

INSTRUCTION MANUAL

SENSIT[®] CO

Carbon Monoxide Analyzer

Read and understand instructions before use.





Approved UL913, For Class 1, Division 1, Groups C & D hazardous locations when used with alkaline or NiMH batteries.


Warning: To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.



FOR YOUR SAFETY

NOTICE:  **CAUTION:** This safety symbol is used to indicate a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

 **Warning:** To prevent the risk of ignition of flammable atmospheres, batteries must only be changed in an area known to be non-hazardous.

 **Warning:** To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

Do not mix batteries of different age or type.

CARBON MONOXIDE EXPOSURE STANDARDS AND HEALTH EFFECT CHART

LEVEL	EFFECT
0 ppm	Desired level - No Effect
9 ppm	Acceptable level in a living space*
50 ppm	Maximum level for continuous exposure in any 8 hour period
400 ppm	Frontal headaches in 1 to 2 hours, life threatening after 3 hours
800 ppm	Nausea and convulsions, death within 2 hr.
1,600 ppm	Nausea within 20 min., death within 1 hr. **
12,800 ppm	Death within 1-3 minutes**

* Always consider outdoor ambient conditions

** Health effects can vary significantly based on age, sex, weight and overall health.

TABLE OF CONTENTS

Preparation

For Your Safety.....	ii
Table of Contents.....	3-4
Parts and Accessories.....	5
General Description.....	6
Product Specifications.....	7
Product Features.....	8-10

Basic Operation

Battery Installation/Replacement.....	11
Operation and Use	12-14
Calibration Check	15

User Menu

User Menu / Function Descriptions	16
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User Menu Operation

Printing to Optional IR Printer.....	17
Power Off - Automatic Shut-Off	18

TABLE OF CONTENTS

User Menu Operation

Set Clock	19
Calibration Log: Show and Print Calibration Log.....	20
Session Log: Show and Print Session Log.....	21-22
Bump Test.....	23
Smart-Cal	24
O2 Test	25

Calibration

Calibration Notes	26
Preparing For Manual Calibration.....	26
Carbon Monoxide (CO) Calibration	27
Oxygen Sensor (O2) Test	28
Using The Smart-Cal Calibration Station.....	29
Warranty	Back Cover

PARTS AND ACCESSORIES

Standard Accessories (Included)

872-00001	Hard Carrying Case
883-00023	Hot Air Probe
360-00040	Wrist Strap
750-00013	Instruction Manual
310-00004	3”C” Alkaline Batteries
873-00017	External Hydrophobic Filter Assembly
873-00005	Dirt and Water Filter Assembly (Particle Filter)

Optional Accessories

870-00004	IR Printer
870-00039	IR Link Interface w/ SmartLink Software
914-00000-01	Smart-Cal Automatic Calibration Station

Calibration Kits

Contact us with instrument model number for correct Calibration Kit.

GENERAL DESCRIPTION

The **SENSIT® CO** is a hand held carbon monoxide analyzer. The base model is designed to provide part-per-million (ppm) readings of levels of CO within a range of 0-2000ppm.

The instrument is available with an optional oxygen sensor which provides the percent of oxygen in air within a range of 0-25% volume. Additionally, an Air-Free CO feature is available on the CO/O2 version. With this optional feature, the instrument will calculate the elevated levels of CO related to increasing oxygen levels detected in appliance flue gas emissions. This information is presented in PPM as “CF” on the display.

All model options can be specified at the time of ordering or base models can be upgraded by the factory or authorized service center with the required hardware and software additions.

The sensors are electrochemical, which can be field calibrated. The sensors have a renewable filter which reduces cross-sensitivity and are economical to replace. By using the supplied hot air probe the instrument can evaluate CO and O2 levels from appliance flues or vents.

