Model 8760/8762
IAQ-CALC™
Indoor Air Quality Meters

Operation and Service Manual

1980406, Revision H
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Model 8760/8762 IAQ-CALC™ Indoor Air Quality Meters

Operation and Service Manual

TSI®

Service Policy

Knowing that inoperative or defective instruments are as detrimental to TSI as they are to our customers, our service policy is designed to give prompt attention to any problems. If any malfunction is discovered, please contact your nearest sales office or representative, or call TSI's Customer Service department at (800) 874-2811 (USA) and 1 (651) 490-2811 (International).

CONTENTS

Chapters

Chapter 1

Unpacking and Parts Identification

Carefully unpack the instrument and accessories from the shipping container. Check the individual parts against the list of components in Table 1-1. If any are missing or damaged, notify TSI or your local distributor immediately.

Table 1-1: List of Components

Qty	Item Description	Part/Model
1	Model 8760 IAQ-CALC or	8760
	Model 8762 IAQ-CALC	8762
1	Carrying Case	1319114
4	AA Alkaline Batteries	1208013
1	Operation and Service Manual	1980406
1	Calibration Certificate for 8760	1083174
or	Calibration Certificate for 8762	1083175
1	Computer Interface Cable	8940
1	Downloading Software Disk	800832
1	Calibration Collar	801679
1	Sensor Probe Stand	1083134

Optional Accessories

The following table lists information for optional accessories for the IAQ-CALC.

Table 1-2: List of Optional Accessories

Qty	Item Description	Part
1	AC Adapter	
	115 V, NEMA-5	2613033
	230 V, European CEE 7/16	2613078
	230 V, Great Britain	800169
	240 V, Australian	2613106
1	Portable Printer	Contact TSI

Parts Identification
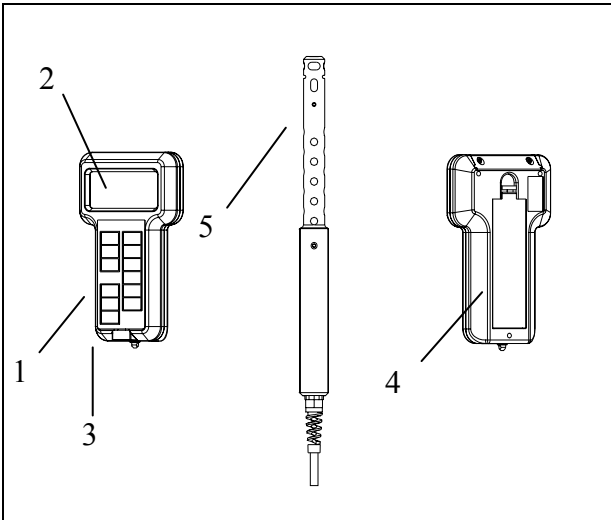
Figure 1-1: IAQ-CALC and Accessories

1. Keypad
2. Display
3. Printer Output/ Communications Port
4. Battery Access Cover
5. Sensor Probe

Chapter 2

Setting-Up

Supplying Power to the IAQ-CALC

The IAQ-CALC can be powered in one of two ways: four AA-size batteries or the AC adapter.

Installing the Batteries

Insert four AA batteries as indicated by the diagram located on the inside of the battery compartment. TSI ships the unit with alkaline batteries. Other batteries are not recommended because of low battery life and danger of battery acid leakage. At 15% battery life remaining, the battery light will indicate the batteries need to be changed.

Using the AC Adapter

The AC adapter allows you to power the IAQ-CALC from a wall outlet. When using the AC adapter, the batteries (if installed) will be bypassed. The AC adapter is not a battery charger.

Selecting the Display Units

The IAQ-CALC is capable of displaying the measured values in several different measurement units, as shown in Table 2-1.

Table 2-1: Choices of Measurement Units

DIP Switch Setting #5	Humidity Ratio and Absolute Humidity	Temp.	Dew Point/ Wet Bulb
OFF	lbs/lb and lbs/ft^3	°F	°F
ON	g/kg and g/m^3	°C	°C

If you wish to change the display units on your IAQ-CALC, see Appendix B for more detail on DIP Switch Settings.

Using the Sensing Probe

The sensing probe relies on the diffusion of air. For best results, try to keep the sensing probe surrounded by moving air.

