OWNER'S MANUAL

CO_2 Meter

Model IAQ10

AIRFLOW™
INSTRUMENTS
TSI Incorporated

LIMITATION OF WARRANTY AND LIABILITY

Seller warrants the goods sold hereunder, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for twenty-four (24) months, or the length of time specified in the operator's manual, from the date of shipment to the customer. This warranty period is inclusive of any statutory warranty. This limited warranty is subject to the following exclusions:

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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 Customer Service department at +44 (0) 149 4 459200 (UK), (800) 874-2811 (USA), or (1) 651-490-2811 (International).

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SECTION 1
General Description

The Model IAQ10 is a hand-held meter to measure Carbon Dioxide (CO_2), displayed in units of parts per million (ppm). An NDIR sensor in the top end of the meter measures gas content by diffusion through sensing holes.

The IAQ10 ships in a pouch that provides a small amount of protection to the display and the sensing holes in the top of the instrument case. The instrument ships with batteries (which are not installed), a calibration sheet, and this Owner's Manual.

SECTION 2
Theory of Operation: NDIR Sensor

The IAQ10 measures carbon dioxide concentration by relying on one of the natural properties of CO_2 molecules: CO_2 molecules absorb light at a specific wavelength of 4.26 µm. This wavelength is in the infrared (IR) range. High concentrations of CO_2 molecules absorb more light than low

concentrations. This technique is called non-dispersive infrared (NDIR) detection.

SECTION 3
Safety

When using the IAQ10 to check for CO_2 values, make certain that you can safely raise and hold the instrument while making measurements. Be especially careful when working on a ladder.

Observe all necessary precautions so that the unit does not become caught in moving machinery or touch any exposed electrical wiring.

DANGER!

Use with corrosive or other dangerous or explosive gas mixtures is not recommended.

SECTION 4
Setting-Up the Model IAQ10

Supplying Power

The IAQ10 can be powered in one of two ways: four AA-size batteries or the optional AC adapter.

Installing the Batteries

Insert four AA batteries as indicated by the diagram located on the inside of the battery compartment. The Model IAQ10 is designed to operate only with alkaline batteries. When 15% battery life is remaining, the battery indicator will blink, indicating the batteries need to be changed. At 0%, "LO" will display and the meter will shut off within 10 seconds.

Using the Optional AC Adapter

The optional AC adapter allows you to power the Model IAQ10 from a wall outlet. When using the AC adapter, the batteries (if installed) will be bypassed. The AC adapter is NOT a battery charger.

SECTION 5
Operation of the Model IAQ10

***Note**: Do **not** hold the instrument close to your face. Humans exhale CO_2 and this will affect the accuracy of the readings.*

When pressing the keys on the keypad, the Model IAQ10 will beep to confirm the function. If you press a key and the Model IAQ10 does not beep, the Model IAQ10 does not allow that function during the selected mode. (See Section 9 for information on disabling this feature through an internal DIP switch.)

ON/OFF Key

Press the ON/OFF key to turn the Model IAQ10 on and off. When the instrument is first turned on, it goes through a preprogrammed power-up sequence that includes an internal self-check.

First, all displayable LCD segments will appear. If a problem is detected, the display will show "CAL" to indicate that it should be returned for servicing and/or

calibration. When the Model IAQ10 completes the internal self-check, it will display the approximate percentage of battery life remaining.

Note: *The sensor needs up to 10 minutes to stabilize in still air before displayed readings can be considered accurate. Moving the instrument may decrease this stabilization time.*

READ Key

Carbon dioxide concentrations will be displayed in parts per million (ppm). The IAQ10 can be left in a room to monitor general conditions, but it is important to ensure that the sensing holes at the top of the meter are not covered or in a downward position.

Press the READ key once to start taking a CO_2 sample; press it again to end the sample. The minimum sample time is five seconds, even if the second press occurs after two, three, or four seconds. SAMPLE will flash on the display while the instrument takes a measurement.

The display updates every second and each reading is the average of five samples.

(▲) Key
The instrument only displays CO_2.

RECALL (▼) Key
Press the RECALL key repeatedly to display: minimum value (MIN), maximum value (MAX), average value (AVG), and number of seconds sampled (COUNT). Press the READ key to return to normal measuring mode.

The instrument does not store readings. The information viewed in the recall mode is for the sample reading just taken. Once a new sample starts or the instrument is turned off, all previous data is lost.

The (▲) and (▼) references on keys are used during the field calibration process.

SECTION 6
Maintenance of the Model IAQ10

The Model IAQ10 requires very little maintenance to keep it performing well.

Case

If the instrument case or storage case needs cleaning, wipe it off with a soft, damp cloth. Never submerge the IAQ10 in any liquid or allow any liquid to enter the sensing holes.

