



# LOW TEMPERATURE OUTSIDE AIR TRANSMITTER SERIES SENSOR

*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).**

## MOUNTING INSTRUCTIONS

Separate the cover from the base. Attach the base directly to the wall or to a standard 2" x 4" junction box using the (2) #6-32 x 1" screws provided.

Take care when mounting. Check local code for mounting height requirements. Typical mounting heights are 48-60" (1.2-1.5 m) off the ground and at least 1.5' (0.5 m) from the adjacent wall. The sensor should be mounted in an area where air circulation is well mixed and not blocked by obstructions.

\*Reference **FIGURE 2** (p. 2)

### For optimal temperature measurement:

- Do not install on external walls.
- Avoid air registers, diffusers, vents, and windows.
- Avoid confined areas such as shelves, closed cabinets, closets, and behind curtains.
- Eliminate and seal all wall and conduit penetrations. Air migration from wall cavities may alter temperature readings.
- A thermally-insulated backing should be used when fitting to solid walls (concrete, steel, etc.). ACI part: A/ROOM-FOAM-PAD

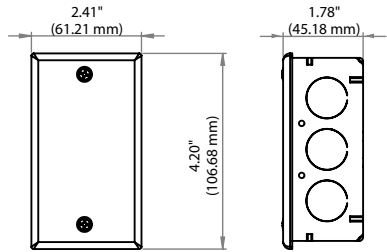
\*Reference **FIGURE 3** (next page)

- Do not install near heat sources, eg: lamps, radiators, direct sunlight, copiers, chimney walls, walls concealing hot-water pipes.

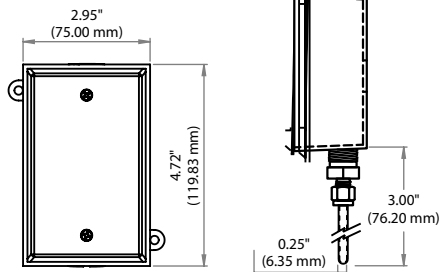
Refer to the **Wiring Instructions** (p. 2) to make necessary connections. After wiring, attach the cover to the base by snapping the top of the cover on first and then the bottom. Tighten the cover down, using the (2) 1/16" Allen screws located in the bottom of the housing. A 1/16" Hex driver is needed to secure the cover to the base.

## FIGURE 1: ENCLOSURE DIMENSIONS

**GALVANIZED** (-GD, Transmitter)

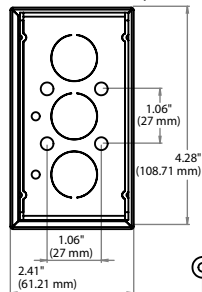


**BELL BOX** (-BB, Sensor)

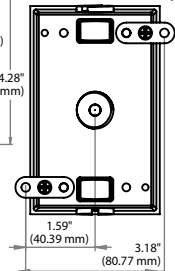


## FIGURE 2: MOUNTING DIMENSIONS

**-GD Enclosure** (Transmitter)



**-BB Enclosure** (Sensor)



# MOUNTING INSTRUCTIONS

(Continued)

## SENSOR ENCLOSURE

Attach the base directly to the wall. Mounting holes are located at the corners of the housing. Drill pilot holes for the mounting screws. Use the enclosure mounting holes as a guide, or use the dimensions listed in **FIGURE 1** (p. 1) to measure out.

Sensors should not be placed in direct sunlight, or any other potential heating or cooling sources that could affect temperature being sensed. Refer to the **Wiring Instructions** (p. 2-3) to make necessary connections.

## WIRING INSTRUCTIONS

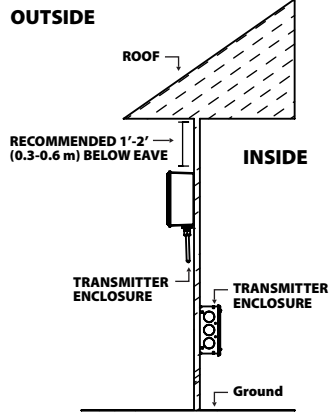


### PRECAUTIONS

- **Transmitter is powered by 24 VDC only.**
- **Remove power before wiring. NEVER connect or disconnect wiring with power applied.**
- **When removing the shield from the sensor end, make sure to properly trim the shield to prevent any chance of shorting.**
- **When using a shielded cable, ground the shield ONLY at the controller end. Grounding both ends can cause a ground loop.**
- **If the 24 VDC power is shared with devices that have coils such as relays, solenoids, or other inductors, each coil must have an MOV, DC Transorb, Transient Voltage Suppressor (ACI Part: 142583), or diode placed across the coil or inductor. The cathode, or banded side of the DC Transorb or diode, connects to the positive side of the power supply. Without these snubbers, coils produce very large voltage spikes when de-energizing that can cause malfunction or destruction of electronic circuits.**

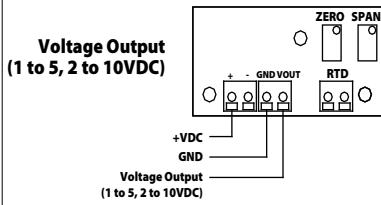
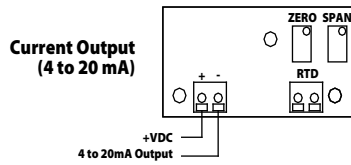
Open the cover of the enclosure. ACI recommends 16 to 26 AWG twisted pair wires or shielded cable for all transmitters. Twisted pair may be used for 2-wire current output transmitters or 3-wire for voltage output. Refer to **FIGURE 4** (right) for wiring diagrams. All wiring must comply with local and National Electric Codes.

