TOXALERT™ DATA SHEET

CARBON DIOXIDE (CO_2) INDOOR AIR QUALITY SENSOR

MODEL AIR 2000

FEATURES

- **10 year sensing element life**
- **Low voltage circuits**
- **Linear 4 to 20 mA output or 0 to 10 vdc output**
- **Optional digital display**
- **Relay option available**
- **Optional Duct Mounted Unit**
- **Interfaces directly to DDC systems**
- **Other Ranges Available**

GENERAL DESCRIPTION:

Toxalert's AIR 2000 Carbon Dioxide (CO_2) sensors come with a linearized signal output capability of 0 to 10 VDC and 4 to 20 mA over its 0 – 2000ppm range (other ranges available). It has an accuracy of ± 5% of reading and a repeatability of ± 20ppm. Options available with the AIR 2000 are a digital display for reading CO_2 concentration in ppm; relay output with field adjustable setpoint; and duct mounting hardware. The AIR 2000 may input directly to a Toxalert controller, interface directly to any standard direct digital controller (DDC); or be a standalone unit for the control of ventilation equipment.

SENSING ELEMENT:

Model AIR 2000 Carbon Dioxide sensors consist of a patented solid state infrared CO_2 monitor housed in an attractive plastic case. The AIR 2000 has a new state-of-art lithium tantalate detector, updated digital electronics and unique auto-zero function. This results in very stable calibration and longer trouble-free operation in the field. The new IR source is more rugged, operated at 10X derated power and has a life expectancy of 10 years. The new lithium tantalate detector enhances stability, has less ambient temperature sensitivity, and faster response time. The AIR 2000 space sensor has louvers to allow free passage of air to the sensing cell inside. The AIR2000DM duct sensor has pedo tubes for drawing a sampling from the ventilation duct.

BACKGROUND:

CO_2 is generally accepted as an indicator of IAQ. Ambient outside air concentrations of CO_2, in most areas, is about 300 to 400 parts per million (ppm). The generally accepted high level of CO_2 indoors is 1000 to 1300 ppm. ASHRAE Standard 62-1989, Ventilation for Acceptable Indoor Air Quality, recommends that 1000 ppm of CO_2 is the maximum acceptable level of CO_2 concentration. CO_2 itself is not a health hazard at these levels, but if these levels of CO_2 are maintained as a maximum, it is generally accepted that other IAQ contaminants are being diluted by outside air to maintain acceptable limits.

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The ambient CO_2 level within a building will vary with the number of occupants within the building and the level of physical activity of those occupants. The CO_2 levels may be monitored and controlled within a building by controlling the outside air and return air dampers of the building ventilation system. Space or duct CO_2 sensors may be placed in areas of the building where CO_2 concentrations are expected to be highest and the ventilation system may be modulated to control the indoor air quality.

INDOOR AIR QUALITY CONTROL GUIDE SPECIFICATIONS:

Note to Specifying Engineer: *CO_2 sensors are available with optional contact closure (digital) output and with analog (voltage and/or current) outputs. The digital output simply closes a set of contacts when the CO_2 concentration in the space or duct reaches a pre-set level. The mechanical equipment is then activated to bring in more outside air. If the analog output is used, a controller is required to operate the mechanical equipment.*

If you want to specify a system with only a digital output use the first three paragraphs of the guide specification below. If you want an analog system with multiple output levels, use all four paragraphs of the guide specification.

Guide Specification: Provide an indoor air quality control system to maintain a maximum CO_2 level in ambient air as specified herein. Provide space and/or duct type carbon dioxide as indicated on the plans.

The carbon dioxide transducer(s) shall have a non-dispersive infrared optical sensor cell for long life, and accurate CO_2 sensing. The CO_2 transducer shall have a linear analog output signal calibrated over a range of 0 to 2000 ppm. The CO_2 sensor shall be Toxalert International, Inc., Model AIR 2000 space sensor or Model AIR 2000DM duct sensor.

