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**8500A  
Carbon Monoxide  
Analyzer**

Owner's Manual

## GENERAL INFORMATION



Thank you for purchasing a TIF8500A Carbon Monoxide Analyzer. The TIF8500A is a professional grade service tool for accurate measurements of Carbon Monoxide (CO) levels in any environment or application. The 0-10,000ppm range allows measurement of any area, including ambient, appliance surroundings and furnace flues.

The TIF8500A introduces an industry first, "Voice" feature which allows the unit to actually speak out the measured reading. Additional convenience features such as the large LCD readout, protective rubber "boot" and long search probe, permit operation in many areas in and around homes, offices and plant facilities.

Rapid response and high accuracy make this an ideal tool for Heating and Appliance contractors interested in ensuring safety and performance.

In order to gain the fullest benefits of your purchase, please carefully read and review the information in the following pages. If you have further questions, or need additional assistance, please contact the TIF Customer Service Hotline at 1-800-327-5060.

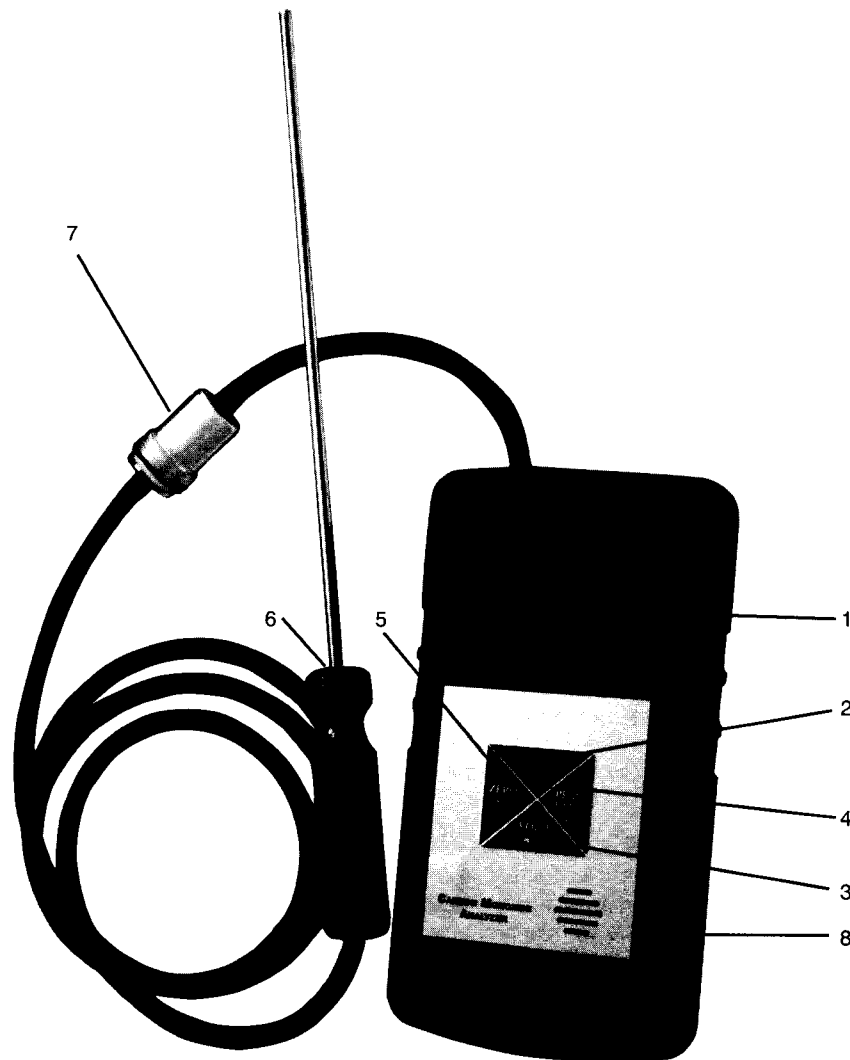
## FEATURES



- LCD Readout displays 0-10,000 parts per million (ppm)
- Voice feature allows audible readouts
- Proven electrochemical sensor technology
- Rapid warm-up
- High efficiency sample draw pump
- 15" (375 mm) Stainless steel flue probe with 5 foot (1.5m) hose and particulate/moisture filter
- Overage indication
- Low battery indication
- Cordless and Portable
- Multiple applications
- Rubber Boot protects unit and provides ergonomic package
- Two Year Warranty (One Year on Sensor)

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## PARTS & CONTROLS



1. LCD readout
2. ON/OFF key
3. Voice key
4. Peak Hold Key
5. Zero Key
6. Flue Probe
7. Particle/Moisture Filter
8. Headphone Jack

FIG. 1

# OPERATING INSTRUCTIONS



## SET UP PROCEDURE

**NOTE:** Refer to the Maintenance Section for battery installation or replacement.

1. Remove the unit and flue probe assembly from the foam packaging in the carrying case.
2. Connect the Flue probe to the rubber hose by inserting the hose into the handle of the probe.

