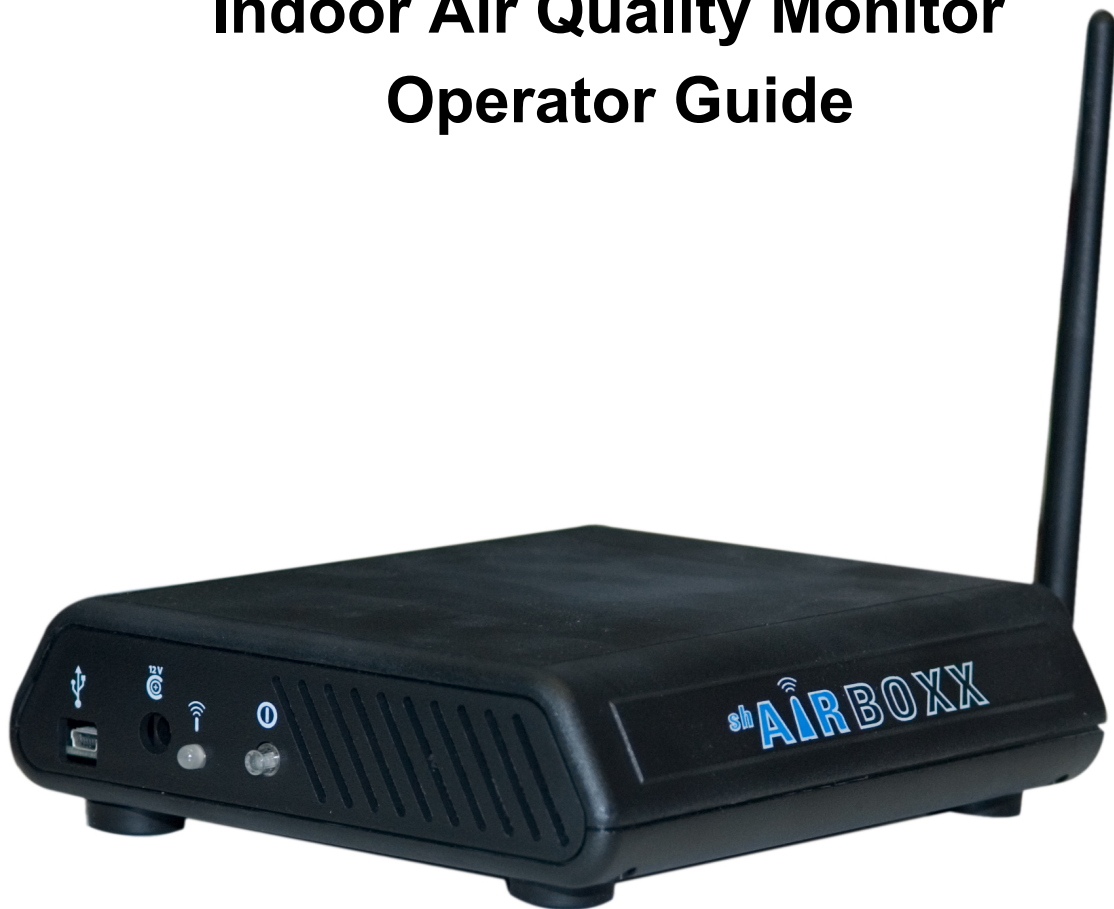




# KD Engineering's **shAirBoxx**

## Indoor Air Quality Monitor Operator Guide



**K.D. Engineering**

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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](http://www.teamkd.com).

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 shAirBoxx I.A.Q. monitor.

The following sections are in this guide.

- *Installing Software.* This section contains instructions for installing software for use with your shAirBoxx onto your computer.
- *Using the I.A.Q. Monitor.* This section contains instructions for using the I.A.Q. monitor to log data.
- *Appendix A: CO<sub>2</sub> Background Information.* This section contains general information regarding indoor air quality (I.A.Q.) and carbon dioxide (CO<sub>2</sub>).
- *Appendix B: Specifications.* This section contains specifications for the sensors.
- *Appendix C : shAirBoxx IAQ Monitor - Standards and Explanation of Readings.* This section contains information about the sensors used in the I.A.Q. monitor and the industry recommended standards.
- *Appendix D: 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.