The CO_2 transducer(s) signal(s) shall be used as inputs to the ventilation control system, which shall be adjustable, to operate outdoor air ventilation dampers such that the indoor air CO_2 level does not exceed 1000 ppm.

The IAQ controller, TOXALERT's Model TOX-4ANA or a direct digital controller (DDC), shall be programmed to activate the first stage when the CO_2 level reaches or exceeds 1000 ppm of CO_2. The system shall be wired such that maximum outside air is introduced into the space when the first stage is activated. When the CO_2 level reaches 1500 ppm CO_2 a red LED shall be lighted on the face of the controller and an audible alarm shall sound. Provide an audible alarm silence push button on the controller to silence the audible alarm.

SPECIFICATIONS

- **Method:** Non Dispersive Infrared
- **Gas:** Carbon Dioxide (CO_2)
- **Range:** 0 to 2000 ppm (other ranges available)
- **AIR 2000:** Space Sensor
- **AIR 2000DM:** Duct Mount Sensor
- **Adjustable Set Point:** SPST relay contacts 2 amp non inductive @ 24 VAC
- **Output Signals:** 0 to 10 VDC and 4 to 20 mA linearized over full range of 0 to 2000 ppm
- **External Dimensions:** 5.2"H x 3.2"W x 1.4"D
- **Accuracy:** $\pm$ 5% full scale
- **Repeatability:** $\pm$ 20 ppm
- **Input Power:** 20-30 VAC, 18 to 30 VDC
- **Power Consumption:** Less than 2 watts @ 24 VAC
- **Weight:** Less than 0.5 lbs. 6.5 oz. (.35 kg)
- **Operating Temperature:** 32ºF to 122ºF
- **Calibration:** Recommended once every 5 years

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INSTALLATION INSTRUCTIONS

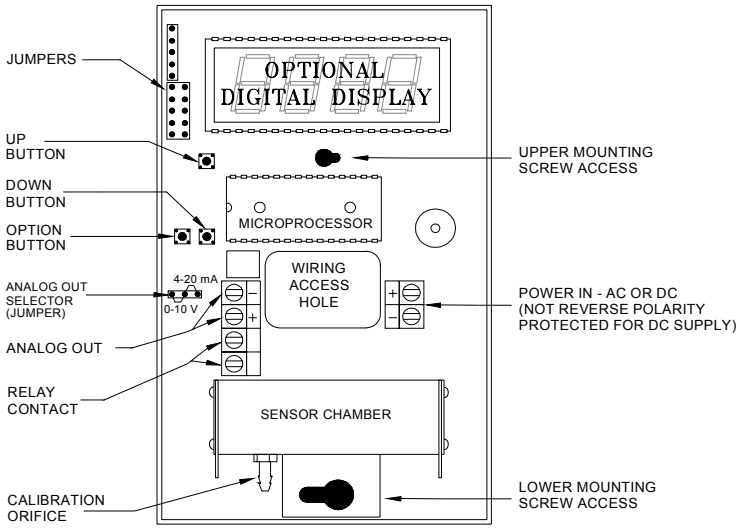

FIG. 1: AIR 2000 COMPONENT LOCATIONS

1. INTRODUCTION

Your TOXALERT ventilation control system incorporates the latest in solid state technology to give you maximum reliability and performance. Either analog output signal will provide a linear output over the units calibrated range.

2. INSTALLATION

Refer to figures 1, 2 and 3 and install and connect the TOXALERT system as follows:

(1) AIR 2000- Locate a flat mounting surface in the area where the presence of carbon dioxide is to be monitored or controlled. Locate away from direct fresh air intakes where a temporary clearing of CO_2 concentration may occur and mount approximately 5 feet above the floor.

(2) The AIR 2000 Space Sensor and the AIR 2000DM Duct Sensor are designed to be mounted on a standard single gang electrical outlet box, or directly onto drywall.

