



**Airflow Products**

# ***IAQ-Tek***

## **Outdoor Airflow Transmitter**

Installation, Operation  
& Maintenance Manual

*Released*

*July 2017*

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Danbury, CT 06810**

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# WARRANTY STATEMENT

Accutrol LLC, having its principal place of business at 21 Commerce Drive, Danbury, CT USA ("Manufacturer") warrants its IAQ-TEK Outdoor Airflow Transmitter product (the "Products") as follows:

## 1. Limited Warranty.

Manufacturer warrants that the Products sold hereunder will be free from defects in material and workmanship for a period of thirty-six (36) months from the date of purchase. If the Products do not conform to this Limited Warranty during the warranty period (as herein above specified), Buyer shall notify Manufacturer in writing of the claimed defects and demonstrate to Manufacturer's satisfaction that said defects are covered by this Limited Warranty. If the defects are properly reported to Manufacturer within the warranty period, and the defects are of such type and nature as to be covered by this warranty, Manufacturer shall, at its own expense, furnish, replacement Products or, at Manufacturer's option, replacement parts or services for the defective Products. Shipping and installation of the replacement Products or replacement parts shall be at Buyer's expense.

## 2. Other Limits.

THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Manufacturer does not warrant against damages or defects arising out of improper or abnormal use or handling of the Products; against defects or damages arising from improper installation (where installation is by persons other than Manufacturer), against defects in products or components not manufactured by Manufacturer, or against damages resulting from such non-Manufacturer made products or components. Manufacturer passes on to Buyer the warranty it received (if any) from the maker thereof of such non-Manufacturer made products or components. This warranty also does not apply to Products upon which repairs have been affected or attempted by persons other than Manufacturer or pursuant to written authorization by Manufacturer. This warranty also does not apply to any product provided by the Buyer and mounted by the Manufacturer to Products.

## 3. Exclusive Obligation.

THIS WARRANTY IS EXCLUSIVE. The sole and exclusive obligation of Manufacturer shall be to repair or replace the defective Products in the manner and for the period provided above. Manufacturer shall not have any other obligation with respect to the Products or any part thereof, whether based on contract, tort, strict liability or otherwise. Under no circumstances, whether based on this Limited Warranty or otherwise, shall Manufacturer be liable for incidental, special, or consequential damages.

## 4. Other Statements.

Manufacturer's employees or representatives' ORAL OR OTHER WRITTEN STATEMENTS DO NOT CONSTITUTE WARRANTIES, shall not be relied upon by Buyer, and are not a part of the contract for sale or this limited warranty.

## 5. Entire Obligation.

This Limited Warranty states the entire obligation of Manufacturer with respect to the Products. If any part of this Limited Warranty is determined to be void or illegal, the remainder shall remain in full force and effect.

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# Getting Started

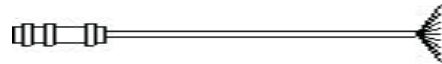
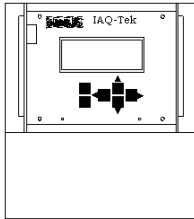
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## Step 1

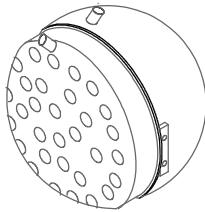
### Unpacking

Check that you have received the following items with your IAQ-TEK.

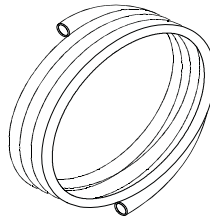
- **(1) Monitor**  
PN 2001ASM00293
- **(1) Transducer**  
PN 2001ASM00294
- **(1) 50' Cable Assembly**  
PN 1025CAB00030



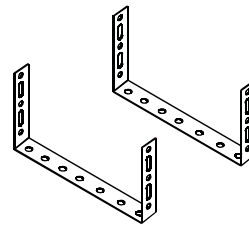
- **Probe and Mounting Kit, <sup>1</sup>Single Probe Kit Shown Below**  
PN 2001ASM00295



Probe`



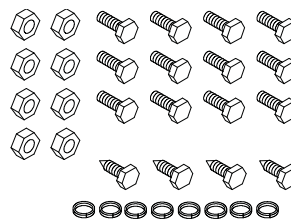
10' Tubing



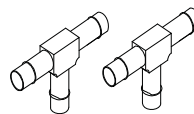
End Brackets



Vertical Brackets



Mounting Hardware



“T” Fittings

(Only included with multiple probe kits.)

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<sup>1</sup> For two-probe configuration, quantity of each item in the kit doubles and four T-Fittings are included. For three-probe configuration, quantity of each item triples, etc..

