



KD Engineering's **AirBoxx**

Indoor Air Quality Monitor Operator Guide



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Keeping Current

The latest versions of this document, the *KD Data Pro Software User's Guide* and the KD Data Pro software are available for downloading free of charge on the Internet at www.teamkd.com. We recommend that you use Netscape Navigator 4.x or higher, or Microsoft Internet Explorer 4.x or higher to download these files.

K.D. Engineering can also deliver this document, the *KD Data Pro Software User's Guide* or the KD Data Pro software to you at a nominal cost. For more information about delivery, call K.D. Engineering at (800) 308-7717.

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Introduction

This guide provides information to help you use the AirBoxx I.A.Q. monitor.

The following sections are in this guide.

- *Cabling the Monitor to Your Computer.* This section contains instructions for cabling the I.A.Q. monitor to your computer.
- *Using the I.A.Q. Monitor.* This section contains instructions for using the I.A.Q. monitor to log data.
- *Appendix A: CO₂ Background Information.* This section contains general information regarding indoor air quality (I.A.Q.) and carbon dioxide (CO₂).
- *Appendix B: Specifications.* This section contains specifications for the sensors.
- *Appendix C: Important Safety Information.* This section contains safety precautions for using the I.A.Q. monitor and battery charger.
- *Troubleshooting.* This section contains information to help you resolve problems you may encounter when using the I.A.Q. monitor.
- *Limited Warranty.* This section outlines the terms by which K.D. Engineering warrants AirBoxx I.A.Q. monitors.

For information about installing and using the KD Data Pro software, see the *KD Data Pro Software User's Guide*.

Thank you for purchasing the I.A.Q. monitor. For information about other products available or technical support, call K.D. Engineering toll-free at (800) 308-7717.

Cabling the I.A.Q. Monitor to Your Computer

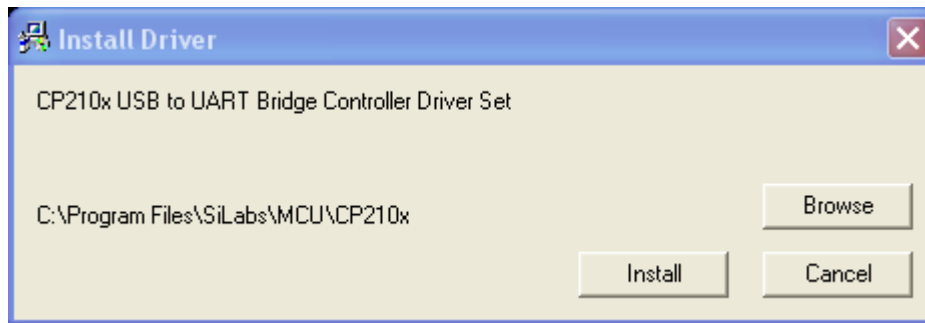
The I.A.Q. monitor connects to your computer through an interface cable. Before you can use the KD Data Pro software, you must cable the I.A.Q. monitor to your computer, and turn the monitor on. Use the following instructions to cable the I.A.Q. monitor to your computer:

Connecting Your AirBoxx via Serial Cable

1. Connect the serial cable to an available COM port on the back of your computer.
2. Connect the other end of the serial cable to the I.A.Q. monitor.

Connecting Your AirBoxx via USB Cable (after *KD DataPro* has been installed)