(3) The sensor analog output terminals (0 to 10V or 4 to 20 mA) are shown in fig. 2 as the top two terminals on the left of the wiring access hole. Polarity is shown as the top terminal being negative (-) and the second terminal being positive (+). The optional relay contact terminals are the lower two terminals located on the left side. The power input terminals on the sensor are the two located to the right of the wiring access hole. Power can be either 24VAC or 24VDC. If 24VAC is used with multiple sensors, make sure “H” goes to (+) terminal and “N” goes to (-) terminal on all sensors. If 24VDC is to be used, ensure correct polarity. TOXALERT recommends the use of #18 gauge wire for wiring the sensor.

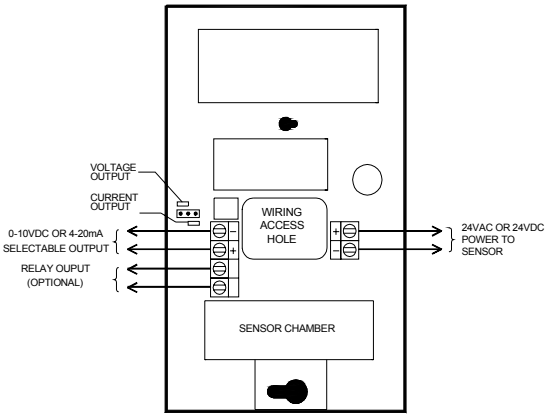

FIG. 2 : AIR 2000 TYPICAL WIRING DIAGRAM

4.) After all connections have been made and verified the following check should be performed after power up to ensure that the connection has been properly establish and the Air2000 is transmitting the correct values.

1) Be sure that the output select jumper is set correctly for voltage or current output. If this is not done first, the following check may product incorrect results.

2) Note whether the shorting block at jumper JP5 is covering both pins or only a single pin, **then borrow the shorting block and slide it over the two pins of jumper JP4 (see figure 2).**

3) The display (if present) will show 'SEL' to indicate selection of voltage calibration mode.

4) Momentarily closing JP5 will set the unit to full scale output (10V or 20mA). Do not press the buttons on the unit as this will affect the output calibration.

If the receiving device shows no change after JP5 is closed, verify that the wiring is correct.

Remote the shorting block from JP4 and restore it to its original position at jumper JP5. Air 2000 will reset and its output now corresponds to the actual detected CO_2 concentration.

AIR 2000DM DUCT SENSOR

The AIR 2000DM Duct Mounted Sensor includes an AIR 2000 sensor and associated hardware (sampling tubes, tubing, filter, adapter, etc.)

Mounting and wiring of the sensor is similar to that of the space sensor. Complete installation instructions are included in the AIR 2000 Instruction Manual.

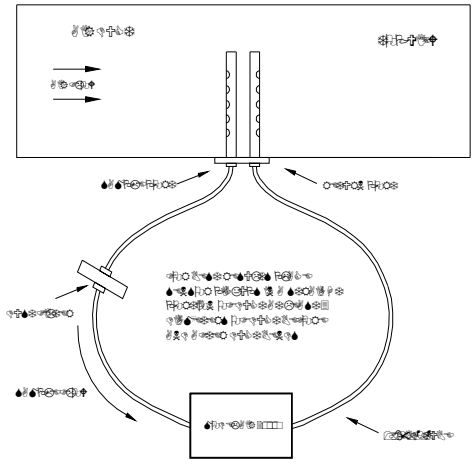

FIG 3: DUCT SAMPLING DIAGRAM

ORDERING INFORMATION

Model No.	Description
• AIR 2000	CO2 Sensor
• AIR 2000D	CO2 Sensor with Digital Display
• AIR 2000R	CO2 Sensor with Relay Output
• AIR 2000D/R	CO2 Sensor with Digital Display and Relay Output
• AIR 2000DM	CO2 Sensor with Duct Mounting Capability
• AIR 2000D/DM	CO2 Sensor with Digital Display and Duct Mount Capability
• AIR 2000D/R/DM	CO2 Sensor with Digital Display, Relay Output, and Duct Mount Capability

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