**FIGURE 3: MOUNTED ASSEMBLY**

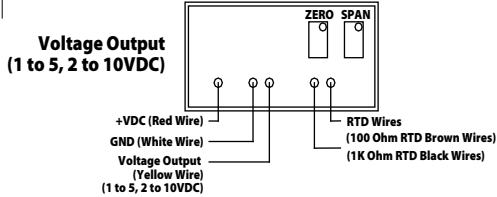
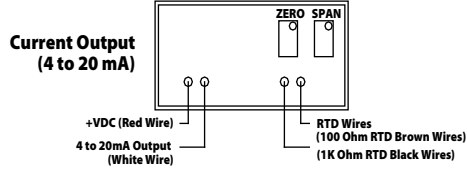


**FIGURE 4: WIRING DIAGRAMS**

### STANDARD UNITS



### POTTED UNITS

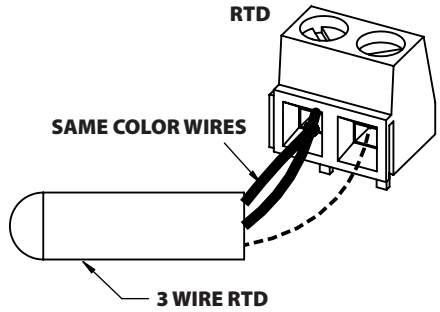


## WIRING INSTRUCTIONS (Continued)

All ACI TT and TTM temperature transmitters can be powered from either an unregulated or regulated 8.5 to 32VDC power supply. The TT and TTM DO NOT support an AC input. All TT and TTM temperature transmitters are reverse polarity protected. After wiring, attach the cover to the enclosure.

**Note:** All RTD's are supplied with (2) or (3) flying lead wires. ACI's transmitters are supplied with a 2 pole terminal block for RTD sensor connections. When wiring a 3 wire RTD, connect the (2) common wires (same color) together into the same terminal block - see **FIGURE 4** (right).

**FIGURE 4: 3 WIRE RTD**



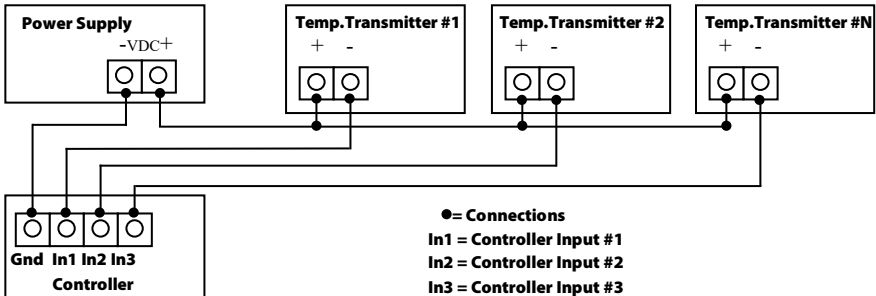
### Formula for Number of Transmitters

Several transmitters may be powered from the same supply as shown in **FIGURE 5** (below). Each transmitter draws 25mA; refer to the following equation to obtain the number of permissible transmitters:  $[\# \text{ Transmitters}] = \frac{[\text{Current}]}{(25 \text{ mA})}$ .

Example: *If [Current] = 1.5 A, then...*  
 $[\# \text{ Transmitters}] = 1.5 \text{ A} / 25 \text{ mA}$   
 $[\# \text{ Transmitters}] = 60$

Therefore a 1.5 A power supply will power up to 60 transmitters.