ALWAYS CHECK THE FILTER BEFORE USE, IF THE ELEMENT IS BADLY DISCOLORED OR CONTAINS WATER, REPLACE THE FILTER (see Maintenance Section page 6). ALSO ENSURE THAT THERE IS NO MOISTURE IN THE SAMPLING HOSE OR PROBE.

3. Switch on the instrument with the Red On/Off key, and allow approximately 1 minute for the sensor to stabilize (reading no longer changes).
4. In clean air (i.e. outdoors) set the instrument to ZERO by pressing and holding the ZERO key for 3 seconds.

The instrument is now ready for use.

## PEAK HOLD FEATURE

The TIF8500A includes a Peak Hold Feature that will permit the capture of the highest (i.e. maximum) reading measured while the feature is activated. This is useful when there is rapid fluctuation in the reading, or when measuring in difficult to access areas.

To activate this feature:

1. Either before, or while, measuring, press the Peak Hold Key.
2. The word "MAX" will appear on the left of the display, and only the highest reading measured, since the feature was activated, will be displayed.
3. To return to normal, real time measurements, press the Peak Hold Key again.
4. The "MAX" will disappear from the display and actual measured values will be displayed. NOTE: the memory of the highest reading is erased each time the Peak Hold Feature is switched off.

## VOICE FEATURE

The TIF8500A includes an industry first "Voice Feature". This revolutionary feature makes the TIF8500A the world's first talking test instrument for the HVAC industry, and will permit audible readings in any environment.

The Voice Feature is in lieu of the traditional backlit display. The audible concentration readout can be heard under any condition, and allows you to know the readings even when you cannot see the instrument display.

Accessory headphones are included for privacy, or high noise areas. When the headphones are connected to the instrument jack, the standard speaker circuit is interrupted and the Voice is heard only through the headphones.

To use the Voice feature:

1. With the unit on and displaying a reading, press and release the Voice key.
2. The unit will say "Voice On" and then state the concentration; e.g. " 2 ppm".
3. As long as the Voice Feature remains activated the unit will state the measured value every five to seven (5-7) seconds.
4. To switch off the Voice Feature, press the Voice key. The unit will say "Voice Off" , and will no longer read-out measurements.

If the Peak Hold Feature is activated in conjunction with the Voice Feature, the unit will say ".Max" each time a reading is announced; e.g. "15ppm, Max". NOTE: As with the displayed value, only the highest reading (not necessarily the current reading is spoken).

If the measured reading exceeds 10,000ppm, the unit will state "Overrange".

## Multilingual Voices

The unit is also programmed to speak in languages other than English, based upon the country(ies) in which it is sold. The unit always defaults to English. To select another language:

1. With the unit on and displaying a reading, press and hold the Voice key until "English" is displayed.
2. Release the key, and press it again within 3 seconds to scroll through the available languages.
3. Press the key once again when the desired language is displayed. The unit will now speak in the selected language.
4. To return to English, or select another language, repeat steps 1-3.

## AMBIENT MEASUREMENTS

1. Enter the area to be measured with the unit powered on (and stabilized as described above in Set Up Procedures).
2. Place the probe near the center of the area to be measured.
3. Allow approximately 20 seconds for the sample to be drawn over the sensor and the reading to reach equilibrium.
4. If Carbon Monoxide is present the TIF8500A will display CO from 0-10,000 ppm.
5. In low light conditions activate the Voice feature (see page 4).
6. Move the probe to different locations, pausing slightly, to see if the reading changes in other parts of the area.
7. If a reading above 25ppm is obtained, then safety checks should be carried out to determine the reason, and then resolve problem.

## CHECKING FOR CO SPILLAGE

1. Follow the Set Up Procedure on page 4 before entering the area in which the appliance rests.
2. Allow the appliance that you are testing to operate for 10-15 minutes with all the windows and doors closed (to simulate poor ventilation).
3. Slowly move the probe around the sides, top, vents and above the radiants of the appliance for approximately 4-5 minutes (Remember it takes about 20 seconds for the pump to draw the sample over the sensor).
4. If Carbon Monoxide is present the TIF8500A will display CO from 0-10,000 ppm.
5. In low light conditions activate the Voice feature (see page 4).
6. If a reading above 25ppm is obtained, then safety checks should be carried out on the appliance to determine the reason, and then resolve problem.