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# Getting Started

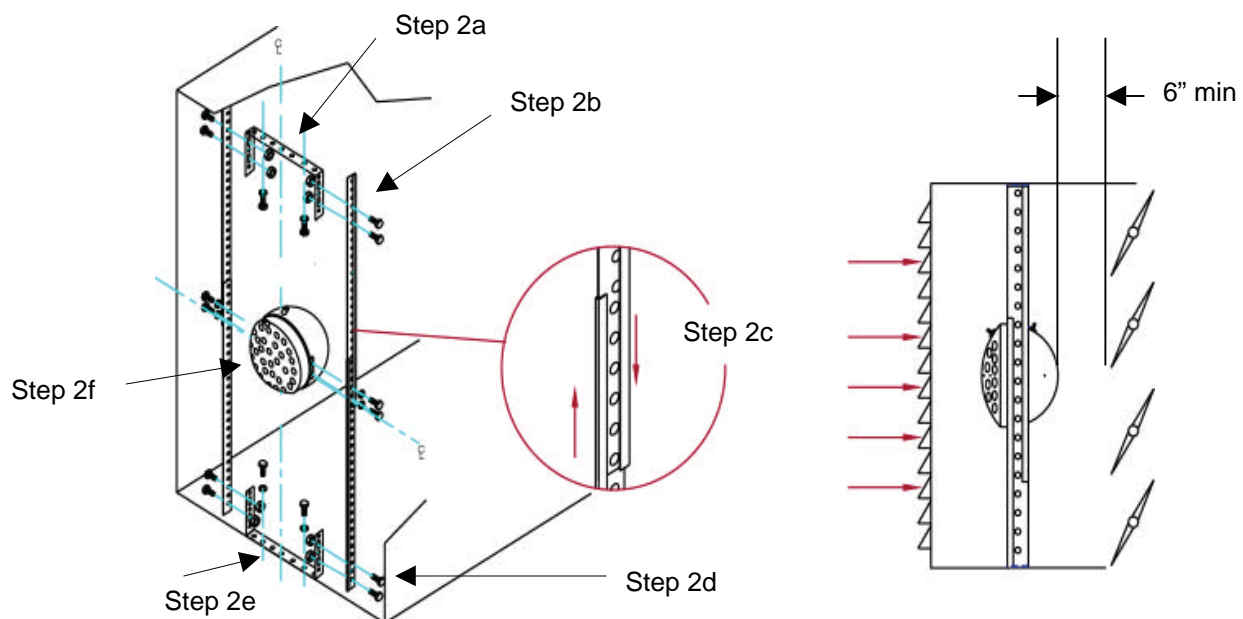
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## Step 2

### Probe Installation

Install the probe(s) in the outdoor-air intake plenum per Figure 1 (*Reference Appendix A for various types of installations*). For multiple probe installations, determine probe location by dividing the damper area into as many quadrants as you have probes. Mount each probe in the center of each quadrant repeating Steps 2a through 2f for each probe.

**Note: All probes must be mounted with the brass fittings up to prevent moisture blockage in tubing.**



**Figure 1**  
**PROBE INSTALLATION**

- Step 2a:** Locate the center of area to be measured and attach the upper end bracket to the upper mounting surface using (2) lock-washers and (2) sheet metal screws provided. Make sure the back of the Probe is at least six inches from the fully open damper.
- Step 2b:** Attach the (2) vertical brackets to the upper end bracket using (4)  $\frac{1}{4}$ -20x  $\frac{1}{2}$  screws and (4) lock-nuts provided.
- Step 2c:** Slide the (2) lower vertical brackets onto the upper vertical brackets as shown and extend to the lower mounting surface.
- Step 2d:** Attach the lower end bracket to the (2) vertical brackets using (4)  $\frac{1}{4}$ -20 screws and (4) lock-nuts provided.
- Step 2e:** Attach the lower end bracket to the lower mounting surface using (2) lock-washers and (2) sheet metal screws provided.
- Step 2f:** Locate the Probe in center of the damper and mount to the vertical brackets using (4)  $\frac{1}{4}$ -20x  $\frac{1}{2}$  screws and (4) lock-washers provided.

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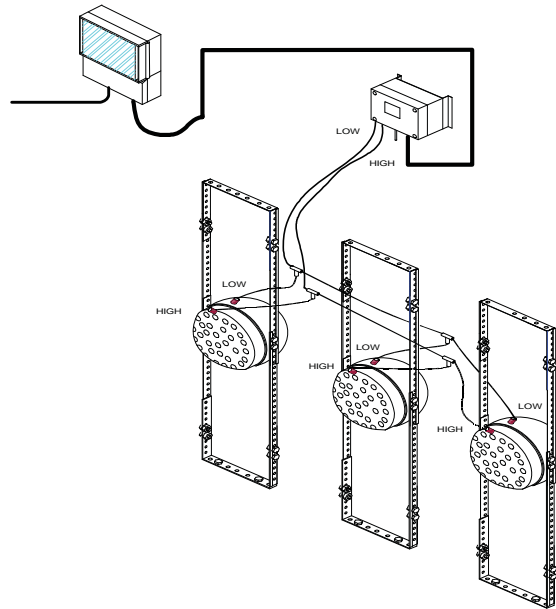
# Getting Started

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## Step 3

### Transducer Installation

Mount the transducer vertically in the outdoor-air intake plenum in close proximity to the probe(s) per Figure 2. The transducer should be located no more than 4 feet from the probe. If it is not possible to mount the transducer into the outdoor-air intake plenum, it can be mounted outside and external to the air handler (provided it is in the shade) or in a machine room. If the transducer is going to be mounted in a machine room or other location that is not in the outside air, the auxiliary temperature probe (purchased separately) is required. Mount the transducer using (4) screws suitable for the 3/16 holes provided in the mounting bracket. *This mounting hardware is not included in the kit.*



**Note:** The transducer must be mounted vertically higher than the probes with the fittings pointing down to allow condensation to drain down to the probes.

