped logging:*

- Memory might be full
  - Menu
  - Memory
  - View ..... displayed number is last log number. 255 is full
- PUMP is OFF
- Analyser is PRINTING

***Display is totally clear or totally dark***

- Set the rotary dial to MENU switch on and leave unit for five minutes.
  - Press UP **three** times (listen for three beeps) then press ENTER
  - Press and hold down UP until the display becomes visible again (this can take up to 20 seconds). Use UP and DOWN to adjust the display's contrast.
  - Press ENTER to exit.

***The analyser continually beeps and the display has frozen.***

- You have exited a menu function without completing the required sequence.
  - Rotate the dial back to MENU
  - Press ENTER until MENU appears on the top line
    - (NB You may be changing settings when you do this)
  - Rotate the dial to the required display position.

***The unit will not turn off.***

- Do not hold down the on/off button.
  - Try connecting the charger.

## **9. ANNUAL RECALIBRATION AND SERVICE**

Although sensor life is typically more than two years the analyser should be re-calibrated and serviced annually to stop any long-term sensor or electronics drift or accidental damage.

Local regulations may require more frequent re-calibration.

### **SERVICE MODE**

This mode can be selected from MENU and gives password protected access to certain functions **WARNING: entering inappropriate codes may corrupt the calibration of this instrument.**

The User level pass code to view software issue is 1111

## 10. SPECIFICATION

Parameter	Resolution	Accuracy*1	Specified Range	Over Range
<b>Gas Measurement</b>				
Carbon Monoxide	1 ppm	+/-5 ppm <100ppm +/-5% > 100ppm +/-10% >1000ppm	1000 ppm	2000ppm
Carbon Dioxide	1 ppm	+/-20ppm <400ppm +/-5% < 4000ppm +/-10% >4000ppm	200 to 4000 ppm	9999ppm
<b>Dimensions</b> Weight Handset		1kg / 2.2lb 200mm / 7.9" x 45mm / 1.8" x 90mm / 3.5"		
<b>Ambient Operating Range</b>		+0°C to +45°C / 32-104°F 10% to 90% RH non- condensing		
<b>Battery Life</b>		6 hours from full charge and with pump on		
<b>Battery Charger (standard type trickle charger)</b>		Input: 100 - 240 V ac 50 - 60 Hz Output: 12V dc. @ 800 mA. Max.		

\*1 Using dry gases at STP with the instrument not subjected to sudden changes of temperature, position or severe vibration

## 11. 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, and radio transmitting devices which may not be covered by this Directive, they may emit excess electromagnetic radiation levels and, occasionally, it may be appropriate to check the analyser before use by:

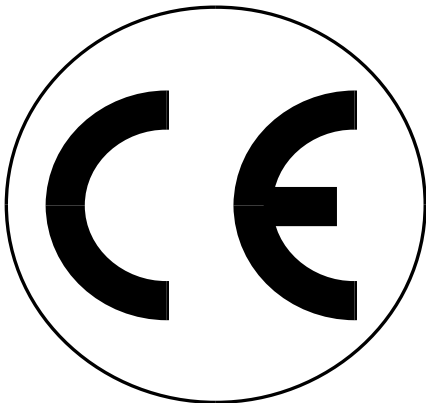
Use the normal start up sequence in the location where the analyser will be used.

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

At the time of writing this manual (December 2004) we 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

EN 61000-6-1

and is certified to be compliant

Specification EC/EMC/KI/KANE 100 details the specific test configuration, performance and conditions of use.

## APPENDIX

### Carbon Monoxide:

Current World Health Organisation recommended maximum exposure levels to Carbon Monoxide:

15 minutes	89ppm	≡	100mg/m <sup>3</sup>
30 minutes	53ppm	≡	60mg/m <sup>3</sup>
60 minutes	27ppm	≡	30mg/m <sup>3</sup>
8 hours	9ppm	≡	10mg/m <sup>3</sup>

### Carbon Dioxide:

HSE Regulation EH40 sets the maximum occupational exposure limit at 5000ppm.

BSRIA recommend a maximum of 800ppm over an eight hour time weighted average.

ASHRAE (62/99) recommends a maximum level of 1000ppm.

Data on ambient CO<sub>2</sub>:

NOAA observatory

(US. National Oceanic and Atmospheric Administration)

<http://www.cmdl.noaa.gov/ccgg/insitu.html>

<http://www.cmdl.noaa.gov/ccgg/iadv/>