## FLUE GAS MEASUREMENTS

1. Follow the Set Up Procedure on page 4 before entering the area of the flue.
2. To check the levels of CO within a flue, it may be necessary to make a small hole in the flue wall.
3. Place the probe into the flue. DO NOT INSERT THE PROBE HANDLE OR RUBBER HOSE INTO THE FLUE AT ANY TIME.
4. After approximately 20 seconds, if CO is present, the CO level will be indicated on the display. Allow approximately 1 minute for the reading to stabilize.
5. In low light conditions activate the Voice feature (see page 4).

- Should the readings indicate above 400ppm, a complete combustion efficiency test should be performed.

**CAUTION!:** The stainless probe will become quite hot when placed in the flue. Use care when removing the probe. Pay close attention to where the hot probe is placed when removed, and allow sufficient time for it to cool before storing. The probe handle may also become hot if left in the flue for extended periods.

## OVERRANGE INDICATION

If the unit is exposed to concentrations above 10,000ppm, "Overrange" will be displayed on the LCD, and heard if the Voice feature is activated.

## MAINTENANCE

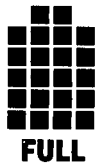


## BATTERY INSTALLATION/REPLACEMENT

The battery icon on the left hand side of the display indicates relative battery voltage (see Fig 2.). When the battery icon becomes empty, approximately 2 hours of operation remain. Replace the batteries as soon as possible when this occurs.

To install or replace batteries:

- Slide off the battery cover on the back of the unit as indicated by the embossed arrows.
- If applicable, remove the old batteries.
- Install 4 new or tested "AA" size batteries, carefully noting the polarity indications in the compartment.
- Replace the battery cover.



**BATTERY  
INDICATOR**



FIG. 2

## FILTER REPLACEMENT

If the disposable particle/moisture filter appears at any time to be dirty (anything other than a clean white), or contains signs of moisture or water, it must be replaced.

To replace the filter (See Fig. 3, page 7):

- Make certain you have a replacement filter before beginning. See the replacement parts section for part numbers.
- Remove the old filter by firmly grasping the filter with one hand and slowly pulling off the rubber hose from each end.
- Dispose of the old filter.
- Make certain there is no moisture or dirt in the hose before installing the new filter.
- Connect the new filter by firmly grasping with one hand and slowly sliding the rubber hose over the barb fittings on each end.

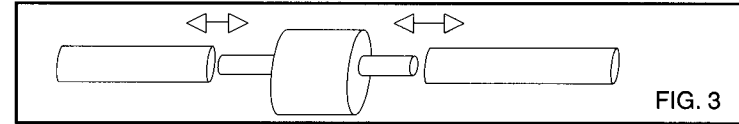


FIG. 3

## SENSOR FAILURE

In the event of a sensor failure, you will be unable to stabilize or zero the reading, and random, nonsensical numbers will be displayed. In this case, the sensor must be replaced. In any event, it is recommended that the sensor be replaced annually to ensure proper performance.

The sensor may be replaced in the field as described below. New sensors are calibrated with a high degree of accuracy. However, if desired, TIF offers a calibration service to certify accuracy; contact the factory at the toll-free telephone number on the back of this manual for pricing and return instructions.

### Sensor Replacement

(Refer to Fig. 4)

- Remove the unit from its protective rubber boot.
- Unscrew the four (4) Phillips screws on the back which hold the case together.
- Carefully separate the case halves, noting the wires connecting the two halves. Before touching the PC Board or components, make certain you are properly grounded; and take care not to disturb other components.
- Using both hands, press in the three (3) tabs holding the black plastic Sensor Cover onto the PC Board, and lift away the cover to expose the sensor.
- Remove the retaining spring clip by pushing away from the sensor.
- The sensor may now be lifted away from the PC Board. Dispose of the used sensor in accordance with local regulations.
- Remove the new sensor (P/N TIF8505) from its packaging.
- NOTE** that the sensor has three (3) small pegs on the bottom side. These are keyed so that the sensor fits onto the PC Board only one way. Locate the pegs into the corresponding holes, thereby positioning the sensor onto the Board.
- Replace the retaining spring clip by pulling back over the sensor.
- Replace the black plastic Sensor Cover, noting the correct position per the diagram on the board, making certain that the tabs snap into place on the Board.
- Carefully close the case halves, re-install the screws and replace the unit into its protective boot.