**Figure 2**  
**System Installation**

## Step 4

### Monitor Installation

We recommend that the monitor be installed in a location that is protected from environmental extremes such as the penthouse or mechanical room, however, the monitor may be mounted outdoors providing the specified operating conditions are not exceeded. The monitor should be mounted in a location that is easily accessible for set-up. To access the mounting holes remove the window door and mount the monitor using a minimum of (4) #8 screws in the slots provided. *This mounting hardware is not included in the kit.*

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# Getting Started

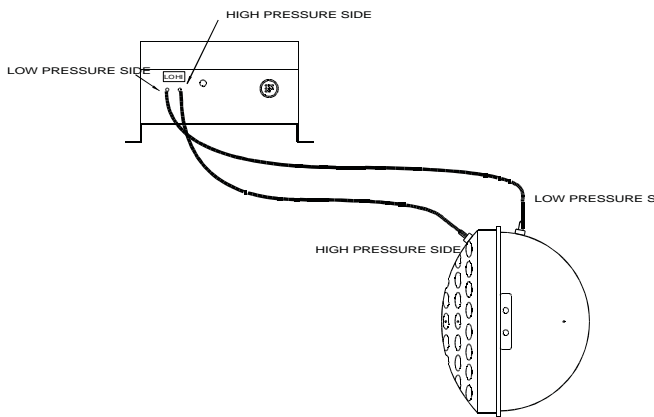
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## Step 5

### Tubing Installation

- **Single Probe Configuration**

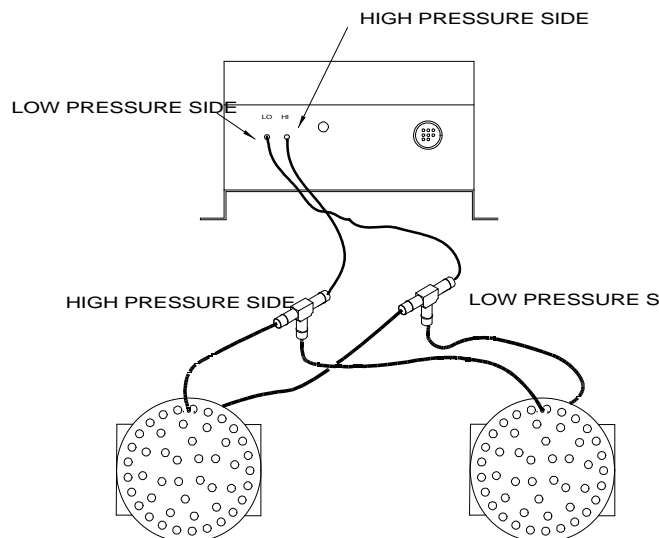
- Step 5a:** Measure the distance from the transducer “High” port to the probe “High” port.
- Step 5b:** Cut a piece of the tubing provided to the proper length and attach it to “High” ports of the transducer and probe.
- Step 5c:** Repeat steps 5a and 5b for the “Low” port.



**Note:**  
*The tubing must run continuous directly from the probe to the transducer with no kinks, pockets or loops.*

- **Multiple Probe Configuration**

- Step 5d:** Connect each of the probes “High” ports together using “tee” fittings and the tubing provided.
- Step 5e:** Connect the probes “High” ports to the transducer “High” port per figure below.
- Step 5f:** Repeat Steps 5d and 5e for the “Low” ports.



**Note:**  
*The tubing must have no kinks, pockets or loops.*

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# Getting Started

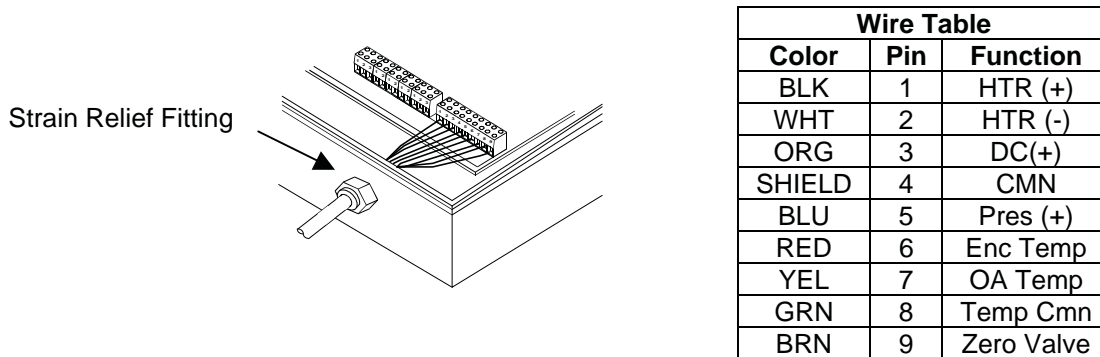
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## Step 6

### Wiring

#### Transducer Wiring

- Connect the 50-foot cable assembly to the pressure transducer. One end of this cable has flying leads to allow cable to be run through conduit.
- Loosen the strain relief fitting nut on the lower right side of the monitor enclosure.
- Guide the cable end through the strain relief fitting and terminate the transducer wires to the monitor 9-pin terminal block per Figure 3. Be sure to secure each screw after landing wire in the proper location.
- Secure strain relief fitting nut.

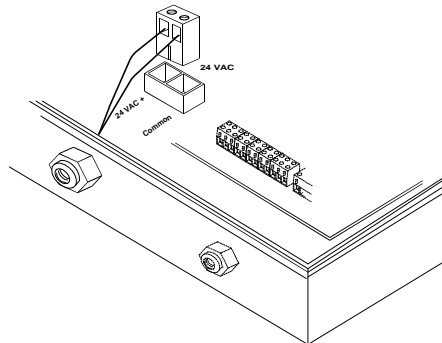


**Figure 3**  
**Transducer Wiring**

#### Input Power Wiring

- Loosen the strain relief fitting nut located on the lower left side of the monitor enclosure.
- Guide the 24 VAC input power wires (18 AWG) through the strain relief fitting and terminate on the green input power terminals.

