Copper Averaging Series | Transmitter
Bendable Copper Transmitter

The ACI Transmitter Copper Averaging Series features a two-wire, 4 mA to 20 mA loop powered output signal with an optional 3-Wire voltage output signal available. The Copper Averaging sensors are designed to be installed in medium to large ducts or air handling units where moisture, UV Light Air Treatment equipment, critical temperature control, higher corrosion resistance and faster response times when compared to similar Aluminum sensing elements. Copper has also been proven to provide an anti-bacterial effect on molds, fungus and other bacteria typically found in ducts. All transmitters include Zero and Span adjustments for field calibration and are calibrated using NIST Certified Calibration equipment. ACI recommends the use of an 1.02 mm (18 AWG) to 0.65 mm (22 AWG) shielded cable for all temperature transmitter installations to reduce the possibility of noise being introduced onto the signal lines. The 1k Ω Rigid Averaging sensor assemblies include a continuous sensing element the covers the entire length of the 2.44 m (8 ft) to 30.48 m (100 ft) sensing elements and are manufactured using Etched Teflon lead wires to differentiate between the different sensor types. All units are hermetically sealed using our epoxy material to eliminate the effects of moisture on the sensors. All Copper Averaging transmitters include a foam pad to properly seal the duct and limit vibration once installed. Optional NEMA/IP rated weather proof enclosures are available as specified on the back of the product data sheet. For best accuracy, ACI recommends the use of the A/TTM Series Matched transmitters with a 3 or 5 Point NIST Calibration Certificate, since they include a second calibration process in which the RTD and transmitter are calibrated together as a system.

Applications
Roof Top Units, Air Handlers, Monitoring Supply/Discharge/Return/Mixed Air Temperatures, Data Centers, Hospitals, Laboratories

Warranty
The ACI Copper Averaging Transmitter Series is covered by ACI's Five (5) Year Limited Warranty. The warranty can be found in the front of ACI's Sensors & Transmitters catalog, as well as on ACI's website, workaci.com.

Specifications

Transmitter Supply Voltage	Supply Current	8.5 Vdc to 32 Vdc (Reverse Polarity Protected)	25 mA minimum **250 Ω Load:** 13.5 Vdc to 32 Vdc **500 Ω Load:** 18.5 Vdc to 32 Vdc
Maximum Load Resistance	(Terminal Voltage - 8.5 V)	0.020 A
Output Signals	**Current:** 4 mA to 20 mA (2-Wire Loop Powered) **Voltage:** 1 Vdc to 5 Vdc or 2 Vdc to 10 Vdc (3-Wires)
Calibrated Accuracy	Linearity[1]	Temp. Spans < 260 °C (500 °F): ± 0.2 %
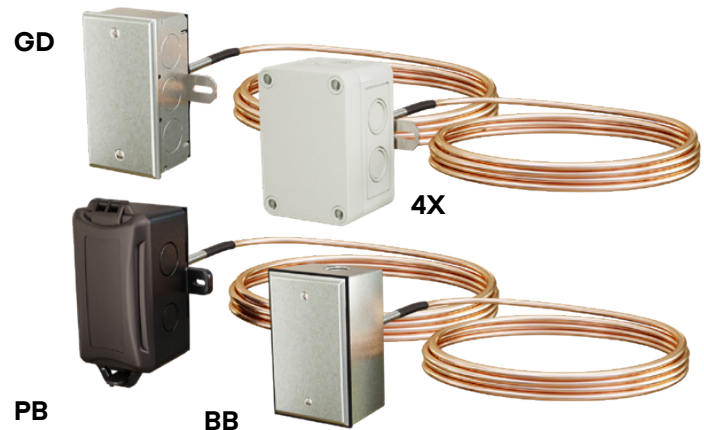
Thermal Drift[2]	**Temp. Spans < 38 °C (100 °F):** ± 0.04 % / °F **Temp. Spans > 38 °C (100 °F):** ± 0.02 %
Min/Max Temperature Spans	**Minimum Span:** 28 °C (50 °F) **Maximum Span:** 204 °C (400 °F)
TTM1K NIST Certification Points	**3 Point NIST:** 20 %, 50 % & 80 % of span **5 Point NIST:** 20 %, 35 %, 50 %, 65 %, 80 % of span
Warm Up Time	Warm Up Drift	10 minutes	± 0.1 %
Transmitter Operating Temperature Range	–40 °C to 85 °C (-40 °F to 185 °F)
Transmitter Operating Humidity Range	0 % to 90 %, non-condensing
Connections	Wire Size	Screw Terminal Blocks (Polarity Sensitive)	1.31 mm² (16 AWG) to 0.129 mm² (26 AWG)
Terminal Block Torque Rating	0.5 Nm (0.37 lb-ft) nominal
Sensor Type	Sensor Curve	Sensing Points	Platinum RTD	PTC (Positive Temperature Coefficient)	Continuous
Number Wires	Wire Colors	Three	Black/Black/White (Polarity Sensitive)
Sensor Output at 0 °C (32 °F)	1000 Ω nominal
Sensor Accuracy	± 0.1 % at 0 °C (32 °F)	± 0.25 % at 21 °C (70 °F)	± 1.0 % at 130 °C (266 °F)
Temperature Coefficient	3850 ppm / °C