The **SENSIT® CO** models can also be used as a personal monitor. The default factory alarm set point for carbon monoxide is 35ppm. The optional O2 sensor default factory alarm set points are less than 19.6% or greater than 23.5%. The display must be in view to determine the detected CO and O2 levels.

SPECIFICATIONS

PRODUCT SPECIFICATIONS

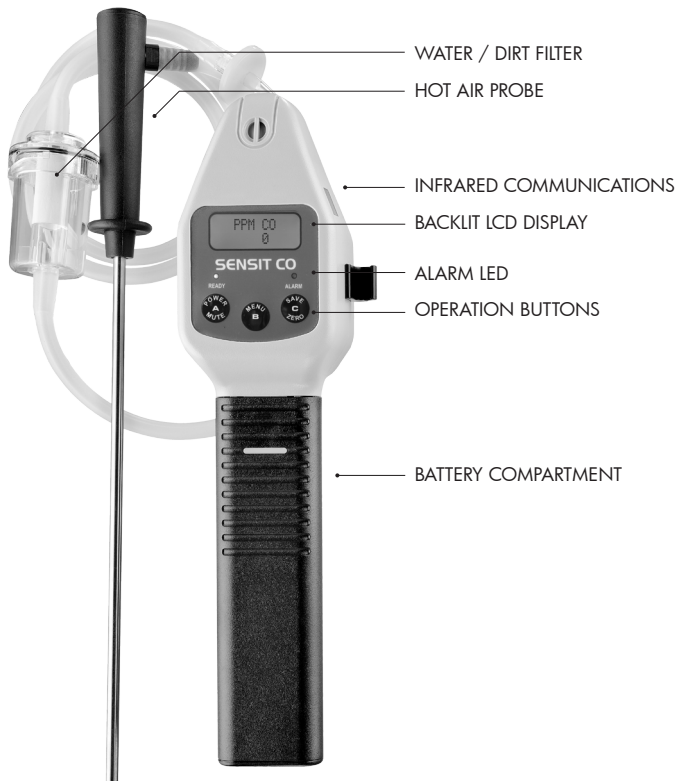
Power Supply:	3 "C" Alkaline Batteries
Sensor:	Long Life Electrochemical
Range:	0-2000ppm CO, 0-25% Oxygen for O2 model
Alarm:	35ppm CO, $\leq 19.5\%$ or $\geq 23.5\%$ Oxygen for O2 model
Alarm Range:	0-300ppm CO, 17.5% - 20.5% (low) for O2 model
Warm Up:	Less than 30 seconds
Response Time:	90% of reading < 60 sec.
Duty Cycle:	Preset at 60 Minutes, User Adjustable
Battery Life:	Approx. 30 Hours
Size:	3.5" x 12" x 1.6" (89 x 305 x 40 mm)
Weight:	1.3 lbs. (590 g), 1.55 lbs (703g) with Hot Air Probe
Probe Length:	11 Inches (27.64 cm)
Tube Length:	4 Feet (121.92cm)
Hot Air Probe:	700° F (371.11 celsius) @ 5 Minutes



Approved UL913, For Class 1, Division 1, Groups C & D hazardous locations when used with alkaline or NiMH batteries.

Warning: To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

PRODUCT FEATURES



PRODUCT FEATURES

SENSIT® CO instruments are constructed of high impact ABS plastic to withstand the rigors of field use. Incorporated in the hand grip area is the battery compartment.

All **SENSIT® CO** instruments models operate on “C” type alkaline batteries or NiMH (nickel metal hydride) batteries. The approved batteries are, PROCELL MN1400 Alkaline or equivalent and the PANASONIC HHR300CH NiMH battery or equivalent.

The two line LCD continually updates PPM CO levels for the base model, percent oxygen level is added for the CO/O2 model and PPM “CF” is included for the CO/O2/air-free CO model. Regardless of the model, all instruments display all data simultaneously on the LCD when in the work display.

All models use a diaphragm pump to draw in the air samples. Flow block, low battery power and sensor failure alert will appear on the LCD as needed.

