



ROOM SERIES (TTM) TEMPERATURE TRANSMITTER

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

Installation & Operation Instructions

GENERAL INFORMATION

The ACI Room 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/TTM temperature transmitters can be powered from either an unregulated or regulated 8.5 to 32VDC power supply.

MOUNTING INSTRUCTIONS

For optimal temperature measurement, follow these tips:

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

The sensor is located on the front side of the enclosure; the temperature transmitter is located on the back. TTM transmitters must be mounted on junction boxes and not on surfaces.

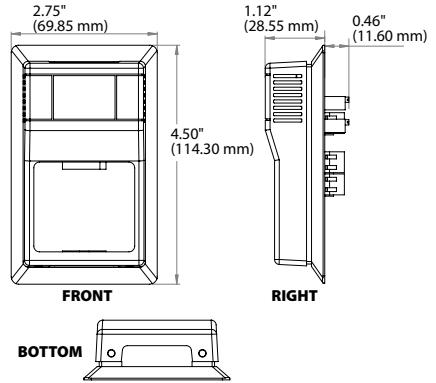
Separate the cover from the base. Attach the base directly to the wall or to a standard 2" x 4" junction box using the (2) #6-32 x 1" screws provided.

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 - see **FIGURE 3** (p. 2).

Refer to **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 (2) 1/16" Allen screws. A 1/16" Hex driver is needed to secure the cover to the base.

FIGURE 1: ROOM DIMENSIONS

ROOM, VERSION 1 [R]



ROOM, VERSION 2 [R2]

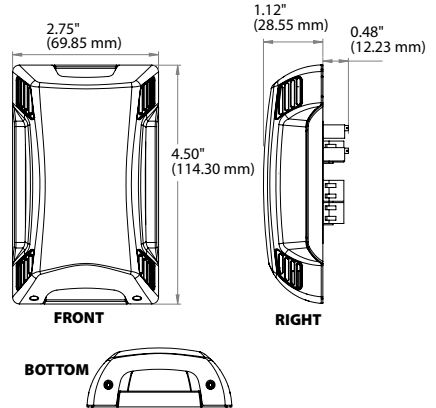
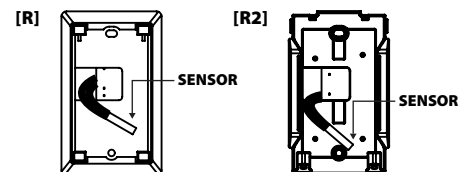


FIGURE 2: SENSOR LOCATED ON FRONT



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

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

- 249Ω 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.

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 5** (bottom).

FIGURE 3: ROOM MOUNTING

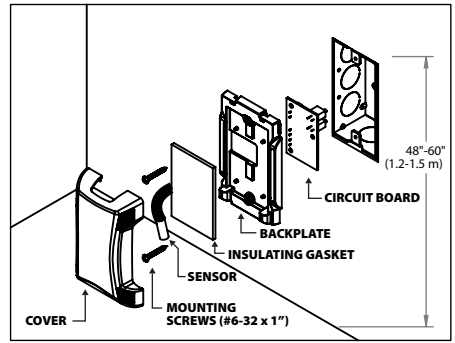


FIGURE 4: WIRING DIAGRAMS

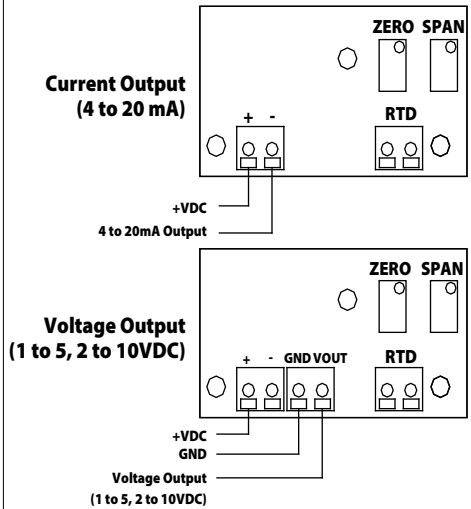
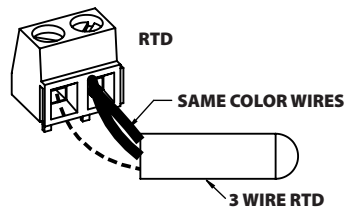