1. Go to **Start – All Programs – KD Engineering – USB Setup-AirBoxx**. The following dialog box should appear:



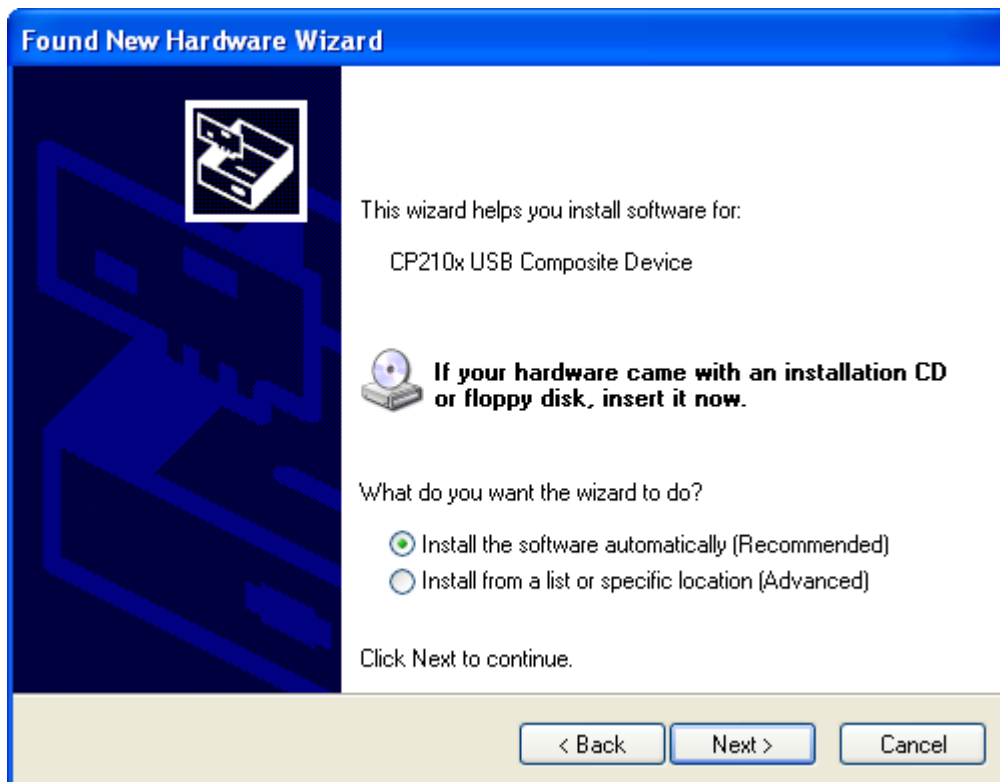
2. Click **Install** to begin driver installation. The following dialog box will appear:



3. Click **Continue Anyway**. The same dialog box will reappear. Click **Continue Anyway** again.
4. Connect your AirBoxx to your computer via a USB cable. The **Found New Hardware Wizard** will appear:



5. Click the **No, not this time** radio button, then click **Next**.
6. You will receive the following dialogue box:



7. Click **Next**. You will receive the following dialogue box:



Click **Continue Anyway**. Click **Finish**.

8. Repeat steps 4 to 7 for the second driver.

You have now successfully installed your USB drivers

Using the I.A.Q. Monitor

This section contains information to help you use the I.A.Q. monitor.

Powering the I.A.Q. Monitor

The monitor is powered either by plugging in the AC adapter or by using the included four AA rechargeable batteries. Battery life varies (typically 8 hours) depending on sensor configuration.

Note: The AC adapter does not charge the rechargeable batteries. Batteries must be charged using the included charger. Batteries need to be charged for 24 hours (using the supplied charger). Batteries will slowly self-discharge even when not in use and must be recharged if they have not been charged recently.

Buttons on the I.A.Q. Monitor

The following buttons are on the I.A.Q. monitor interface.



Power button

Allows you to turn the I.A.Q. monitor on and off.



Soft buttons

Allow you to choose options displayed at the bottom of the screen.



Navigation/Enter buttons

Allow you to navigate and choose on-screen menu options as well as increase and decrease screen contrast



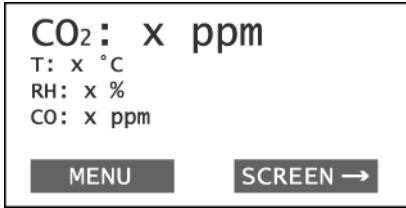
Number/Letter buttons

Allow input such as calibration gas values, location names etc..

Turning the I.A.Q. Monitor On

To turn the I.A.Q. monitor on, hold down the **Power** button until a screen appears (this may take several seconds). The I.A.Q. monitor automatically marks a new location every time you turn it on.

After you turn the I.A.Q. monitor on and it warms up, you receive a Real-Time Readings screen similar to the following:



Note: x represents ppm, temperature and percent RH values in this example. Display will vary according to installed sensors.