Response Time (63 % Step Change)	15 seconds nominal
Sensor Operating Temperature Range	-40 °C to 135 °C (-40 °F to 275 °F)
Enclosure Specifications (Operating Temperature, Material, Flammability, NEMA/ IP Ratings)	**"-GD" Enclosure:** -40 °C to 115 °C (-40 °F to 239 °F); Galvanized Steel; NEMA 1 (IP10) **"-PB" Enclosure:** -30 °C to 100 °C (-22 °F to 212 °F); ABS Plastic; UL94-5VB; Plenum Rated **"-BB" Enclosure:** -40 °C to 115 °C (-40 °F to 239 °F); Aluminum; NEMA 3R (IP 14) **"-4X" Enclosure:** -40 °C to 70 °C (-40 °F to 158 °F); Polystyrene Plastic; UL94-V2; NEMA 4X (IP 66)
Storage Temperature Range	-40 °C to 80 °C (-40 °F to 176 °F)
Operating Humidity Range	5 % to 90 % RH, non-condensing
Sensing Element Material l Sensor Diameter	Copper l 5.34 mm (0.210 in) nominal
Probe Diameter l Probe Material	6.35 mm (0.250 in) l 304 Stainless Steel
Fitting Material l Flammability Rating	Polyamide 66 (High Performance Nylon 66) l UL94-HB
Fitting Thread Size	1/8 in-27 NPSM
Foam Pad Material l Flammability Rating	Neoprene/EPDM/SBR Polymer l UL94-HBF; FMVSS-302; MIL-R-6130C

Automation Components
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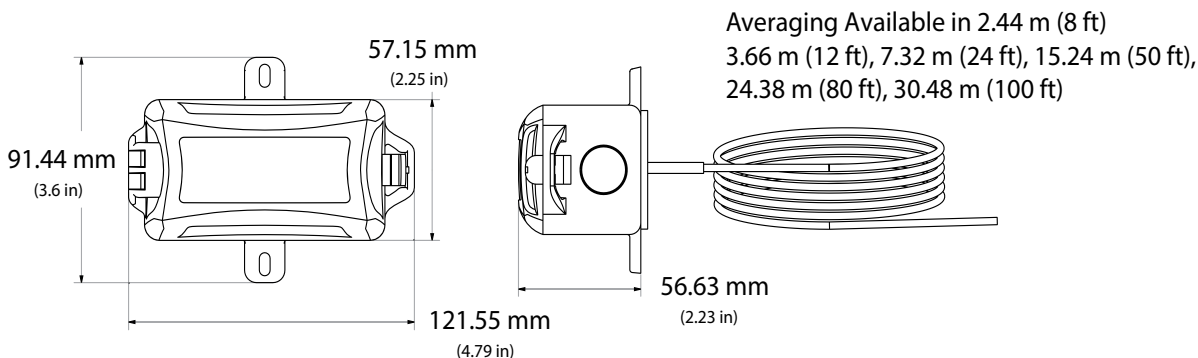|	
Lead Length l Conductor Size	30.5 cm (12 in) l 0.65 mm (22 AWG)
Lead Wire Insulation l Wire Rating	Etched Teflon (PTFE) Colored Leads l Mil Spec 16878/4 Type E
Conductor Material	Silver Plated Copper
Product Dimensions l Product Weight	See table on this product data sheet
Agency Approvals	CE, UKCA, RoHS2, WEEE, RoHS 20

