



# RIGID AVERAGING SERIES

Installation & Operation Instructions

Phone: 1-888-967-5224

Website: workaci.com

## PRECAUTIONS

- **DO NOT RUN THE WIRING IN ANY CONDUIT WITH LINE VOLTAGE (24/120/230 VAC).**

## GENERAL INFORMATION

The Platinum rigid averaging sensors include a continuous sensing element, which covers the entire length of the probe. The Thermistor rigid averaging sensors include four sensing points, which are spread out evenly. This allows for a better average temperature over the length of the sensor when compared to that of a single point duct sensor. The sensor is designed for use with electronic controllers in commercial heating and cooling building management systems. It is available with multiple thermistor or RTD options.

### For optimal temperature readings, follow these tips:

- Duct probe should be placed (3) to (4) duct segments down from any bend or obstructions and away from 90° bends.
- Mount the sensor on the top or sides of duct work; mounting on the bottom risks damage due to moisture.
- The sensor should be mounted in the middle of the duct where air circulation is well mixed (no stratification), and not blocked by obstructions. Stratification and obstructions can cause sensing errors. An example is downstream from a heating or cooling coil.

## MOUNTING

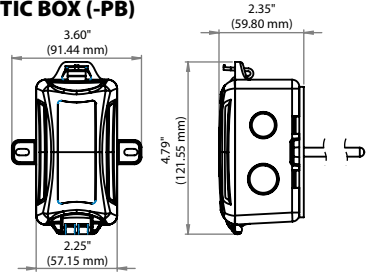
Drill a 3/8" hole in the duct and insert the probe through the hole until the foam pad is tight to the duct. Drill pilot holes for the (2) mounting screws. Use the enclosure flange as a guide, or use the dimensions listed below to measure out.

Now fasten and insert (2) screws #8 x 3/4" TEK (provided and recommended) through the mounting holes in the flange and tighten until the unit is held firmly to the duct. Make sure the foam pad is tight to the duct to eliminate any possible air leaks. Refer to the

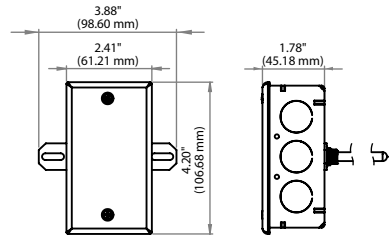
**Wiring Instructions** (p. 2-3) to make necessary connections.

**FIGURE 1: ENCLOSURE DIMENSIONS**

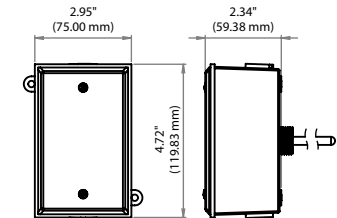
### PLASTIC BOX (-PB)



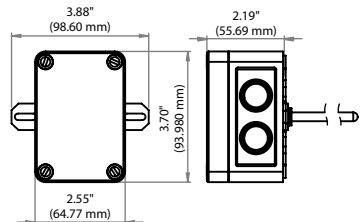
### GALVANIZED ENCLOSURE (-GD)



### BELL BOX (-BB)



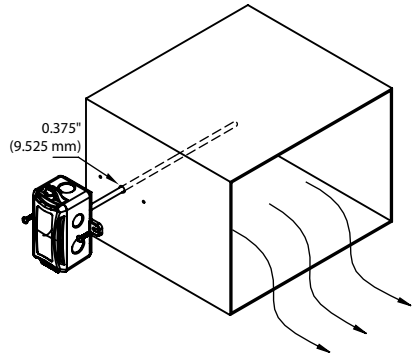
### NEMA -4X (-4X)