Do not breathe on the probe, since humans exhale levels well exceeding 10,000 ppm CO_2 and it may take time for the probe to re-stabilize. TSI recommends using the probe holder when in continuous data logging mode.

Setting the Real-Time Clock

The IAQ-CALC has an internal clock that keeps track of the time (the format is HH.MM where HH is the hour in 24-hour format, and MM is minutes) and the date. It is very important to set the time and date correctly, otherwise, date and time stamping of recorded data will not be correct.

To set the time and date, press and hold either ▲ or ▼ keys during the power-up sequence when the time is displayed. Release the keys when the IAQ-CALC beeps twice. You will have an opportunity to view and/or change the minutes, hours, year, month and day in sequence. Use the ▲ or ▼ key to change any settings. Use the ENTER key to store each setting and advance to the next one.

Changing the Baud Rate

The IAQ-CALC has a variable baud rate that is used when downloading or printing data from the instrument. Increasing the baud rate will make downloading faster.

The instrument baud rate is displayed during the initial power up sequence. To change the baud rate, press and hold either ▲ or ▼ keys during power-up sequence while baud rate is displayed. Release the keys when the IAQ-CALC beeps twice. Use the ▲ or ▼ keys to scroll through the available values of 1200, 2400, 4800, 9600 and 19,200. Press ENTER to set the value that is displayed.

Connecting the Optional Portable Printer

To connect the portable printer to the IAQ-CALC, do the following:

1. Ensure that the IAQ-CALC and printer are off.

2. Locate the printer interface cable and connect the 9-pin end labeled **PRINTER** to the printer and the other end to the communications port on the IAQ-CALC monitor.

3. Turn on the IAQ-CALC; *then* turn on the printer.

Note: *Always turn on the IAQ-CALC before turning on the printer. If the printer prints question marks (??????), asterisks (******), or random characters, reset it by turning it off and then on again. If necessary, refer to the Portable Printer Manual.*

Connecting to a Computer

Use the Computer Interface Cable provided with the IAQ-CALC to connect the instrument to a computer for downloading data using LOGDAT or for remote polling. Connect the 9-pin end labeled "COMPUTER" to the computer COM port and the other end to the data port of the IAQ-CALC. A 9-pin to 25-pin adapter will be required if your computer has a 25-pin serial port connector.

For more information on how to download stored data see *Downloading Data to a Computer* section in Chapter 3. For polling instructions, see the following *Data Acquisition (Polling)* section.

> **Caution:** The data port of the IAQ-CALC is not intended for connection to a public telecommunications network. Connect the data port only to another RS232 port.

Data Acquisition (Polling)

The IAQ-CALC is designed to allow you to perform polling through the use of a computer. To do this, your computer must be connected and in terminal mode. The baud rate for the computer and the IAQ-CALC must be set to the same value. For details on viewing or changing the baud rate, see *Changing the Baud Rate* section in Chapter 2. You must send an upper case V to the instrument.

You must write your own routine (program) to obtain information at specific intervals from the IAQ-CALC. The meter will only send information when the SAMPLE key is pressed or after the computer has sent a "V" command to the IAQ-CALC.

CO$_2$ and CO Field Calibration Procedure

1. Turn the IAQ-CALC on and set the Barometric Pressure to the current Barometric Pressure. Be sure to use "station pressure" which may be available at the local airport. "Station pressure" is not corrected to sea level.

2. Turn the IAQ-CALC off and flip DIP switch #7 to ON.

3. Turn the IAQ-CALC on. It will flash "CAL" on the top row and beep intermittently.

4. Press and hold the CO$_2$ or CO key to begin the calibration procedure. The display will begin a countdown from 5 to 0. Release the key when the display reads 0. If the key is released too soon or too late, the instrument will go back to beeping and flashing "CAL". If you've done this step correctly, "ZerO" will appear on the display and the beeping will have stopped.

5. Slide the calibration collar onto the probe until it stops.

6. Install the regulator on the zero calibration gas tank and connect tubing from the regulator to the inlet fitting on the calibration collar.

7. Turn on gas flow.

8. Press and release the SAMPLE key to begin a zero calibration. The IAQ-CALC begins a countdown during the zero reading. The actual zero reading is taken in the last 10 seconds. When the countdown is completed, the display indicates "SPAN" and the span concentration.

