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**MODEL TR-3210
OPERATION MANUAL**



AIR QUALITY SENSOR

Installation & Calibration

INSTALLATION:

1. Locate a flat surface to mount the enclosure. The power entry is at the top of the enclosure.
2. Remove the cover of the enclosure by removing the 2 screws in the faceplate. Be careful here since the circuit board and sensor are connected to the cover. Set the cover/electronics safely aside while connecting the conduit and pulling in the wiring.
3. Connect the electrical fittings to the enclosure and bring in the electrical wires. **NOTE: BE SURE WIRING IS DONE ACCORDING TO THE LOCAL ELECTRICAL CODE REQUIREMENTS.**

Connect the wires to the terminal block as shown on the wiring drawing. **NOTE POLARITY.** (See Wiring drawing). Use 18 gauge minimum wire. It is recommended that shielded wire be used if it is not being run in metal conduit.

CALIBRATION AND CONTROLLER SETUP:

The AirTest TR-3210 gas detection sensor is calibrated at the factory to a 4 to 20 milliamp output in proportion to a concentration range as per table 1. No further calibration should be required upon initial installation. Since the output of the sensor is linear, a simple formula (see below) can be used to calculate the output signal level for a given gas concentration. These calculated signal levels can be used to set a controllers' ventilation or alarm trip points.

The sensor should be recalibrated if, during a verification test, the output reading is off by more than +/- 5% of full scale or, if the sensor has been in service for approximately 1 year after last calibration. Follow the steps below to recalibrate the sensor.

1. Connect the TR3210 to a controller, one wire (16 AWG max) to + and the other to the 4-20 mA loop return (-). The connection polarity of the TR3210 is marked on the terminal block. Power-up the unit.
2. Using a DVM (Digital Volt Meter), monitor the voltage at test points (mA -) and (mA+) and adjust the ZERO trimpot so the DVM reads 40 mV (0.040 volts or 4mA) **NOTE:** Calibration area must be free of gas or Zero Gas must be applied).
3. While still monitoring the test points, apply calibration gas to the sensor using the cap provided. (Flow rate as per table 1). **NOTE:** Unlike solid state sensor elements, the TR3210's electrochemical sensor does NOT require moisture to be added to the calibration gas stream. Wait until the reading stabilizes.
4. After the test point voltage has stabilized (approximately 1 minute) adjust the SPAN trimpot so the voltage at the test points reads the desired output (0.01 volts = 1mA) for the calibration gas concentration. See examples and formulas below.

** If you are confident that the calibration area is free of contaminating gases, O₂ concentration can be assumed as 20.9% and used as the calibration point.

Specifications

<i>Sensing Element</i>	<i>Electrochemical</i>
Gas Sampling Method	Diffusion
<i>Warm-up Time</i>	<i>< 2 minutes</i>
Power Requirement	12 to 30 VDC
<i>Calibration Interval</i>	<i>12 months</i>
Power Consumption	20 mA
<i>Response Time</i>	<i><1 minute</i>
Output	4-20 mA
Humidity (non-cond.)	0 to 90%
<i>Linearity</i>	<i>Linear</i>
Dimensions(LxWxD) in.	5.7 x 2.9 x 2.6
	cm. 14.6 x 7.5 x 6.5
<i>Miscellaneous Options</i>	<i>Flush mount</i>
<i>Approvals</i>	<i>Pending</i>

AirTest continues to work on product improvement, therefore specifications are subject to change without notice

Important

Although this instrument will operate with a wide range of DC supply voltages the minimum voltage specified is dependant on the input resistance of the controller used plus the wire run resistance.

Use the formula below to determine minimum DC supply voltage required with any given input load resistance.

$$V_{\min} = C_r \times .02 + 7 + (W_r)$$

Where

C_r = the Controller input resistance (C_r ohms).

W_r = Voltage to be added due to wire resistance loss. (W_r volts) More detail below.

V_{\min} = the minimum DC supply voltage required (V_{\min} volts).

Example: Where controller input resistance is 250 ohms and wire run resistance is less than 5 ohms. (No voltage needs to be added for wire run resistances below 5 ohms.

$$C_r \times .02 + 7 + (W_r) = V_{\min}$$

$$250 \times .02 + 7 + (0) = 12 \text{ Volts}$$

Wire run (W_r) resistance must be taken into account if the power supply to be used is within 1 volt of the calculated minimum requirement.

The following can contribute to increased wire run resistance.

