

# Temperature Transducers

## Model TE-211Y, TE-211Z, TE-213

### TE-211Y, Z

- Temperature transducer utilizing 100  $\Omega$  Platinum RTD and 1,000  $\Omega$  Platinum RTD
- 24 VDC power input, 4-20 mA two wire loop signal output

### TE-213

- Temperature transducer utilizing Integrated Circuit
- 12, 24 VDC power input, 0-5, 0-10 VDC, and 4-20 mA signal output available
- Supports four (4) wire power, signal configuration

### GENERAL INFORMATION MAMAC SYSTEMS TEMPERATURE TRANSDUCERS

All sensing elements manufactured by MAMAC Systems, Inc. for the TE-211 and TE-213 are protected against moisture and other contaminants by means of a conformal coating process. The conformal coat is applied to the sensor and a portion of the lead wires creating a moisture proof seal. In addition to coating the sensor, the same urethane compound is used to seal the end of the probe where sensor lead wires exit, resulting in another barrier against harmful moisture. Without this protection, sensors may fail in a short condition due to condensation and other sources of moisture.

The TE-211 and TE-213 are available in different housings to cover applications of Space, Duct, Immersion, Duct Averaging, Outside Air and Strap-On.

**Space Temperature:** Polystyrene enclosure with internal wall separating the sensing element from the electronic circuit board.

**Duct/Immersion Temperature:** Sturdy NEMA-1 16 AWG steel enclosure houses the electronic circuit board. Available with 4", 6", 8" or 12" aluminum or series 300 stainless probe. Probe protrudes from the bottom of the enclosure and is affixed to the enclosure with a brass compression fitting. The bottom of the duct enclosure is gasketed for a tight seal to the duct work. The immersion sensor is equipped with a 1/4" NPT or 1/2" NPT thermowell fitting that can be screwed directly into the A-500 thermowell providing a rigid support to the transducer.

**Duct Averaging:** NEMA-1 16 AWG steel enclosure with 6 ft., 12 ft. or 24 ft. bendable aluminum 3/8" OD probe for averaging duct air temperature. The probe incorporates numerous encapsulated at equal distances across the length of the probe. The complete assembly acts as a single sensor and temperature change is averaged across the sensors. The probe can be easily bent to fit any size duct.

**Outside Air:** A weather proof enclosure with suitable sun shield can be easily screwed onto 1/2" conduit.

**Strap-On:** A NEMA-1 16 AWG steel enclosure is provided with 6 ft. of 18 AWG twisted shielded cable. The sensing element is housed in a 2" aluminum or stainless steel probe at the end of the cable suitable for being strapped onto a pipe or used in a remote application.



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## TE-211Y, TE-211Z, TE-213

### MORE ABOUT TE -211Y, -211Z

The RTD and transmitter are matched and calibrated as a complete assembly in a temperature chamber against a NIST traceability calibrated standard. The final accuracy is verified with a three (3) point calibration check against the standard over the specified temperature range. The transmitter is equipped with non-interacting zero and span adjustment trimmers for site calibration and is reverse polarity protected against accidental mis-wiring. The transmitter assembly conforms to a ANSI S50.1 Type 2 Class U circuit.

### MORE ABOUT THE TE-213

Signal conditioning is performed by industrial quality integrated circuits to provide a true linear output. The circuit is factory calibrated but zero and span trimmers are provided to adjust the output if necessary. Output accuracy is not affected by long wire runs or electrical noise. The TE-213 provides an analog output linear and proportional to the calibrated temperature range. The integrated circuit and transmitter are calibrated as a complete assembly in a temperature chamber using a NIST traceable calibrated standard. The final accuracy of  $\pm 0.5^{\circ}\text{F}$  is verified with a three (3) point check against the standard over the specified temperature range.

### ORDERING INFORMATION - TE-211

MODEL	ENCLOSURE	PROBE LENGTH	PROBE MATERIAL	WELL FITTING	VOLTAGE IN	SIGNAL OUTPUT	RANGE
<b>TE-211-Y</b> for 100 $\Omega$ Sensor  <b>TE-211-Z</b> for 1,000 $\Omega$ Sensor	(A) Space (B) Duct (C) Immersion (D) Duct Ave (E) Remote Probe Strap On (F) Outdoor (G) Custom	(A) 4 Inches (B) 6 Inches (C) 8 Inches (D) 12 Inches (E) 2 Feet (F) 6 Feet (G) 12 Feet (H) 24 Feet (I) Custom	(1) Aluminum (2) Stainless Steel (3) Custom	(A) Brass 1/4" NPT (B) Brass 1/2" NPT (C) Custom	(1) 24 VDC	(E) 4-20 MA 2 wire	(1) 50 T 85F (2) 40 T 140F (3) -30 T 130F (4) 0 T 100F (5) 100 T 250F (6) 0 T 250F (7) Custom
USE THIS NUMBER TO ORDER:					<b>1</b>	<b>E</b>	