Warning systems for the operator consist of one audible alarm, omitting a tone from the speaker on the back of the instrument and two visual indicators on the front. One is a red flashing LED alarm light, the other is a flashing gas or optional oxygen reading on the LCD when the instrument detects readings at the alarm set point. All alarms indicate simultaneously unless the operator chooses to use the audible alarm mute feature.

An infrared communication window is located on the right side to permit downloading of calibration data, data saved by the operator and communication with the Smart-Cal Calibration Station and PCI2s computer interface.

PRODUCT FEATURES

There are 3 operational button pads on the front of all models used for the following features.

BUTTON (A) POWER/MUTE

Turns the instrument ON/OFF, mutes audible alarm, exit menu items.

BUTTON (B) MENU

Enter customer menu.

BUTTON (C) SAVE/ZERO

Save data to on-board memory, manual zero of all sensors, scrolling in menu options.

BATTERY INSTALLATION/REPLACEMENT

Battery replacement is necessary when the display reads **BAT LOW**, an audible alarm sounds and the green ready LED flashes. When **BAT LOW** is displayed, the instrument has approximately 30 minutes of useful operation time prior to shut off.

 **CAUTION: Always change batteries in an environment free of combustible gases.**


Remove the battery sleeve cover by depressing the locking tab on the front of the handle with a coin or flat object and pulling the handle away from the top or display area of the instrument.

Place 3 approved batteries into the battery holder. For best results hold the battery compartment so that it lays in your right hand. With your left hand install the battery that goes toward the front first. The battery that is in contact with the rear spring second and finally insert the third battery in the center by forcing the second battery such that the spring compresses and allows the batteries to go into place. If you do not use your right hand to hold the bottom of the battery compartment the batteries can come out.

Observe the polarity markings on the inside of the battery holder. Improper installation will cause the instrument not to operate. Replace the battery sleeve and allow the locking tab to snap into position.

Check to be sure the handle is secure to the instrument body by gently pulling the handle away. The handle will remain firmly in place if a proper connection is made.

OPERATION AND USE

 **CAUTION: Always start your SENSIT® CO in a gas free environment to insure a proper zero.**


1. Push the POWER/MUTE BUTTON (A). The following start-up sequence will be displayed.
 - a. Product name and model version number
 - b. System check for proper pump and battery strength
 - c. Date and time
 - d. Serial number
 - e. Warm-up countdown, 10 seconds
 - f. “Autozero” zeroing all sensors (CO standard, O2 optional)
 - g. Work display (will vary depending on model version)
2. If the display fails to illuminate or BAT LOW is shown on the display, replace the batteries. There is room in the carrying case to keep an extra set.
3. If a sensor is past the intended calibration cycle, CAL DUE will appear during the start-up sequence. Calibrate the instrument before placing it in service. If calibration is unsuccessful, remove the instrument from service and consult the factory.
4. If the instrument detects an inoperable sensor an ERROR message will flash during the warm-up. The display will also show “FAIL”. Remove the instrument from service and contact the factory.

OPERATION AND USE

5. Prior to use, test a running instrument and hot air probe for air leakage. Air leaks can cause diluted samples, provide inaccurate readings and invalid tests.

First, block the inlet of the instrument with your finger for approximately 5 seconds. The display should read “FLOW BLOCKED” and a warning beep will sound if all seals are intact. This is a pass. However, if the flow block signals are not given, this is a failure and the instrument should be removed from service. Please consult the factory for repair.

If the instrument passes, attach the hot air probe to the instrument. The connection need only be finger tight and requires approximately 1/4 turn of the fitting. Next block the end of the probe. Within 10 seconds the display should read “FLOW BLOCKED” and the audible warning will sound. This is a pass. However, if the flow block signals are not given, this is a failure and the probe should be removed from service. Please consult the factory for repair.