9. Install the regulator on the span calibration cylinder and connect tubing from the regulator to the inlet fitting on the calibration collar.

10. Use ▲ and ▼ to adjust the concentration displayed on the IAQ-CALC to match the concentration on the span gas cylinder.

11. Press and release the SAMPLE key to begin a span gas calibration. The IAQ-CALC starts a countdown. When the countdown reaches zero, the instrument returns to the normal measurement mode.

12. With the gas still connected, observe the reading on the display. It should indicate the span gas concentration. If not, repeat the calibration.

13. If the displayed reading is accurate, remove the regulator and tubing.

14. Turn the IAQ-CALC off and flip DIP switch #7 to OFF (normal mode). The calibration is now complete.

CO Sensor Zero Calibration

1. Turn the IAQ-CALC off and flip DIP switch #7 to ON.

2. Turn the IAQ-CALC on. It will flash "CAL" on the top row and beep intermittently.

3. Press and hold the CO key to begin the calibration procedure. The display will begin a countdown from 5 to 0. Release the key when the display reads 0. If the key is released too soon or too late, the instrument will go back to beeping and flashing "CAL". If you've done this step correctly, "ZerO" will appear on the display and the beeping will have stopped.

4. Slide the calibration collar onto the probe until it stops.

5. Install the regulator on the zero calibration gas tank and connect tubing from the regulator to the inlet fitting on the calibration collar.

6. Turn on gas flow.

7. Press and release the SAMPLE key to begin a zero Calibration. The IAQ-CALC begins countdown during the zero reading. The actual zero reading is taken in the last 10 seconds. When the countdown is completed, the display indicates "SPAN" and the span concentration.

8. Turn the instrument off. The Zero calibration on the CO sensor is now complete.

Temperature and Humidity Field Calibration Adjustment
Temperature and humidity have a field calibration adjustment available. The temperature adjustment can add or subtract a number of degrees. The range is ±9.99°F (± 5.55°C). Calibration can be done in either °F or °C mode. Humidity adjustment adds or subtracts a constant percentage. The range is ± 12.0% relative humidity. The procedure for field adjustment is as follows:

1. Turn on the IAQ-CALC and set the Barometric Pressure to the current Barometric Pressure. Be sure to use "station pressure" which may be available at the local airport. "Station pressure" is not corrected to sea level.

2. Turn the IAQ-CALC off and flip DIP switch #7 to "ON." Turn the IAQ-CALC on again.

3. Press and hold the TEMP or HUMIDITY key to enter the calibration mode for that parameter. To enter the calibration mode for the RTD, make sure the RTD is plugged in. Toggle the TEMP key until "rtd" shows on the display, then press and hold the TEMP key.

4. The display will begin a countdown from 5 to 0. Release the key when 0 is displayed.

5. The top line of the display will show the adjustment number (factory setting is 0.0) and the bottom line will show the actual parameter reading. Use ▲ and ▼ to change the adjustment number and press ENTER to accept.

6. To make changes to other parameters, repeat procedure starting at step 3.

7. Turn off the instrument, flip DIP switch #7 to "OFF." Turn the IAQ-CALC on again.

Chapter 3

Operation

Keypad Functions
When pressing the keys on the keypad, the IAQ-CALC will beep to confirm the function. If you press a key and the IAQ-CALC does not beep, then the IAQ-CALC does not allow that function during the selected mode. The beep function can be turned off. See *Appendix B* for more detail.

WARNING!	Do **not** expose the sensing probe to excessive heat—it can damage the sensors and probe.

ON/OFF Key
Press the ON/OFF key to turn the IAQ-CALC on or off. When the instrument is first turned on it goes through a preprogrammed power-up sequence that includes an internal self-check (when all displayable items are shown). The IAQ-CALC displays percentage of battery life remaining (accurate for alkaline batteries only), percentage of memory available, baud rate, time (HH.MM) and barometric pressure. At this point, the IAQ-CALC will start measuring CO_2 and temperature.

If a problem is detected, the display will light "CAL" to indicate that it should be returned for servicing and calibration.

> *Note: To skip the start-up displays, press* ENTER *at any time during the power-up sequence.*

Arrow Keys (▲▼)
The two arrow keys are used to scroll through and select values as needed for IAQ-CALC functions. Press and hold either arrow key on the start-up sequence while baud rate, barometric pressure, or time is displayed to change the current setting.