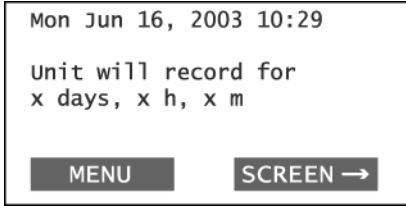
Turning the I.A.Q. Monitor Off

To turn the I.A.Q. monitor off, hold down the **Power** button for several seconds.

I.A.Q. Monitor Screens

Press the **Screen** button (the soft button below **SCREEN →**) to scroll through the following I.A.Q. monitor screens.

Date/Time Information Screen



Note: x represents the days, hours, and minutes of logging available in this example.

Location Marking/Editing Screen



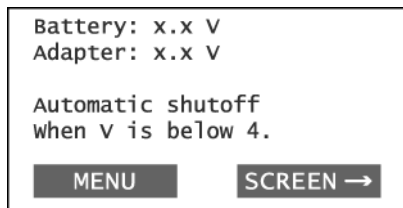
Use the up and down arrows to choose your location. Press the enter button to choose the location, and begin logging for that location.

To edit the name of a location, press the **EDIT** button.

You are presented with a screen showing the current location name. Using the alpha-numeric keypad type in the new name, then press the **SAVE** button.

Power/Battery Status Screen

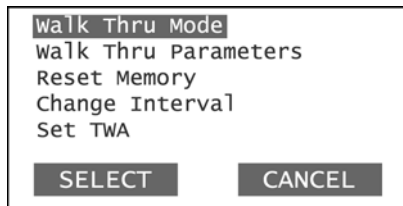
The power/battery status screen shows the power (in volts) available from both the internal rechargeable batteries and the adapter. It also shows the minimum voltage before the unit shuts itself off.





Note: x represents the voltage in this example.

I.A.Q. Monitor Menus

Once the I.A.Q. monitor is turned on, press the **Menu** button (the soft button below **MENU**) to activate the I.A.Q. monitor menu options. You will see the following display:



Do the following to scroll through menu options.

- Press the  button to scroll up.
- Press the  button to scroll down.

The menu option is selectable when it is highlighted such as **Walk Thru Mode** in the above example.

Menu Options

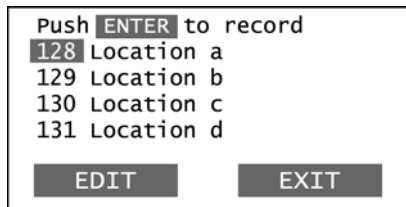
This section contains information regarding the I.A.Q. monitor menu options. You use these options to do the following.

- Walk Thru Mode
- Walk Thru Parameters
- Reset the memory
- Change Interval
- Set TWA (Time Weighted Average)
- Preferences
- Lock Unit
- Calibrate
- Info
- Backup calibration
- Restore from backup

Walk Thru Mode

Use the following instructions to modify Walk Thru location names and perform a Walk Thru test.

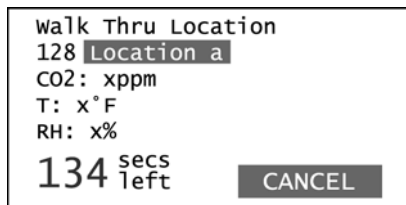
1. From the first I.A.Q. monitor menu, select **Walk Thru Mode** (by using the soft button or the **enter** button) to receive a screen similar to the following:



- a. Select **EDIT** to edit the name of the selected location.

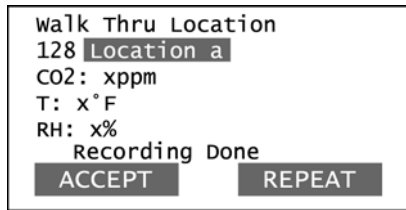
You are presented with a screen showing the current location name. Using the alpha-numeric keypad type in the new name, then press the **SAVE** button.

2. Push the **enter** button to begin recording at the selected location. You will receive the following screen:



Note: x represents ppm, temperature and percent RH values in this example. Display will vary according to installed sensors.

