



RTD FREEZER TRANSMITTER SERIES SENSOR

Installation & Operation Instructions

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Website: workaci.com

GENERAL INFORMATION

The ACI RTD Freezer 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.

MOUNTING INSTRUCTIONS

ACI's Freezer Series sensor includes a transmitter with enclosure and a 3/16" diameter stainless steel probe. The transmitter needs to be mounted in environments with ambient temperatures above -40 °C (-40 °F) - see **SPECIFICATIONS** (p. 4). The freezer probe's operating temperature range is -200 °C (-328 °F) to 200 °C (392 °F).

TRANSMITTER ENCLOSURE MOUNTING

The transmitter must be mounted outside of the freezer/cooler. On Vertical units, mount on the top of the freezer see **Figure 3** (p. 2). On Horizontal units, mount on the backside or side of the freezer. Attach the base directly to the wall by using double sided tape.

WIRE INSTALLATION

ACI recommends installing the wire through the door seal, probe access port, or cooler wall. On horizontal units, the preferred method is using the rear door seal as shown in **Figure 4** (p. 2). On vertical units, remove the rear panel. There is typically a probe access hole. Probe and wires can be ran into that access hole. Alternatively, you can drill a hole just larger than the diameter of the wire (0.125" (3.175 mm)) through the wall. From inside the cooler/freezer, push the wire through the hole. Use mounting clips to secure the wire to the interior wall or shelving. Use silicone caulking to seal the hole around the wire.

SENSOR MOUNTING

Bullet Probe sensors can be wrapped around a shelf as shown in **Figure 5**.

FIGURE 1: FREEZER PROBE DIMENSIONS

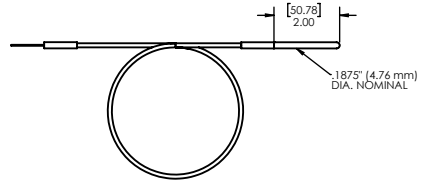
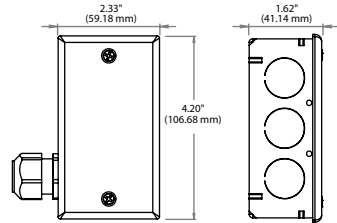
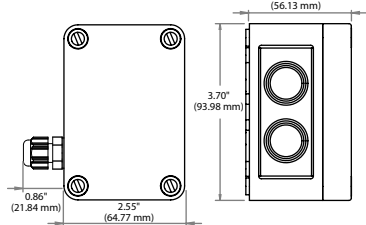


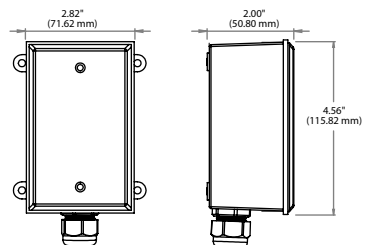
FIGURE 2: ENCLOSURE DIMENSIONS GALVANIZED (-GD)



NEMA 4X (-4X)



BELL BOX (-BB)



SENSOR MOUNTING (Continued)

Alternative, the sensor may be mounted on walls using a 1/4" mounting clip (ACI Item #108169). The sensor should be mounted in an area where air circulation is well-mixed and not blocked by obstructions. Slide the sensor probe through the mounting clip - see **FIGURE 6**. Drill a 1/4" screw through the socket and tighten to the wall. If a thermal buffer is required, use a glycol kit (ACI Item #130127). Drill pilot holes for the provided mounting screws. Use the mounting clip holes as a guide - see **FIGURE 7**. Drill the #10-16 x 1/2" screws through the bracket holes and fasten it to the wall. Insert the bottle into the bracket, and make sure it is seated securely.

