

SGA91

Single Gas Analyser (Carbon Monoxide) Operators Manual

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Issue 16179/3, June 1996

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USI 8030 SW NIMBUS AVE.
BEAVERTON, OR 97008
TEST INSTRUMENTS



SAFETY WARNING

The gases that the Kane-May SGA family of analysers are designed to sample are injurious to health, even at relatively low concentrations.



In the interest of safety the equipment and sampling procedures described in this manual should only be undertaken by competent trained personnel after due consideration of the potential hazards.



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1. Introduction

The Kane-May 91 Series Single Gas Analyser (SGA91) is a portable, battery powered, toxic gas monitoring system. Applications of the SGA91 are two fold. The basic instrument and probe allow for 'sniffing' around boiler flues and general areas where higher than normal levels of toxic gases are suspected. The measurement of levels of toxic gas in flues can also be made.

Features include:

Rugged instrument casing with protective rubber sleeve.

Continuously updating display with switchable backlight.

Fast response electrochemical sensor.

Quick fit gas connector.

Standard probe for 'sniffing' with an in-line filter for use in boiler flues.

Note: It is recommended that the maximum continuous sampling time direct from a flue be limited to 30 minutes - always providing there is no water build up in the tubing (see section 3.1).

For optimum sensor life a fresh air purge of 10 minutes or so should follow.

2. Checks and Zeroing

- Ensure the batteries are correctly inserted as detailed in section 4.2.
- Check the probe filter and replace if necessary as shown in section 4.3.
- Ensure there is no water present in the probe tubing (especially between the instrument connector and the filter). Drain any water from tubing and allow to dry before use.
- Turn the POWER switch to ZERO & STANDBY and allow the display to settle (This will typically take 2 minutes).
- Once the display has settled as above, move the ZERO ADJUST until the display shows 000 ± 1 ppm. The zero adjust control is located at the top of the instrument on the panel where the probe attachment is located.

Note: Zeroing must be performed in fresh air, remove from any flue or toxic area.

- If you are conducting a series of measurements leave the instrument switched to ZERO & STANDBY until complete. (See next section Taking Measurements for methods of sampling).

3. Using the SGA91

3.1. Probe connection and uses

Attach the probe using the quick fit connector on the top of the instrument.

- The standard probe is suitable for use in general applications, confined or cramped spaces, room air analysis, grilles, diffusers, furnace heat exchangers emissions analysis.

Note: Do not insert the flexible tubing into a flue or furnace.

- The probe is also used for boiler, furnace and hot water heater emission analysis.

Caution! Handle of probe may become hot if left in flue for long periods, carefully remove and allow to cool.

Note: If condensation is observed within the clear hose do not allow to build up to a point where it would enter the gas inlet connector of the instrument. Disconnect, drain and allow to dry.

3.2. Taking measurements

Ensure the instrument has been correctly zeroed as in 2.0 and the POWER switch is on ZERO & STANDBY.

Place the probe in the space required to measure gas. Move the POWER switch to ON, this will activate the pump allowing gas to be drawn into the instrument.

Allow the display to stabilise and take the reading as indicated below.

123

Gas reading.

The LCD shows the level of the gas concentration in parts per million (ppm). The display above shows a reading of 123 ppm.

If the gas concentration exceeds 1999 ppm the display will show a '1' as indicated below.

1

Over-range reading.

To clear this condition the instrument should be vented in fresh air until the display reading returns to zero. If the display does not return to zero (± 2 ppm) but stabilises at a higher reading, perform zeroing procedure as in Section 2.

Once measurement is taken, remove the probe from the space, leave the instrument ON to allow it to clear any gas taken in the sample. Allow the display to settle to normal.

Return POWER switch to ZERO & STANDBY to prolong battery life.

Repeat process for additional readings.

Before switching the unit off, purge with fresh air for two minutes.