Note[1]: *Transmitter's calibrated at 22 °C (71 °F) nominal*
Note[2]: *Temperature Drift is referenced to 22 °C (71 °F) nominal calibration temperature*

Dimensions and Weight

xx = sensor type l **yy** = insertion length

Plastic Box Enclosure (PB)

57.15 mm (2.25 in)
91.44 mm (3.6 in)
121.55 mm (4.79 in)
56.63 mm (2.23 in)

Averaging Available in 2.44 m (8 ft) 3.66 m (12 ft), 7.32 m (24 ft), 15.24 m (50 ft), 24.38 m (80 ft), 30.48 m (100 ft)

ACI Model #	Weight and Probe Length				
	2.44 mm (8 ft)	**3.66 mm (12 ft)**	**7.32 mm (24 ft)**	**15.24 mm (50 ft)**	**24.38 m (80 ft)**
A/xx-A-yy-PB	0.327 kg (0.72 lb)	0.435 kg (0.96 lb)	0.771 kg (1.70 lb)	1.488 kg (3.28 lb)	2.059 kg (4.54 lb)
	30.48 m (100 ft)				
	2.549 kg (5.62 lb)				

Galvanized Enclosure (GD)
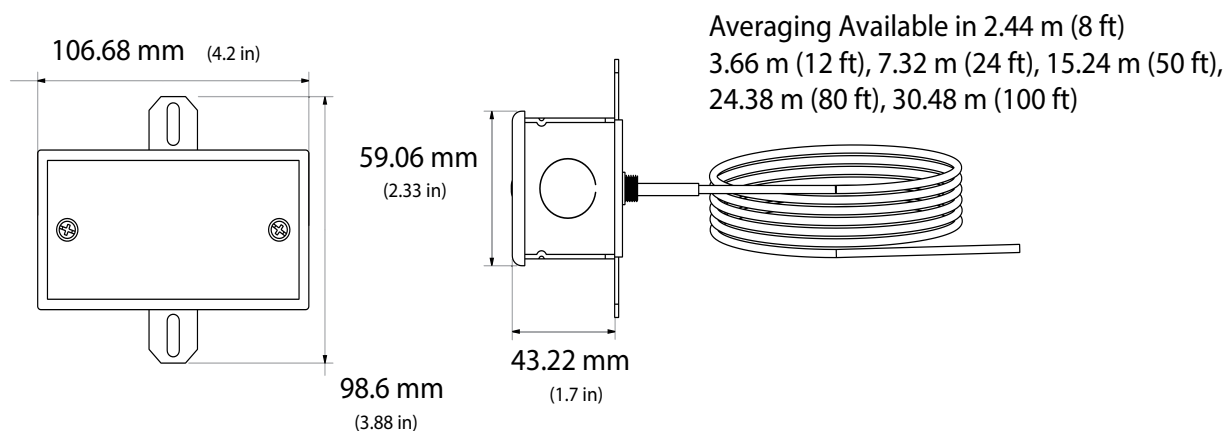
106.68 mm (4.2 in)

59.06 mm (2.33 in)

43.22 mm (1.7 in)

98.6 mm (3.88 in)