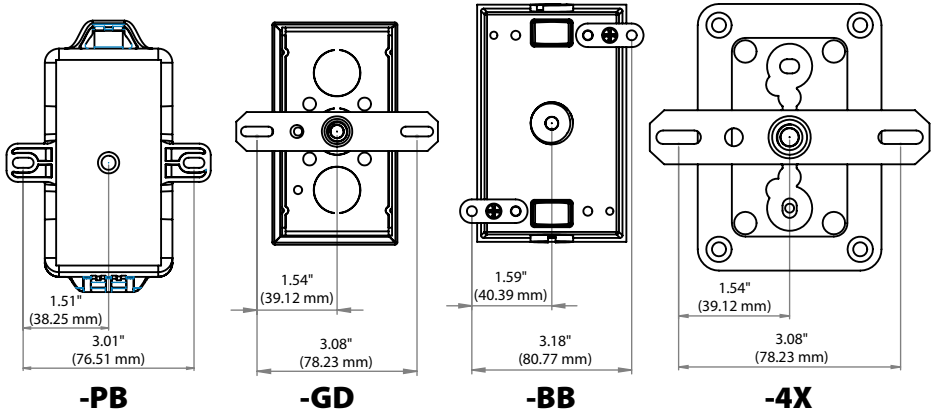
## WIRING INSTRUCTIONS

Open the cover of the enclosure. ACI recommends 16 to 26 AWG twisted pair wires or shielded cable for all sensors. Signal wiring must be run separate from low and high voltage wires (24/120/230VAC). All ACI thermistors and RTD temperature sensors are both non-polarity and non-position sensitive. All thermistor type units are supplied with (2) flying lead wires, and all RTD's are supplied with (2) or (3) flying lead wires – see **FIGURE 4** (below). The number of wires needed depends on the application.

### FIGURE 2: DUCT MOUNTING

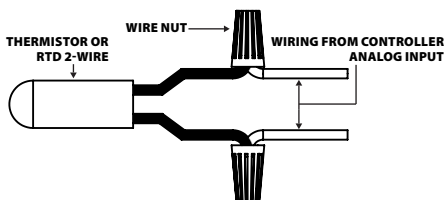


### FIGURE 3: MOUNTING FOR DIFFERENT CONFIGURATIONS

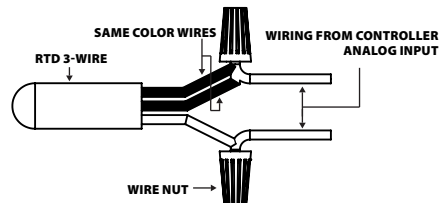


### FIGURE 4: TEMPERATURE WIRING

#### 2-WIRE THERMISTOR or RTD WIRING



#### 3-WIRE RTD WIRING



## WIRING INSTRUCTIONS (Continued)

Connect thermistor/RTD wire leads to controller analog input wires using wire nuts, terminal blocks, or crimp style connectors. All wiring must comply with all local and National Electric Codes. After wiring, attach the cover to the enclosure.

**Note:** When using a shielded cable, be sure to connect only (1) end of the shield to ground at the controller. Connecting both ends of the shield to ground may cause a ground loop. When removing the shield from the sensor end, make sure to properly trim the shield to prevent any chance of shorting.

**Note:** If the controller requires a (2) wire input for a RTD, connect the (2) common wires (same color) together. If the controller requires (3) wires, use (3) individual wires.

## TROUBLESHOOTING

PROBLEM	SOLUTION(S)
<b>Sensor Reading Is Incorrect</b>	<ul style="list-style-type: none"><li>• Verify sensor wiring to controller is not damaged and has continuity.</li><li>• Verify sensor or wires are not shorted together.</li><li>• Verify controller is setup for correct sensor curve.</li><li>• Disconnect sensor wires and take a resistance (ohm) reading with a multimeter.</li><li>• Compare the resistance reading to the Temperature Vs Resistance Curves online: <a href="http://www.workaci.com/content/thermistor-curves-0">http://www.workaci.com/content/thermistor-curves-0</a></li><li>• Verify proper mounting location to confirm no external factors are affecting reading.</li></ul>
<b>Sensor Reads Infinity/Very High Resistance</b>	<ul style="list-style-type: none"><li>• Sensor or wires are open.</li></ul>
<b>Sensor Reads Low Resistance</b>	<ul style="list-style-type: none"><li>• Sensor or wires are shorted together.</li></ul>
<b>Erratic Readings</b>	<ul style="list-style-type: none"><li>• Bad wire connections.</li></ul>

## WARRANTY

The ACI Rigid Averaging Series temperature sensors are covered by ACI's Five (5) Year Limited Warranty, which is located in the front of ACI'S SENSORS & TRANSMITTERS CATALOG or can be found on ACI's website: [www.workaci.com](http://www.workaci.com).

## W.E.E.E. DIRECTIVE

At the end of their useful life the packaging and product should be disposed of via a suitable recycling centre. Do not dispose of with household waste. Do not burn.

