

IMMERSION

Stainless Steel Immersion, Transmitters

The ACI Transmitter Immersion Series features a two-wire, 4 to 20 mA loop powered output signal with optional three-wire voltage output signal available. All transmitters include Zero and Span adjustments for field calibration and are calibrated using NIST Certified Calibration equipment. We recommend the use of an 18 to 22 AWG shielded cable for all temperature transmitter installations to keep noise from being introduced onto the signal lines. The sensor assemblies are manufactured using Etched Teflon colored lead wires and ACI's proven double encapsulation process to eliminate the effects of moisture on the sensors as well as increased response times from our high quality, thermally conductive epoxy. The immersion sensors "-I" include a welded thermowell but can be ordered without the thermowell "-INW" version. The "-INW" includes a standard 1/2" NPS process thread to be used with a machined thermowell or

existing thermowell application. Optional NEMA/IP rated weather proof enclosures and NIST Calibration Certificates are available when ordering the A/TTM Series transmitters as referenced in the ordering grid on the back of the product data sheet. For best accuracy, ACI recommends the use of the A/TTM Series Matched transmitters which includes a 3 or 5 Point NIST Calibration Certificate, since they include a second calibration step in which the RTD and transmitter are calibrated together as a system.

Applications: Chilled Water Systems, Hot Water Systems, Boilers, Pumps, Compressors, Chillers, Cooling Towers, Process Control

The ACI Transmitter Immersion 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, www.workaci.com.

PRODUCT SPECIFICATIONS

Transmitter Supply Voltage Supply Current:	+8.5 to 32 VDC (Reverse Polarity Protected) 25 mA minimum
Maximum Load Resistance:	250 Ohm Load: +13.5 to 32 VDC 500 Ohm Load: +18.5 to 32 VDC (Terminal Voltage - 8.5 V) 0.020 A
Output Signals:	Current: 4-20 mA (2-Wire Loop Powered) Voltage: 1-5 VDC or 2-10 VDC (3-Wires)
Calibrated Transmitter Accuracy Linearity¹:	Temp. Spans < 500°F (260°C): +/- 0.2% Temp. Spans > 500°F (260°C): +/- 0.5%
Temperature Drift²:	Temp. Spans < 100°F (38°C): +/- 0.04%/°F Temp. Spans > 100°F (38°C): +/- 0.02%
TTM100/TTM1K 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%
Operating Storage Temperature:	-40°F to 185°F (-40 to 85°C)
Operating Humidity Range:	0 to 90%, non-condensing
Calibrated Temperature Spans¹:	Minimum Temp. Span: 50°F (28°C) Maximum Temp. Span: 500°F (260°C)
Matched Calibrated Temperature Spans (A/TTM models) Range:	-45 to 155°C (-49 to 311°F)
Connections Wire Size:	Screw Terminal Blocks (Polarity Sensitive) 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
Sensor Type Sensor Curve Sensing Points:	Platinum RTD PTC (Positive Temperature Coefficient) One
Number Wires Wire Colors:	Two A/TT100/TTM100 Series: Brown/Brown A/TT1K/TTM1K Series: Black/Black
Sensor Output @ 0°C (32°F):	A/TT100/TTM100 Series: 100 Ohms nominal A/TT1K/TTM1K Series: 1000 Ohms nominal
RTD Class 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)
Response Time (63% Step Change):	8 Seconds nominal
Sensor Operating Temperature Range:	-40 to 200°C (-40 to 392°F)
Enclosure Specifications (Operating Temperature, Material, Flammability, NEMA/IP Ratings):	"-GD" Enclosure: Galvanized Steel, -40 to 121°C (-40 to 250°F), NEMA 1 (IP10) "-PB" Enclosure: ABS Plastic, -30 to 90°C (-22 to 194°F), UL94-HB, Plenum Rated "-BB" Enclosure: Aluminum, -40 to 121°C (-40 to 250°F), NEMA 3R "-4X" Enclosure: Polystyrene Plastic, -40 to 70°C (-40 to 158°F), UL94-V2, NEMA 4X (IP 66)
Storage Temperature Range:	-40 to 85°C (-40 to 185°F)
Operating Humidity Range:	10 to 90% RH, non-condensing
Probe Diameter Thermowell Bore Diameter:	0.250" (6.35mm) 0.260"
Probe Material Thermowell Material:	304 Stainless Steel 304 Stainless Steel
Thermowell Instrument Thread Process Thread:	1/2" NPS (National Pipe Straight) 1/2" NPT (National Pipe Tapered)
Fitting Material Flammability Rating:	Polyamide 66 (High Performance Nylon 66) UL94-HB
Fitting Thread Size:	1/2" (20 mm) NPSM
Lead Length Conductor Size:	14" (35.6 cm) 22 AWG (0.65mm)
Lead Wire Insulation Wire Rating:	Etched Teflon (PTFE) Colored Leads Mil Spec 16878/4 Type E
Conductor Material:	Silver Plated Copper
Product Dimensions Product Weight:	
Agency Approvals:	