 CAUTION: Do not handle the steel portion of any hot air probe during or too soon after sampling. It will become hot and retain heat and burns may occur!

6. When sampling or testing areas with elevated temperatures such as an appliance vent or flues, always attach and use the supplied hot air probe. Failure to use the approved probe can result in inaccurate readings or damage to the instrument and may void the warranty.

OPERATION AND USE

7. For models with the optional Air-Free CO calculation, the data will appear on the LCD in the form of PPM next to the “CF” designator. This calculation will only be presented when the oxygen level has dropped to 18.9% or less while sampling flue gas emissions.

NOTE: Air Free CO levels or CF readings are calculated by the instrument based on CO and O2 levels detected during flue gas sampling.

8. To disable or enable the audible alarm, press and release the POWER/MUTE BUTTON (A) .

9. To save any displayed readings, press and release the SAVE/ZERO BUTTON (C). The data saved can be viewed or downloaded later. Printouts are possible using the optional IR printer (#870-00004). See Menu operation for complete instructions.

10. When used in low light conditions, an automatic backlight will illuminate the display.

11. To turn the instrument off, press and hold the POWER/MUTE BUTTON (A) for approximately 5 seconds until “Power Down” appears on the display.

CALIBRATION CHECK

To verify the accuracy of **SENSIT® CO**, it must be exposed to a known concentration of test gas that will test any sensor combination included in your particular model.

Any sensor that does not meet the specifications listed in this manual may require calibration or repair. A calibration check does not update the calibration due date. Full calibration is required to update these times.

A calibration past due message will appear during warm-up if calibration has not been performed per your instrument setting. Anytime it is suspected the **SENSIT® CO** is not working properly, check calibration.

USER MENU

SENSIT® CO models have several categories within the User Menu:

- PRINT MENU:** Print session log (saved data), cal log (calibration data), access Smart-Cal communication.
- CALIBRATION:** Calibrate CO sensor and access Smart-Cal communication.
- POWER OFF:** Set the automatic shut off timer in minutes.
- SET CLOCK:** Set date and time.
- SHOW CAL LOG:** Display last valid calibration data.
- SHOW SES LOG:** Display saved sensor reading data with corresponding date and time.
- BUMP TEST:** Perform automatic test for response to minimum of 80% of 100 ppm CO calibration gas within 45 seconds.
- SMART-CAL:** Access automatic Smart-Cal communication.
- O2 TEST:** A 20 second test to confirm depletion of the O2 readings when exposed to the proper gas, such as 100% methane (only on models with optional oxygen sensors installed).

USER MENU OPERATION

PRINT MENU

From the working display access the menu by pressing & holding the MENU BUTTON (B) until the top line of the display reads USER MENU. The bottom line will read PRINT MENU. Press & release the MENU BUTTON (B) once to enter the menu.

Prepare the optional IR printer. Aim the IR window (on the right side of the instrument) at the IR window on the printer.

Press & release the SAVE/ZERO BUTTON (C) to scroll to the item you want to print. Press & release the MENU BUTTON (B) to print that item. To exit this menu, press & release the POWER/MUTE BUTTON (A) until the instrument returns to the working display.

CALIBRATION

See Calibration section on page 26.

USER MENU OPERATION

POWER OFF

From the working display access the menu by pressing & holding the MENU BUTTON (B) until the top line reads USER MENU and the bottom line will read PRINT MENU.

Press & release the SAVE/ZERO BUTTON (C) until the bottom line displays POWER OFF. Press & release the MENU BUTTON (B) once to enter the menu.

Press & release the MENU BUTTON (B) to decrease the minutes until automatic shut-off or press & release the SAVE/ZERO BUTTON (C) to increase the minutes.

NOTE: Setting this number to “0” will set the instrument to run continuously for as long as the battery power will permit.

Press & release the POWER/MUTE BUTTON (A) to save the selection. To exit this menu, press & release the POWER/MUTE BUTTON (A) once more.