# Installing Software

## Installing AirBoxx Connect Software

Use this software when you want to see the unit's real time readings as they are recorded and to download data as a .csv file. You can also use this software to change settings of the monitors and to modify the way the unit operates. See *AirBoxx Connect Software User's Guide* for more details on using this software.

### Software Setup

1. Insert included USB drive and run (double click) *AirBoxxSetup.msi*
2. Welcome to the AirBoxx Connect Set-up Wizard:
  - a) Click **Next**
  - b) Accept default or choose a file location using the **Browse** button
  - c) Click **Next** twice, then **Close**

## Installing the KD DATA PRO Software

Use this software to download, view, graph and format data. See *KD Data Pro Software User's Guide* for more details on using this software.

### Software Setup

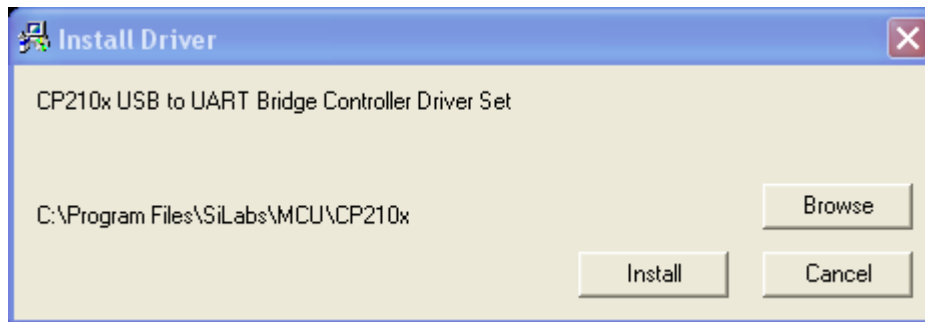
1. Insert included USB drive and run (double click) *KD DataPro.msi*
2. Welcome to the KD DataPro Set-up Wizard:
  - a. Click **Next**
  - b. Accept default or choose a file location using the **Browse** button
  - c. Click **Next** twice, then **Close**

# Installing USB Drivers on 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 install the USB driver onto your computer. Use the following instructions to cable the I.A.Q. monitor to your computer:

## Connecting Your shAirBoxx via USB Cable (after *KD DataPro* or *AirBoxx Connect* has been installed)

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

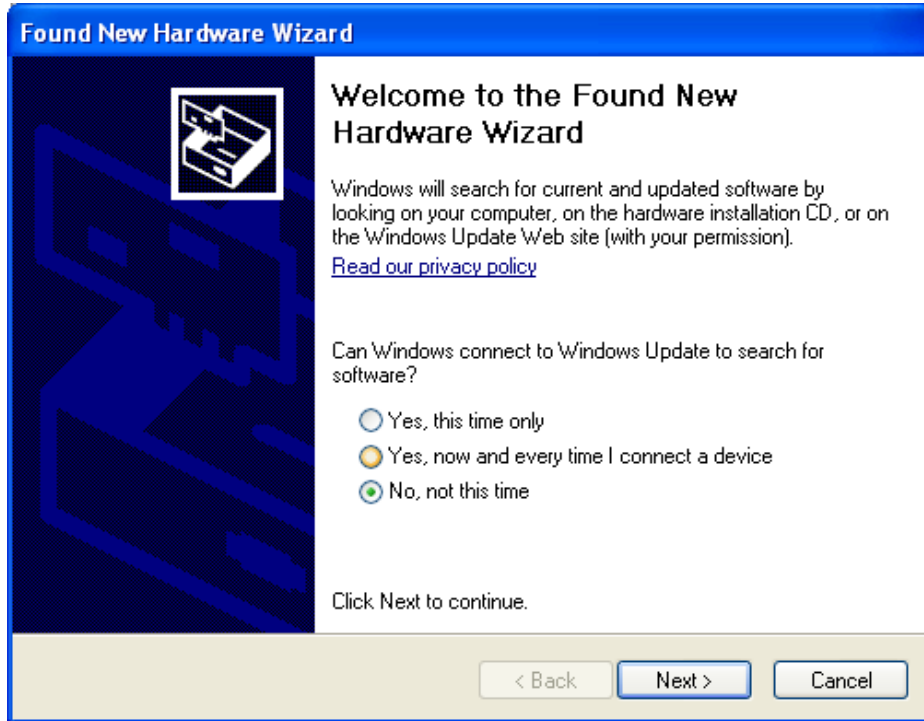


2. Click **Install** to begin driver installation. The following dialog box will appear:

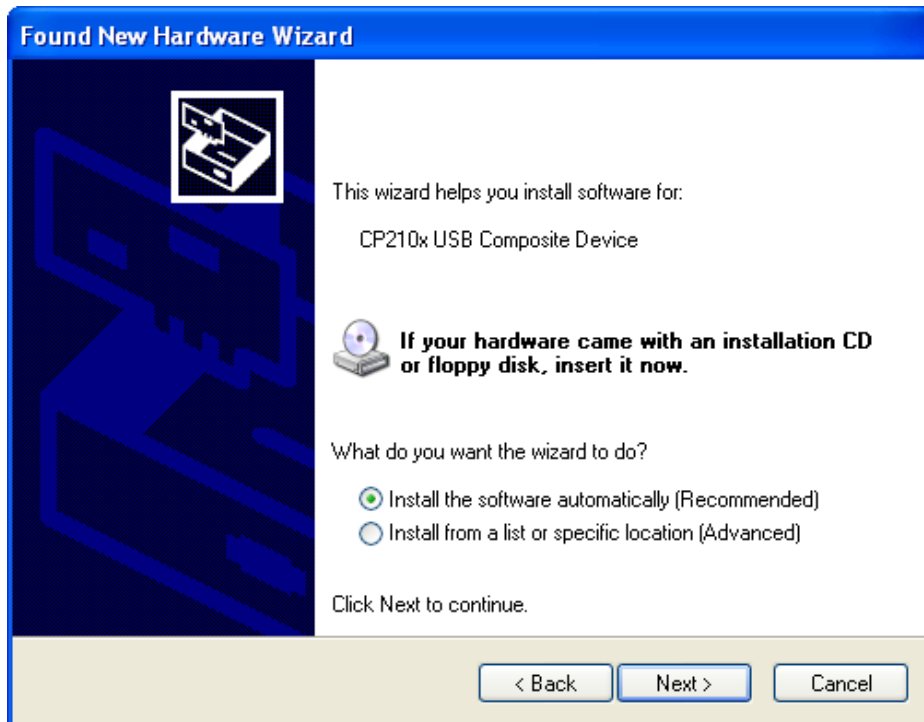


3. Click **Continue Anyway**. The same dialog box will reappear. Click **Continue Anyway** again. This places the USB driver files in the appropriate place for Windows to find them.

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:

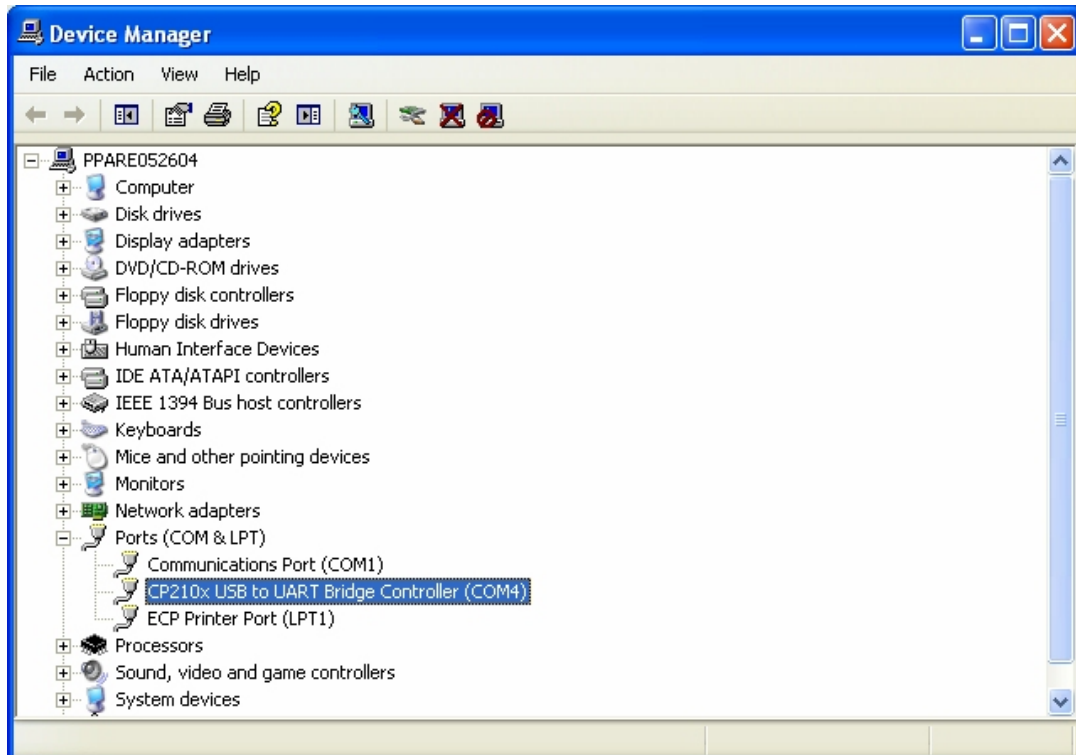


Click **Continue Anyway**. Click **Finish**.

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

You have now successfully installed your USB drivers.\*

\* You can check if the USB drivers are installed by looking in your computer's **Device Manager** – this is found by going to **Control Panel – System – Hardware (tab) – Device Manager (button)**. The USB driver should show up under **Ports (COM & LPT)** as **CP210x USB Composite Device** as highlighted below. Make note of the COM number as you will need it to set up the download in *KD DataPro*.



## Using the I.A.Q. Monitor

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



- A. USB port: for connectivity with a computer running *Airboxx Connect* or *KD Data Pro* software.
- B. Power connector: 12V power supply adapter is connected here to supply power to the unit.
- C. Wireless Connection LED indicator: Indicates state of wireless connection: solid green if bound to a BlackBoxx and blinking red if unbound.
- D. Power LED/Reset Button: When the unit is operating properly, the LED blinks green. To reset memory (delete existing Data) while the unit is operating, press and hold button for at least six seconds until LED blinks red three times. At this point, release button and memory has been reset.
- E. Antenna connector: If the shAirBoxx is used as stand-alone, supplied antenna does not have to be connected. If networked, connect antenna here to enable wireless communication with BlackBoxx

## shAirBoxx Placement

1. Find an AC outlet in the space being monitored.
2. Make sure the shAirBoxx is placed somewhere between two and five feet above floor level and is out of direct sunlight.
3. Place the shAirBoxx away from vents and any possible window or door drafts.
4. Make sure the fan grill on the shAirBoxx is not blocked. There should be space for the air to flow through the unit.

## Powering the shAirBoxx and Starting an IAQ Study

1. Connect unit to the power adaptor and plug adaptor to an outlet.
2. The LED Power /Reset Button will initially turn orange for about 15 seconds (or up to 1 minute or more depending on the amount of IAQ data stored in memory). This is normal as unit is initializing.
3. After initialization, LED Button will turn green. This means unit is operating normally.
4. Please note that the unit will not start recording until 10 minutes after initialization is completed. This is to allow the user to download previously collected data without collecting new data at the same time.

## Starting an IAQ Study

1. Ensure the shAirBoxx power adapter is plugged in and placed in an appropriate location.
2. The unit's LED will be orange during initialization and then blink green, indicating that the instrument is functioning properly.

## IAQ Study Duration

1. It is recommended that the shAirBoxx be left for at least 24 hours in one location to determine trends. The internal memory has the capacity to record 6 months of data at five minute intervals.
2. Make sure the unit is plugged in and running (LED power button is flashing green) during the length of the study.

## Concluding an IAQ Study

1. To turn the shAirBoxx off, unplug the unit.
2. Take the unit to a computer to download and view data.

## Resetting the Memory on the shAirBoxx

1. Make sure the unit is on and operating normally (LED button blinking green)
2. When LED is green, press and hold the button for about six seconds until the LED flashes orange three times. Release button and it should start blinking green. The memory has now been reset.

**Note:** After resetting the memory, the shAirBoxx will not start recording again for ten minutes).

## Appendix A: CO<sub>2</sub> Background Information

This section contains general information about carbon dioxide (CO<sub>2</sub>) and why measurement of CO<sub>2</sub> is essential to regulation of indoor air quality.

The proliferation of animal and plant life is based upon the exchange of oxygen and CO<sub>2</sub> gases. Humans inhale oxygen and exhale CO<sub>2</sub>; plants take in CO<sub>2</sub> and emit oxygen. Thus, CO<sub>2</sub> 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 CO<sub>2</sub> should not be considered an indoor air contaminant, its measurement provides an indicator of indoor air quality. In addition to CO<sub>2</sub>, 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 CO<sub>2</sub> are synchronous with high concentrations of effluents. However, bioeffluents are not easily measured, which makes CO<sub>2</sub> evaluation a more viable method of indicating indoor air quality.