- a. Once the timer has finished counting down you will be presented with the following screen:

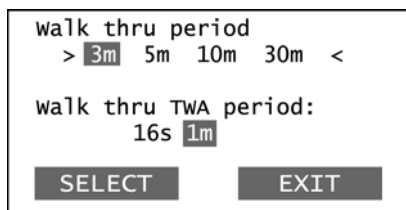


- b. Push the **ACCEPT** button to accept the Walk Thru readings, or **REPEAT** to repeat the test. Selecting **REPEAT** will delete the previous reading before recording new information.
3. Once you have logged at a location an asterisk appears next to that location indicating the location contains data. You can still re-record at that location, overwriting the data.
4. Select **EXIT** to return to the menu screen.

Walk Thru Parameters

Use the following instructions to change the Walk Thru parameters.

1. From the I.A.Q. monitor menu, select **Walk Thru Parameters** (by using the soft button or the **enter** button) to receive the following screen:



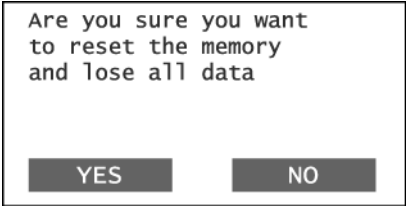
- a. Using the arrow keys choose the desired **walk thru period** and **walk thru TWA period**.
2. Push **SELECT** to implement changes, and **EXIT** to return to the main menu.

Resetting the Memory

Use the following instructions to reset the memory on the I.A.Q. monitor.

WARNING: Resetting the memory erases all data.

1. From the menu, select **Reset Memory** (by using the soft button or the **enter** button) to receive the following screen:

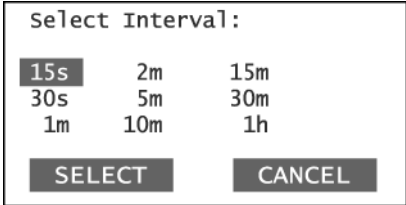


- b. Select **YES** to erase all data, and reset the I.A.Q. monitor memory. After the memory resets, you return to the Real-Time Readings screen.
 - c. Select **NO** to return to the menu screen without resetting the monitor memory.
2. Press the **CANCEL** button to return to the Real-Time Readings I.A.Q. monitor screen.

Setting Data Logging Intervals

You can set the logging interval to record data in a range of once every 15 seconds to once every hour. Use the following instructions to set the data-logging interval on the I.A.Q. monitor.

- I. From the I.A.Q. monitor menu, select **Change Interval** to receive the following screen:



- II. Use the navigation and enter (or choose **SELECT** from the soft button menu) buttons to select and choose the interval desired. This returns you to the Real-Time Readings screen.

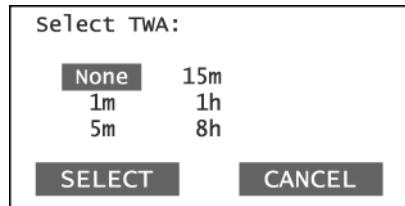


3. Use the **CANCEL** soft button to return to the menu options.

Setting the TWA

You can adjust the time-weighted average (TWA) in predefined increments. Use the following instructions to set the TWA on the I.A.Q. monitor.

1. From the I.A.Q. monitor menu, select **Set TWA** to receive the following screen:



5. Use the navigation and enter (or choose **SELECT** from the soft button menu) buttons to select and choose the desired TWA.



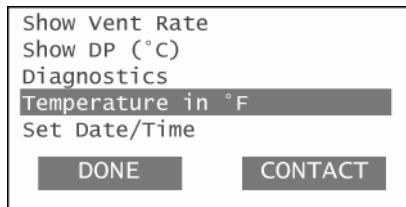
- III. Use the **CANCEL** soft button to return to the menu options.

Defining the Preferences



You can define preferences for measuring temperature and humidity on the I.A.Q. monitor. Use the following instructions to define preferences on the I.A.Q. monitor.

Preferences

- From the I.A.Q. monitor menu, select **Preferences** to receive the following screen:

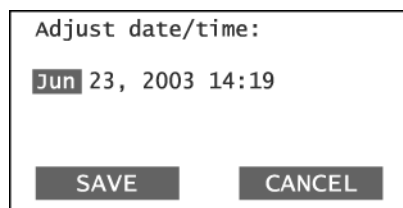






Do the following to scroll through menu options.

- Press the  button to scroll up.
- Press the  button to scroll down.

Note: The menu option is selectable when it is highlighted such as **Temperature In °F** in the above example.