**FIGURE 5: MULTIPLE TRANSMITTER CONNECTIONS**



# PRODUCT SPECIFICATIONS

SENSOR NON-SPECIFIC	
<b>Storage Temperature Range:</b>	-40 to 85 °C (-40 to 185 °F)
<b>Operating Humidity Range:</b>	5 to 100% RH
<b>Lead Length   Conductor Size:</b>	8' (2.44 m)   22 AWG (0.20 mm <sup>2</sup> )
<b>Lead Wire Insulation   Conductor Material:</b>	Etched Teflon (PTFE)   Silver Plated Copper
<b>Probe Material   Probe Diameter</b>	316 Stainless Steel   0.250" (6.35 mm)
<b>Compression Fitting:</b>	316 Stainless Steel
<b>Enclosure Specifications:</b>	<b>"-GD" Enclosure:</b> -40 to 199 °C (-40 to 390 °F); Galvanized Steel; NEMA 1 (IP10) <b>"-BB" Enclosure:</b> -40 to 85 °C (-40 to 185 °F); Aluminum; NEMA 3R (IP 14)
TRANSMITTER	
<b>Transmitter Supply Voltage   Supply Current:</b>	+8.5 to 32 VDC (Reverse Polarity Protected)   25 mA minimum <b>250 Ω Load (1-5 VDC):</b> +13.5 to 32 VDC   <b>500 Ω Load (2-10 VDC):</b> +18.5 to 32 VDC
<b>Output Signals:</b>	<b>Current:</b> 4-20 mA (2-Wire Loop Powered)   <b>Voltage:</b> 1-5 VDC or 2-10 VDC (3-Wires)
<b>Calibrated Transmitter Accuracy   Linearity:</b>	<b>T. Spans &lt; 260 °C (500 °F):</b> +/- 0.2%   <b>T. Spans &gt; 260 °C (500 °F):</b> +/- 0.5%
<b>Transmitter Operating Temperature Range:</b>	-40 to 85 °C (-40 to 185 °F)
<b>Operating Humidity Range:</b>	0 to 90%, non-condensing
<b>Calibrated Temperature Spans:</b>	<b>Min. T. Span:</b> 28 °C (50 °F)   <b>Max T. Span:</b> 426 °C (800 °F)
<b>Temp Drift</b>	<b>T. Span &lt; 38 °C (100 °F):</b> +/- 0.04%   <b>T. Span &gt; 38 °C (100 °F):</b> +/- 0.02%
<b>Warm Up Time   Drift</b>	10 Minutes   +/- 0.1%
<b>Connections   Wire Size</b>	Screw Terminal Blocks (Non-Polarity Sensitive)   16 AWG (1.31 mm <sup>2</sup> ) to 26 AWG (0.129 mm <sup>2</sup> )
<b>Terminal Block Torque Rating</b>	0.5 Nm nominal
PROBE	
<b>Sensor Type   Sensor Curve   Sensing Points:</b>	Platinum RTD   PTC (Positive Temperature Coefficient)   One
<b>DIN Standard   Temp Coefficient</b>	DIN EN 60751 (IEC 751)   3850 ppm / °C
<b>Response Time</b>	15 Seconds nominal
<b>Sensor Output @ 0°C (32°F):</b>	<b>A/100-3W-LT-D-xx:</b> 100 Ω nominal   <b>A/1K-3W-LT-D-xx":</b> 1 KΩ nominal
<b>Sensor Tolerance Class   Accuracy:</b>	+/- 0.12% Class B   <b>Class B Tolerance Formula:</b> +/- °C = (0.30 °C + (0.005 *  t ))
<b>Sensor Operating Temperature Range:</b>	-198 to 150°C (-324 to 302°F)

## WARRANTY

The ACI Outside Air Series sensors and transmitters 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.

# TROUBLESHOOTING

## TEMPERATURE PROBLEM

### No Reading

- No power to board - check voltage at power terminal - should be between +8.5 and 32 VDC.

### Reading too Low

- RTD wires shorted. Disconnect wires from terminal block and check with ohmmeter. Reading should be close to 100  $\Omega$  or 1 K $\Omega$ .
- RTD Improper range of transmitter (too low). Check current or voltage - should be between 4-20 mA, 1-5 V, or 2-10 V.

### Reading too High

- RTD opened. Disconnect sensor wires from terminal block and check with ohmmeter. Reading should be close to 100  $\Omega$  or 1 K $\Omega$ .
- Improper range of transmitter (too high). Check current or voltage - should be between 4-20 mA, 1-5 V, or 2-10 V.

### Reading is Inaccurate

- **Sensor check:** Disconnect sensor wires from terminal block and check with ohmmeter. Compare the resistance reading to the Temperature vs Resistance curves located on ACI's website.
- **Transmitter check:** Make sure sensor wires are connected to terminal block. Determine that the proper output is being transmitted based on predetermined span:
  1. Go to ACI Website, Span to Output Page: <http://www.workaci.com/content/span-output>
  2. Enter the low end of the span
  3. Enter the high end of the span
  4. Click on the output of the transmitter. This will generate a span to output chart.
  5. Measure output of transmitter.

### RF Interference

- Input power must be clean. Use twisted wires or shielded cable. RF resistant power supply. Use a shielded cable to connect the sensor - connect the shield to ground. Encase the board in a RF shielded enclosure.



## NOTES

---

---

---

---

---

---

---

---

---

---

## NOTES

---

---

---

---

---

---

---

---

---

---



# NOTES

---

---

---

---

---

---

---

---

---

---

# NOTES

---

---

---

---

---

---

---

---

---

---