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





MAXIMUM VELOCITY VS THERMOWELL INSERTION LENGTH Machined Thermowell

Straight Shank Insertion Length "U"					Stepped Shank Insertion Length "U"	
Material:	Media Type:	1.0" (25.4 mm)	2.5" (63.5 mm)	8.0" (203.2 mm)	4.0" (101.6 mm)	6.0" (152.4 mm)
304/316 SS	Air/Gas/Steam ¹	349 ft/s (106.3 m/s)	349 ft/s (106.3 m/s)	71.9 ft/s (21.9 m/s)	109 ft/s (33.2 m/s)	39.5 ft/s (12.0 m/s)
304/316 SS	Water	360 ft/s (109.7 m/s)	360 ft/s (109.7 m/s)	71.9 ft/s (21.9 m/s)	82.2 ft/s (25.1 m/s)	39.5 ft/s (12.0 m/s)

Note 1: Values are for Air/Gas/Steam and similar density media | All velocity ratings are based upon an operating temperature of 1000°F (537.8°C)

MAXIMUM PRESSURE VS TEMPERATURE RATINGS Two-Part Fabricated / Welded Thermowell

Material:	70°F (21.1°C)	200°F (93.3°C)	400°F (204.4°C)	600°F (315.6°C)	800°F (426.7°C)	1000°F (537.8°C)	1200°F (648.9°C)
304/316 SS	982 PSI (67.7 Bar)	820 PSI (56.5 Bar)	675 PSI (46.5 Bar)	604 PSI (41.6 Bar)	550 PSI (37.9 Bar)	510 PSI (35.1 Bar)	290 PSI (20.0 Bar)

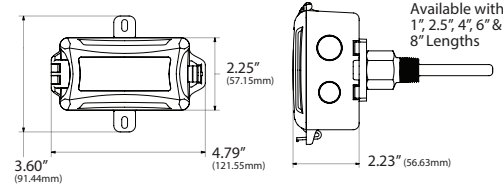
MAXIMUM FLUID VELOCITY RATINGS Two-Part Fabricated / Welded Thermowell

Straight Shank Insertion Length "U"				
Material:	Media Type:	2.5" (63.5 mm)	4.0" (101.6 mm)	6.0" (152.4 mm)
304/316 SS	Air/Gas/Steam ²	169 ft/s (51.5 m/s)	61 ft/s (18.6 m/s)	20 ft/s (6.1 m/s)
304/316 SS	Water	88 ft/s (26.8 m/s)	20 ft/s (6.1 m/s)	10 ft/s (3.05 m/s)

Note 2: Values are for Air/Gas/Steam and similar density media

DIMENSIONAL DRAWING. WEIGHTS

Plastic Box Enclosure [PB]



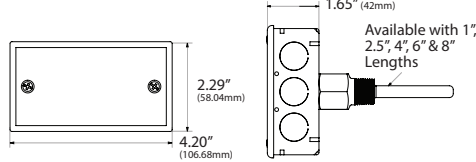
xx = Sensor Type | **yy** = Insertion Length

Plastic Box Enclosure [PB] Weights

ACI Model #	1.0"	2.5"	4.0"	6.0"	8.0"
A/xx-INW-yy-PB	0.20 lbs. (0.091 kg)	0.24 lbs. (0.109 kg)	0.28 lbs. (0.127 kg)	0.32 lbs. (0.145 kg)	0.36 lbs. (0.163 kg)
A/xx-I-yy-PB	N/A	0.56 lbs. (0.254 kg)	0.60 lbs. (0.272 kg)	0.64 lbs. (0.290 kg)	N/A
A/xx-IM-yy-PB	0.40 lbs. (0.182 kg)	0.58 lbs. (0.263 kg)	0.74 lbs. (0.336 kg)	0.92 lbs. (0.417 kg)	1.15 lbs. (0.522 kg)