- Select **Show Vent Rate** to change the CO2 reading from CO2 ppm to room ventilation rate. Changing this preference will delete any previously stored CO2 data.
- Select **Show DP (°C)** to change the RH reading from %RH to dew point reading. Changing this preference will delete any previously stored RH data.
- Select **Diagnostics** to bump test your AirBoxx. The unit's fan is disabled, allowing you to flood the chamber (using the calibration fittings and a known gas value).
 - Once the bump test has been performed you can get out of **Diagnostics** mode by repeating the above steps and selecting **Cancel Diagnostics**.
- Select **Temperature in °F** to toggle between Fahrenheit (°F) and Celsius (°C) temperature scales. Selecting this option changes the temperature mode and returns you to the first screen.
- Select **Set Date/Time** to adjust the date and time settings on your IAQ monitor. You should see the following screen:



Use the  and  buttons to select the value you wish to change; use the  and  buttons to change the month, day, year and time values. Select **SAVE** to save your time and date changes. This returns you to the date/time screen.

- VII. Select **Display Contrast** to change the contrast of the screen. You should receive the following screen:



Use the  and  buttons to adjust the screen contrast. Select OK when you are happy with the contrast of the screen. This returns you to the Real-Time Readings screen.

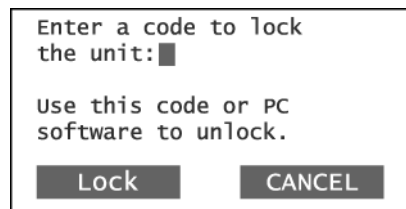
- VIII. Select **Turn PID off** to turn off the PID sensor (if a PID sensor is not present in your AirBoxx the menu option will read **PID sensor not present**). This is sometimes desirable in order to save PID lamp life.
- IX. Select **Complex Calibration** to toggle from basic calibration method. Complex calibration allows the user to calibrate multiple sensors simultaneously.
- Repeat steps to change calibration method back to **Basic Calibration**.

Locking the I.A.Q. Monitor

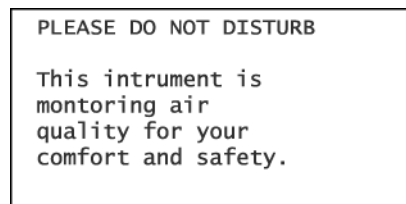
You can lock the I.A.Q. monitor to preserve data confidentiality and prevent setting changes. While locked, you cannot turn the I.A.Q. monitor off using the **On/Off** button. If the battery is low, the I.A.Q. monitor turns off automatically and remains locked, even after you charge the internal batteries and turn the I.A.Q. monitor back on. Use the following instructions to lock the I.A.Q. monitor:

Note: **xxxx** represents the 4-digit passcode in the following instructions. The passcode can be 1-4 digits (however four is recommended for security reasons)

- From the I.A.Q. monitor menu, select **Lock Unit** to receive the following screen:



- Enter 1-4 digits to define the pass code (4 digits is recommended). You will receive the following screen until the unit is unlocked:



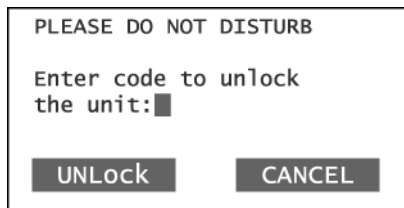
Note: There is no way to cancel during the Lock Out Process. Once you begin the lock out process, you must complete it.

Unlocking the I.A.Q. Monitor

Use the following instructions to unlock the I.A.Q. monitor.

Note: **xxxx** represents the 4-digit passcode in the following instructions.

1. Press any key to receive the following screen:



2. You have 30 seconds to enter the code.
3. After you enter the code, press the **UNLOCK** button to unlock the I.A.Q. monitor.

WARNING: If you do not enter the code within 30 seconds or you enter a wrong code, you will receive the Checking Air Quality screen. If this happens, go to step 1 and repeat these instructions

4. After you unlock the I.A.Q. monitor, you receive the Real-Time Readings screen.

Note: If you forget your passcode, you can still unlock the I.A.Q. monitor. To unlock it without a passcode, connect the I.A.Q. monitor to your computer and start the KD Data Pro software. Choose **Retrieve Data** from the **Logger** menu in the KD Data Pro software.