USER MENU OPERATION

SET CLOCK

From the working display access the menu by pressing and holding the MENU BUTTON (B) until the top line reads USER MENU and the bottom reads PRINT MENU.

Press & release the SAVE/ZERO BUTTON (C) until the bottom line displays SET CLOCK. Press & release the MENU BUTTON (B) once to enter the menu.

The day will be the section flashing on the display. To change this section, press & release the MENU BUTTON (B) for adjustments. Press & release the SAVE/ZERO BUTTON (C) to advance to the next section (month, year or time).

Press & release the POWER/MUTE BUTTON (A) to save the selection. To exit this menu, press & release the POWER MUTE BUTTON (A).

USER MENU OPERATION

SHOW A CALIBRATION LOG

From the working display press & hold the MENU BUTTON (B) until the top line reads USER MENU, the bottom line reads PRINT MENU.

Press & release the SAVE/ZERO BUTTON (C) to scroll until the bottom line reads SHOW CAL LOG. Press & release the MENU BUTTON (B) once to enter the menu.

Calibration data will be displayed. The sensor which was calibrated will appear on the top line and the date of the last successful calibration will appear on the bottom line.

Press & release the SAVE/ZERO BUTTON (C) to scroll to view the next available sensor calibration data. After viewing the calibration data for the last sensor, the next scroll will return the display to the USER MENU. To exit this menu, press & release the POWER/MUTE BUTTON (A).

PRINT A CALIBRATION LOG

From the working display, press & hold the MENU BUTTON (B) until the top line reads USER MENU, the bottom line reads PRINT MENU. Press & release the MENU BUTTON (B) once to enter the menu. Press & release the SAVE/ZERO BUTTON (C) to scroll until the bottom line reads CAL LOG.

Prepare the optional IR printer. Aim the IR window on the right side of the instrument at the IR printer. Press & release the MENU BUTTON (B) to print the log. To exit this menu, press & release the POWER/MUTE BUTTON (A) to return to working display.

USER MENU OPERATION

SHOW A SESSION LOG

From the working display, press & hold the MENU BUTTON (B) until the top line reads USER MENU and the bottom line reads PRINT MENU.

Press & release the SAVE/ZERO BUTTON (C) to scroll until the bottom line reads SHOW SES LOG. Press & release the MENU BUTTON (B) once to enter the menu.

SESSION 1 will be displayed. This is the most recent data saved. Press & release the SAVE/ZERO BUTTON (C) to scroll to the session number you want to view.

Press & release the MENU BUTTON (B) once to enter that session's recorded day, month and time. Press & release the MENU BUTTON (B) once again to access the gas readings for that session.

Press & release the SAVE/ZERO BUTTON (C) to scroll to view the individual gas readings saved. Press & release the POWER/MUTE BUTTON (A) once to access a different session number.

Press & release the SAVE/ZERO BUTTON (C) to scroll to a new session number. The standard number of available stored sessions is factory set at 6 but is factory adjustable up to 100.

To exit this menu, press & release the POWER/MUTE BUTTON (A) to return to the working display.

USER MENU OPERATION

PRINT A SESSION LOG

From the working display, press & hold the MENU BUTTON (B) until the top line reads USER MENU and the bottom line reads PRINT MENU.

Press & release the MENU BUTTON (B) once to enter this menu, SESSION LOG will be displayed.

Prepare the optional IR printer. Aim the IR window, on the right side of the instrument, at the IR printer. Press & release the MENU BUTTON (B) to print the log.

Press & release the POWER/MUTE BUTTON (A) to return to the working display.

USER MENU OPERATION

BUMP TEST

From the working display, press & hold the MENU BUTTON (B) until the top line reads USER MENU and bottom line reads PRINT MENU.

Press & release the SAVE/ZERO BUTTON (C) to scroll until the bottom line reads BUMP TEST.