FIGURE 3: ENCLOSURE MOUNTING

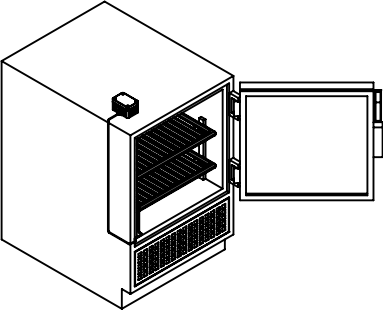


FIGURE 4: WIRE ROUTING

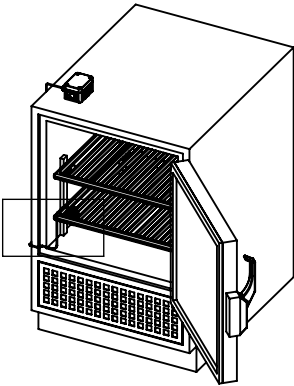
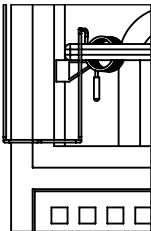


FIGURE 5: SENSOR MOUNTING



Note: When using in tank or glycol application, the sensor cannot be fully submerged. The end of the probe must be kept above the liquid.

FIGURE 6: SENSOR MOUNTING ON WALL

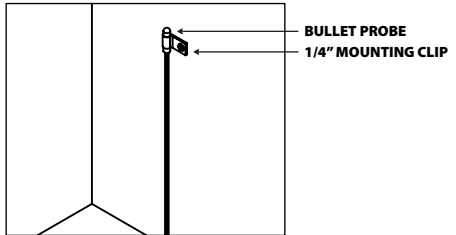
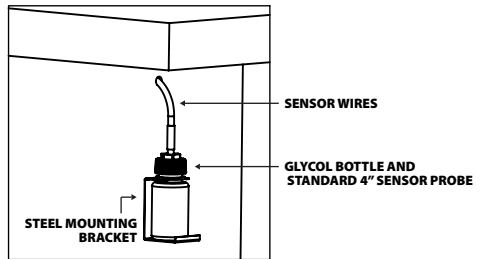


FIGURE 7: GLYCOL SENSOR w/ BRACKET



WIRING INSTRUCTIONS



PRECAUTIONS

- Transmitter must be 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.

WIRING INSTRUCTIONS

(Continued)

- 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 8** (right) 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

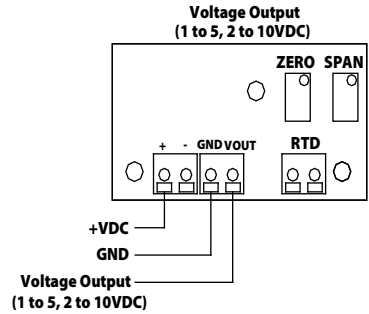
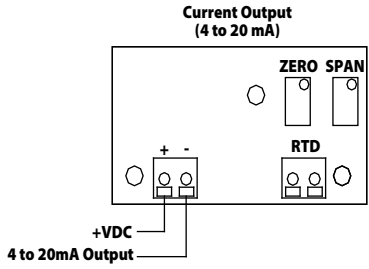
Note: Adding extra wire length between the sensor and transmitter board may affect accuracy.

FORMULA FOR NUMBER OF TRANSMITTERS

Several transmitters may be powered from the same supply as shown in **FIGURE 9** (p. 4). Each transmitter draws 25mA; refer to the following equation to obtain the number of permissible transmitters: $[\# \text{ Transmitters}] = [\text{Current}] / (25 \text{ mA})$.