Calibrating the AirBoxx

Zero and Span (Two-Point) Calibration of the CO₂ and CO Sensors

You calibrate the I.A.Q. monitor using a *two-point* calibration.

Two-point calibration requires two gases: a zero **and** a suitable span. The following is an example of how to calibrate an AirBoxx instrument that includes an electrochemical CO₂ AND CO sensor. Screens may vary depending on the sensor configuration of your monitor. Please refer to the table below for a suitable span gas recommendations and minimum flow rate requirements.

Sensor span gas recommendations and flow rates

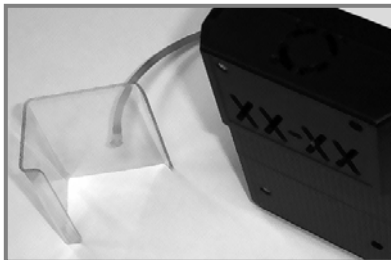
Sensor	Recommended calibration gas	Range of sensor	Minimum flow rate
CO ₂	1000 ppm	0-10,000 ppm	500 mls/min
CO*	50 ppm	0-200 ppm	500 mls/min
NO ₂ *	5 ppm	0-10 ppm	1000 mls/min
O ₃	1 ppm (NO ₂)	0-2 ppm	1000 mls/min
O ₂	21 %	0-30 %	500 mls/min
SO ₂	10 ppm	0-20 ppm	1000 mls/min
H ₂ S	5ppm	0-20 ppm	1000 mls/min
VOC	Isobutylene 10 ppm	0-20 ppm	1000 mls/min

For other sensors please call us at (800) 308-7717.

*higher ranges available

What is needed

- KD IAQ AirBoxx – running and warmed up
- Appropriate gas (i.e. CO₂ gas)
- Ultra zero air
- Calibration Fitting (included with the AirBoxx)
- Tubing



Time Required

Approximately 10 minutes per sensor.

Calibration Fitting and Tubing

1. Attach fitting to the top of the AirBoxx.
2. Attach tubing to the top of the calibration fitting.

Calibration mode

1. From the I.A.Q. monitor menu, select **Calibrate** to receive the following screen:

ENTER	SPAN	GAS	(0=NO)
YES	CO2	1000.0	ppm
NO	CO	0.0	ppm
CALIBRATE		CANCEL	

2. Use the ▼ and ▲ buttons to select the sensor you wish to calibrate.
3. Enter the value of the span gases (entering 0 will turn the calibration off for that sensor).
4. Attach the calibration fittings and tube to the AirBoxx. Select **CALIBRATE** to begin calibration.
5. Follow on screen instructions to complete calibration. At the end of each gas application you will be prompted to **ACCEPT** or **REJECT** the readings.

Calibration Completion

At the end of the process you will be prompted to save to main memory or main and backup memory. If you choose the latter you will not be able to retrieve the previous or factory calibration.

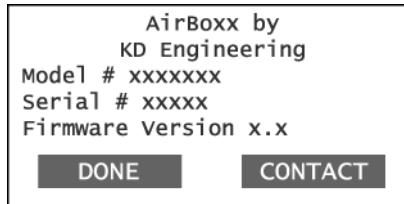
You are then returned to the Real Time Reading screen.

Displaying Monitor's Version Information Screen

Use the following instructions to display the AirBoxx I.A.Q. monitor's Version Information such as model number, serial number, firmware version, and even a 1-800 support number (this information may differ if your local distributor provides support and service).

Note: x represents numbers in the following instructions.

1. From the I.A.Q. monitor menu, select **INFO** to receive the following screen:



2. Press **DONE** to return to the Real-Time-Readings screen, or **CONTACT** to receive the following screen:



3. Press **DONE** to return to the Real-Time-Readings screen, or **INFO** to return to the information screen.

Backup Calibration

Use the following instructions to backup the current AirBoxx calibration data.

1. Select **Backup calibration** to keep the current calibration in the memory in order to restore it at a later date
2. Select **Restore from backup** to restore calibration to previous or saved calibration.

Appendix A: CO₂ Background Information

This section contains general information about carbon dioxide (CO₂) and why measurement of CO₂ is essential to regulation of indoor air quality.