4. Additional Features and Information

4.1. Using the backlight.

The backlight can be used at any time simply by moving the BACKLIGHT switch to ON.

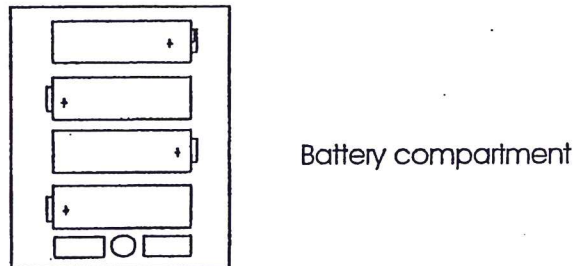
Note: It is advisable not to use the backlight unless necessary because this will considerably reduce the life of the batteries.

4.2. Battery indicator and changing batteries.

If the BAT symbol appears on the display (as shown below) the batteries should be replaced as soon as possible. The instrument will still function but the readings given may be inaccurate.



To change batteries, remove the cover located on the back of the instrument. Install four 'AA' size batteries as illustrated below, ensure correct polarity. Alkaline batteries are recommended.



4.3. Particle filter replacement

The in-line filter in the probe's tubing prevents excess dirt and water vapour reaching the instrument. If it appears wet or dirty replace with recommended part (Filter AF10).

Note: When using the **SGA91** to measure carbon monoxide in flue gases where the fuel is heavy oil or coal, it is recommended that the SF11 sulphur filter is used in place of the AF10. This will prevent the early depletion of the sensor's integral sulphur filter and thus prolong the sensors life.

Remove the tubes from both ends of the filter.

Replace with new filter, do not use any lubricant and ensure arrow points towards the instrument.

4.4. Electromagnetic Compatibility

The European Council Directive 89/336/EEC requires that electronic equipment does not generate electromagnetic disturbances that exceed defined levels and has an adequate level of immunity to enable it to be operated as intended. The specific standards applicable to this product are detailed in the appendices.

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

Go through the normal start up sequence in the location where the equipment is to be used. Switch on all localised electrical equipment that might be capable of causing interference.

Check that all readings are as expected. (A level of disturbance in the readings is acceptable). If not adjust the position of the instrument to minimise interference or switch off, if possible, the offending equipment for the duration of the test.

At the time of writing this manual Kane International Ltd is not aware of any field based situation where such interference has ever occurred and this advice is only given to satisfy the requirements of the Directive.

5. Suggested Safety Check List

This is for guidance only and its applicability must be reviewed in the light of local circumstances and regulations.

- Ensure that the calibration of the instrument is regularly checked. Annual calibration is recommended by an approved service centre.
- Always re-zero the instrument where you can be sure that the ambient level of the gas being sampled is extremely low
- Always replace flue access cover and check to ensure it is properly sealed.
- When sampling from a flue always ensure a good seal around the probe otherwise ambient air may be drawn in and an erroneous sample taken.
- If sampling very high draught flues ensure that the pump draw is sufficient to overcome the high draught.
- Do not operate the instrument outside its rated specifications.
- Operation of the instrument when low battery indication is displayed may give false readings and be suspect to errors.
- For maximum sensor life ensure that no condensate enters the instrument. If you see moisture building up in the sampling hose stop testing and dry out the hose.

Note: The instrument is designed for sampling very hot flue gases for short periods only.

- Remember that any condensate may be acidic so take care not to allow it to touch your skin. If condensate touches skin rinse thoroughly with cold water and seek medical attention.
- If moisture droplets appear at the gas exhaust outlet at the base of the instrument, disconnect the sampling hose at the top of the instrument and allow ambient air to be sucked through until moisture disappears. Take care to wipe off any droplets with a clean rag and dispose of immediately.