**Note: The power source must be capable of providing 25 VA to the monitor.**



**Figure 4**  
**Input Power Wiring**



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# Getting Started

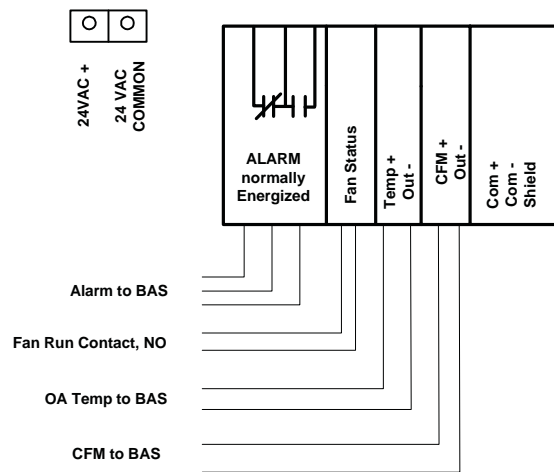
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## Step 6

### Wiring

#### Wiring to BAS

- Loosen the strain relief fitting nut located on the lower left side of the monitor enclosure (*Same as used for the power wires*).
- Guide the cable from the BAS through the strain relief fitting and terminate on the appropriate terminal blocks per Figure 5. Be sure to secure each screw after landing wire in the proper location.
- Secure the strain relief fitting nut.



**Figure 5**  
**Wiring to BAS**

## Step 7

### Power-Up

- Activate the input power (24 VAC) to the Monitor. The IAQ-TEK Monitor Display should be at the **HOME** menu with **ALARMS> NO**. If Monitor Display indicates **ALARMS> YES**, you probably have an installation error. Refer to the **Diagnostic Alarms Section** for an explanation of the alarms.

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## ***Basic Display and Keypad Operation***

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The IAQ-TEK display and keypad have been designed to function together in such a way as to provide a straightforward and intuitive tool for the setup, calibration, and troubleshooting of the monitor. Following is a brief description of the basic keypad operation.

### ***Buttons will index the displays in the hierarchy.***

- HELP - I  
HOME - II ■ Pressing once will take the user to the HELP screen if available.  
Press again to return to the last active screen you left.  
Pressing this twice will take the user back to the top-level display.
- ▲▼ Will cause scrolling up and down through the menu items.
- ▶ Will cause the display to go to the adjacent menu item.
- ◀ Will cause the display to go back to the previous display.
- ▲▼ Will allow the user to scroll through the various selections.
- ▶ Will index the selection of a particular item.
- ENTER ■ Will change the value to the one indexed. All entries of ENTER shall be followed by a message which asks the user to confirm this is what he/she wants to do.

### ***Buttons will also be used to enter numbers in numeric fields. When a numeric data entry display is indexed, buttons act as follows.***

- ▶ Pressing will cause the cursor to move to the right, one digit per press. When at the far right, one additional press will bring the cursor back to the leftmost character.
- ◀ Will cause the cursor to move to the left, one digit per press. When at the far left, one additional press will cause the display to exit the numeric data entry mode.
- ▲▼ Will cause the numeric value to scroll up or down in response to the specific button pressed.
- ENTER ■ Will cause the numeric value to be set. All entries of ENTER shall be followed by a message which asks the user to confirm this is what he/she wants as a value.

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## ***Password Operation***

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A password is required to access any menus that allow the user to make changes to the Monitor operation. Password protected menu items include; Diagnostic Tests, Set-Up Wizards, Custom Setup and Factory Setup.

The factory default password is 1234. This password will give the user access to ***Diagnostic Tests, Set-Up Wizards, and Custom Set-Up.*** You may change the password through the **CUSTOM SETUP** menu. To disable password protection, enter 9999 as the new password.

There is a password lockout function that resets fifteen minutes after the keypad is last touched. If the user is in a password protected menu item and the keypad is not touched for fifteen minutes, the user will have to re-enter the password to proceed.

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## ***Verify Functionality Using Diagnostic Alarms***

---

### ***Diagnostic Alarms***

The Diagnostic Alarms are used to provide diagnostic information on the performance of the product, and to alert the user to a possible malfunction. Following is a description of the Diagnostic Alarms that are available in the IAQ-TEK.

#### **Low Flow Alarm**

The Low Flow Alarm is used to alert the building operators that the intake volume has fallen below the minimum acceptable level. The basis of the alarm shall be the result of the Balancer Adjusted CFM (BCFM). The Low Flow Alarm set point is user established and stored in a register in nonvolatile memory. The default value shall be 0 CFM. Should the air volume fall below the low volume alarm limit, the alarm delay timer shall activate. Should the alarm condition persist longer than the time period established by the alarm delay timer, the low volume alarm will toggle to ALARM. To reset to a NORMAL condition, the air volume must rise to a value that is ten percent higher than the Low Volume Alarm Limit. Once this threshold has been crossed, the alarm process is reset automatically.

#### **Reverse Flow Alarm**

The Reverse Flow Alarm is used to alert the building operators that the airflow is blowing out of the intake to the air handler. No deadband shall apply to this alarm. Should the alarm condition persist longer than the time period established by the alarm delay timer, the reverse flow alarm bit shall toggle to 1 or ALARM. To reset to a NORMAL condition, the TTCP must increase to zero or have the sign change to positive. Once this threshold has been crossed, the alarm process is reset automatically.

---

## ***Verify Functionality Using Diagnostic Alarms***

---

### **Pressure Loss Alarm**

Should the incoming signal from the pressure transducer indicate a negative pressure, a Pressure Loss alarm flag will be initiated immediately and without delay.