The proliferation of animal and plant life is based upon the exchange of oxygen and CO₂ gases. Humans inhale oxygen and exhale CO₂; plants take in CO₂ and emit oxygen. Thus, CO₂ is one of the most commonly found gases on Earth. In the coming years, measurement and control of this gas in buildings will become as commonplace as the measurement of temperature is today.

Although CO₂ should not be considered an indoor air contaminant, its measurement provides an indicator of indoor air quality. In addition to CO₂, humans exhale bioeffluents (pollutants), which include bacteria, gases, odors, pherons, viruses, and particulate. When bioeffluents amass in an enclosed building, the humans occupying that space experience discomfort, such as headaches and fatigue. Frequently, high concentrations of CO₂ are synchronous with high concentrations of effluents. However, bioeffluents are not easily measured, which makes CO₂ evaluation a more viable method of indicating indoor air quality.

CO₂ measurement also provides an indication of the ventilation rate in a building. While outdoor CO₂ levels remain roughly constant, indoor levels are defined by the space's occupancy. Since most humans produce a consistent and predictable amount of carbon dioxide, the CO₂ level is relative to the number of occupants in the space. The CO₂ level is also relative to the amount of outdoor air that is introduced to and circulated within the space, as fresh air dilutes the CO₂ concentration. By considering the number of occupants and the introduction of outdoor air, CO₂ measurement can indicate the ventilation rate per person per space.

In the same manner that temperature can be regulated using set points, CO₂ measurement set points can be used to provide an ideal ventilation rate per person. Ventilation rates for indoor air quality control ensure that optimum comfort and productivity levels are maintained for the occupants of the space. In addition to ensuring a more productive and healthier environment, CO₂-based ventilation demand control regulates the amount of incoming outdoor air according to actual inhabitation. Energy costs for a space can be dramatically cut by increasing/decreasing the ventilation rates based on occupancy.

Use the following guidelines to test CO₂ and ventilation levels.

- Spot measurements are difficult to interpret. When performing a diagnostic CO₂ assessment, take and record measurements continuously for at least one day and only when occupancy is considered typical for the space.
- Repeat measurements for each climactic season if occupancy patterns differ according to season.
- Take measurements when equilibrium has been reached.

Appendix B: Specifications

This section contains information regarding specifications for the I.A.Q. monitor. Some information may not apply depending upon specific sensor configurations of your I.A.Q. monitor.

CO₂ Sensor

Type	Referenced non-dispersive infra-red (NDIR)
Measurement range	0 to 10000 ppm
Accuracy	±5% of reading or 60 ppm, whichever is greater
Resolution	1 ppm
Response time	<60 seconds to 90% of final value

Relative Humidity Sensor

Type	CMOSens
Measuring range	5 to 95% RH
Accuracy at +25°C	Better than ±2% RH
Resolution	0.1% RH
Response time	<15 seconds to 90% of final value

Temperature Sensor

Type	CMOSens
Measuring range	32 to 122°F (0 to 50°C)
Accuracy	1.0°F (0.5°C)
Resolution	0.1°F (0.1°C)
Response time	<30 seconds to 90% of final value
Units	User-selectable (C° or F°)

CO Sensor

Type	Electrochemical
Measuring range	0 to 500 ppm
Accuracy	±3% of reading or 2 ppm, whichever is greater
Resolution	0.1 ppm
Response time	<45 seconds to 90% of final value

Data Logger

Storage capacity	Standard 512KB (6 sensors sampling at 1 minute intervals = 30 days data)
A/D resolution	12 bit
Logging interval	15 seconds to 1 hour (User-selectable)

Dimensions

Weight	1lb / 0.45 kg
Dimensions	6.5" (16.5cm) x 4" (10cm) x 1.75" (4.5cm)

Optional Sensors

Ozone

Type	Electrochemical
Measuring range	0 to 2000 ppb
Accuracy	+/- 40 ppb
Resolution	1 ppb
Response time	150 seconds to 90% of final value

Oxygen

Type	Electrochemical
Measuring range	0 to 30%
Accuracy	0.5%
Resolution	0.1%
Response time	<45 seconds to 90% of final value

Nitrogen Dioxide

Type	Electrochemical
Measuring range	0 to 10000 ppb
Accuracy	40 ppb
Resolution	1 ppb
Response time	<45 seconds to 90% of final value

Please call us for other electrochemical sensor specifications at (800) 308-7717.