FIGURE 5: 3 WIRE RTD



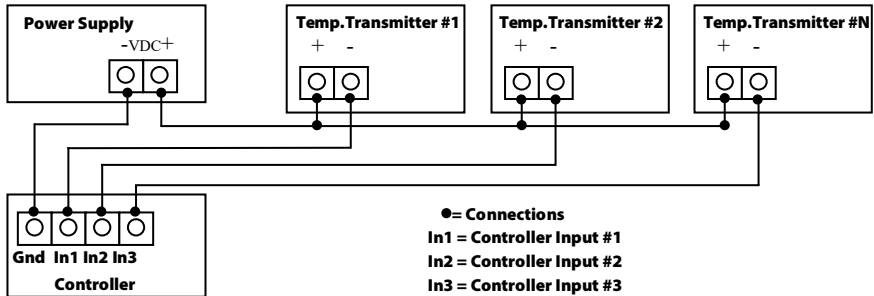
Formula for Number of Transmitters

Several transmitters may be powered from the same supply as shown in **FIGURE 6** (below). Each transmitter draws 25mA; refer to the following equation to obtain the number of permissible transmitters: $[# \text{ Transmitters}] = [\text{Current}] / (25 \text{ mA})$.

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

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

FIGURE 6: MULTIPLE TRANSMITTER CONNECTIONS



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 Ω or 1 K Ω .
- 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 Ω or 1 K Ω .
- 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.
 6. Compare measured output to calculated output

PRODUCT SPECIFICATIONS

SENSOR NON-SPECIFIC	
Number Temperature Sensing Points:	One
Housing Screw Size / Drive Size:	1/16" Allen screws (2 qty) / 1/16" Hex Driver
Override Option:	"Dry Contact" Closure (Separate Input);
Operating Storage Temperature Range:	1.5 to 50 °C (35 to 122 °F) -40 to 65 °C (-40 to 149 °F)
Operating Humidity Range:	5 to 90% RH, non-condensing
Enclosure Material Color:	"R2" Enclosure: ABS Plastic White, UL94-HB "R" Enclosure: ABS Plastic Beige UL94-HB
SENSOR	
Sensor Type Sensor Curve Sensing Points:	Platinum RTD PTC (Positive Temperature Coefficient) One
Wires Wire Colors (TTM Series only):	Two A/TTM100-R/R2: Brown/Brown A/TTM1K-R/R2: Black/Black
Nominal Sensor Output @ 0°C (32°F):	A/TTM100-R/R2: 100 Ohms A/TTM1K-R/R2: 1000 Ohms
RTD Tolerance Class Sensor Accuracy:	+/- 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
Din Standard Temperature Coefficient:	DIN EN 60751 (IEC 751) 3850 ppm / °C
Sensor Stability:	+/- 0.03% after 1000 Hours @ 300°C (572°F)
TRANSMITTER	
Transmitter Supply Voltage 	+8.5 to 32 VDC (Reverse Polarity Protected) 25 mA minimum
Supply Current:	250 Ω Load: +13.5 to 32 VDC 500 Ω Load: +18.5 to 32 VDC
Maximum Load Resistance:	(Terminal Voltage - 8.5 V) 0.020 A
Output Signals:	Current: 4-20 mA (2-Wire) Voltage: 1-5 VDC or 2-10 VDC (3-Wires)
Calibrated Accuracy Linearity¹:	T. Spans < 500 °F (260 °C): +/- 0.2%
Thermal Drift²:	T. Spans < 100 °F (38 °C): +/- 0.04%/°F T. Spans > 100 °F (38 °C): +/- 0.02%
Min./Max. Calibrated Temperature Spans:	Min. T. Span: 50 °F (28 °C) Max T. Span: 400 °F (204 °C)
TTM100/TTM1K Certification Points:	3 Pt. NIST: 20, 50, & 80% of span 5 Pt. NIST: 20, 35, 50, 65, & 80% of span
Warm Up Time Warm Up 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:	0.37 ft-lb (0.5 Nm) nominal

Note¹: Transmitter's calibrated at 71 °F (22 °C) nominal | **Note²:** Thermal Drift is referenced to 71 °F (22 °C) nominal calibration temperature

WARRANTY

The ACI Room 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.

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.