FIGURE 8: WIRING DIAGRAMS

STANDARD UNITS



POTTED UNITS

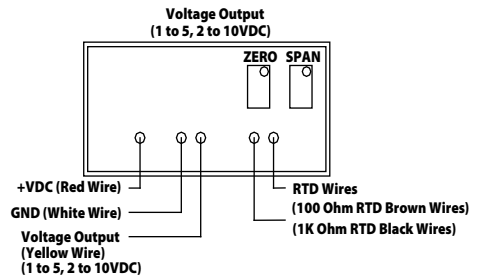
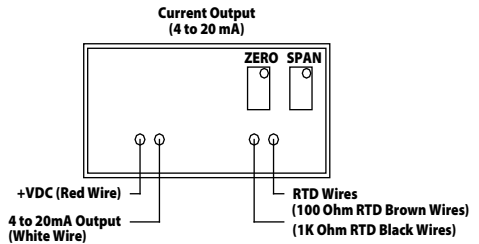
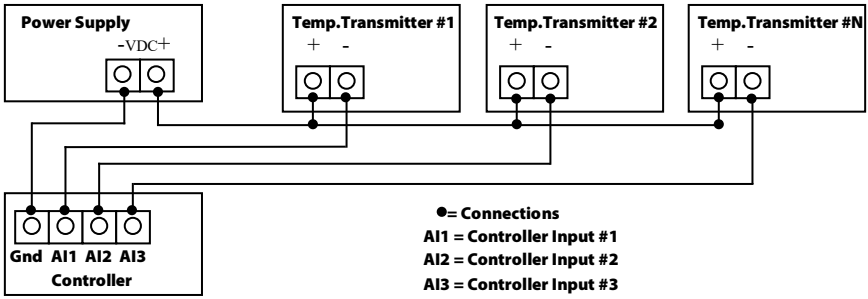


FIGURE 9: MULTIPLE TRANSMITTER CONNECTIONS



TROUBLESHOOTING

PROBLEM	
No Reading	<ul style="list-style-type: none"> No power to board - check voltage at power terminal - should be between +8.5 and 32 VDC.
Reading too Low	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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: <ol style="list-style-type: none"> Go to ACI Website, Span to Output Page: http://www.workaci.com/content/span-output Enter the low end of the span Enter the high end of the span Click on the output of the transmitter. This will generate a span to output chart. Measure output of transmitter. Compare measured output to calculated output
RF Interference	<ul style="list-style-type: none"> 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.



PRODUCT SPECIFICATIONS

SENSOR NON-SPECIFIC	
Storage Temperature Range:	-40 to 80 °C (-40 to 176 °F)
Operating Humidity Range:	10 to 95% RH, non-condensing
Lead Length Cable Diameter:	10' (3.05 m) or 30' (9.15 m) 0.106" nominal (2.69 mm)
Lead Wire Insulation Jacket Color:	FEP/FEP (Teflon) Jacketed Cable White
Conductor Size Conductor Material:	24 AWG (0.51 mm) Silver Plated Copper
Probe Material Length Diameter:	316 Stainless Steel 2" (50.8 mm) 0.1875" (4.76 mm) nominal
Enclosure Specifications:	"-GD": -40 to 100 °C (-40 to 212 °F); Galvanized Steel; NEMA 1 (IP10) "-BB": -40 to 85 °C (-40 to 185 °F); Aluminum; NEMA 3R (IP 14) "-4X": -40 to 70 °C (-40 to 158 °F); Polystyrene Plastic, UL94-V2, IP66 (NEMA 4X)
Cleaning Solutions Compatibility:	Alcohol, Ammonia, Bleach, Hydrogen Peroxide
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) to 26 AWG (0.129 mm)
Terminal Block Torque Rating	0.5 Nm nominal
SENSOR	
Sensor Type Sensor Curve:	Platinum RTD Linear, PTC (Positive Temperature Coefficient)
DIN Standard Temp Coefficient	DIN EN 60751 (IEC 751) 3850 ppm / °C
Response Time	15 Seconds nominal
Sensor Output @ 0°C (32°F):	A/TT/TTM100-LTS Series: 100 Ω A/TT/TTM1K-LTS: 1 KΩ
Sensor Tolerance Class Accuracy:	+/- 0.12% Class B Class B Tolerance Formula: +/- °C = (0.30 °C + (0.005 * t))
Sensor Operating Temperature Range:	-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 Freezer Temperature 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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