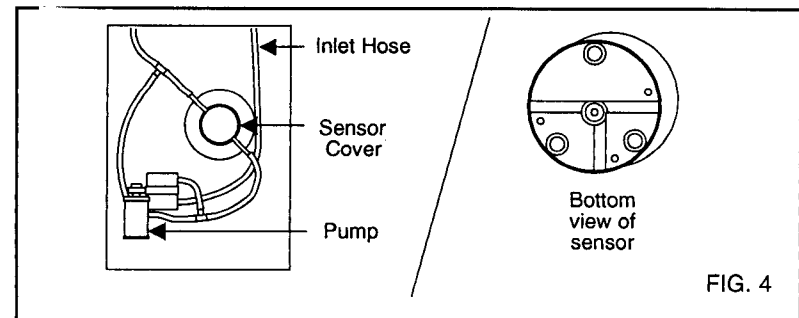


FIG. 4

## REPLACEMENT PARTS



Disposable Particle/Moisture Filter  
Flue Probe assembly, includes sample hose  
Replacement Sensor  
Protective Rubber Boot  
Replacement Sensor Cover and Tubing

**TIF8501**  
**TIF8502**  
**TIF8505**  
**TIF8506**  
**TIF8507**

## SPECIFICATIONS



**Range -** 0 - 10,000 ppm CO  
**Resolution -** 1 ppm  
**Accuracy -** +/- 5% of reading  
**Sensor -** Electro- Chemical  
**Sensor Life -** 2 years typically (One Year Warranty)  
**Response time -** 20-30 Seconds  
**Power Supply -** 4 AA Cells  
**Battery Life -** 35 Hours continuous use (without voice)  
**Ambient Operating Temp -** 0° to 49°C (32° to 120°F)  
**Probe -** 15" (375mm) Long with 5' (1.5 meter) Hose, including disposable cotton filter assembly.

## WARRANTY



This instrument has been designed and manufactured to provide unlimited service. Should the unit be inoperative, after performing the recommended maintenance, a no-charge repair or replacement will be made to the original purchaser if the claim is made within two years from the date of purchase. This warranty applies to all repairable instruments that have not been tampered with or damaged through improper use. This warranty does not cover batteries, sensor beyond one year, or any other materials that wear out during normal operation of the instrument.

Before returning your instrument for repair please make sure that you have carefully reviewed the Unit Maintenance section of this manual to determine if the problem can be easily fixed. Make sure that the batteries are working properly BEFORE returning the unit. If the instrument still fails to work properly send the unit to the repair facility address on the back cover of this manual. Repaired or replaced tools will carry an additional 90 day warranty. For more information please call (800) 327-5060.

## FACTS ABOUT CARBON MONOXIDE

Carbon Monoxide (CO) is colorless and odorless toxic gas which is a byproduct of incomplete combustion. CO is readily absorbed by the blood if present in the lungs, and will displace the oxygen, causing many harmful effects, including the possibility of death. In fact hundreds of people die each year as a result of CO poisoning.

The effect of CO is cumulative. Meaning that even exposure to small amounts over a period of time can be harmful. There are many standards defining allowable exposure levels to CO. A few of these, as well as the effects and symptoms at various points, are documented in the table below.

Concentration in Air	Symptom and, if applicable, Standard
9 ppm	Maximum allowable concentration in a living space per <b>ASHRAE Standard 62-1989</b>
25 ppm	Maximum limit for 8 hours of continuous exposure per <b>California OSHA</b> (Occupational Health and Safety Administration)
35 ppm	Maximum limit for 8 hours of continuous exposure per <b>US OSHA</b> (Occupational Health and Safety Administration)
200 ppm	Slight headache within 2-3 hours, dizziness, nausea also possible
400 ppm	Maximum concentration in flue gas per the <b>US EPA and AGA</b> (American Gas Association). Also frontal headache within 1-2 hours, life threatening beyond 3 hrs.
800 ppm	Headache, dizziness and nausea within 45 minutes, Unconsciousness within 2 hours and Death within 2-3 hours.
1600 ppm	Headache, dizziness and nausea within 20 minutes, Death within 1-2 hours.
3200 ppm	Headache, dizziness and nausea within 5-10 minutes, Death within 30 minutes.
6400 ppm	Headache, dizziness and nausea within 1-2 minutes, Death within 10-15 minutes.
12800 ppm	Death within 1-3 minutes.

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# TROUBLESHOOTING



Symptom	Possible Cause	Cure
Negative Readings	Improper Zero	Re-adjust Zero see page 4
Minus sign appears	Improper Zero	Re-adjust Zero see page 4
Erratic Readings	Sensor Failure	Replace Sensor see page 7
	Low Battery	Check Battery Indicator, see p.6
Unit will not Zero	Sensor Failure	Replace Sensor see page 7
	Zero key not held down long enough	Hold zero key at least 3 seconds, see p. 4
Non-zero reading in Fresh Air	Improper Zero	Re-adjust Zero see page 4
Readings do not change	Peak Hold Feature activated	Check and de- activate, see p.4
	Pump Failure	Return for Repair
Slow or no response	Dirty Filter/Clogged Hose	Replace Filter/Clean Hose, see page 6
	Pump Failure	Return for Repair
Voice Feature cannot be heard	Headphones connected	Unplug Headphones
Unit 'speaks' values different from those displayed	rapidly changing readings	Normal operation in such conditions