Storage

When storing the Model IAQ10 for more than a month, TSI recommends removing the batteries. This prevents possible damage due to battery leakage.

SECTION 7
Service Information

Please return your Product Registration Card immediately. This allows us to send service reminders, special offers, and important information about your product.

Before sending your instrument for calibration or repair, you should call Customer Service. The service department will provide you with the cost of service or calibration, Return Material Authorization (RMA) number, and shipping instructions.

Please have the following information available when you call:

- Owner's name, address, and phone number
- Billing address, if different and applicable
- Instrument name and model
- Serial number
- Date of purchase
- Where purchased

TSI recommends that you keep a "calibration log" and keep all records of service on your instrument.

Factory Calibration

To maintain a high degree of accuracy in your measurements, TSI recommends that you return your instrument to the factory for annual calibration. For a nominal fee, we will calibrate 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.

Send the instrument to TSI Instruments Ltd. prepaid. Securely package your instrument in a strong container surrounded by at least 5 cm of suitable shock-absorbing material. Include a purchase order that clearly shows the instrument model number and serial number, a contact name, phone, fax number, and RMA number. Mark the outside of your shipping container with the RMA number. This will expedite processing of your instrument when we receive it.

Field Verification

Field verification of your CO_2 instrument is recommended monthly. You need a gas tank and regulator. Calibration grade gases are available through local industrial gas supply.

1. Turn the instrument off. Under the batteries, move DIP switch # 7 to ON. Turn the instrument back on.
2. Press and hold the READ 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 sampling in real-time. "ZerO" will appear on the display if the instrument is in calibration mode.
3. Install the regulator on the zero calibration gas tank and connect tubing from the regulator to the inlet fitting on the top of the Model IAQ10. The regulator has a fixed flow rate of 0.3 L/min. Do **not** use a flow rate lower than 0.25 L/min or higher than 1.0 L/min.
4. Turn on gas flow.
5. Press and release the READ key to begin a zero reading. The Model IAQ10 begins a 60-second 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.

6. Install the regulator on the span calibration cylinder and connect tubing from the regulator to the inlet fitting on the top of the Model IAQ10.
7. Use ▲ and ▼ to adjust the concentration displayed on the Model IAQ10 to match the concentration on the span gas cylinder.
8. Press and release the READ key to take a span gas reading. The Model IAQ10 starts a 60-second countdown. When the countdown reaches zero, the instrument returns to the normal measurement mode.
9. With the gas still connected, observe the reading on the display. It should indicate the span gas concentration. If not, repeat this procedure.
10. If the displayed reading is accurate, remove the regulator and tubing. The calibration is now complete.
11. Before taking measurements, turn the instrument off and move DIP switch #7 back to OFF.

SECTION 8
Troubleshooting of the Model IAQ10

This table lists the symptoms, possible causes, and recommended solutions for the Model IAQ10.

Symptom	Possible Causes	Corrective Action(s)
No display	Unit not switched on	Switch on the unit
	Low or dead batteries	Replace the batteries
	Dirty battery contacts	Clean the battery contacts
	Batteries installed incorrectly	Refer to battery illustration inside battery cover
BAT is blinking	Dirty battery contacts Batteries are low	Clean the battery contacts Replace the batteries
Cal err	Error in field calibration	Perform calibration again

Symptom	Possible Causes	Corrective Action(s)
Display reads "LO"	Batteries are low	Replace the batteries

Note: If your symptoms are not remedied by the suggested corrective action, call TSI Instruments Ltd.

SECTION 9
Internal 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.

DIP Switch	OFF	ON
1-3	Must be OFF	-----
4	not assigned	not assigned
5	not assigned	not assigned
6	Beep is turned OFF	Beep is turned ON
7	Normal mode	Field Verification mode
8	not assigned	not assigned

- The ON position is away from the batteries and OFF is towards the batteries.
- Switch 1 is towards the top of the case and Switch 8 is nearest the bottom.

Specifications

(subject to change without notice)

CO_2 Sensor type:
Dual wavelength detector with non-dispersive infrared (NDIR) sensor

Range: 0 to 5000 ppm

Accuracy ±3% of reading or ±50 ppm, whichever is greater[1, 2]

Resolution 1 ppm

Response time <10 minutes in still air

Operating Temperature Range:
5 to 70°C

External Meter Dimensions:
89 mm × 168 mm × 41 mm

Display: LCD, 4 digits, 10-mm high

Power requirements:
Four (4) AA-size alkaline batteries

Battery Life: Minimum 10 hours using alkaline batteries

[1] Add ±0.36% of reading per °C away from calibration temperature
[2] Under standard barometric pressure of 29.92 in Hg (406.8 inches H_2O) [101.4 kPa].

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