

## Overview

The Carrier Thermistor Strap-On Series features a 1.5" square copper plate with the sensor encapsulated to the back side of the plate to improve the thermal conductivity between the pipe and the sensor when an Immersion style sensor can't be inserted into the pipe. Each sensor has two, 14 inch 22 AWG Etched Teflon colored lead wires to differentiate the different sensor types. The sensors in this series are manufactured using Carrier's proven double encapsulation process to eliminate the effects of moisture upon the sensors as well as to improve the thermal response times using our high quality, thermally conductive epoxy. The Strap-On Series sensors can be used to monitor pipe sizes from 1 1/4" to 10" in diameter. For best accuracy and increased thermal conduction between the pipe and the sensor, Carrier recommends to clean the pipe before applying thermal grease as well as to insulate the sensor from the effects of the ambient air. Optional weather proof enclosure and NIST certificates are available upon request.

**Applications:** Cold Water Systems, Hot Water Systems, Retrofit, Hydronic Heating Systems, Chillers



## Part Numbers

NSA-A/CP-S10-4X

NSA-HH/CP-S10-GD-C

## Specifications

<b>Sensor Type   Sensor Curve:</b>	Thermistor   Non-Linear, NTC (Negative Temperature Coefficient)
<b>Number Sensing Points:</b>	One
<b>Number Wires:</b>	Two (Non-Polarity Sensitive)
<b>Sensor Series Output @ 25°C (77°F)   (Lead Wire Colors):</b>	10KΩ nominal   (White/Green)
<b>Accuracy 0-70°C (32-158°F):</b>	+/-0.2°C (+/-0.36°F)
<b>Stability:</b>	Sensor Dependent; Contact Carrier for more information on specific sensor
<b>Response Time (63% Step Change):</b>	30 Seconds nominal
<b>Power Dissipation Constant:</b>	3 mW/°C
<b>Enclosure Specifications, Operating Temperature Range, Ratings:</b>	<b>NSA-A/XX-S-GD:</b> Galvanized Steel, -40 to 93°C (-40 to 200°F), NEMA 1 (IP 10) <b>NSA-A/XX-S-4X:</b> Polystyrene Plastic, -40 to 70°C (-40 to 158°F), UL94-V2, NEMA 4X (IP 66)
<b>Storage Temperature Range:</b>	-40 to 80°C (-40 to 176°F)
<b>Operating Humidity Range:</b>	10 to 95% RH, non-condensing
<b>Pipe Mount Sensor Enclosure Material:</b>	14" (35.6cm)   22 AWG (0.65mm)
<b>Acceptable Pipe Size:</b>	2" (50mm) to 10" (250mm)
<b>Foam Material   Flammability Rating:</b>	Neoprene/EPDM/SBR Polymer   UL94-HF1; MIL-R-6130C; FMVSS-302
<b>Lead Length   Conductor Size:</b>	2" (50mm) to 10" (250mm)
<b>Lead Wire Insulation   Wire Rating:</b>	Etched Teflon (PTFE) Colored Leads   MIL-W-16878/4 (Type E)
<b>Conductor Material:</b>	Silver Plated Copper
<b>Product Weight:</b>	<b>NSA-A/XX-S-GD:</b> 0.80 lbs. (0.37kg)   <b>NSA-A/XX-S-4X:</b> 0.55 lbs. (0.25kg)
<b>Agency Approvals:</b>	CE, RoHS2, WEEE

### Dimensional Drawing

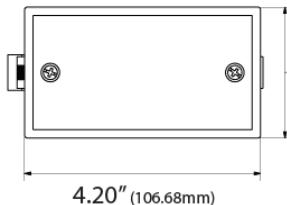
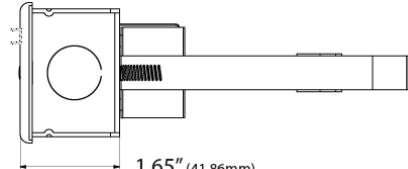
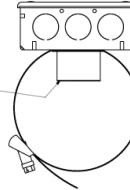
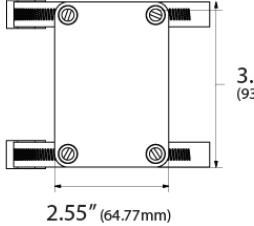
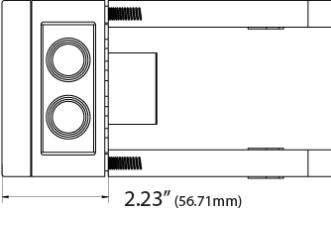
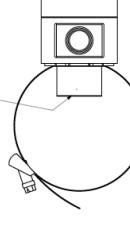
<b>Galvanized Enclosure [GD]</b>  2.33" (59.06mm) 4.20" (106.68mm)	 1.65" (41.86mm)	 Foam Pad Will Compress Upon Installation ∅ Adjustable 2"- 5"
<b>NEMA 4X Enclosure [4X]</b>  3.70" (93.98mm) 2.55" (64.77mm)	 2.23" (56.71mm)	 Foam Pad Will Compress Upon Installation ∅ Adjustable 2"- 5"
<b>Front View</b>	<b>Right View</b>	<b>Top View</b>

Figure 1

### Installation

Do not run the wiring in any conduit with line voltage (24/120/230 vac).