ENTER Key
Press the ENTER key to accept a value or condition. In start-up mode, you can also press the ENTER key to skip the start-up sequence.

CO_2 Key
Press the CO_2 key to display CO_2 measurements (the IAQ-CALC will automatically start in CO_2 mode). Place the probe in the location where you want to make the measurement.

⚠	**C a u t i o n**
	The CO sensor in some models of TSI IAQ monitors may be adversely affected when exposed to isopropyl alcohol vapors released from TSI instruments utilizing condensation particle counting (CPC) technology. For maximum performance, keep CO sensors away from CPC-based instruments utilizing isopropyl alcohol.

TEMP Key

Press the TEMP key to view temperature from the main probe. Press the TEMP key again to toggle from reading temperature from the main probe to reading from the external temperature probe (if attached). The IAQ-CALC will display temperature readings in either degrees Fahrenheit (°F), or degrees Celsius (°C) depending on the DIP switch settings (refer to Appendix B).

HUMIDITY Key

Press HUMIDITY to display the humidity measurement on the top row of the display. Humidity can be read in % relative humidity, dew point, wet bulb, absolute humidity or humidity ratio. Press the HUMIDITY key to toggle through the available humidity readings until the desired reading is displayed.

Dew point and wet bulb will be measured in the units selected for temperature. Absolute humidity will read in either g/m^3 or lbs/ft^3 and humidity ratio will read in lbs/lb or g/kg depending on the DIP switch setting.

Absolute humidity and humidity ratio will display in scientific notation. The top line will display the number value and the bottom line will display the exponent value.

CO Key (Model 8762 only)

Press the CO key to read CO on the top line of the display.

%OA (Percent Outside Air) Key

The percent of outside air can be calculated using temperature or CO_2. Calculations of Outside Air are made using the following equations:

Using CO_2:
$$\%OA = (C_R - C_S) / (C_R - C_O) \times 100\%$$

where 　%OA 　= Percentage of outside air
　　　　C_R 　= Concentration CO_2 of return air
　　　　C_S 　= Concentration CO_2 of supply air
　　　　C_O 　= Concentration CO_2 of outside air

Chapter 3

Using Temperature:

$$\%OA = (T_R - T_S) / (T_R - T_O) \times 100\%$$

where %OA = Percentage of outside air
       T_R = Temperature of return air
       T_S = Temperature of supply air
       T_O = Temperature of outside air

The general procedure is to take a sample in each of four modes. The modes are return air, outside air, supply air and %OA. Pressing the SAMPLE key while in %OA mode will store all four sample values. You may use the ▲ and ▼ keys to move from mode to mode.

You may press TEMP or CO_2 at any time to move from calculating %OA from TEMP to CO_2 or from CO_2 to TEMP. You may press the %OA key at any time to exit back to normal sampling. Details on the procedure are as follows:

> *Note: You may press the %OA key at any time during the following procedure to exit without saving any data and to return to normal sampling.*

Press the %OA key once to put the instrument in **return mode**. To calculate %OA using temperature, press the TEMP key. The IAQ-CALC defaults to measuring %OA using CO_2 readings.

> *Note: The TEMP key may be pressed at any time during this procedure to begin using temperature for the %OA calculation.*

In **return air** mode, "RETURN" will appear on the display. The current temperature or CO_2 value will display on the bottom line of the display. Previously taken values will display on the top line or if this is the first time this mode has been used, "----" will display on the top line.

Press the SAMPLE key to take a sample once the reading has stabilized. Now the sampled value will display on the top line. If the sample is not acceptable or the reading is not yet stable, wait a minute and take another sample to overwrite the value on the top line. Once the top line value is acceptable, press the ▲ key to advance to outside air mode.

In **outside air** mode, "OA" will appear on the display along with the current reading on the bottom line. Previously taken values will display on the top line or if this is the first time this mode has been used, "----" will display on the top line.

Press the SAMPLE key once the reading has stabilized. The sampled value for outside air will display on the top line with the current reading on the bottom line. If the sample is not acceptable or the temperature is not yet stable, wait a minute and then take another sample to overwrite the value on the top line. Once the value is acceptable, press the ▲ key to advance to supply air mode.

