



# IMMERSION

## Low Temperature Immersion Sensors & Transmitters

The ACI Low Temperature Immersion Series sensors and transmitters are a single point immersion sensor featuring a three wire RTD sensor assembly using Teflon insulated lead wires and a 316 Series stainless steel probe. The three wire sensors can be used with a two wire transmitter by connecting the two (Red) colored wires to one of the RTD Terminal blocks with the 3rd (White) wire going to the second RTD Terminal block. The purpose of the 3rd wire is to compensate for external lead wire resistance that will affect the accuracy of your sensor output when using with a three wire temperature transmitter or sensor configuration on your Building Management System or PLC (Programmable Logic Controller). ACI recommends the use of 18 AWG lead wires to reduce the external lead wire resistance when using a Platinum RTD. The operating specifications are for both the sensor and transmitter as designated in the specification table. The overall accuracy of the temperature transmitter must be calculated using the transmitter calibrated accuracy plus that of the sensor error over temperature unless ordering as a TTM matched transmitter. Standard enclosure options include the “-GD” Galvanized or “-BB” Aluminum weather proof

enclosure. NIST Certificates are available for all of the configurations listed in the ordering grid on the back of the product data sheet. For best accuracy, ACI recommends the use of the TTM100 or TTM1K Series Matched transmitters since they include a second calibration step in which the RTD and transmitter are calibrated together as a system, in order to remove most of the sensor error over the calibrated temperature span of the transmitter.

**Applications:** Chillers, Pharmaceutical, Refrigeration, Process Cooling, Industrial Process Control

**The ACI Low Temperature Immersion Sensors and Transmitters 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 web site, [workaci.com](http://workaci.com).**

PRODUCT SPECIFICATIONS	
<b>Transmitter Supply Voltage   Supply Current:</b>	+8.5 to 32 VDC (Reverse Polarity Protected)   25 mA minimum
<b>Maximum Load Resistance:</b>	250 Ohm Load: +13.5 to 32 VDC   500 Ohm Load: +18.5 to 32 VDC (Terminal Voltage - 8.5 V)   0.020 A
<b>Output Signal:</b>	<b>Current:</b> 4-20 mA (2-Wire Loop Powered)   <b>Voltage:</b> 1-5 VDC or 2-10 VDC (3-Wires)
<b>Calibration Transmitter Accuracy   Linearity:</b>	<b>Temp. Spans &lt; 500°F (260°C):</b> +/- 0.2%   <b>Temp. Spans &gt; 500°F (260°C):</b> +/- 0.5%
<b>Temperature Drift:</b>	<b>Temp. Spans &lt; 100°F (38°C):</b> +/- 0.04%/°F   <b>Temp. Spans &gt; 100°F (38°C):</b> +/- 0.02%
<b>Warm Up Time   Warm Up Drift:</b>	10 Minutes   +/- 0.1%
<b>Operating   Storage Temperature Range:</b>	-40°F (-40°C) to 185°F (85°C)
<b>Operating Humidity Range:</b>	0 to 90%, non-condensing
<b>Calibration Temperature Spans<sup>1</sup>:</b>	<b>Minimum Temp. Span:</b> 50°F (28°C)   <b>Maximum Temp. Span:</b> 700°F (370°C)
<b>Connections   Wire Size:</b>	Screw Terminal Blocks (Non-Polarity Sensitive)   16 AWG (1.31 mm <sup>2</sup> ) to 26 AWG (0.129 mm <sup>2</sup> )
<b>Terminal Block Torque Rating:</b>	0.5 Nm nominal
<b>Sensor Type   Sensor Curve   Sensor Points:</b>	Platinum RTD   PTC (Positive Temperature Coefficient)   One
<b>Number Wires:</b>	<b>A/100-3W-LT-I-XX” and A/1K-3W-LT-I-xx”:</b> Three (White / Two Red) Polarity Sensitive
<b>Sensor Output @ 0°C (32°F):</b>	<b>A/100-3W-LT-I-xx”:</b> 100 Ohms nominal   <b>A/1K-3W-LT-I-xx”:</b> 1000 Ohms nominal
<b>Sensor Tolerance   Accuracy<sup>2</sup>:</b>	+/- 0.12% Class B   <b>Class B Tolerance Formula:</b> +/- °C = (0.30°C + (0.005 *  t ))
<b>Din Standard   Temperature Coefficient:</b>	DIN EN 60751 (IEC 751)   3850 ppm / °C
<b>Sensor Stability:</b>	< 0.04 % at 1000 hours at 400°C
<b>Self-Heating   Maximum Operating Current:</b>	<b>100 Ohm RTD:</b> 7 mW/°C (Still Air)   5 mA   <b>1K Ohm RTD:</b> 4 mW/°C (Still Air)   3 mA
<b>Sensor Operating Temperature Range:</b>	-198 to 150°C (-324 to 302°F)
<b>Enclosure Specifications (Operating Temperature Range, Material, Flammability, NEMA/IP Rating):</b>	<b>“-GD” Enclosure:</b> -40 to 199°C (-40 to 390°F); Galvanized Steel; NEMA 1 (IP10) <b>“-BB” Enclosure:</b> -50 to 115°C (-58 to 239°F); Aluminum; NEMA 3R
<b>Storage Temperature Range:</b>	-40 to 85°C (-40 to 185°F)
<b>Operating Humidity Range:</b>	10 to 95% RH, non-condensing
<b>Probe Material   Probe Diameter:</b>	316 Stainless Steel   0.250” (6.35mm)
<b>Compression Fitting Material:</b>	316 Stainless Steel
<b>Lead Length   Conductor Size:</b>	8’ (2.44 m)   22 AWG (0.25 mm <sup>2</sup> )
<b>Lead Wire Insulation   Conductor Material:</b>	Etched Teflon (PTFE)   Silver Plated Copper
<b>Product Dimensions   Product Weight:</b>	See table on back of Product Data sheet
<b>Agency Approvals:</b>	RoHS2, WEEE