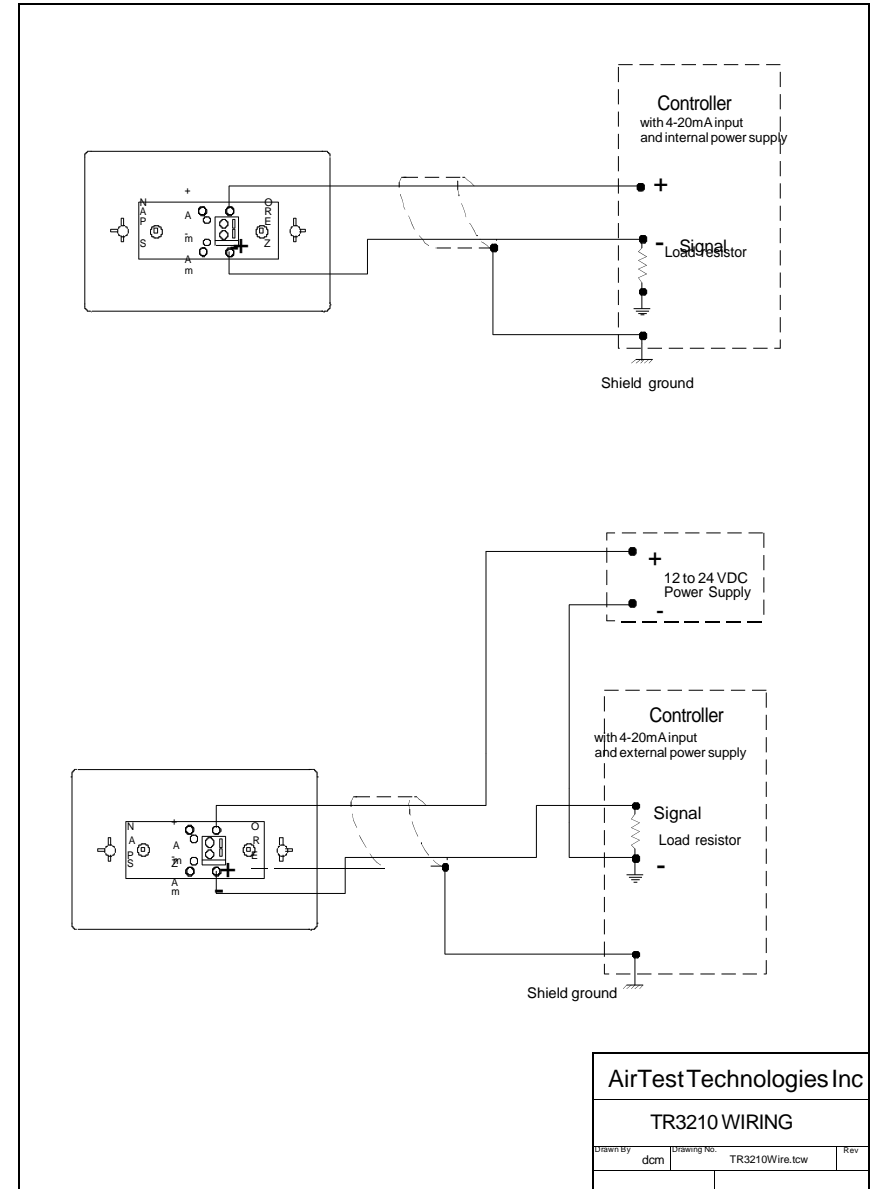
- Very long wire runs (over 500 feet or 150 meters)
- Small gauge wire (20awg or less) especially solid conductor
- Splices in wire run that are not soldered
- High oxygen content, low grade wire

Add 0.1 volts for every 5 ohms of wire run resistance. No voltage needs to be added for wire run resistances below 5 ohms.