CO<sub>2</sub> measurement also provides an indication of the ventilation rate in a building. While outdoor CO<sub>2</sub> 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 CO<sub>2</sub> level is relative to the number of occupants in the space. The CO<sub>2</sub> level is also relative to the amount of outdoor air that is introduced to and circulated within the space, as fresh air dilutes the CO<sub>2</sub> concentration. By considering the number of occupants and the introduction of outdoor air, CO<sub>2</sub> measurement can indicate the ventilation rate per person per space.

In the same manner that temperature can be regulated using set points, CO<sub>2</sub> 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, CO<sub>2</sub>-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 CO<sub>2</sub> and ventilation levels.

- Spot measurements are difficult to interpret. When performing a diagnostic CO<sub>2</sub> 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: shAirBoxx IAQ Monitor - Specifications and Explanation of Readings

### Relative Humidity

**Sensor Description** – CMOS capacitive polymer – range 5-95% - accuracy  $\pm 3\%$

**Standards/Guidelines** – 62-55 is the comfort standard that gives T/RH specs for seasons – typically 30-60% is an acceptable zone – too dry leads to dust mites and too wet leads to mold growth – keeping in mind the Temp plays a major role in the equation for dew point.

### Temperature

**Sensor Description** – CMOS bandgap temperature sensor – range 40-90 degrees F – accuracy  $\pm 1.5$  degree F.

**Standards/Guidelines** – same standard as above

### CO<sub>2</sub>

**Sensor Description** – Non dispersive infra red. Sensor life is estimated at 10 years. Range is 0-20000 ppm – accuracy is  $\pm 75$  ppm – outside air is typically 325-425 ppm depending on what part of the country you are in.

**Standards/Guidelines** – ASHRAE standards says 650 ppm above ambient is the limit before you have to look at changing your ventilation system – this is a commercial standard of care –but this is a good guideline.

### CO

**Sensor Description** – electrochemical. Range is 0-250 ppm – accuracy is  $\pm 3$  ppm – ambient levels are between 0-2ppm depending on area.

**Standards/Guidelines** – EPA outdoor air standard is 9 ppm. Theoretically shouldn't be more than ambient levels of CO in your home. The OSHA standard is 50 parts per million (ppm). OSHA standards prohibit worker exposure to more than 50 parts of the gas per million parts of air averaged during an 8 hour time period. Sensor life is estimated at 3 – 5 years.

## Particulates

**Sensor Description** – near nephelometer – range 0-200 ug/m<sup>3</sup> accuracy  $\pm 10$  ug/m<sup>3</sup> or 20% of reading (whichever is larger). Accuracy measurement is difficult because of different sizes of particles.

**Standards/Guidelines** – Outside air standard is 50 ug/m<sup>3</sup>. EPA Indoor guideline is 150  $\mu\text{g}/\text{m}^3$  for a 24-hour average.

## VOC

**Sensor Description** – Metal Oxide. Accuracy is highly dependent on what gas is reacting on the sensor, but is good for overall use.

**Standards/Guidelines** – Typical background levels are very low. Examples are cleaning compounds, air fresheners and perfumes. There are no EPA or other standards.

## Appendix D: Important Safety Information

The following are safety precautions for using the I.A.Q. monitor. 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.

<b>Problem</b>	<b>Suggested Solution</b>
Monitor will not communicate with software	<ul style="list-style-type: none"> <li>• Ensure your cable is connected, your monitor is on, the LED light is green and your USB drivers are loaded*</li> <li>• Reboot the monitor (power down and power up) and computer</li> </ul>
Readings don't change	Check the TWA (Time Weighted Average) via the AirBoxx Connect software. The default for this setting is 5 minutes. If the interval is too large, the unit's readings will appear to not change.

\* You can check if the USB drivers are installed by looking in your computer's **Device Manager** – see page 5 in this document for details.

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

## Limited Warranty

K.D. Engineering warrants that this equipment (except for sensors) 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. Sensors are warranted for one year only.

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.**

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

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

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United States

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Internet: [airboxx@teamkd.com](mailto:airboxx@teamkd.com)

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Internet: [airboxx@teamkd.com](mailto:airboxx@teamkd.com)