Prepare the appropriate certified gas mixture for your instrument model (see proper gas mixtures listed in the Calibration section).

Apply the gas to the instrument and press & release the MENU BUTTON (B) to start the BUMP TEST. The display will show the gas value being tested on the top line with registered gas value and a 45-60 second countdown on the bottom line. The instrument will automatically check the function of the CO sensor.

If sensor tested reads at least 80% of the value of the gas, within the time period required, the display will flash BUMP TEST PASS before returning to the USER MENU automatically. Press & release the POWER/MUTE BUTTON (A) to exit and return to the working display.

If any sensor fails, the display will show BUMP TEST FAILED. This means that calibration is required. If calibration is unsuccessful, remove the instrument from service.

Consult the factory in the event of any failure. To exit this menu, press & release the POWER/MUTE BUTTON (A) to return to the working display.

USER MENU OPERATION

SMART-CAL

From the working display, press & hold the MENU BUTTON (B) until the top line reads USER MENU and the bottom line reads PRINT MENU. Press & release the SAVE/ZERO BUTTON (C) to scroll until the bottom line reads SMART CAL.

Place the instrument into the cradle on the left side of the Smart-Cal Calibration Station. Attach the tubing from the station to the instrument. Press & release the MENU BUTTON (B), the display will show SMART CAL communicating.

Press & release the CALIBRATE button on the Smart -Cal and calibration will begin automatically. If successful, CALIBRATION PASSED will show on display.

If unsuccessful, CALIBRATION FAILED will show. Let the instrument clear and repeat the calibration process. If the instrument will not pass, remove the instrument from service. Consult the factory in the event of any failure.

Alternative methods to enter the Smart-Cal menu are:

1. Enter the USER MENU. Press & release the MENU BUTTON (B) once to enter the PRINT menu.

Press & release the SAVE/ZERO BUTTON (C), to scroll until the bottom line reads SMART-CAL. Press & release the MENU BUTTON (B) once to begin Smart-Cal communication.

2. From the working display, press & hold the POWER/MUTE BUTTON (A) for 2-3 seconds. The display will read SMART CAL communicating.

USER MENU OPERATION

O2 TEST

From the working display press & hold the MENU BUTTON (B) until the top line reads USER MENU and the bottom line reads PRINT MENU. Press & release the SAVE/ZERO BUTTON (C) to scroll until the bottom line reads O2 TEST.

Apply recommended gas mixture void of oxygen, such as 100% Methane or 100% Nitrogen and press & release the MENU BUTTON (B) to start the test. A 20 second countdown will begin.

If the sensor shows proper depletion within this period, PASSED will flash on the display. Press & release the POWER/MUTE BUTTON (A) to return to the working display.

If the O2 sensor does not respond properly within the 20 second test, FAILED will appear on the display. Remove the instrument from service. Consult the factory in the event of any failure.

Press & release the POWER/MUTE BUTTON (A) to return to the working display.

CALIBRATION

Calibration is the process of setting the readings of the sensors in the instrument to equal the value of certified calibration gases. Prior to calibration, allow the instrument to operate for 5 minutes in a clean air environment and conduct a manual zero of the instrument using the SAVE/ZERO (C) button.

NOTE: Using calibration kits other than recommended by SENSIT TECHNOLOGIES may cause inaccurate readings. Repairs are required if any sensor fails to calibrate. Consult SENSIT TECHNOLOGIES for details.

NOTE: When calibrating, the numbers shown on the display represent the numbers seen by the microprocessor and should not be confused with actual gas readings. These readings will update every 5 seconds during calibration.

CALIBRATION

The following instructions pertain to manual calibration of the Sensit CO models. If you are using the automatic Smart-Cal Calibration Station, the procedure is different. See the Smart-Cal sections of this manual or consult the Smart-Cal instruction manual.

CARBON MONOXIDE (CO) CALIBRATION (100PPM CO/AIR)

From the working display press & hold the MENU BUTTON (B) until the top line reads USER MENU.