In **supply** mode, "SUPPLY" will appear on the display along with the current reading on the bottom line and "----" on the top line. Previously taken values will display on the top line or if this is the first time this mode has been used, "----" will display on the top line.

Press the SAMPLE key once the reading has stabilized. The sampled value for outside air will display on the top line with the current reading on the bottom line. If the sample is not acceptable or the reading is not yet stable, wait a minute and then take another sample to overwrite the value on the top line. Once the value is acceptable, press the ▲ key to advance to %OA mode.

"OA%" will appear on the display along with the % outside air value. Press the SAMPLE key while in this mode to put *all four samples into memory*.

> **Note**: *"OA Err" means that the calculation does not make sense with the values stored. Retake all 3 measurements or use another parameter to measure %OA.*

To make changes to one of the other three readings without putting them to memory yet, press the ▲ or ▼ keys to review the values and press SAMPLE to overwrite values if necessary.

To make another % outside air calculation, make sure you pressed SAMPLE to save your current values. Then use ▲ and ▼ to review the measurements and take new samples for supply and return. If you suspect the outside air value has changed, you will have to retake that sample as well.

SAMPLE INTERVAL Key
The SAMPLE INTERVAL key is used to set the instrument to discrete or continuous sampling and to set continuous data logging intervals.

Use the ▲ or ▼ key to toggle from "dISC" for discrete data logging and "cont" for continuous data logging. Press ENTER to accept the choice.

If you chose "dISC," the instrument will return to normal operation.

If you chose "cont," then use the ▲ or ▼ key to scroll through the continuous logging interval choices, which are 5 s, 10 s, 15s, 20 s, 30 s, 1 m, 2 m, 5 m, 10 m, 15 m, 20 m, 30 m and 60 m. Press ENTER to accept the choice and return to measuring mode.

SAMPLE Key

Setting Data Storage Options

In this section the terms "On" and "OFF" are referred to. The following brief explanations may help to understand what function is being performed. "On" means that the parameter will record whenever the SAMPLE key is pressed whether or not the parameter is displayed. "OFF" means that the parameter will not record even if displayed while the SAMPLE key is pressed.

Press and hold the SAMPLE key to enter data storage options. Use ▲ or ▼ key to toggle between "On" and "OFF," then press ENTER to accept the setting.

If the setting for the optional secondary temperature probe or Resistive Temperature Device (RTD) is set to "ON," the RTD will data log when the RTD is plugged in.

Discrete Data Logging (Single Point Measurements)

Discrete data logging allows you to record single data points. The instrument must first be in discrete data logging mode (default). See *SAMPLE INTERVAL key* section above.

Press the SAMPLE key to take a sample. While the sample is being taken, "SAMPLE" will flash on the display along with the sample number for each displayed parameter. The sampling will last for five seconds. Then the IAQ-CALC will display the values that were recorded for each displayed parameter. If the data storage option was set to "OFF" then "----" will display for that parameter. See *Setting Data Storage Options* for details to set storage options.

Continuous Data Logging (Multiple Readings Over Time)

Continuous data logging allows you to record samples continuously. To get into data logging mode and to select a logging interval, see *SAMPLE INTERVAL key* section above.

Pressing the SAMPLE key once begins the sampling process. The instrument will flash "LOG" while in continuous data logging mode. After one logging interval has passed and whenever a sample is recorded, the

instrument will display "SAMPLE" briefly along with the log sample value. The instrument continues taking samples until you press the SAMPLE key a second time. One sample is taken every logging interval and each sample is an average over the entire logging interval.

The display will then scroll through the number of samples stored, test ID number, and sample average for that test ID. To see maximum, minimum, or individual data points, please see *STATISTICS (review data) key* section.

NEXT TEST (clear) Key

Press NEXT TEST (clear) to advance to the next test ID. If the current test ID does not have anything stored, it will not advance to the next test ID.

> *Note: UPPER CASE words on keys are the primary functions. Lower case words on keys are press and hold functions.*

The IAQ-CALC will automatically increment the test ID number under the following conditions:

- Turning off the IAQ-CALC (if there is stored data)
- Taking a continuous data logging sample
- Taking discrete samples after taking continuous sample
- Taking a %OA sample after a normal sample
- Taking a normal sample after taking a %OA sample

To clear the last sample, press and hold the NEXT TEST (clear) key and the display will begin a countdown from 5 to 0. Release the key at any time during the countdown *before* zero is displayed.