**Note<sup>1</sup>:** Transmitter’s calibrated at 71°F (22°C) nominal | **Note<sup>2</sup>:** Where |t| is the absolute value of temperature above or below 0°C in Centigrade

# TEMPERATURE | LOW TEMP TRANSMITTERS | IMMERSIONS

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 <sup>1</sup>	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)

DIMENSIONAL DRAWING													
<p><b>Galvanized Enclosure [GD]</b></p> <p>Available with 2.5", 4", and 6" Lengths</p>	<p><b>Galvanized Enclosure [GD] Weights</b></p> <table border="1"> <thead> <tr> <th>ACI Model #</th> <th>2.5" (Insertion Length)</th> <th>4" (Insertion Length)</th> <th>6" (Insertion Length)</th> </tr> </thead> <tbody> <tr> <td>A/xx-INW-yy-GD</td> <td>0.66 lbs. (0.299 kg)</td> <td>0.70 lbs. (0.318 kg)</td> <td>0.74 lbs. (0.336 kg)</td> </tr> <tr> <td>A/xx-IM-yy-GD</td> <td>1.00 lbs. (0.454 kg)</td> <td>1.16 lbs. (0.526 kg)</td> <td>1.32 lbs. (0.599 kg)</td> </tr> </tbody> </table>	ACI Model #	2.5" (Insertion Length)	4" (Insertion Length)	6" (Insertion Length)	A/xx-INW-yy-GD	0.66 lbs. (0.299 kg)	0.70 lbs. (0.318 kg)	0.74 lbs. (0.336 kg)	A/xx-IM-yy-GD	1.00 lbs. (0.454 kg)	1.16 lbs. (0.526 kg)	1.32 lbs. (0.599 kg)
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<p><b>Bell Box Enclosure [BB]</b></p> <p>Available with 2.5", 4", and 6" Lengths</p>	<p><b>Bell Box Enclosure [BB] Weights</b></p> <table border="1"> <thead> <tr> <th>ACI Model #</th> <th>2.5" (Insertion Length)</th> <th>4" (Insertion Length)</th> <th>6" (Insertion Length)</th> </tr> </thead> <tbody> <tr> <td>A/xx-INW-yy-BB</td> <td>0.68 lbs. (0.308 kg)</td> <td>0.72 lbs. (0.326 kg)</td> <td>0.76 lbs. (0.345 kg)</td> </tr> <tr> <td>A/xx-IM-yy-BB</td> <td>1.02 lbs. (0.463 kg)</td> <td>1.20 lbs. (0.544 kg)</td> <td>1.36 lbs. (0.617 kg)</td> </tr> </tbody> </table>	ACI Model #	2.5" (Insertion Length)	4" (Insertion Length)	6" (Insertion Length)	A/xx-INW-yy-BB	0.68 lbs. (0.308 kg)	0.72 lbs. (0.326 kg)	0.76 lbs. (0.345 kg)	A/xx-IM-yy-BB	1.02 lbs. (0.463 kg)	1.20 lbs. (0.544 kg)	1.36 lbs. (0.617 kg)
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<b>Standard Views</b>	<b>Product Weights</b>												

**Note:** There are two enclosures included with configurations involving Temperature Transmitters. A secondary GD (Galvanized) enclosure contains the transmitter board to protect it from the extreme temperatures exposed to the sensing element