Power

Output	6V DC @ 500mA
Polarity	Center Negative
Plug size	2.1mm x 5.5mm
Input	120V AC 60Hz

Appendix C: Important Safety Information

The following are safety precautions for using the I.A.Q. monitor and battery charger. Read this information carefully, as it is intended to protect you and your investment in the I.A.Q. monitor.

Danger

- Never alter the AC cord or plug provided. If it will not fit your outlet, replace with the proper type of cord or have a proper outlet installed by a qualified technician. Improper connection can result in a risk of an electric shock.
- Ensure cords are located so that they will not be stepped on, tripped over, or otherwise subjected to damage or stress.
- Do not operate the power supply with a damaged cord or plug. If a cord or plug is damaged, replace it immediately.
- To reduce the risk of damage to the electric plug, pull by the plug—not the cord—when disconnecting the charger.

Troubleshooting

This section contains information regarding problems you may encounter using the I.A.Q. monitor.

Problem	Suggested Solution
Monitor will not turn on	Ensure that either the internal batteries are charged or the unit is plugged in.
Monitor will not turn off	Press the On/Off button for two to three seconds. Disconnect power, reconnect and turn on.
<ul style="list-style-type: none"> • Monitor will not communicate with the computer • <i>Could not perform chosen operation error message0</i> 	<p>Do one or more of the following.</p> <ul style="list-style-type: none"> • Ensure the cable is fully plugged in to the I.A.Q. monitor. • Ensure that the COM port setting on the KD Data Pro software matches the COM port the unit is cabled to. • Close any program(s) that control the COM port, including communication programs and fax software. • If you also use your serial port for a network connection or a mouse, ensure the port is configured for the I.A.Q. monitor. • If you use Palm software, ensure the HotSync Manager is disabled. If you use another PDA, and synchronize via the COM port, ensure synchronization software is disabled. • Change the Communication Speed setting (in the Download Options dialogue box, under the Monitor menu) to 9600bps. For more information, see the <i>KD Data Pro Software User's Guide</i>
Monitor readings seem incorrect	<p>Do one or more of the following.</p> <ul style="list-style-type: none"> • Extreme conditions can cause irregularities. Allow the I.A.Q. monitor to equilibrate with the environment. • Connect the charger to the unit. Extremely low batteries affect sensor accuracy. • Calibrate the I.A.Q. monitor as recommended.

For additional troubleshooting information, call K.D. Engineering toll-free at (800) 308-7717 or email help@teamkd.com.

Limited Warranty

K.D. Engineering warrants that this equipment will be free of defects in materials and workmanship for a period of **two years*** from the date of original purchase when used in compliance with directions outlined in this document. This warranty does not cover repair or replacement required as a result of misuse, mishandling, or improper storage.

K.D. Engineering will, at its option, repair or replace any defective equipment or parts at its facility or other location approved by it at no charge to the user. User will be responsible for all costs of shipping equipment to K.D. Engineering or another location for warranty service.

K.D. Engineering makes no other warranty, expressed or implied, and makes no warranty of merchantability or fitness for a particular purpose.

Except for the remedy described above, unless otherwise required by applicable law, K.D. Engineering will have no other obligation with regard to any breach of warranty or other claim with respect to the equipment, or liability for any direct, indirect, consequential, or incidental loss or damage caused by or occurring in connection with any of the equipment.

Warranty is void if equipment is subjected to unauthorized service.

** Warranty on sensors is limited to sensor manufacturer warranty and varies from 3 months to 1 year.*

To obtain warranty service, return the I.A.Q. monitor to your authorized distributor or send it directly to:

K.D. Engineering
239 East 6th Avenue
Vancouver, British Columbia
V6N 2T5
Canada

K.D. Engineering
#166 – 1685 H Street
Blaine, Washington 98230
United States

Telephone: (604) 872-8651
Fax: (604) 872-0281
Internet: airboxx@teamkd.com

Telephone: (800) 308-7717
Fax: (800) 739-4497
Internet: airboxx@teamkd.com