N/A = Not Available

Galvanized Enclosure [GD]



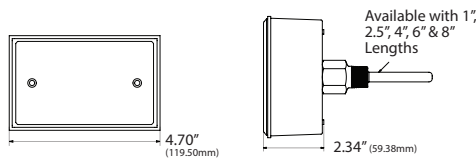
xx = Sensor Type | **yy** = Insertion Length

Galvanized Enclosure [GD] Weights

ACI Model #	1.0"	2.5"	4.0"	6.0"	8.0"
A/xx-INW-yy-GD	0.62 lbs. (0.281 kg)	0.66 lbs. (0.299 kg)	0.70 lbs. (0.318 kg)	0.74 lbs. (0.336 kg)	0.78 lbs. (0.354 kg)
A/xx-I-yy-GD	N/A	0.88 lbs. (0.399 kg)	1.00 lbs. (0.454 kg)	1.04 lbs. (0.472 kg)	N/A
A/xx-IM-yy-GD	0.81 lbs. (0.367 kg)	1.00 lbs. (0.454 kg)	1.16 lbs. (0.526 kg)	1.32 lbs. (0.599 kg)	1.55 lbs. (0.703 kg)

N/A = Not Available

Bell Box Enclosure [BB]



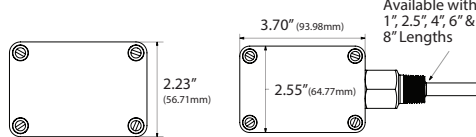
xx = Sensor Type | **yy** = Insertion Length

Bell Box Enclosure [GD] Weights

ACI Model #	1.0"	2.5"	4.0"	6.0"	8.0"
A/xx-INW-yy-BB	0.64 lbs. (0.290 kg)	0.68 lbs. (0.308 kg)	0.70 lbs. (0.318 kg)	0.74 lbs. (0.336 kg)	0.80 lbs. (0.363 kg)
A/xx-I-yy-BB	N/A	1.02 lbs. (0.463 kg)	1.00 lbs. (0.454 kg)	1.04 lbs. (0.472 kg)	N/A
A/xx-IM-yy-BB	0.83 lbs. (0.376 kg)	1.02 lbs. (0.463 kg)	1.16 lbs. (0.526 kg)	1.32 lbs. (0.599 kg)	1.59 lbs. (0.721 kg)

N/A = Not Available

NEMA 4X Enclosure [4X]



xx = Sensor Type | **yy** = Insertion Length

NEMA 4X Enclosure [4X] Weights

ACI Model #	1.0"	2.5"	4.0"	6.0"	8.0"
A/xx-INW-yy-4X	0.28 lbs. (0.127 kg)	0.32 lbs. (0.145 kg)	0.36 lbs. (0.163 kg)	0.40 lbs. (0.181 kg)	0.44 lbs. (0.200 kg)
A/xx-I-yy-4X	N/A	0.64 lbs. (0.290 kg)	0.68 lbs. (0.308 kg)	0.72 lbs. (0.327 kg)	N/A
A/xx-IM-yy-4X	0.48 lbs. (0.218 kg)	0.66 lbs. (0.299 kg)	0.82 lbs. (0.372 kg)	1.00 lbs. (0.454 kg)	1.27 lbs. (0.576 kg)

N/A = Not Available

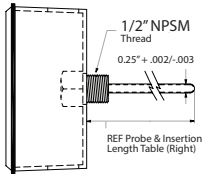
Standard Views

Product Weights



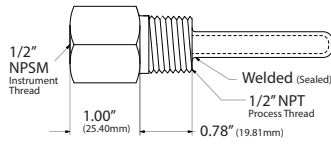


PROBE AND INSERTION LENGTH IMMERSION NO WELL



Pictured Above: immersion no well (INW) sensor in Bell Box Enclosure (BB).

Pictured Below: welded two piece thermowell to show connection and depth reference. Thermowell not included with immersion no well (INW).



