LOW/HIGH TEMPERATURE DUCT TRANSMITTER SERIES

Installation & Operation Instructions

Phone: 1-888-967-5224
Website: workaci.com

GENERAL INFORMATION

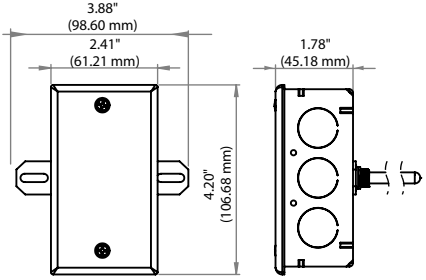
The ACI Low/High Temperature Duct Series sensors and transmitters are single point sensors that output 4-20 mA with an optional voltage signal output of 1-5VDC or 2-10VDC signal to BAS or controller. All ACI/TT and TTM temperature transmitters can be powered from either an unregulated or regulated 8.5 to 32 VDC power supply.

For optimal temperature measurement, follow these tips:

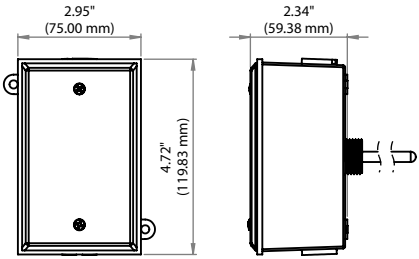
- The sensor should be mounted in the middle of the duct where air circulation is well mixed (no stratification), and not blocked by obstructions. Stratification and obstructions can cause sensing errors. An example is downstream from a heating or cooling coil.
- Duct probe should be placed (3) to (4) 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.

FIGURE 1: ENCLOSURE DIMENSIONS

GALVANIZED (-GD)



BELL BOX (-BB)



MOUNTING INSTRUCTIONS

ACI's Low/High Temperature Series comes with two enclosures: one for transmitter and a second for the duct sensor. The transmiter needs to be mounted in environments with ambient temperatures between -40 to 85 °C (-40 to 185 °F) - see **SPECIFICATIONS** (p. 4). The duct high temperature probe operates between -40 to 395 °C (-40 to 743 °F). The low temperature probe operates between -198 °C and 150 °C (-324 to 302 °F).

TRANSMITTER ENCLOSURE

Attach the base directly to the wall by first drilling pilot holes for the mounting screws. Alternatively, you may refer to the dimensions listed on page 2 to measure out.

SENSOR ENCLOSURE

Drill a 3/8" hole in the duct and insert the probe through the hole until the enclosure 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 in **FIGURE 2** (p. 2). Now fasten and insert (2) screws through the mounting holes in the flange and tighten until the unit is held firmly to the duct. Make sure the enclosure is tight to the duct to eliminate any possible air leaks.

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FIGURE 2: MOUNTING DIMENSIONS

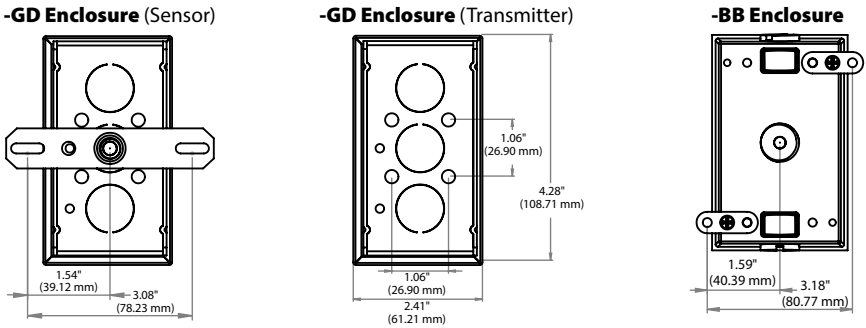
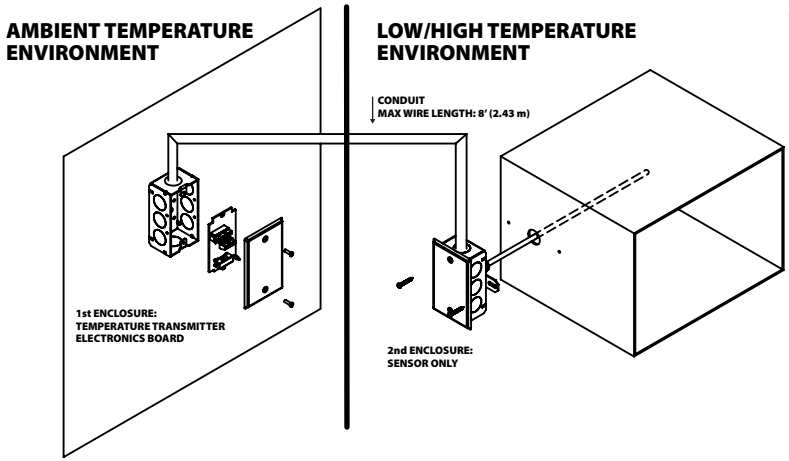


FIGURE 3: INSTALLATION



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.**

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WIRING INSTRUCTIONS
(Continued)

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** (p. 3) for wiring diagrams. All wiring must comply with local and National Electric Codes. 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.

The minimum voltage at the transmitter power terminal is 8.5V after load resistor voltage drop.

- 249 Ω load resistor (1-5 VDC output) = 13.5 V min supply voltage
- 499 Ω load resistor (2-10 VDC output) = 18.5 V min supply voltage

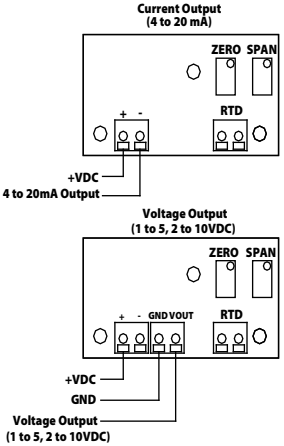
Note: Adding extra wire length between the sensor and transmitter board may affect accuracy.