> *Note: Only the last sample recorded can be cleared. You cannot go back to a previous test ID and erase any of the values. You cannot add data to a previous test ID. Sample clear does not work in continuous data logging mode.*

To clear *all* memory, keep holding key during the countdown. Release the key *while 0 is displayed*. The display will beep twice and flash "CLEAR LOG."

> *Note: If you release the key* after *0 is displayed, it will not beep, and nothing will be deleted.*

STATISTICS (review data) Key

The STATISTICS (review data) key has two purposes. One is to view the statistics for the currently displayed parameter and the other is to review data for a particular test ID, including individual sample values.

To View Statistics

Press STATISTICS (review data) key to view statistics for the parameter currently shown on the display. The number of samples, test ID and finally the average will be displayed. Press STATISTICS (review data) again repeatedly (before the average disappears from the display) to toggle through maximum and minimum.

To Review Data

Press and hold STATISTICS (review data) key. The IAQ-CALC will beep twice. Release the key and the current test ID number will be displayed. Use the ▲ or ▼ key to select the desired test ID. Press ENTER to accept the test ID number. Use ▲ to view average, minimum, maximum, total number of samples, and individual sample numbers and values for the selected test ID. The samples will be displayed in the order that they were taken.

To view a different test ID, press STATISTICS (review data) again to return to test ID. Use ▲ or ▼ key to choose a new test ID, then press ENTER to accept the choice and continue as above to review the data.

To review data of a different measurement type, press the desired measurement type button while AVG, MAX, MIN, number of samples, or individual sample is being displayed. If there is no data for that measurement type, "-----" will be displayed. Press another measurement type key to view more data or press ENTER to return to measuring mode.

Printing Data Using the Portable Printer

If the optional portable printer is connected, the following will be printed while pushing the following keys:

- SAMPLE key:
  Top line— (sample #), sample value, units
  Bottom line—(sample #), sample value, units
- STATISTICS key:
  Top line— AVG (# samples), average value, units
  Bottom line— AVG (# samples), average value, units
- STATISTICS (again)
  Top line— MIN (#samples), min value, units
  Bottom line— MIN (#samples), min value, units

- STATISTICS (again)
  Top line— MAX (#samples), max value, units
  Bottom line— MAX (#samples), max value, units
- CLEAR (released before 0) "CLEAR LAST SAMPLE"
- CLEAR (released at 0) "CLEAR LOG MEMORY"

The value of the logging interval is transmitted when it is changed. In continuous logging mode, it prints the same as if you are pressing SAMPLE every logging interval.

To print everything in memory, press and hold the ENTER key. This will initiate a countdown from 5 to 0. When the display shows zero, release the key and everything in memory will print to the printer. If you release the key at any time other than 0 during the countdown, nothing will print.

> **Note**: In order to print, the baud rate on the IAQ-CALC must be set to the same as the printer. The default is 1200.

The data will print in a format such as 12345.67. If you desire, the IAQ-CALC can print in a format such as 12345,67 by switching DIP switch #8 ON. See Appendix B for DIP Switch Settings.

Downloading Data to A Computer

"LOGDAT" is a windows-based program from TSI designed to download the data stored in the memory of the IAQ-CALC to a computer. This data includes the test ID, measurement, unit of measure, flow area, and sample interval. This data is date and time stamped. In addition, the statistics for each test ID are provided. The file containing the downloaded data is sorted and tab delimited to allow it to be imported into a spreadsheet for further data analysis.

To install LogDat software, run the SETUP.EXE file on the LogDat distribution disc. Once you open the program, it is self-directing and provides all the necessary instructions for downloading data.

To download data from the IAQ-CALC, connect the supplied computer interface cable to the IAQ-CALC and to a computer serial port. Any serial port from COM1 to COM4 can be used.

Chapter 4

Maintenance

Sensor Probe
Periodically inspect the probe to ensure that it is clean. Dust and oil deposits on the sensor probe may affect the response time of the IAQ-CALC. To remove dust, blow it off with a gentle stream of air.

CO_2 Sensor
TSI recommends calibrating the IAQ-CALC monitor CO_2 measurement monthly to help ensure accurate readings.