### **Outdoor Air Temperature Sensor Loss Alarm**

Should the OA Temp Input to the monitor go either high (input short) or low (input open), an OA Sensor Loss alarm flag will be initiated immediately and without delay.

### **Enclosure Temperature Loss**

Should the ENC TEMP input to the monitor representing the transducer temperature go either high (input short) or low (input open), an Encl Temp Loss alarm flag will be initiated immediately and without delay.

### **Loss of Enclosure Heater**

Should the enclosure temperature fall to eleven degrees below the enclosure temperature set point, an Enclosure Heater Alarm flag will be initiated after the time delay period. Should the heater alarm flag continue for a period of one hour, a heater malfunction flag will be initiated.

### **Auto-Zero Valve Malfunction**

Should the pressure transducer's auto-zero valve malfunction, the Auto Zero Valve alarm flag will be initiated immediately and without delay.

### **Memory Loss Alarm**

Indicates there has been a loss of nonvolatile memory parameters. The Memory Loss alarm will occur immediately and without delay.

### **Checksum Error Alarm**

Indicates that there is a memory checksum error. The Checksum Error alarm will occur immediately and without delay.

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# Set-Up Using the Wizards

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The typical set-up of the IAQ-TEK is performed in three steps:

1. The Temperature Control Contractor sets up the monitor functions.
2. The Air Balancer verifies the system operation and calibrates the IAQ-TEK to field conditions.
3. The Facilities Manager sets the alarm limits to meet their requirements for minimum outdoor air.

The IAQ-TEK has three Set-Up Wizards which allows for the selection and implementation of predefined step by step procedures required for set-up. The three Wizards are; “**Temp. Control Wizard**”, the “**Air Balancer Wizard**” and the “**Facilities Mgmt. Wizard**”. Steps 1 through 8 will guide you through the IAQ-TEK Set-Up using the Wizards.

**Note: The Pressure Transducer has an internal heating element, which must be stabilized at set point before proceeding. Allow the Pressure Transducer to warm-up for a period of 30 minutes prior to proceeding.**

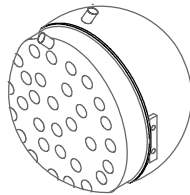
**Step 1:** Scroll to the **PRIMARY MENU** and select **Setup Wizards**. The **SETUP WIZARDS** menu should read as follows:



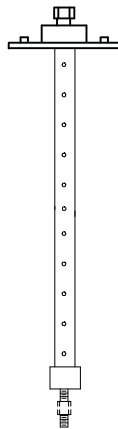
The “!” on the right side of the menu item indicates this wizard has not yet been performed.

**Step 2:** To set up Monitor functions, Select **Temp. Control** from the **SETUP WIZARDS** menu. Answer each question in the **TEMP CONTROL SETUP**.

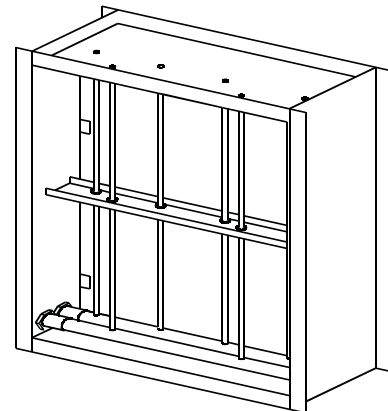
**Note: The second question will ask you for probe type, below is a diagram of each type:**



Tek-Air IAQ-TEK



Tek-Air TFP5000



Tek-Air TPS6000

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## Set-Up Using the Wizards

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**Step 3:** After answering all of the questions, the display should now read:

```
TEMP CONTROL SETUP
> Confirm Outpt Scale
AO1  0 - ##### CFM
AO2 -40 to 120 degF
```

The ### should have the full scale CFM value that you input.

**Step 4:** If the full scale CFM is correct, confirm with keypad.

```
SETUP WIZARDS
> Temp. Control
Air Balancer      !
Facilities Mgmt. !
```

The “!” on the right of Temp. Control should be gone. This indicates the Temp. Control wizard has been performed.

**Step 5:** To verify system operation and calibrate readings for field conditions, select **Air Balancer** from the **SETUP WIZARDS** menu. Follow the procedure as prompted in the **BALANCER SETUP**.

**Step 6:** Once you have completed the procedure, the display should now read:

```
BALANCER SETUP
Monitor:  ##### CFM
Balancer:  ##### CFM
Error:    ##.## %
```

If the **Error** is less than 25%, hit the ENTER key. You will then be asked to “Use Balancer Flow?” Enter Yes.

If the **Error** is greater than 25% the wizard will guide you through setup parameters that may have been entered incorrectly.

**Step 7:** The display should now read as follows:

```
SETUP WIZARDS
> Temp. Control
Air Balancer
Facilities Mgmt.      !
```

The “!” on the right of Air Balancer should be gone. This indicates the Air Balancer Wizard has been performed.

**Step 8:** To access the facility related items, select **Facilities Mgmt.** from the **SETUP WIZARDS** menu. Answer each question in the **FACILITIES SETUP**.

This completes the Set-Up procedure using the Set-Up Wizards. If you would like to customize your set-up, then turn to the section titled Custom Set-Up.

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## ***Custom Set-Up***

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Custom Set-Up provides a one stop means to setup any parameter. A password is required for entry to this display group. Items in this group allow the user to individually setup each of the read/write registers.

- Each Item is a read/write value found in the register table.
- Current Value and Units – Displays the value now existing in the register and the engineering units if appropriate.
- New Value -- Enter the new value here, or toggle if a digital value.
- ENTER to Change - Prompts the user to press ENTER to change the value.
- HELP MENU's -- For each item there is a help menu which includes a brief description

### ***Custom Set-Up Items***

**Area of Flow Device** -- Enter the area of the measurement point in square feet. The input value must be in the range from 1 to 999.9 square feet. Factory default is 1 square foot.