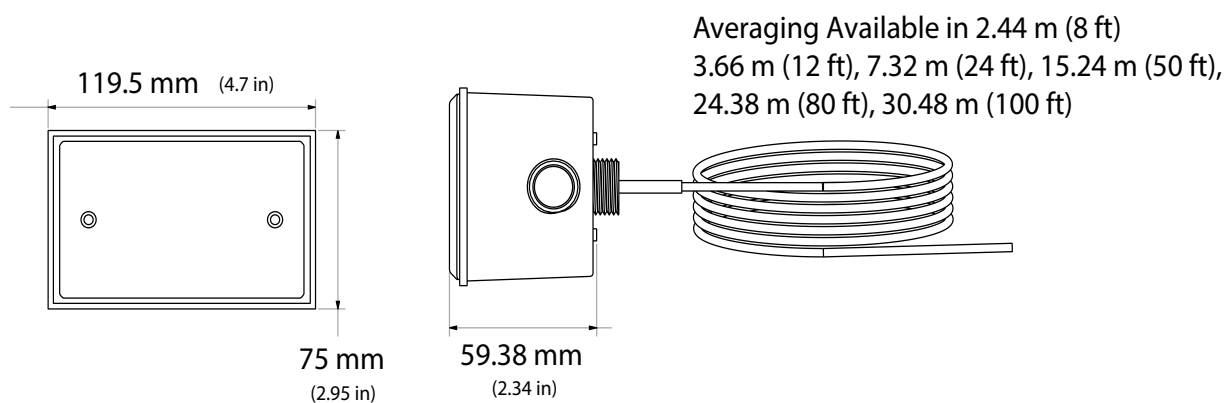Averaging Available in 2.44 m (8 ft)
3.66 m (12 ft), 7.32 m (24 ft), 15.24 m (50 ft),
24.38 m (80 ft), 30.48 m (100 ft)

ACI Model #	Weight and Probe Length				
	2.44 mm (8 ft)	**3.66 mm (12 ft)**	**7.32 mm (24 ft)**	**15.24 mm (50 ft)**	**24.38 m (80 ft)**
A/xx-A-yy-GD	0.526 kg (1.16 lb)	0.635 kg (1.4 lb)	0.998 kg (2.2 lb)	1.715 kg (3.78 lb)	2.304 kg (5.08 lb)
	30.48 m (100 ft)				
	2.794 kg (6.16 lb)				

Bell Box Enclosure (BB)

119.5 mm (4.7 in)

75 mm (2.95 in)

59.38 mm (2.34 in)

Averaging Available in 2.44 m (8 ft)
3.66 m (12 ft), 7.32 m (24 ft), 15.24 m (50 ft),
24.38 m (80 ft), 30.48 m (100 ft)

ACI Model #	Weight and Probe Length				
	2.44 mm (8 ft)	**3.66 mm (12 ft)**	**7.32 mm (24 ft)**	**15.24 mm (50 ft)**	**24.38 m (80 ft)**
A/xx-A-yy-BB	0.553 kg (1.22 lb)	0.653 kg (1.44 lb)	0.989 kg (2.18 lb)	1.696 kg (3.74 lb)	2.286 kg (5.04 lb)
	30.48 m (100 ft)				
	2.776 kg (6.12 lb)				

NEMA 4X Enclosure (4X)

98.6 mm (3.88 in)

64.77 mm (2.55 in)

93.98 mm (3.7 in)

58.33 mm (2.3 in)