Press & release the SAVE/ZERO BUTTON (C) once. The bottom line will read CALIBRATION.

Press & release the MENU BUTTON (B) once. The bottom line will read CO 100ppm. Apply 100ppm CO/Air calibration gas and press & release the MENU BUTTON (B) to start CO calibration.

When the reading is satisfactory, the display will flash DATA SAVED indicating that calibration is complete for that sensor. The date for CAL PAST DUE is automatically reset for that sensor as well.

Scroll with the SAVE/ZERO BUTTON (C) if you need to calibrate another sensor. When finished, remove and shut off the gas supply. Press & release the POWER/MUTE BUTTON (A) to return to the working display.

CALIBRATION

OXYGEN SENSOR TEST

To determine if the O₂ sensor is working properly, verify the sensors reaction by exposing it to a calibration gas void of oxygen, such as 100% methane or 100% nitrogen.

From the working display press & hold the MENU BUTTON (B) until the top line reads USER MENU. Scroll with SAVE/ZERO BUTTON (C) until the bottom line reads O₂ TEST.

Apply proper gas and press & release the MENU BUTTON (B) to start the test. A 20 second countdown will begin. If the sensor shows proper depletion within this period, PASSED will flash on the display. Press & release the POWER/MUTE BUTTON (A) to return to the working display.

If the O₂ sensor does not respond properly within the 20 second test, FAILED will appear on the display.

Consult the factory in the event of any failure. Press & release the POWER/MUTE BUTTON (A) to return to the working display.

NOTE: A calibration failure is indicated on the display by BAD CAL. Re-calibration should be attempted. Any instrument that does not accept calibration should be taken out of service. Please contact SENSIT TECHNOLOGIES for any needed repairs.

SMART-CAL CALIBRATION

USING THE SMART-CAL CALIBRATION STATION

From the working display press & hold the MENU BUTTON (B) until the top line reads USER MENU. Scroll with SAVE/ZERO BUTTON (C) until the bottom line reads SMART CAL.

Place the instrument into the cradle on the left side of the Smart-Cal Calibration Station. Attach the tubing from the station to the instrument. Press & release the MENU BUTTON (B), the display will show SMART CAL communicating. Press & release the CALIBRATE Button on the Smart-Cal and calibration will begin automatically.

If successful, CALIBRATION PASSED will be displayed on the instrument. If unsuccessful, CALIBRATION FAILED will show. Let the instrument clear and repeat the calibration process. If the instrument will not pass, remove the instrument from service. Consult the factory in the event of any failure.

Alternative methods to enter the Smart Cal menu are:

1. Enter the USER MENU. Press & release the MENU BUTTON (B) once to enter the PRINT menu. Press & release the SAVE/ZERO BUTTON (C) to scroll until the bottom line reads SMART CAL. Press & release the MENU BUTTON (B) once to begin Smart Cal communication.
2. From the working display, press & hold the POWER/MUTE BUTTON (A) for 2-3 seconds. The display will read SMART CAL communicating. Please see the Smart-Cal Calibration Station instruction manual for additional information.

WARRANTY

Your **SENSIT® CO** is warranted to be free from defects in materials and workmanship for a period of two years after purchase (excluding calibration and batteries). If within the warranty period, your instrument should become inoperative from such defects, the unit will be repaired or replaced at our option. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, accident, misuse, abuse, neglect or improper maintenance. Proof of purchase may be required before warranty is rendered. Units out of warranty will be repaired for a service charge. Internal repair or maintenance must be completed by a SENSIT TECHNOLOGIES authorized technician. Violation will void warranty. Units must be returned postpaid, insured and to the attention of the Service Dept. for warranty or repair.

This warranty gives you specific legal rights and you may have other rights which vary from state to state.

SENSIT Technologies
851 Transport Drive
Valparaiso, IN 46383