# PRODUCT SPECIFICATIONS

SENSOR NON-SPECIFIC INFORMATION		
<b>Number Sensing Points:</b>	<b>Thermistor:</b> Four   <b>Platinum:</b> Continuous   <b>Balco:</b> Four   <b>Nickel:</b> Four	
<b>Storage Temperature Range:</b>	-40 to 80 °C (-40 to 185 °F)	
<b>Operating Humidity Range:</b>	10 to 95% RH, non-condensing	
<b>Probe Material   Diameter:</b>	304 Stainless Steel   0.250" (6.35 mm)	
<b>Wire Size</b>	22 AWG (0.65 mm)	
<b>Enclosure Specifications:</b> (Temperature, Material, Flammability, NEMA/IP Ratings)	<b>"-GD" Enclosure:</b> Galvanized Steel, -40 to 115 °C (-40 to 239 °F), NEMA 1 (IP10) <b>"-PB" Enclosure:</b> ABS Plastic, UL94-HB, -30 to 90 °C (-22 to 194 °F), Plenum Rated <b>"-BB" Enclosure:</b> Aluminum, -40 to 115 °C (-40 to 239 °F), NEMA 3R (IP 14) <b>"-4X" Enclosure:</b> Polystyrene Plastic, UL94-V2, -40 to 70°C (-40 to 158°F), NEMA 4X (IP 66)	
THERMISTOR		
<b>Sensor Output @ 25 °C (77 °F):</b> (Lead Wire Colors) <small>*Does not include CL2P</small>	<b>A/1.8K:</b> 1.8 KΩ nominal (Red/Yellow) <b>A/3K:</b> 3 KΩ nominal (White/Brown) <b>A/AN (Type III):</b> 10 KΩ nominal (White/White) <b>A/AN-BC:</b> 5.238 KΩ nominal (White/Yellow) <b>A/CP (Type II):</b> 10 KΩ nominal (White/Green) <b>A/50K:</b> 50KΩ nominal (Brown/Yellow)	<b>A/CSI:</b> 10 KΩ nominal (Green/Yellow) <b>A/10KS:</b> 10 KΩ nominal (White/Blue) <b>A/10K-E1:</b> 10 KΩ nominal (Gray/Orange) <b>A/20K:</b> 20 KΩ nominal (Brown/Blue) <b>A/100KS:</b> 100 KΩ nominal (Black/Yellow)
<b>Accuracy @ 0-70 °C (32 - 158 °F):</b>	<b>A/1.8K Series:</b> +/- 0.5 °C @ 25 °C (77 °F) and (+/-1.0 °C) (+/-1.8 °F)	<b>A/10K-E1 Series:</b> +/- 0.3 °C (+/- 0.54 °F) <b>All Else:</b> +/- 0.2 °C (+/- 0.36 °F)
PLATINUM		
<b>Sensor Output @ 0 °C (32 °F):</b>	<b>A/100:</b> 100 Ω nominal	<b>A/1K:</b> 1 KΩ nominal
<b>Accuracy:</b>	+/- 0.06% Class A (Tolerance Formula: +/- °C = (0.15 °C + (0.002 *  t )) where  t  is the absolute value of Temperature above or below 0 °C in °C)	
	@ -40 °C (-40 °F): +/- 0.23°C (+/- 0.414°F)	@ 115 °C (239 °F): +/- 0.38 °C (+/- 0.69 °F)
	@ 0 °C (32 °F): +/- 0.15 °C (+/- 0.27 °F)	
BALCO		
<b>Sensor Output @ 21.1 °C (70 °F):</b> (Lead Wire Colors)	1 KΩ nominal (Orange/Yellow)	
<b>Accuracy:</b>	@ 21.1 °C (70 °F): +/- 1%	
NICKEL		
<b>Sensor Output @ 21.1 °C (70 °F):</b> (Lead Wire Colors)	1 KΩ nominal (Red/Red)	
<b>Accuracy:</b>	@ -40 °C (-40 °F): +/- 1.52 °C (+/- 2.73 °F) @ 0 °C (32 °F): +/- 0.4 °C (+/- 0.72 °F) @ 21.1 °C (70 °F): +/- 0.17 °C (+/- 0.34 °F)	@ 54.4 °C (130 °F): +/- 0.56 °C (+/- 1.00 °F) @ 121 °C (250 °F): +/- 1.25 °C (2.25 °F)