CO Sensor
TSI recommends calibrating the IAQ-CALC monitor's CO measurement monthly to help ensure accurate readings. The CO concentration measurement is affected by changes in temperature and atmospheric pressure. Normal day-to-day variations due to local weather conditions have little effect. However, changes in altitude can cause more significant errors. For best accuracy, calibrate the IAQ-CALC monitor's CO measurement for your local conditions or if conditions change.

Recalibration
To maintain a high degree of accuracy in your measurements, TSI recommends that you return your instrument for annual recalibration. For a nominal fee, we will recalibrate the unit and return it to you with a NIST (US National Institute of Standards and Technology) traceable certificate. This "annual checkup" assures you of consistently accurate readings; it is especially important in applications where strict calibration records must be maintained.

Cases
If the instrument case or storage case needs cleaning, wipe it off with a soft cloth and a mild detergent. Never submerge the IAQ-CALC.

Storage
When storing the IAQ-CALC for more than a month, TSI recommends removing the batteries. This prevents possible damage due to battery leakage.

Chapter 5

Troubleshooting

Table 5-1 lists the symptoms, possible causes, and recommended solutions for common problems encountered with the IAQ-CALC. If your symptom is not listed, or if none of the corrective actions solve your problem, please contact TSI.

Table 5-1: Troubleshooting the IAQ-CALC

Symptom	Possible Causes	Corrective Action
No display	Unit not switched on	Switch on the unit.
	Low or dead batteries	Replace the batteries or plug in the AC adapter.
	Dirty battery contacts	Clean the battery contacts.
Battery symbol is blinking	Batteries are low, 15% or less life remaining	Replace or recharge batteries.
Display reads "LO"	Wrong AC adapter	Replace with the correct AC adapter.
	Low AC line voltage	Correct the AC line voltage or use batteries.
	Dirty battery contacts	Clean the battery contacts.
Display reads "CAL" (with beeping)	IAQ-CALC has detected an internal fault	Return to factory for service.
	Instrument is in calibration mode	Flip DIP switch #7 to "OFF" (see Appendix B)
Display reads "OVER"	The temperature, CO_2 or CO is too high	Use an alternate method to make measurement.
Temp. initially reads high or low	Temperature sensor is still adjusting to temperature	Allow sufficient time for the temperature to stabilize.
Display reads "LOG FULL"	Memory is full	Clear the memory and then proceed
Display reads "LI BATT"	Low lithium battery power	Return to TSI for replacement.

Symptom	Possible Causes	Corrective Action
SpAn or Zero error	1. Error in field calibration 2. Not long enough gas flow to purge gas inside probe cavity. 3 Orientation incorrect when using the older style CO_2 calibration collar.	1. Perform calibration again. 2. Allow longer purge time, before pressing SAMPLE key let gas flow an extra 30 seconds. 3. Orientate collar so bar fitting is closest to probe handle.
Instrument CO reading not Zero with known fresh ambient air or with Zero calibration gas.	CO sensor Zero baseline voltage drifted.	Perform a Zero Calibration on the CO Sensor See Chapter 2, CO Zero Calibration Procedure.
OA Err	Values for Supply, Return or Outside Air don't make sense	Re-take Supply, Return and Outside Air values or use another parameter to calculate %OA

Appendix A

Specifications

Specifications are subject to change without notice.
Specifications in parentheses () indicate metric equivalents.

CO_2
Sensor type:	Dual wavelength NDIR (Non-dispersive infrared)
Range:	0 to 5000 ppm
Accuracy:	±3% of reading at 77° F (25°C) or ±50 ppm, whichever is greater. Add ±0.2%/°F (±0.36%/°C) away from calibration temperature
Resolution:	1 ppm

TEMPERATURE:
Range:	32 to 140°F (0 to 60°C)
Accuracy:	±1.0°F (± 0.6°C)
Resolution:	0.1°F (0.1°C)

OPTIONAL SECONDARY TEMPERATURE PROBE:
Sensor Type:	RTD
Range:	-40 to 248°F (-40 to 120°C)
Accuracy:	±1.0°F (±0.6°C) for range of 23 to 203°F (-5 to 95°C)
Resolution:	0.1°F (0.1°C)

RELATIVE HUMIDITY:
Sensor Type:	Thin-film capacitive
Range:	5% to 95% RH
Accuracy	3% RH at 77°F (25°C). Add uncertainty of 0.03%RH / °F (0.05%RH / °C) away from calibration temperature.
Resolution:	0.1% RH