The ACI Strap-On Series Sensor features a 1.5" square copper plate with the sensor encapsulated to the back side of the plate to improve the thermal conductivity between the pipe and the sensor when an immersion style sensor can't be inserted into the pipe. The Strap-On temperature sensor is a single point temperature sensor that is designed for use with electronic controllers in commercial heating and cooling building management systems. It is available with multiple thermistor and RTD options. The Strap-On series sensor can be used to monitor pipe sizes from 1-1/4" to 10" (31.75mm to 254mm). The "-S10" Model is designed to fit around a 2" to 10" (50.8mm to 101.5mm) pipe. For optimal temperature measurement, follow these tips:

- Clean the pipe with an emery cloth or file before applying thermal grease and insulate the sensor from the effects of ambient air.
- The sensing element is the 1.5" square copper plate. Applying thermal grease in-between the sensor plate and pipe is recommended, but not required.

## Mounting Instructions

If there is insulation around the pipe, remove a section of insulation to accommodate the width of the junction box and sensor. The sensor should be mounted on the top or side of the pipe. Press the sensor copper plate to the cleaned pipe surface, and tighten the clamp around the pipe. Take care not to over tighten the clamp in order to prevent damage to the copper heat transfer plate or sensor. As you tighten the clamp, make sure the sensor does not rotate. Place insulation around the sensing point to prevent ambient air affecting the sensed temperature - see Figure 2.

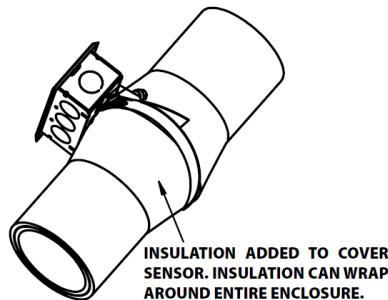


Figure 2

## Wiring Instructions

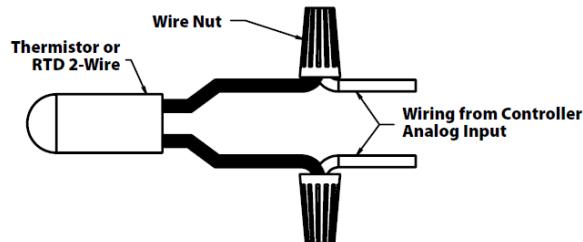
Open the cover of the enclosure. ACI recommends 14 to 22 AWG twisted pair wires or shielded cable for all sensors. Signal wiring must be run separate from low and high voltage wires (24/120/230VAC). All ACI thermistors and RTD temperature sensors are both non-polarity and non-position sensitive. Thermistor sensors are supplied with (2) flying lead wires, and RTD's are supplied with (2) or (3) flying lead wires – see Figure 3. The number of wires needed depends on the application.

Connect thermistor/RTD wire leads to controller analog input wires using wire nuts, terminal blocks, or crimp style connectors. All wiring must comply with all local and National Electric Codes. After wiring, attach the cover to the enclosure.

## NOTES

- When using a shielded cable, connect only (1) end of the shield to ground at the controller only. Connecting both ends of the shield to ground may cause a ground loop. When removing the shield from the sensor end, make sure to properly trim the shield to prevent any chance of shorting.
- If the controller requires a (2) wire input for a RTD, connect the (2) common wires (same color) together. If the controller requires (3) wires, use (3) individual wires.

### 2-WIRE THERMISTOR or RTD WIRING



### 3-WIRE RTD WIRING

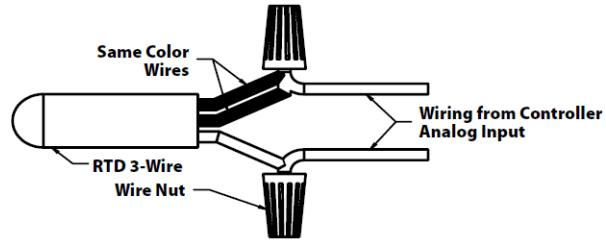


Figure 3

**Troubleshooting**

Problem	Solution
Sensor reading is incorrect	<ul style="list-style-type: none"><li>Verify sensor wiring to controller is not damaged and has continuity.</li><li>Verify sensor or wires are not shorted together.</li><li>Verify controller is setup for correct sensor curve.</li><li>Disconnect wires from sensor terminal block, tighten terminal block screws down, and take a resistance (ohm) reading with a multi-meter.</li><li>Compare the resistance reading to the Temperature Vs Resistance Curves online: <a href="http://www.workaci.com/content/thermistor-curves-0">http://www.workaci.com/content/thermistor-curves-0</a></li><li>Verify proper mounting location to confirm no external factors are affecting reading.</li></ul>
Sensor reads infinity/very high resistance	Sensor or wires are open.
Sensor reads low resistance	Sensor or wires are shorted together.
Erratic readings	<ul style="list-style-type: none"><li>Condensation on PCB board</li><li>Bad wire connections</li></ul>

**W.E.E.E. Directive**

At the end of their useful life the packaging and product should be disposed of via a suitable recycling center. Do not dispose of with household waste. Do not burn.