PROBE AND INSERTION LENGTH IMMERSION NO WELL																	
<p><b>Pictured Above:</b> immersion no well (INW) sensor in Bell Box Enclosure (BB).</p> <p><b>Pictured Below:</b> welded two piece thermowell to show connection and depth reference. Thermowell not included with immersion no well (INW).</p>	<p><b>Probe &amp; Insertion Length</b></p> <table border="1"> <thead> <tr> <th>Probe Length</th> <th>Insertion Length</th> <th>ACI Part #</th> <th>Thermowell Part #</th> </tr> </thead> <tbody> <tr> <td>4.5"</td> <td>4.31" +/- 0.13"</td> <td>A/xx-INW-2.5"-yy-zz</td> <td>A/M2.5"</td> </tr> <tr> <td>6"</td> <td>5.81" +/- 0.13"</td> <td>A/xx-INW-4"-yy-zz</td> <td>A/M4"</td> </tr> <tr> <td>8"</td> <td>7.81" +/- 0.13"</td> <td>A/xx-INW-6"-yy-zz</td> <td>A/M6"</td> </tr> </tbody> </table>	Probe Length	Insertion Length	ACI Part #	Thermowell Part #	4.5"	4.31" +/- 0.13"	A/xx-INW-2.5"-yy-zz	A/M2.5"	6"	5.81" +/- 0.13"	A/xx-INW-4"-yy-zz	A/M4"	8"	7.81" +/- 0.13"	A/xx-INW-6"-yy-zz	A/M6"
Probe Length	Insertion Length	ACI Part #	Thermowell Part #														
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<b>Standard Views</b>	<b>Product Weights</b>																

# TEMPERATURE | LOW TEMP TRANSMITTERS | IMMERSIONS

CUSTOM ORDERING LOW TEMPERATURE IMMERSION SENSORS		Model # Example: <b>A/ 1K 3W LT I 4" GD NIST</b>	MODEL#
		A. B. C. D. E. F. G. H.	
<b>A. Sensor Series</b> <i>No Selection Required</i>	A/ <input type="text"/>		A/
<b>B. Model Series</b> <i>Select One (1)</i>	<b>100</b> = 100 Ohm Platinum RTD only   <b>1K</b> = 1K Ohm Platinum RTD only		
<b>C. Number of Wires</b> <i>No Selection Required</i>	<b>3W</b> = Three Wires (Specify for 100 and 1K RTD Sensors only) <input type="text"/>		3W
<b>D. High Temperature</b> <i>No Selection Required</i>	<b>LT</b> = Low Temperature Series <input type="text"/>		LT
<b>E. Configuration</b> <i>Select One (1)</i>	<b>IM</b> = Immersion with Machined Thermowell   <b>INW</b> = Immersion without Thermowell		
<b>F. Thermowell Insertion Length</b> <i>Select One (1)</i>	<b>2.5"</b> = 2.5" Probe   <b>4"</b> = 4" Probe   <b>6"</b> = 6" Probe		
<b>G. Enclosure</b> <i>Select One (1)</i>	<b>GD</b> = Galvanized Enclosure   <b>BB</b> = Cast Aluminum Weather Proof Enclosure		
<b>H. NIST</b> <i>Select One (1)</i>	---- = No NIST Certificate   <b>NIST</b> = NIST Certificate (3 Points)		

CUSTOM ORDERING LOW TEMPERATURE TRANSMITTERS		Model # Example: <b>A/ TT100 LT I 6" 2 GD</b>	MODEL#
		A. B. C. D. E. F. G. H.	
<b>A. Sensor Series</b> <i>No Selection Required</i>	A/ <input type="text"/>		A/
<b>B. Model Series</b> <i>Select One (1)</i>	<b>TT100</b> = Unmatched Temperature Transmitter & 100 Ohm RTD <b>TT1K</b> = Unmatched Temperature Transmitter & 1K RTD <b>TTM100</b> = Matched 100 Ohm Temperature Transmitter/Sensor <b>TTM1K</b> = Matched 1K Ohm Temperature Transmitter/Sensor (Must specify 3 or 5 Point NIST Certificates for all TTM100 and TTM1K Transmitters)		
<b>C. High Temperature</b> <i>No Selection Required</i>	<b>LT</b> = Low Temperature Series <input type="text"/>		LT
<b>D. Configuration</b> <i>Select One (1)</i>	<b>IM</b> = Immersion with Machined Thermowell   <b>INW</b> = Immersion without Thermowell		
<b>E. Thermowell Insertion Length</b> <i>Select One (1)</i>	<b>2.5"</b> = 2.5" Probe   <b>4"</b> = 4" Probe   <b>6"</b> = 6" Probe		
<b>F. Analog Output</b> <i>Select One (1)</i>	<b>1</b> = 1 to 5 VDC   <b>2</b> = 2 to 10 VDC   <b>4</b> = 4 to 20 mA		
<b>G. Enclosure</b> <i>Select One (1)</i>	<b>GD</b> = Galvanized Enclosure   <b>BB</b> = Cast Aluminum Weather Proof Enclosure		
<b>H. Calibration Span</b>	<b>Specify Span in °F or °C (Best Accuracy in 100°F Increments)</b>		

ACCESSORIES ORDERING			Model # Example: <b>A/316SS_1-8IN_NPT_COMPRESS_FIT -OR- 143457</b>
Model #	Item #	Description	
A/316SS_1-8IN_NPT_COMPRESS_FIT	143457	1/8" MNPT x 1/4" Tube Fitting (Bore Through), Compression Fitting	
A/316SS_1-2IN_NPT_COMPRESS_FIT	143458	1/2" MNPT x 1/4" Tube Fitting (Bore Through), Compression Fitting	