Probe & Insertion Length

Probe Length	Insertion Length	ACI Part #	Thermowell Part #
3"	2.81" +/- 0.13"	A/xx-INW-1"-yy-zz	A/M1"
4.5"	4.31" +/- 0.13"	A/xx-INW-2.5"-yy-zz	A/2.5" or A/M2.5"
6"	5.81" +/- 0.13"	A/xx-INW-4"-yy-zz	A/4" or A/M4"
8"	7.81" +/- 0.13"	A/xx-INW-6"-yy-zz	A/6" or A/M6"
10"	9.81" +/- 0.13"	A/xx-INW-8"-yy-zz	A/M8"

CUSTOM ORDERING Welded Thermowell or No Thermowell

Model # Example: **A/ TT100 1 6" 2 GD NIST**
A. B. C. D. E. F. G.

MODEL #

A. Sensor Series No Selection Required	A/ _____ →
B. Model Series Select One (1)	TT100 = 100Ω TTM100 = Matched 100Ω* TT1K = 1KΩ TTM1K = Matched 1KΩ*
C. Configuration Select One (1)	1 = Immersion with Welded Thermowell INW = Immersion without Welded Thermowell
D. Insertion Length Select One (1)	2.5" = 2.5" Insertion 4" = 4" Insertion 6" = 6" Insertion
E. Output Signal Select One (1)	1 = 1 to 5 VDC 2 = 2 to 10 VDC 4 = 4 to 20 mA
F. Enclosure Select One (1)	GD = Galvanized PB = Plastic BB = Aluminum, NEMA 3R 4X = NEMA 4X
G. NIST Select One (1)	---- = No NIST Certificate NIST = NIST Certificate (Must Specify 1, 3 or 5 Points)

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CUSTOM ORDERING Machined Well or No Thermowell

Model # Example: **A/ TT100 IM 4" 2 GD NIST**
A. B. C. D. E. F. G.

MODEL #

A. Sensor Series No Selection Required	A/ _____ →
B. Model Series Select One (1)	TT100 = 100Ω TTM100 = Matched 100Ω* TT1K = 1KΩ TTM1K = Matched 1KΩ*
C. Configuration Select One (1)	IM = Immersion with Machined Well INW = Immersion without Thermowell
D. Insertion Length Select One (1)	1" = 1" Insertion 2.5" = 2.5" Insertion 4" = 4" Insertion 6" = 6" Insertion 8" = 8" Insertion
E. Output Signal Select One (1)	1 = 1 to 5 VDC 2 = 2 to 10 VDC 4 = 4 to 20 mA
F. Enclosure Select One (1)	GD = Galvanized PB = Plastic BB = Aluminum, NEMA 3R 4X = NEMA 4X
G. NIST Select One (1)	---- = No NIST Certificate NIST = NIST Certificate (Must Specify 1, 3 or 5 Points)

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Note: Thermowells with lengths of 12", 18", and 24" are available and must be ordered separately | See the Machined Thermowells Data Sheet (Accessories)

ACCESSORIES ORDERING

Model # Example: **NSG HEAT TRANSFER PASTE 20Z -OR- 102595**

Model #	Item #	Description
NSG HEAT TRANSFER PASTE 20Z	102595	Thermal Grease, 2 oz. Tube, Silicone Free, -40 to 320°F (-40 to 160°C)
NSG HEAT TRANSFER PASTE 160Z	140574	Thermal Grease, 16 oz. Jar, Silicone Free, -40 to 390°F (-40 to 198°C)
A/2.5"	128349	2.5" (63.5mm) Insertion, 304 Stainless, Welded, 1/2" NPT Thermowell
A/4"	128350	4" (101.6mm) Insertion, 304 Stainless, Welded, 1/2" NPT Thermowell
A/6"	128351	6" (152.4mm) Insertion, 304 Stainless, Welded, 1/2" NPT Thermowell
A/M1"	128337	1" (25.4mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M2.5"	128338	2.5" (63.5mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M4"	128343	4" (101.6mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M6"	128344	6" (152.4mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M8"	138725	8" (203.2mm) Insertion, 304 Stainless, Machined, 1/2" NPT Thermowell
A/M2.5"-316SS	128352	2.5" (63.5mm) Insertion, 316 Stainless, Machined, 1/2" NPT Thermowell
A/M4"-316SS	128353	4" (101.6mm) Insertion, 316 Stainless, Machined, 1/2" NPT Thermowell
A/M6"-316SS	128354	6" (152.4mm) Insertion, 316 Stainless, Machined, 1/2" NPT Thermowell