### ORDERING INFORMATION - TE-213

MODEL	ENCLOSURE	PROBE LENGTH	PROBE MATERIAL	WELL FITTING	VOLTAGE IN	SIGNAL OUTPUT	RANGE
<b>TE-213</b>	(A) Space (B) Duct (C) Immersion (D) Duct Ave (E) Remote Probe Strap On (F) Outdoor	(A) 4 Inches (B) 6 Inches (C) 8 Inches (D) 12 Inches (E) 2 Inches (F) 6 Feet (G) 12 Feet (H) 24 Feet	(1) Aluminum (2) Stainless Steel (3) Custom	(A) Brass 1/4" NPT (B) Brass 1/2" NPT (C) Custom	(1) 24 VDC  (2) 24 VAC  (4) 12 VDC  (5) Custom	(A) 0-1 VDC (B) 0-5 VDC (C) 0-10 VDC (G) Custom (H) 4-10 MA 2  (D) 4-20 MA (G) Custom  (A) 0-1 VDC (B) 0-5 VDC (G) Custom	(1) 50 T 85F (2) 40 T 140F (3) -30 T 130F (4) 0 T 100F (5) 100 T 250F (6) 0 T 250F (7) Custom
USE THIS NUMBER TO ORDER:							

## TE-211Y, TE-211Z, TE-213

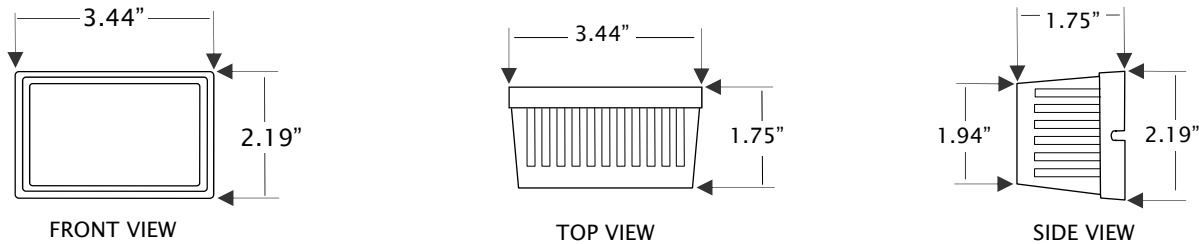
### SPECIFICATIONS:

- Accuracy:** Accuracy\*:  $\pm 0.50^\circ$  F FS; Linearity:  $\pm 0.05^\circ$  F; Repeatability:  $\pm 0.01^\circ$  F; Transmitter Error: better than  $\pm 0.01\%$  span.
- Environmental:** Ambient Temperature:  $-30^\circ$  F to  $250^\circ$  F; Humidity: (10-95%) Non-condensing; Maximum Temperature Span:  $250^\circ$  F; Minimum Temperature Span:  $35^\circ$  F
- Stability:** Stability Factor Over T (rates of drift): better than 10,000 hours @400C; Sensor Stability: .07 ohms per 10,000 hours @ 400C
- Supply Voltage:** **TE-211:** 13 to 28 VDC. Can go down to 12 VDC, but max input impedance is 250 ohms (250 ohms x 20 mA = 5 VDC). **TE-213:** 18 VAC, VDC or greater; 24 VDC, 24 VAC, 115 VAC, 12 VDC\* (maximum input impedance 250 $\Omega$ )
- Output:** **TE-211:** 4 to 20 mA (proportional to range) **TE-213:** 0-1 VDC, 0-5 VDC, 0-10 VDC, 4-20 MA, 4-10 MA 2 wire, 1-50HKz AFCP
- Current Draw:** 50 mA

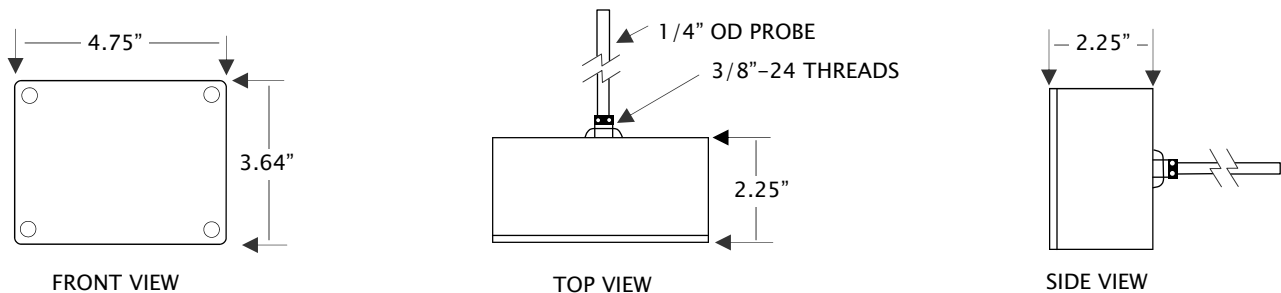
\* Accuracy of Duct Averaging Transducer is  $\pm 3F$

