



HVAC Sensors and Transducers Group

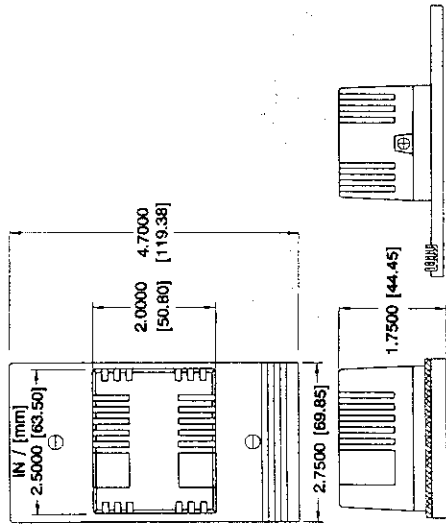
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Installation and Operation Instructions

TCS/1000 Temperature Transmitters

Room Mounting

Always mount room transmitters on interior walls, away from direct sunlight, and positioned upright as shown below. Room transmitters are factory mounted on a plastic adaptor plate, suitable for conduit box or drywall mounting. The Platinum RTD sensor is mounted on the heat sink, below the transmitter circuit. This unique design feature eliminates the self-heating errors caused by the heat generated in the transmitter circuitry.



Room Mount

250

Duct Mounting

Drill a hole with a 1" hole saw at the desired duct location. Remove the cover from the transmitter housing and insert the probe assembly into the hole. Secure the housing to the duct with #10 sheet metal screws through the four mounting holes provided.

Duct Averaging Mounting

Drill a hole with a 1" hole saw at the desired duct location and disconnect the sensor and remove it from the transmitter housing. Then insert that end of the sensor through the hole from the inside to the outside of the duct. Then reconnect the sensor exactly as it was before.

1. Remove the cover from the housing.
2. Unwire the sensor from the transmitter.
3. Remove the sensor assembly from the housing.
4. Pass the transmitter end of the sensor from the inside of the duct through the hole to the outside of the duct.
5. Reinsert the sensor into the housing and rewire the sensor to the transmitter (making sure to rewire the sensor exactly as it was before).

Secure the housing to the duct with #10 sheet metal screws through the four mounting holes provided. To mount the averaging sensor inside the duct, first attach the provided mounting clips to the duct. Bend the clips so that they are perpendicular to the surface of the duct. Run the averaging sensor through the clips securing the end of the element with several cable ties.

Immersion Thermowell Mounting

Insert the thermowell assembly into the tapped pipe end (1/2" NPT for 4" thermowell, 3/4" NPT for 6" thermowell) and screw in tightly. Liberally coat the duct probe with a thermal joint compound, and insert the probe into the thermowell. Tightly screw the duct transmitter/probe assembly into the thermowell.

Strap-on Mounting

Clean the pipe where the copper plate is to make contact, usually the bottom of the pipe, to assure good heat transfer. Wrap the strap around the pipe, position the copper plate over the cleaned surface, and tighten the strap.

Outside Mounting

Outside air units are assembled in two parts. The transmitter unit is housed in a conduit box and the platinum RTD in a weatherproof housing. Mount the sensor on a northerly exposed outside wall away from direct sunlight with the probe pointing down. Mount the transmitter at the nearest possible location that will not exceed the specified environmental limits.

Note: It is important to position the transmitter as close as possible to the sensor because of the errors caused by lead wire resistance and temperature effects. See the TCS/1000 Series Temperature Sensor Engineering Bulletin for a discussion of these effects.

Field supplied wire is required for connecting the sensor to the transmitter. Simply splice the sensor leads to one end of a twisted pair of wires, then connect the other end of the twisted pair to the terminal block on the transmitter circuit that does not have polarity markings.

- * Environmental limits of the circuit board are: High Temp = 125°F, Low Temp = 32°F
Humidity < 100% RH (non-condensing).

Stainless Plate Surface Mount

The surface mount is designed to mount directly over a conduit box. Secure the assembly with two screws through the holes in the steel plate.