Averaging Available in 2.44 m (8 ft)
3.66 m (12 ft), 7.32 m (24 ft), 15.24 m (50 ft),
24.38 m (80 ft), 30.48 m (100 ft)
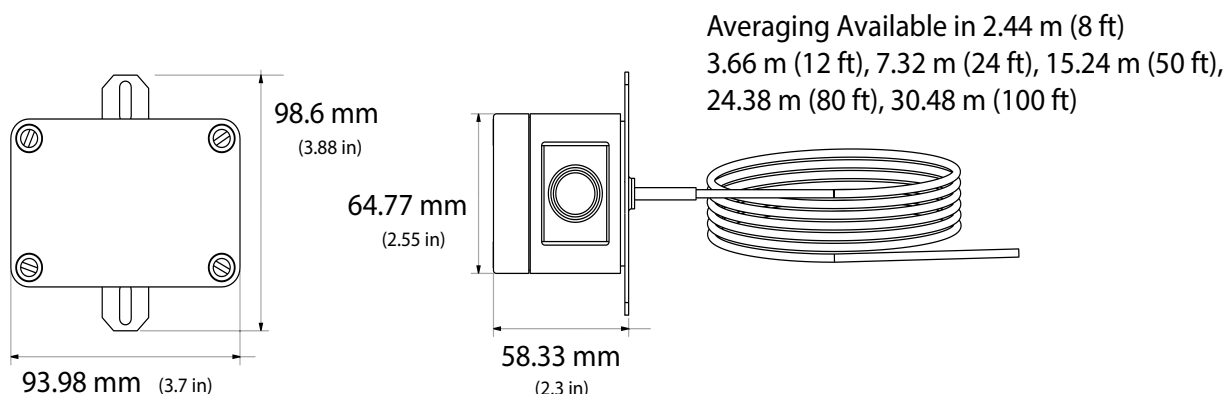
ACI Model #	Weight and Probe Length				
	2.44 mm (8 ft)	**3.66 mm (12 ft)**	**7.32 mm (24 ft)**	**15.24 mm (50 ft)**	**24.38 m (80 ft)**
A/xx-A-yy-4X	0.381 kg (0.84 lb)	0.481 kg (1.06 lb)	0.816 kg (1.8 lb)	1.524 kg (3.36 lb)	2.114 kg (4.66 lb)
	30.48 m (100 ft)				
	2.604 kg (5.74 lb)				

Custom Ordering

		Options and Descriptions			Model #
A.	**Sensor Series** *No Selection Required*	**A/** ⟶			A/
B.	**Model Series** *Select One (1)*	**TT1K** = 1k Ω RTD, Temperature Transmitter			
		TTM1K = 1k Ω Matched RTD/Transmitter*			
C.	**Configuration** *No Selection Required*	**A** = Bendable Copper Averaging ⟶			A
D.	**Probe Length** *Select One (1)*	**8'** = 2.44 m (8 ft)	**12'** = 3.66 m (12 ft)	**24'** = 7.32 m (24 ft)	
		50' = 15.24 m (50 ft)	**80'** = 24.38 m (80 ft)	**100'** = 30.48 m (100 ft)	
E.	**Output Signal** *Select One (1)*	**1** = 1 Vdc to 5 Vdc	**2** = 2 Vdc to 10 Vdc	**4** = 4 mA to 20 mA	
F.	**Enclosure** *Select One (1)*	**GD** = Galvanized **PB** = Plastic	**BB** = Aluminum, NEMA 3R	**4X** = NEMA 4X	
G.	**Calibration Span** *Select One (1)*	**Specify Span in °F or °C (Best Accuracy in 100 °F Increments)**			

Model # Example:	A/	TT1K	A	24'	1	PB	0 °C to 40 °C
	A.	**B.**	**C.**	**D.**	**E.**	**F.**	**G.**

***Note*:** *For TTM100 or TTM1k part numbers, the default NIST is 3 points | 5 points may be specified by using "-5PTNIST" at the end of any TTM part number.*

Accessories Ordering

Model #	Item #	Description
A/CAPILLARY CLIP QTY: 1	130525	Capillary Mounting Clip, Copper, Quantity: 1
A/CAPILLARY CLIP QTY: 50/BAG	142410	Capillary Mounting Clip, Copper, Quantity: 50/Bag
UNIVERSAL CLIP 50	145430	Universal Mounting Clip, Plastic, Quantity: 50/Bag
UNIVERSAL CLIP 6	145421	Universal Mounting Clip, Plastic, Quantity: 6/Bag

Accessories Ordering (NIST)

Model #	Description
-5PTNIST	5 Point Calibration & Certificate for TTM parts

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