DEW POINT:
Range:	5 to 120° (-15 to 49°C)
Resolution :	0.1°F (0.1°C)

WET BULB:
Range:	40 to 140° (5 to 60°C)
Resolution:	0.1°F (0.1°C)

ABSOLUTE HUMIDITY:
Range:	0.0000151 to 0.00491 lbs moisture/ ft^3 of air 0.24 to 79.0 g moisture/m^3 of air

HUMIDITY RATIO:
Range: 0.00014 to 0.187 lbs moisture/lb dry air
                (0.14 to 187 g moisture/kg dry air)

% OUTSIDE AIR:
Range: 0 to 100%
Resolution: 0.1%

CO (Model 8762):
Sensor type: Electro-chemical
Range: 0–500 ppm
Accuracy: ±3% of reading or 3 ppm whichever is greater
Resolution: 0.1 ppm
Response time: <60 seconds to 90% of final value

OPERATING TEMPERATURE:
Model 8760:   41 to 158°F (5 to 70°C)
Model 8762:   41 to 113°F (5 to 45°C)

STORAGE TEMPERATURE:
-4 TO 158°F (-20 TO 70°C)

LOGGING CAPABILITY:
Memory: Up to 14,000 samples
Test ID's   Up to 1,000 test ID's
Intervals: 5 sec, 10 sec, 15 sec, 20 sec, 30 sec, 60 sec, 2 min, 5 min,
                10min, 15 min, 20 min, 30 min, 60 min

EXTERNAL METER DIMENSIONS:
Size measurements: 3.9 in. x 6.6 in. x 1.5 in.
                     100 mm x 168 mm x 38 mm)

METER PROBE DIMENSIONS:
Probe length (Model 8760):   5.81 in. (14.5 cm)
Probe length (Model 8762):   6.5 in. (16.5 cm)
Probe diameter: 0.75 in. (1.9 cm)

METER WEIGHT DIMENSIONS:
With batteries: 1.16 lbs (0.53 kg)

METER DISPLAY DIMENSIONS:
Display: 2 line, 4-digit LCD

POWER REQUIREMENTS:
Four AA-size batteries or
AC adapter (both included)

PRINTER INTERFACE:
Type: Serial
Baud Rate: 1200

Appendix B

DIP Switch Settings

To access the DIP switches, remove the batteries from the battery compartment. On the inside of the battery compartment, there is a window with eight DIP switches. The table below shows the functions for each switch.

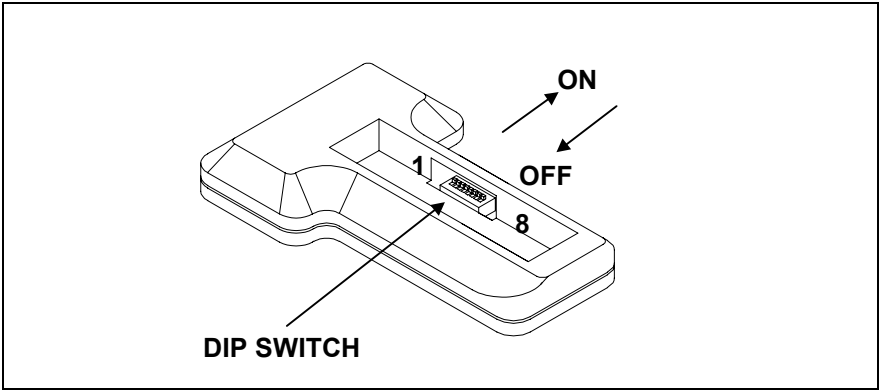> **Caution:** Make certain that power is turned *off* before changing DIP switch settings.

Figure B-1: DIP Switch Location

Table B-1: DIP Switch Settings

Switch	OFF	ON
1-3	Must be OFF	-------
4	Not assigned	-------
5	$^{\circ}$F, lbs/lb, lbs/ft^3	$^{\circ}$C, g/kg, g/m^3
6	Buzzer OFF	Buzzer ON
7	Normal Mode	Calibrate Mode
8	American Date Format	European Date Format

The ON position is away from the batteries and OFF is towards the batteries. Always leave DIP switch #1, 2 and 3 in the OFF position.

TSI®

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