**Sensor Flow Coeff.** -- Enter the Sensor Flow Coefficient (SFC) for the type of differential pressure generating device being used. Following is a list a standard Tek-Air products and their respective SFC;

Generic Pitot	1.00
TFP-5000 or 6000	0.754
TPS-6000	0.624
IAQ-TEK Probe	0.762 (Factory Default)

**Altitude** -- Enter the altitude in feet above or below sea level for the location of the probe. Default is 0 ft.

**Low Flow Alarm Stpt** -- Enter the desired value for the Low Flow Alarm set point in CFM. Default is 0 CFM.

**Analog Out Flow FS** -- Enter the full-scale range in CFM for the analog output scaling. Default is 20,000 CFM.

**Alarm Delay Period** -- Several of the IAQ-TEK alarm conditions have their initiation inhibited for a delay period. This period is utilized to create a delay between the actual occurrence of an alarm and the reporting of the alarm either at the display, through the contact output, the digital outputs, or through communications. The Alarm Delay Period is adjustable between 5 and 60 seconds. The default time is 20 seconds. The IAQ-TEK alarms are non-latching type, meaning that the alarm will automatically clear when the alarm condition clears.

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## ***Custom Set-Up***

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**Press. Average Int** -- Enter the Averaging Time in seconds between one and twenty seconds for the average pressure calculation. Factory default is 2 seconds.

**Use Fan Interlock?** -- Select either NO (OFF) or YES (ON) to activate or deactivate the fan interlock. The Fan Interlock Function is used to interlock the action of the monitor to the running of the fan. The default setting is OFF, meaning the feature is not active. If the Fan Interlock Function is ON, the low CFM airflow alarm is deactivated any time the digital input function reports that the fan is OFF. When the fan is ON the alarm is active. The reporting of diagnostic alarms is not inhibited by fan run status. Fan status is provided on the HOME display if this feature is activated.

**Balancers Adj Fact** -- The Balancers Adj Fact (BAF) allows the Balancer to adjust the readings determined by the monitor, to those observed by the Balancer. Enter the BAF as a percentage of monitor reading. For example; if the monitor indicates the flow 1000 CFM and the Balancer indicates the flow is 900 CFM, the BAF is  $1000/900 = 90\%$ . Factory default is 100%.

**Password Change** -- To change the password, enter new four-digit number. The factory default is 1234.

**Auto-Zero Interval** -- Enter the Auto-Zero Interval in minutes between five and sixty minutes. Factory default is 30 minutes.

**Encl Temp Set Pt** -- Enter the Transducer Enclosure Temperature Set Point in degrees F. This value should be only a couple of degrees greater than the maximum outdoor air temperature. Factory default is 100 degrees F.

**OA Temp Sensor Bias** -- Allows the Balancer to adjust the monitor outside air temperature readings to those observed by the Balancer. Enter the offset desired in degrees F. Factory default is 0.

**Transducer Zero** -- Sets the monitor Zero range in "wc corresponding to the transducer 4mA output. Factory default is 0.00 "wc.

**Transducer FS** -- Sets the monitor Full Scale range in "wc corresponding to the transducer 20mA output. Factory default is 0.25"wc.



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# ***Diagnostic Functions***

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The Diagnostic Functions provide the user with a method by which the functionality of the monitor system can be established by manually reading input status and manipulating outputs. Once activated, Diagnostic Functions will cause all calculation and alarming activities to halt. If left performing Diagnostic Functions for more than fifteen minutes, the monitor will exit Diagnostic Functions and return to normal operation and HOME. Below is a brief description of the Diagnostic Functions.

## ***Test Analog Inputs***

When in this mode, the user will be able to view the Transducer Input Current (mA), the Transducer Enclosure Temperature Sensor Resistance (ohms), and the Outdoor Air Temperature Sensor resistance (ohms).

## ***Test Digital Input***

When this mode is indexed, the user can view the status of the digital input contact as OPEN or CLOSED.

## ***Test Analog Output #1***

When indexed this function will cause the 4-20mA Output (CFM OUT) to step from 4 ma, to 12 mA, to 20 mA, and repeat successively in 3-second intervals.

## ***Test Analog Output #2***

When indexed this function will cause the 4-20mA Output (TEMP OUT) to step from 4 ma, to 12 mA, to 20 mA, and repeat successively in 3 second intervals.

## ***Test Contact Output-***

When activated this function will cause the Alarm Contacts to toggle successively from energized to de-energized every five seconds.

## ***Test Zero Valve***

Five seconds after indexing this function, the Auto-Zero Valve shall energize for ten seconds and the display will show the uncorrected pressure from the transducer. After five seconds more this sequence will repeat. The most current value of offset pressure will also be displayed for informational purposes.

## ***Check Registers***

This function allows you to index through all of the registers in sequential order.

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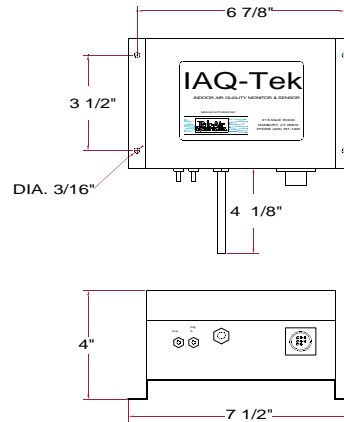
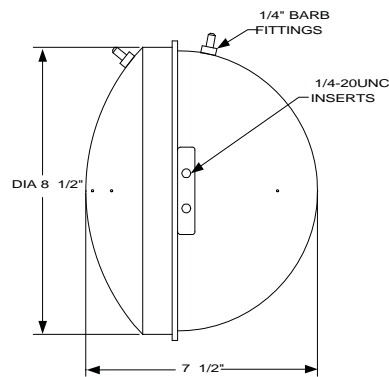
# Specifications

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## System Accuracy

- Intake Velocity
  - 750 to 200 FPM;  $\pm 5\%$  reading
  - 200 to 100 FPM;  $\pm 10\%$  reading

## Probe and Transducer



- Temperature
  - Operating:  $-40$  to  $120 \pm^\circ\text{F}$
  - Storage:  $-40$  to  $150^\circ\text{F}$
- Air Velocity Capabilities
  - Discharge of intake louver- 75 to 750 FPM
  - Free Air, before damper- 100 to 1000 FPM

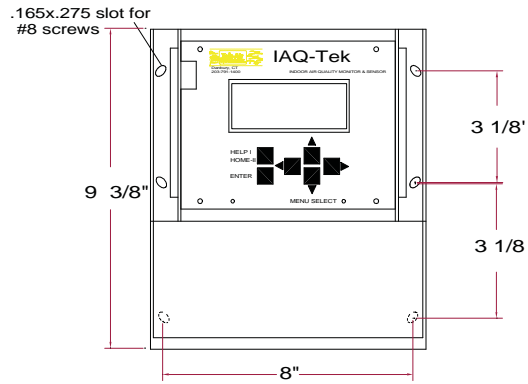
## Probe

- Material: PVC/ABS
- Fire Rating: UL-94-V0 and UL-94-5VB
- Quantity Required:
  - Louver area  $< 64$  square feet:
    - 1 per 12 sq. ft. with aspect ratio of 1 to 1.5.
    - 1 per 8 sq. ft. with aspect ratio greater than 1.5
  - Louver area  $> 64$  square feet:
    - 1 per 16 square feet
- Weight: 1.5 lbs.
- Tubing Connections: 1/4" barb fittings

## Transducer

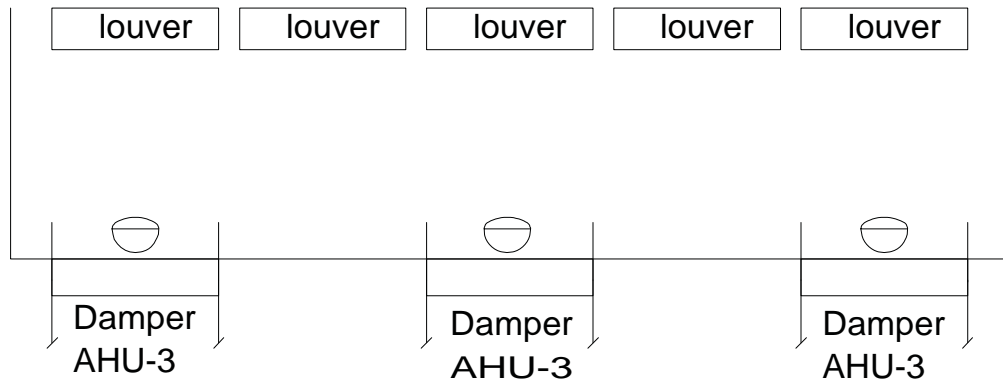
- Enclosure: NEMA-4X Watertight
- Electrical Connection: Integral Cable
- Weight: 1.5 lbs.
- Tubing Connections: 1/4" barb fittings

## Monitor

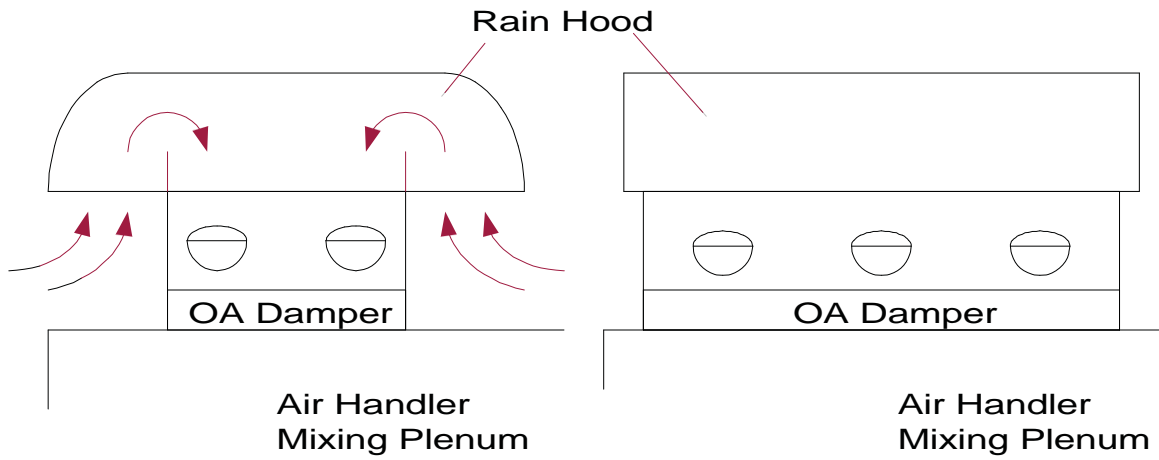


- Temperature
  - Operating: 30 to 110 °F
  - Storage: -40 to 150 °F
- Enclosure
  - Type: NEMA-4X Watertight
  - Weight: 3.5 lbs.
- Power
  - Supply Voltage: 24 VAC, limits 19/31 VAC
  - Power: 25 VA
- Digital Input for Fan Status Interlock:
  - Type: Dry Contact
- Analog Outputs
  - Type: Powered and Isolated 4-20mA
  - Scaling: CFM user set, Temperature -30 to 120 F
  - Output Load: 0-600 ohms
- Digital Alarm Output:
  - Type: Dry Contact, SPDT
  - Rating: 0.5 Amps Max
  - State: Normally Energized
- Display
  - Type: LCD
  - Size: 4x20 lines, backlit