AS A LAST RESTORT

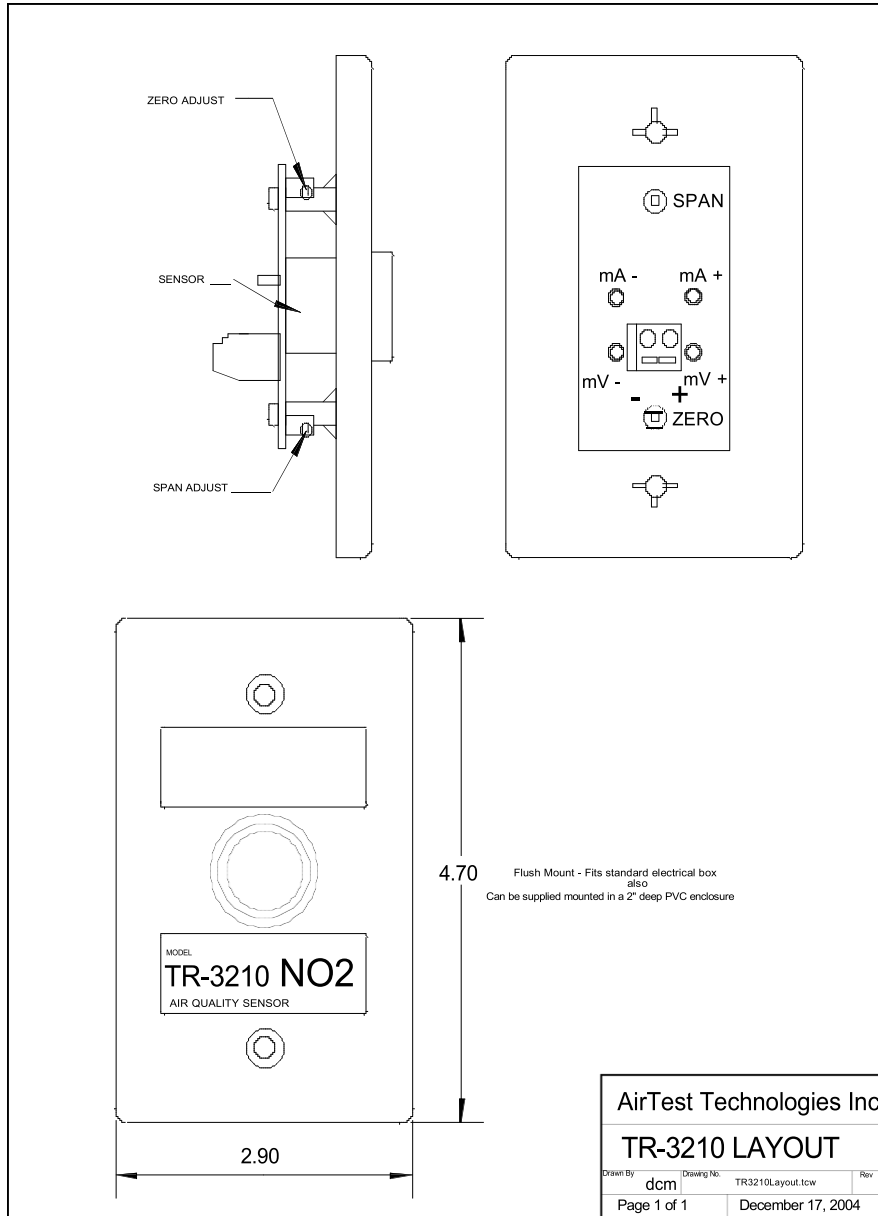
If you are not sure of the technical specifications of the controller or have little experience with instrumentation controls wiring, use a 24VDC power supply to virtually eliminate all the above technical considerations.

TR3210 Wiring



AirTest Technologies Inc			
TR3210 WIRING			
Drawn by	Engineering No.	TR3210Wire.tcw	Rev
dcm			

TR3210 Layout



Calculating ppm to Signal Output and Output to ppm:

Formula... $OUTPUT\ SIGNAL(mA) = [GAS\ CONCENTRATION(ppm) \div FULL\ SCALE\ CONCENTRATION\ (ppm) \times 16] + 4$

For example a unit calibrated to a full scale gas concentration of 20ppm will produce an output signal of $(10 \div 20) \times 16 + 4 = 12mA$ at 10ppm . For 15ppm..... $(15 \div 20) \times 16 + 4 = 16mA$.

To determine the gas concentration level a sensor is detecting by it's output use the following formula.

$CONCENTRATION = [OUTPUT\ SIGNAL(mA) - 4] \div 16 \times FULL\ SCALE\ CONCENTRATION$

For example a unit is reading 10.5mA and is calibrated to 20ppm full scale, the gas concentration detected would be 8.1ppm or $[10.5 - 4] \div 16 \times 20 = 8.1ppm$.

NOTE Most simple calculators need the equals (=) sign press between each operation for an accurate calculation.

Table 1

GAS	RANGE	FLOWRATE
NO ₂	0-10 ppm	0.40 Lpm
H ₂ S	0-50 ppm	0.25 Lpm
CL ₂	0-5 ppm	1.00 Lpm