Remote Probe

The sensor remote probe is typically attached to a surface using a silicon adhesive. Six feet of 22 AWG lead wire is provided to connect the sensor to the transmitter which should be mounted in an environment that does not exceed the specified limits. To mount the transmitter, remove the cover from the housing, and secure at the desired location with #10 sheet metal screws through the four mounting holes in the bottom of the housing.

Wiring

All wiring is low voltage and should be in accordance with local regulations and the National Electric Code. Use twisted pair wire, 22 AWG or larger to power the unit.

Caution

Wiring should not be run in the same conduit as line voltage wiring or other conductors that supply highly inductive loads (i.e. generators, motors, coils, contactors).

1. TCS temperature transmitters provide a terminal block for power. This terminal block is mounted on the printed circuit board and is accessed by removing the cover of the transmitter housing.

2. The circuit board has polarity markings next to the terminal block for power. Connect the wire from the power supply to the terminal marked "+", and the wire from the controller to the terminal marked "-".

Application Notes

1. Several transmitters may be powered from a single DC (12 to 35 volt) power supply (see diagram.) For example, if the supply has a current rating of 1 amp and all transmitters are operating at the high end of the calibrated range (20mA), the supply can then power up to 50 units.

2. For best results the return ("-") of the power supply is typically connected to earth ground.

Field Calibration

The T6 and T7 series transmitters are available either factory calibrated or uncalibrated. Field calibration can be achieved by using an accurate current meter and a TCS/50 or 51 RTD simulator.

First determine the desired temperature range and select the appropriate switch on the transmitter circuit board (see below.)

T6	T7	SW1	SW2	SW3	SW4
175°F	300°F	ON	OFF	OFF	OFF
325°F	350°F	OFF	ON	OFF	OFF
475°F	375°F	OFF	OFF	ON	OFF
625°F	400°F	OFF	OFF	OFF	ON

Replace the RTD sensor with a TCS/50 or 51 RTD simulator and insert the current meter in series with the signal wire from the transmitter to the controller. Start with the zero potentiometer marked "Z" on the circuit board and set the low end of the span. If for example the desired span is 0 to 100°F, switch the RTD simulator to 0°F and set the zero potentiometer to 4mA then switch the RTD simulator to 100°F and set the span potentiometer marked "S" on the circuit board to 20mA. Repeat as necessary.

To find the calibration current other than 4 to 20mA's the following formula can be used:

$$(16/(\text{high-low temp})) \times (\text{simulated temp}) + 4\text{mA} = \text{desired current in mA's}$$

For example, to calibrate a span of 30 to 100°F where 50° is available on the RTD simulator the zero calibration current would be as follows:

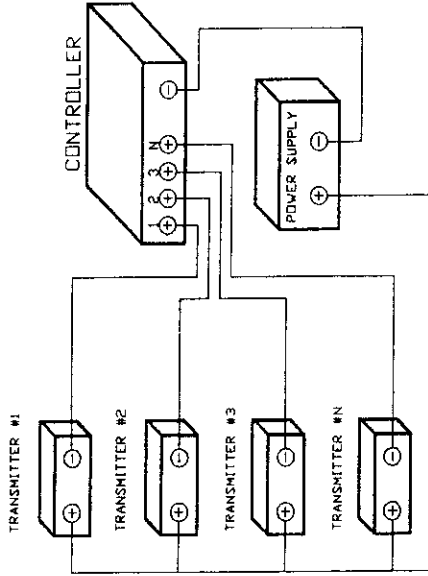
$$(16/(100 - 30)) \times (50 - 30) + 4\text{mA} = 8.57\text{mA}$$

Switch the RTD simulator to 50°F and set the zero pot to 8.57mA then switch the RTD simulator to 100°F and set the span pot to 20mA. Repeat as necessary.

Sensor Wiring

Each TCS/1000 series temperature sensor has a unique wiring color code:

TCS/1000-1a	black/black	TCS/1000-1b	black/black/red
TCS/1000-1.5a	green/black	TCS/1000-1.5b	green/green/black
TCS/1000-2a	red/red	TCS/1000-2b	red/red/black



Where the maximum number of transmitters is given by the following equation:

$$N_{\text{max}} = \text{Current rating of power supply}/20\text{mA}$$

Wiring



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