6. Specifications

Kane-May SGA91 Carbon Monoxide Single Gas Analyser:

Range (ppm):	CO 2000
Accuracy:	5% of reading
Battery Type:	4 x AA cells (Alkaline preferred)
Battery Life:	6 hours on Alkaline batteries (continuous use without backlight)
Sensor Type:	Electrochemical cell type
Sensor Life:	Typically 2 years (Guaranteed 1 year)
Display:	4 digit LCD 1 inch high digits
Zero control:	Situated on the top of the instrument
Low Battery:	Automatically indicated on LCD
Operating temp:	+32°F to +105°F (0°C to 40°C)
Operating RH:	10 to 90% non condensing
Response time:	(90%) Typically 30 seconds
Gas Flow Rate:	Approx. 40cu inches/min (0.7 litres/min) @ S.T.P
Gas Inlet:	Via quick fit couplings
Case Details:	Rugged case Three position power switch - on/standby/off. Two position backlight switch - on/off. Protective rubber sleeve.

Probe Specification:

¼ inch (6mm) stainless steel shaft with quick fit coupling.
Particle filter Part No. ~~AF10~~ *AF9*
9ft (approx.) clear polyurethane tubing.
Quick release instrument coupling.
Maximum allowable probe temperature +1100 °F (600°C).

CAUTION! *do not allow handle to become too hot.*

FACTS ABOUT CARBON MONOXIDE

Carbon Monoxide (CO) is a colourless and odourless toxic gas that is a product of incomplete combustion. When CO is introduced to the bloodstream through the lungs, it is accepted in place of oxygen at a rate of 300:1 and literally suffocates its victim. Since CO is an accumulative and direct reacting toxin, it can be dangerous even at low levels over longer periods of time. The harmful effects of CO inhalation depends on the following factors:

1. Concentration of CO in the air.
2. Length of time exposed to CO gas
3. The health, age, sex and size of the individual being exposed.

The following chart shows the maximum allowable exposure limits and symptoms developed for CO inhalation.

Concentration of CO in air	Inhalation times and toxic symptoms
9ppm	The maximum allowable concentration for short term exposure in a living area according to ASHRAE
35ppm	The maximum allowable concentration for continuous exposure in any eight hour period, according to federal law.
200ppm *	Maximum concentration allowable at any time according to OSHA. Slight headaches, fatigue, dizziness, nausea after 2-3 hours
400ppm	Frontal headaches within 1-2 hours, life threatening after 3 hours. Maximum allowable limit in flue gas according to EPA and AGA.
800ppm	Dizziness, nausea and convulsions within 45 minutes. Unconsciousness within 2 hours. Death within 2-3 hours
1600ppm	Headache, dizziness and nausea within 20 minutes. Death within 1 hour.
3200ppm	Headache, dizziness and nausea within 5-10 minutes. Death within 30 minutes.
6400ppm	Headache, dizziness and nausea within 1-2 minutes. Death within 10-15 minutes.
12,800ppm	Death within 1-3 minutes.

* Note: Exposure to this concentration and higher, the effects can vary depending on size, age, sex and health.

PRODUCT APPLICATIONS

SGA91KIT - CARBON MONOXIDE ANALYSER

- Residential and Commercial market ambient air monitoring.
- Source investigation in areas where CO monitors have alarmed.
- Part of an Indoor Air Quality (IAQ) Service.
- Flue testing in residential and small commercial boilers.
- Safety checks within furnace.

Note: The SGA91Kit alone is not a discernible test for cracks in heat exchangers. Carbon Monoxide detected within the furnace can be caused by a number of factors including poor burner condition, flue blockage, negative pressure within the home, poor fuel quality and cracked heat exchangers.

North America: Use the American Gas Association (AGA) approved method when testing for cracks in heat exchangers.

CAUTION!

The concentration of CO measured is accurate at the time of testing. After the conclusion of the test, conditions can change that may directly affect the CO concentration level within the tested area. Make sure to note the time and date the testing was performed on your service work order.

ELECTROMAGNETIC COMPATIBILITY



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

EN 50081-1

EN 50082-1

and is certified to be compliant

Specification EC/EMC/KI/SGA91 details the specific test configuration, performance and conditions of use.

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Issue 16179/3, June 1996

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SGA91 CALIBRATION KIT USERS GUIDE

EQUIPMENT INCLUDED IN THE KIT

The kit consists of three components :

1. Bottle of 100ppm Carbon Monoxide calibration gas (Figure 1 A below)
2. 1st stage regulator with 0 to 300 psi gauge (Figure 1 B below)
3. On demand regulator (Figure 1 C below)

This kit contains sufficient gas for 3 to 5 calibrations.

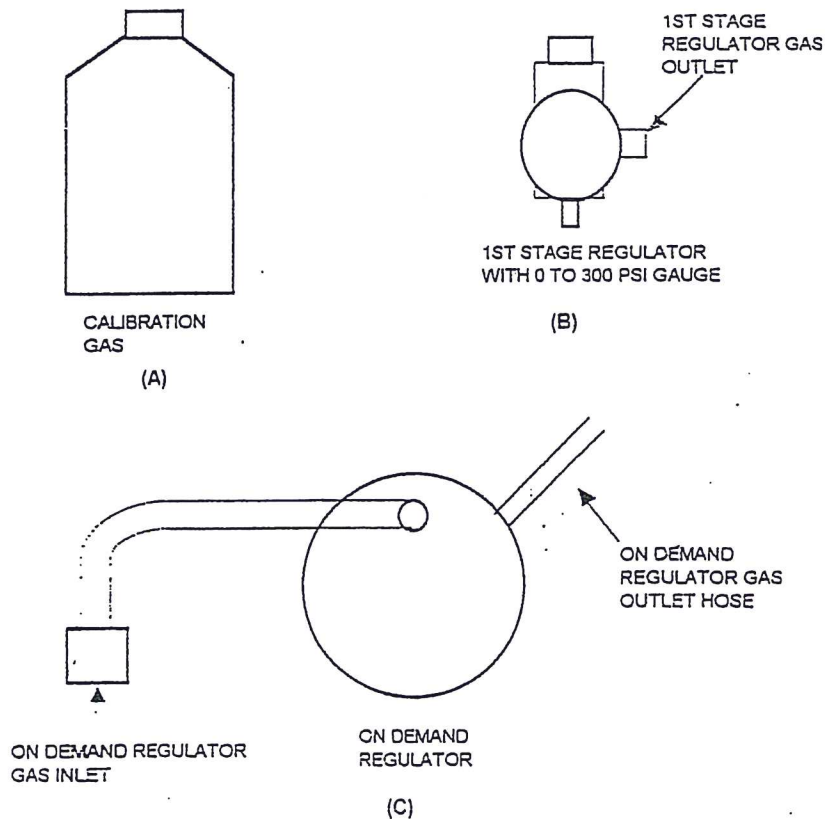


FIGURE 1

ASSEMBLY OF THE CALIBRATION KIT

1. Attach the 1st stage regulator to the bottle of calibration gas. This is accomplished by screwing the regulator onto the neck of the bottle until it is snug.

NOTE : Before proceeding to the next step, verify there is at least 75 psi pressure reading on the 1st stage regulator. If the pressure is below 75 psi, there may not be enough gas to complete the calibration procedure.

Replacement gas cylinders, part number CMO159, are available through your UEI distributor.

2. Connect the on demand regulator gas inlet to the 1st stage regulator gas outlet. This is accomplished by screwing the brass gas inlet fitting onto the threaded outlet of the 1st stage regulator until it is snug.
3. DO NOT connect the on demand regulator gas outlet hose to the SGA91 at this time.

See figure 2 below for an example of a fully assembled calibration kit.