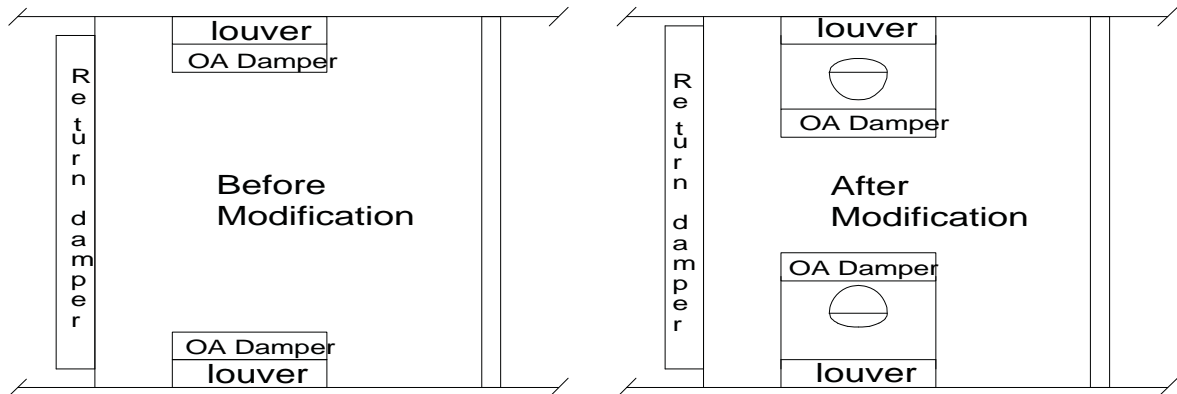
# Appendix A



**Shared Plenum**



**Cap Type Rain Hood Intake**

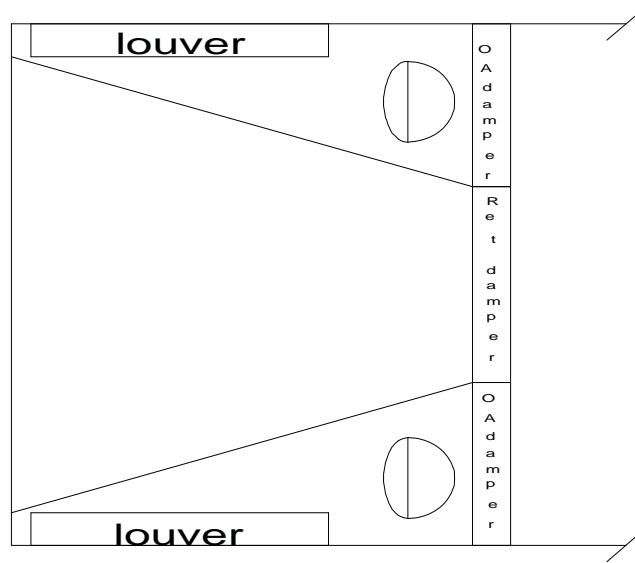


**Side Draw Outdoor Air Intake**

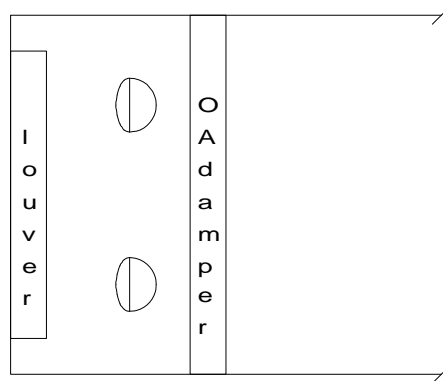
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# Appendix A

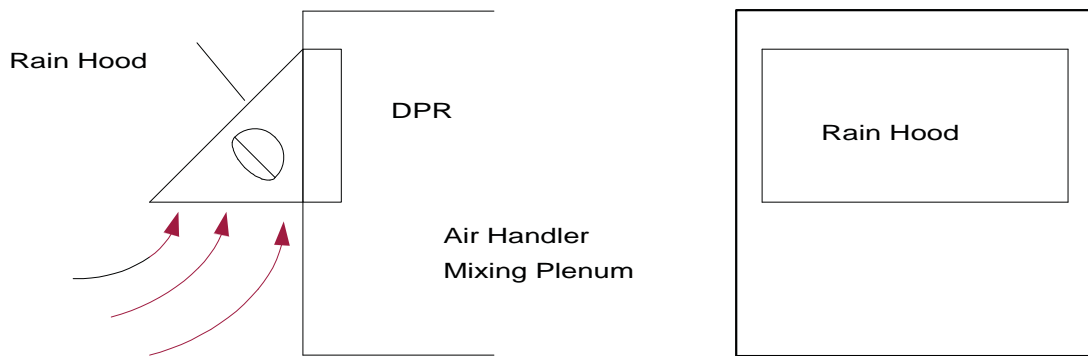
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***McQuay Type Intake***



***Standard Air Intake***



***Standard Rain Hood Intake***