FORMULA FOR NUMBER OF TRANSMITTERS

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

FIGURE 4: WIRING DIAGRAMS

STANDARD UNITS



POTTED UNITS

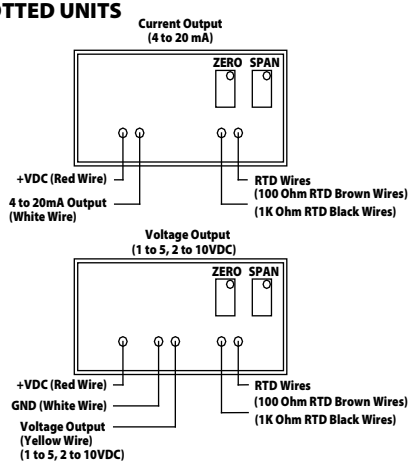
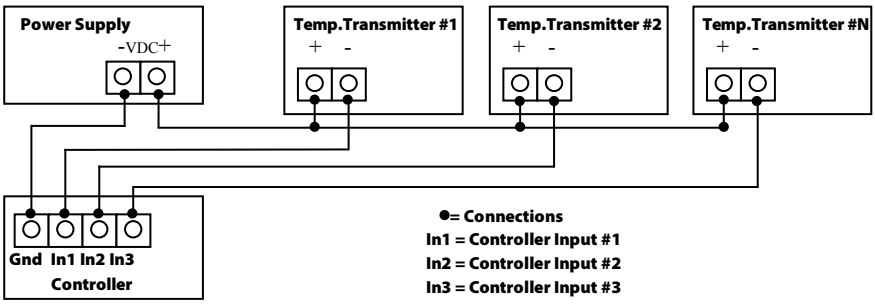


FIGURE 5: MULTIPLE TRANSMITTER CONNECTIONS



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PRODUCT SPECIFICATIONS

SENSOR NON-SPECIFIC	
Storage Temperature Range:	-40 to 85 °C (-40 to 185 °F)
Operating Humidity Range:	10 to 90% RH, non-condensing
Lead Length | Conductor Size:	8' (2.44 m) | 24 AWG (0.20 mm^2)
Lead Wire Insulation | Conductor Material:	**HIGH TT:** Fiberglass Braided Insulation with Mica Tape | 27% Nickel Plated Copper **LOW TT:** Etched Tefon (PTFE) | Silver Plated Copper
Probe Material | Probe Diameter	316 Stainless Steel | 0.250" (6.35 mm)
Compression Fitting:	316 Stainless Steel
Enclosure Specifications:	**"-GD" Enclosure:** -40 to 199 °C (-40 to 390 °F); Galvanized Steel; NEMA 1 (IP10) **"-BB" Enclosure: -**40 to 85 °C (-40 to 185 °F); Aluminum; NEMA 3R (IP 14)
TRANSMITTER	
Transmitter Supply Voltage | Supply Current:	+8.5 to 32 VDC (Reverse Polarity Protected) | 25 mA minimum **250 Ω Load (1-5 VDC):** +13.5 to 32 VDC | **500 Ω Load (2-10 VDC):** +18.5 to 32 VDC
Output Signals:	**Current:** 4-20 mA (2-Wire Loop Powered) | **Voltage:** 1-5 VDC or 2-10 VDC (3-Wires)
Calibrated Transmitter Accuracy | Linearity:	**T. Spans < 260 °C (500 °F):** +/- 0.2% | **T. Spans > 260 °C (500 °F):** +/- 0.5%
Transmitter Operating Temperature Range:	-40 to 85 °C (-40 to 185 °F)
Operating Humidity Range:	0 to 90%, non-condensing
Calibrated Temperature Spans:	**Min. T. Span:** 28 °C (50 °F) | **Max T. Span:** 426 °C (800 °F)
Temp Drift	**T. Span < 38 °C (100 °F):** +/- 0.04% | **T. Span > 38 °C (100 °F):** +/- 0.02%
Warm Up Time | Drift	10 Minutes | +/- 0.1%
Connections | Wire Size	Screw Terminal Blocks | 16 AWG (1.31 mm^2) to 26 AWG (0.129 mm^2)
Terminal Block Torque Rating	0.5 Nm nominal
PROBE	
Sensor Type | Sensor Curve | Sensing Points:	Platinum RTD | PTC (Positive Temperature Coefficient) | One
DIN Standard | Temp Coefficient	DIN EN 60751 (IEC 751) | 3850 ppm / °C
Response Time	15 Seconds nominal
Sensor Output @ 0°C (32°F):	**A/100-3W-HT- D-xx:** 100 Ω nominal | **A/1K-3W-HT-D-xx":** 1 KΩ nominal
Sensor Tolerance Class | Accuracy:	+/- 0.12% Class B | **Class B Tolerance Formula:** +/- °C = (0.30 °C + (0.005 * |t|))
Sensor Operating Temperature Range:	**HIGH TT:** -40 to 395 °C (-40 to 743 °F) | **LOW TT:** -198 to 150 °C (-324 to 302 °F)

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.

WARRANTY

The ACI Duct 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.

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TROUBLESHOOTING

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 sensor wires from terminal block and check with ohmmeter. Reading should be close to either 100 Ω or 1000 Ω. • RTD Improper range of transmitter (too low). Check current or voltage (model dependent) - 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 either 100 Ω or 1000 Ω. • Improper range of transmitter (too high). Check current or voltage (model dependent) - 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. 6. Compare measured output to calculated output
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.

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