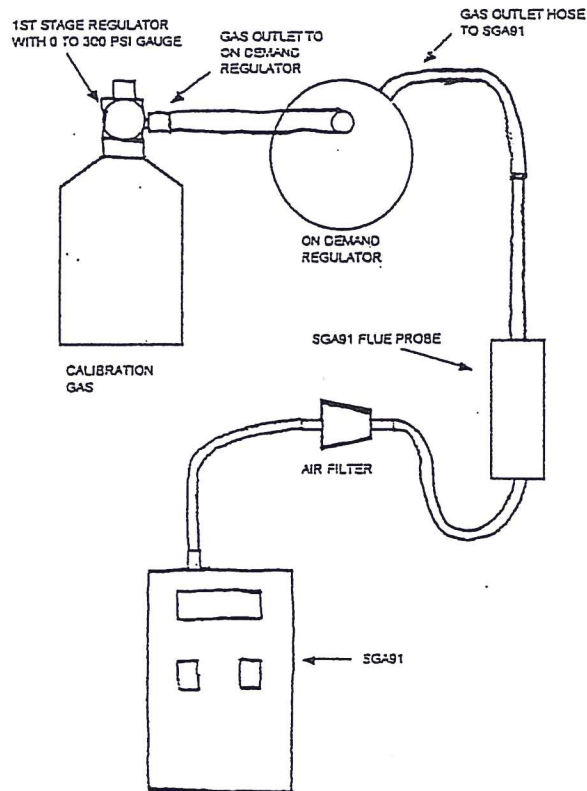
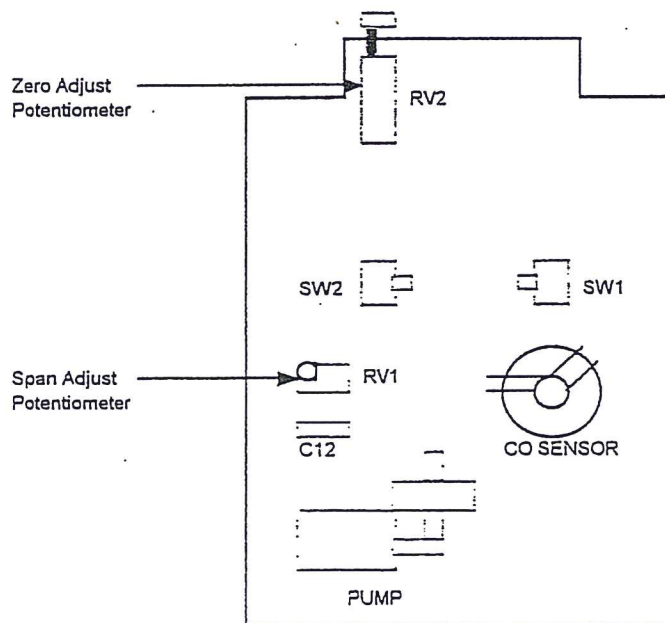


FIGURE 2

CALIBRATION PROCEDURE

1. If your SGA91 has a protective rubber boot, remove it at this time. Remove the two screws in the top casing on the SGA91. Depress the plastic tabs on the top and separate the front and back housings.
2. Connect the flue probe to the SGA91. (See page 2 figure 2)
3. Slide the SGA91 switch to the "ON" position. Allow the meter to stabilize and adjust RV2 until the display reads "000". (See figure 3 below)
4. Connect the on demand regulator gas outlet hose to the flue probe. (See page 2 figure 2). Leave this hose connected until step 5.
4. Allow the reading on the SGA91 to stabilize. Using the screw driver supplied, adjust RV1 until the reading on the SGA91 is 100ppm. (See figure 3 below)
5. Disconnect the on demand regulator gas outlet hose from the flue probe. It will take 10 to 20 minutes for the SGA91 to fully purge and return to zero. Leave the SGA91 pump turned on for this entire time.
6. Disassemble the SGA91 calibration kit and store all pieces in the carrying case.

The calibration is complete.



SGA91 Circuit Board
(Component Side)

FIGURE 3