### DIMENSIONS:

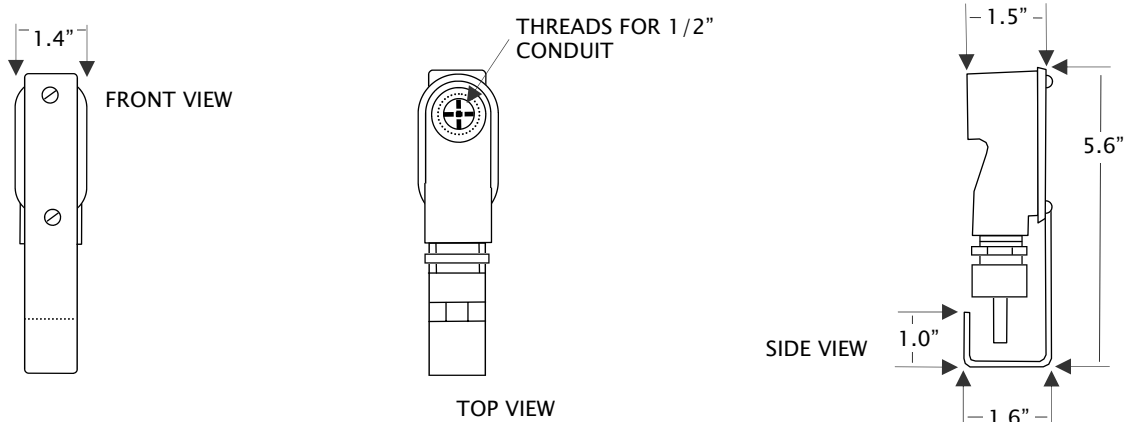
#### Space Temperature Enclosure Dimensions:



#### Duct, Immersion, Duct Averaging Enclosure Dimensions:



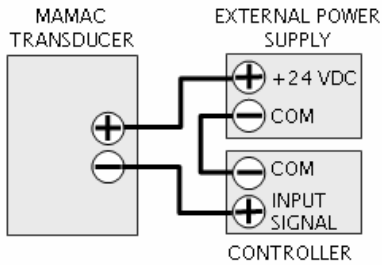
#### Outdoor Air Enclosure Dimensions:



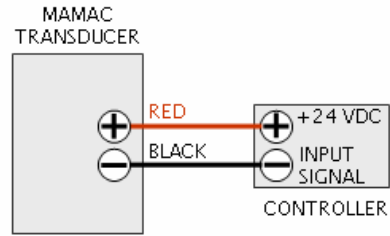
# TE-211Y, TE-211Z, TE-213

## WIRING AND CALIBRATION, TE-211:

### External 12-28 VDC Power Supply



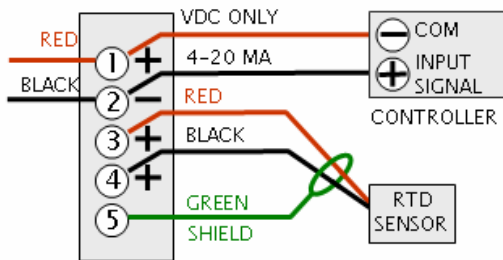
### Internal 12-28 VDC Power Supply



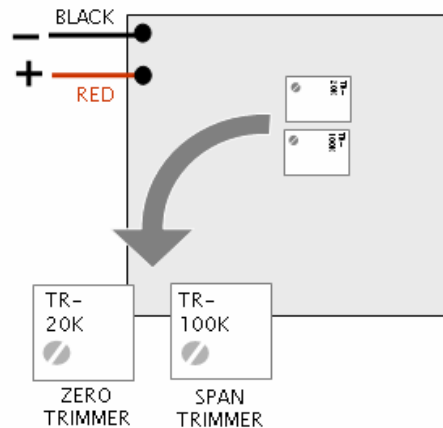
## QUICK CHECKOUT PROCEDURE

- (1) Connect ammeter I series to terminal + or -
- (2) At the low end of the range, the reading should be 4 milliamps. If you don't read this value, a) recheck wiring, b) refer to specific data sheet for the product your are installing, c) call MAMAC Systems for further technical assistance.

## Sensor Termination Schedule



## TE-211 Trimmer Location



## WIRING AND CALIBRATION, TE-213:

