



**AH71, AH72, and AH73  
FM Approved Humidity Transmitter Assemblies  
Installation and Operating Instructions**



## **Description**

Models AH71, AH72, and AH73 are 2-wire temperature compensated humidity transmitters; FM and CFM approved for use in hazardous locations. These models are available with an optional temperature transmitter output. The AH73 incorporates a digital display for remote indication. The transmitters utilize a thin film capacitive humidity sensor which provides outstanding sensitivity and chemical robustness. The transmitter converts the humidity sensor's signal into a 4 to 20 mA DC current, which changes proportionally from 4 mA at 0% RH to 20 mA at 100% RH. The optional temperature loop produces a second 4 to 20 mA DC output where the current changes from 4 mA at the lowest temperature of the range, to 20 mA at the top of the temperature range. The leads that supply power also carry the current signal. The sensor probe is available in lengths of 6" and 12".

## Specifications

<b>Output(s):</b>	Humidity: 4 to 20 mA DC = 0% to 100% RH. Temperature: 4 to 20 mA DC over specified range (optional)
<b>Humidity Range:</b>	0 – 100% RH
<b>Sensing Element:</b>	Humidity: Thin film capacitive element. Temperature: 1000 ohm platinum RTD.
<b>Temperature Effect:</b>	±0.03% RH/°C ±1% from 10°C to 80°C
<b>Operating Temperature:</b>	Transmitter: -40 to 176°F (-40 to 80°C), non-condensing. -4 to 176°F (-20 to 80°C), model AH73. Sensor: -40 to 302°F (-40 to 150°C).
<b>Storage Temperature:</b>	-40 to 185°F (-40 to 85°C), non-condensing.
<b>Supply voltage:</b>	9.5 to 28 VDC for intrinsically safe (IS) and industrial models. 16.5 to 28VDC for explosionproof (XP) models.
<b>Voltage effect:</b>	±0.001% of span/volt from 9.5 to 28 VDC.
<b>Loop resistance:</b>	The maximum allowable resistance of the signal-carrying loop, including extension wires and load resistors, is given by this formula: IS: $R_{loopmax} = (V_{supply}-9.5)/0.02$ AMPS. For example, if supply voltage is 24 VDC, the loop resistance must be less than 725Ω. XP: $R_{loopmax} = (V_{supply}-16.5)/0.02$ AMPS. For example, if supply voltage is 24 VDC, the loop resistance must be less than 375Ω.
<b>Accuracy:</b>	Includes temperature, linearity, hysteresis, repeatability, and voltage effects.
<b>Humidity:</b>	±2.5% from 10% to 80% RH @25°C, ±3.5% from 80% to 90% RH @25°C
<b>Temperature:</b>	±0.5°F (0.27°C) @ 25°C or +/- 0.75% of span, whichever is greater.
<b>Adjustments:</b>	Zero and Span field adjustments, non-interacting.
<b>Time Constant:</b>	50 seconds in slow moving air.
<b>Connections:</b>	Screw terminals (22-14 AWG wire).
<b>Weight:</b>	2.84 lbs (1.29 kg) for AH71, 4.46 lbs (2.02 kg) for AH72 and AH73
<b>Min. output current:</b>	3.8 mA.
<b>Max. output current:</b>	22 mA.
<b>Filter:</b>	60 micron stainless-steel sintered filter (replacement P/N : AC103512)
<b>Factory Mutual Approvals:</b>	Explosionproof: See page 4. Intrinsically safe: See page 5. Entity Parameters: $V_{max}=28V$ , $I_{max}=100mA$ , $C_i=0.037\mu F$ , $L_i=0mH$

## Installation Do's and Don'ts

### Do:

- Check the label and verify the model number of the unit.
- Confirm the required power and signal wires are available at installation site.
- Avoid electrical interference with other signals by using twisted pair wiring. Do not run signal leads near or parallel to line voltage or other power leads.
- Avoid cable or conduit arrangements which might allow moisture to collect inside the housing of the unit.
- When tightening or removing the probe, disconnect the probe cable and wiring harness if turning the probe more than one turn.

### Don't:

- Do not touch or manipulate the sensors.
- Do not expose the sensor to direct light during installation. This causes a false reading. Should this occur, shade the sensor. It will self-adjust and yield an accurate reading in less than two minutes.
- Do not expose the sensor or transmitter to static electricity. This device incorporates CMOS components which are vulnerable to damage via static charges. Before handling any of the electronics, it is recommended to use a grounded work station and wrist straps. Always hold the boards by the edges and avoid touching component contacts.

## Mounting Location

The transmitter can be mounted in virtually any position and location which has a suitable environment (see specifications) and which provides access for connections and adjustments. If the transmitter has an optional display, position the transmitter for easy viewing.

Transmitters are equipped with integral sensors that provide direct ½ - 14 NPT process mounting. For the AH72 and AH73, an optional pipe mounting accessory is available (model AC102765), although pipe mounting is not recommended if the pipe is subject to severe vibration. For the AH71, an optional wall mounting accessory (AC103168) is available, as well as an optional duct mounting accessory (AC103253).

## Power Supply

DC power supply requirements are determined by the transmitters minimum voltage requirement and voltage drop across the load resistor and installation lead wires.

Example: For an Intrinsically Safe installation, the transmitter requires 9.5 Volts minimum. A 250 ohm load resistor drops 5.0 Volts @ 20 mA. Allowing a margin of 0.5 Volts for the supply permits 25 ohms of lead wire resistance for remote installation. Totaling these, we get a minimum power supply requirement of 15.0 VDC.

Note: When installing as intrinsically safe, an additional voltage drop across the barrier will further increase the minimum required supply voltage. A typical barrier with a resistance of 300 ohms will drop an additional 6.0 Volts @ 20mA. This will increase the minimum power supply requirement in the above example to 21.0 VDC.

## Wiring

1. Unscrew and remove the Transmitter's top cover.
2. If the Transmitter has a display (AH73...), then the display board will have to be removed to allow access to the terminal blocks for connecting the field wiring. Refer to page 7 for display installation and setup.
3. Wire the Transmitter as shown using the appropriate wiring diagram. Wiring must be routed through one of the ½" NPT conduit openings. For an explosionproof installation, refer to page 4. For an Intrinsically Safe installation, refer to pages 5-6.
4. If the Transmitter has a display (AH73...), please refer to page 7 for display installation.
5. Re-install the Transmitters cover.

## Explosionproof Installation

For an Explosionproof installation, the model number of the Transmitter must incorporate the HT480 transmitter (AH7abdefHT480ijklm).

Suitable for the following hazardous area locations:

Class I, Division 1, 2, Groups B, C, D  
Class II, Division 1, 2, Groups E, F, G  
Class III, Division 1, 2

Ambient Temperature:

-40 to 80°C

-20 to 80°C (AH73.... model only)



## WARNINGS

To maintain explosionproof rating when transmitters are to be used in a hazardous area:

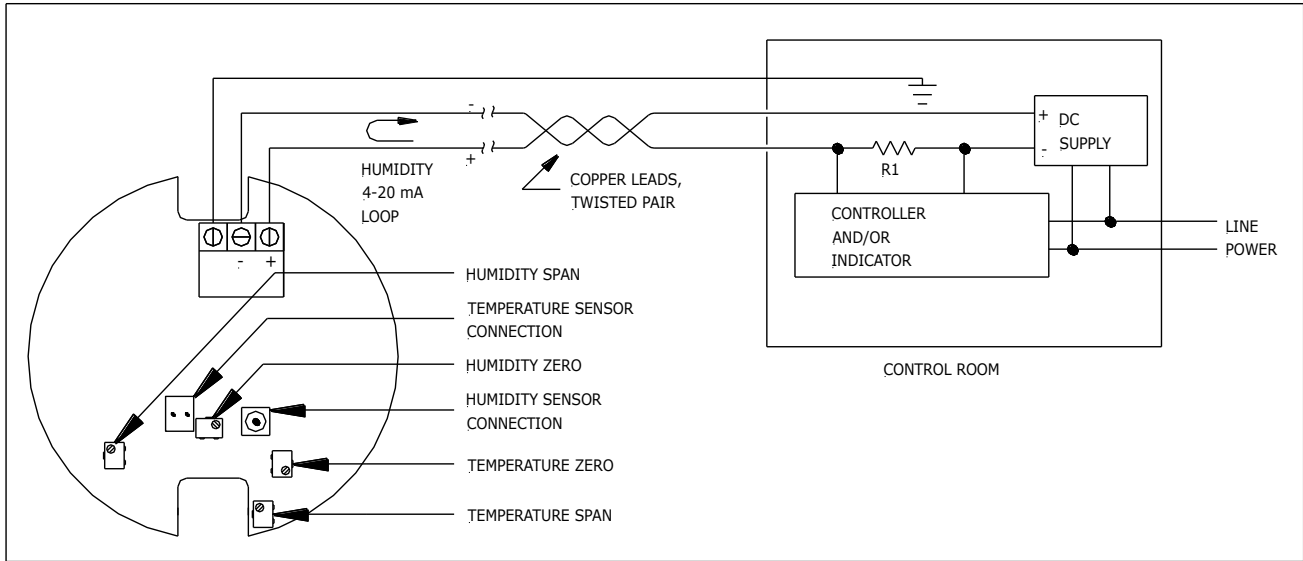
1. Installation should be in accordance with the National Electric Code.
2. Unused conduit entrances must remain plugged. Plugs must be installed with at least 5 threads engaged.
3. Conduit seal must be used within 18 inches of conduit entry.
4. Don't substitute any components. This may impair the Intrinsic Safety of the sensor.
5. Disconnect power before servicing.

**Notes:**

- 1. Control equipment must not use or generate more than 250 Vrms or VDC.

**AH71, AH72, and AH73 (Humidity Only) Wiring Diagrams**

**Figure 1**



**Intrinsically Safe Installation**

For an Intrinsically Safe installation, the model number of the Transmitter must incorporate the HT490 transmitter (AH7abdefHT490ijklm).

Suitable for the following hazardous area locations:

- Class I, Division 1, 2, Groups A, B, C, D
- Class II, Division 1, 2, Groups E, F, G
- Class III, Division 1, 2



Class I, Zone 0, AEx/Ex ia IIC T4

Ambient Temperature:

- 40 to 80°C
- 20 to 80°C (AH73.... model only)

**Entity Parameters**

$V_{max} = 28\text{ V}$        $I_{max} = 100\text{ mA}$   
 $C_i = 0.037\text{ uF}$        $L_i = 0\text{ mH}$

**WARNINGS**

To maintain intrinsically safe rating when transmitters are to be used in a hazardous area:

1. Do not make any component substitutions. This may impair the intrinsic safety of the device.
2. Read, understand and adhere to the live maintenance procedures.

**Notes:**

1. The Associated Apparatus must be FM Approved.
2. The FM Approved Associated Apparatus must be a linear output device.
3. Control equipment must not use or generate more than 250 Vrms or VDC.
4. Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.
5. The Entity Concept allows interconnection of intrinsically safe apparatus with associated apparatus when the following is true:
  - $V_{max} \text{ or } U_i > V_{ox}, V_t, \text{ or } U_o$
  - $I_{max} \text{ or } I_i > I_{sc}, I_t, \text{ or } I_o$
  - $P_{max} \text{ or } P_i > P_o$
  - $C_a > C_i + C_{cable}$
  - $L_a > L_i + L_{cable}$
6. Resistance between intrinsically safe ground and earth ground must be less than 1.0 ohms.
7. For installations in accordance with US requirements, installation should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electric Code ANSI/NFPA 70.  
For installations in accordance with Canadian requirements, installation shall be in accordance with the Canadian Electrical Code, C22.1.
8. Channels 1 and 2 are to be considered separate intrinsically safe circuits. Each channel must have its own shielded, earth grounded cable and two separate barriers must be used.
9. Barrier not required for Division 2.
10. When using a transmitter with both humidity and temperature, both loops must be powered to receive a signal from the transmitter.

# Intrinsically Safe Installation

## AH71, AH72, and AH73 (Humidity Only) Wiring Diagrams

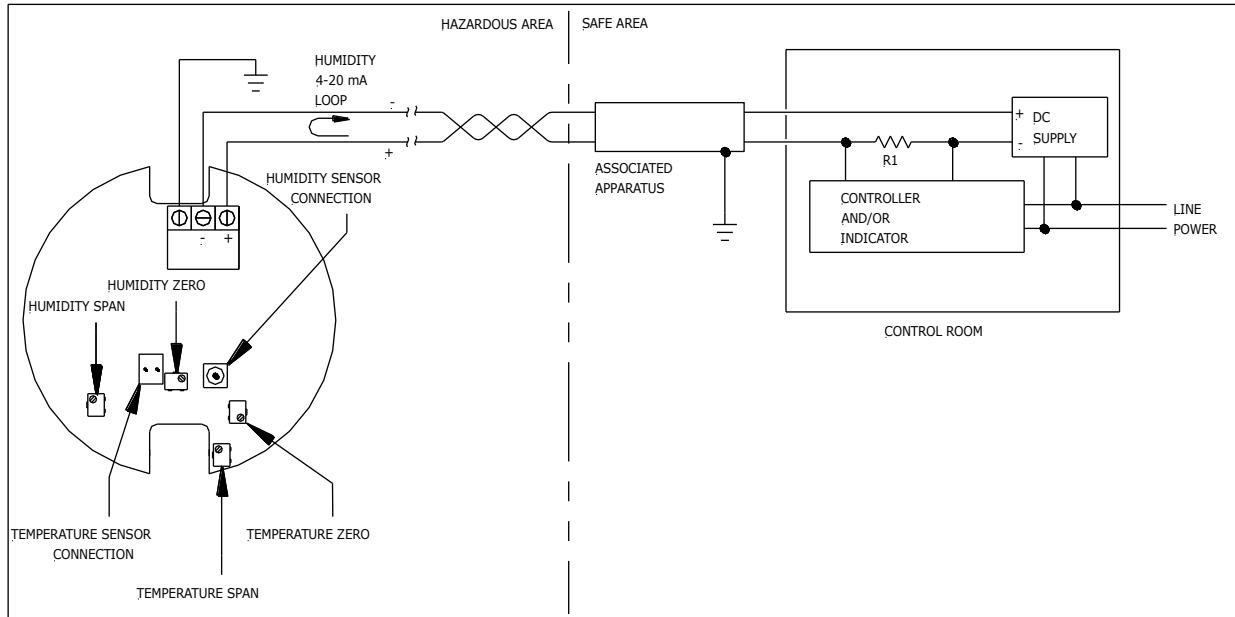


Figure 3

## AH71, AH72, and AH73 (Humidity and Temperature) Wiring Diagrams

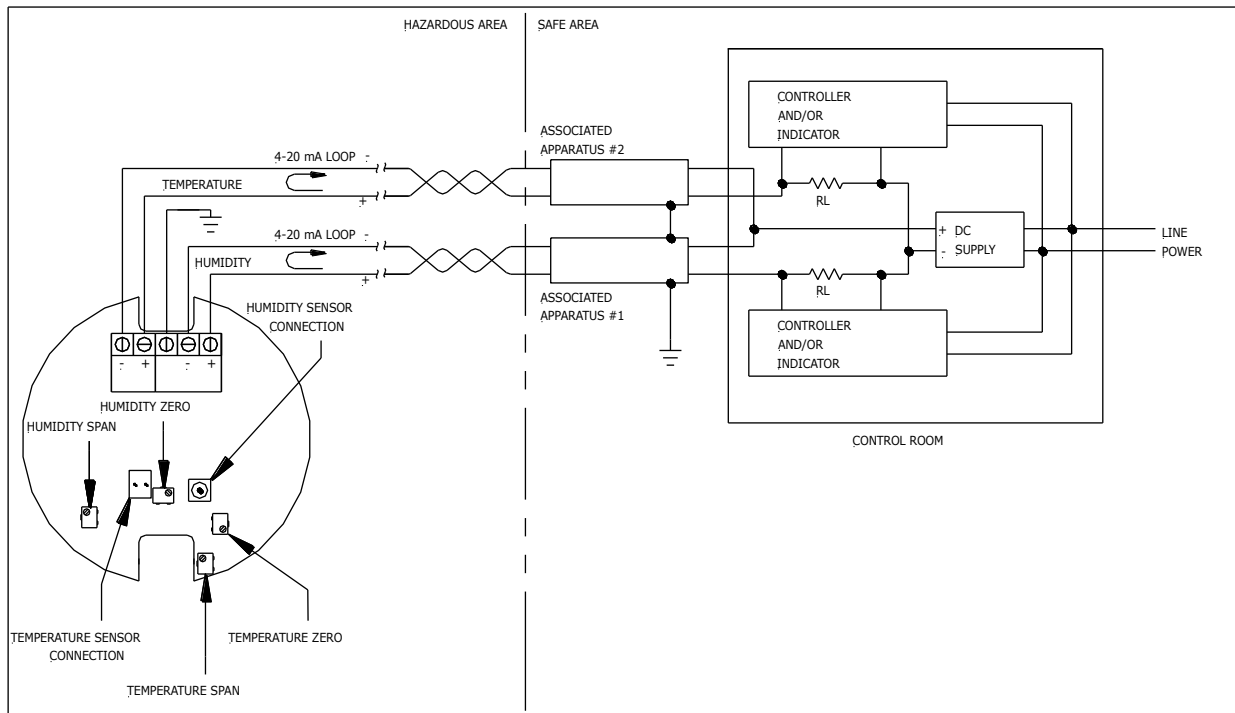


Figure 4



## AH73 – Display Setup

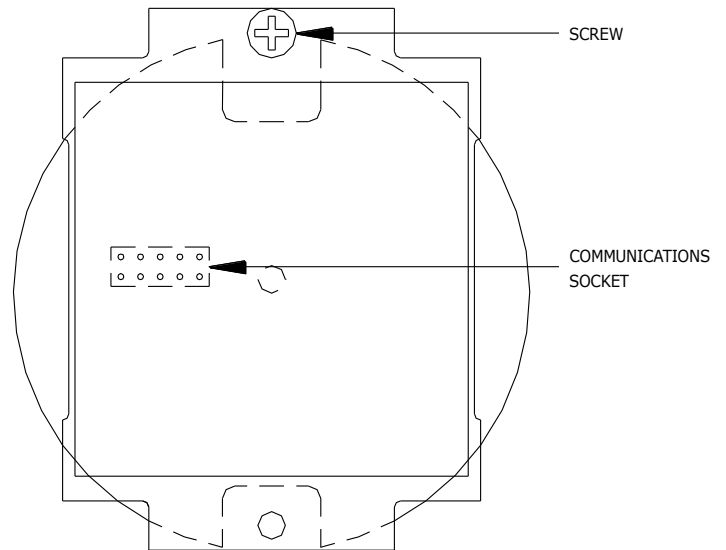
Note: Use ESD precautions when handling the electronics.

### Removing the Display

To access the display board, remove the two screws securing the faceplate. To remove the display board, remove the screw at the top of the display board shown in figure 5. Pull the display board straight outward to detach it from the main transmitter board.

### Installing the Display

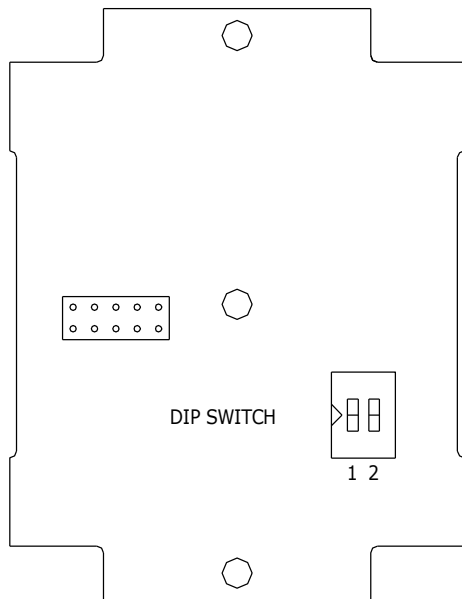
Align the communication socket and the nylon standoff on the round transmitter board with the bottom of the display module. Once aligned, press the display module towards the transmitter board until the module locks into place. Install the screw at the top of the display board shown in figure 5.



**Figure 5**

## Setting up the Display

The display is pre-configured for 0.1% and 0.1°F resolution. If you prefer to change the resolution or the units, set the dip switches on the bottom of the display board (Figure 6) to correspond to the desired settings from Table 1.



**Figure 6**

Switch - Function	ON Position	OFF Position
<b>1 - Display Resolution</b>	0.1 % 0.1 °	1 % 1 °
<b>2 - Display Units</b>	% °F	% °C

**Table 1**

## Humidity Transmitter Calibration

Calibration of the humidity transmitter can be done in a number of ways; comparison to another calibrated RH instrument, using saturated salts, or in a controlled environment using a humidity chamber. The AH7 series transmitters have non-interacting zero and span pots for field calibration. Refer to wiring diagrams for the location of the zero and span pots.

### Comparison method

To compare the calibration of the transmitter to another calibrated RH instrument, both sensors should be within 2" to 3" of each other with a fan blowing on both sensors for at least 10 minutes. This will equalize the temperature of both sensors and emulsify the moisture content of the air. If adjustment is needed, adjust the humidity zero pot only. Refer to wiring diagrams 1-4 for location of the adjustment pots. Do not adjust the span control.

### Saturated Salts

Calibration is accomplished using saturated salt calibration cells as humidity standards. The cells are designed for field use in constant temperature conditions. Various types of cells and their respective relative humidity value are available. The cells must accept a 3/8" diameter probe. If adjustment is needed, adjust the humidity zero pot only. Refer to wiring diagrams 1-4 for location of the adjustment pots. Do not adjust the span control.

### Humidity Chamber

Follow the instructions of the humidity chamber for simulating humidity and temperature under controlled conditions. If adjustment is needed, and you're performing a single point calibration, adjust the humidity zero pot only. For 2 point calibrations, use the humidity zero pot to adjust the low humidity calibration point and the humidity span pot to adjust the high humidity calibration point. If the humidity span pot is adjusted, go back and verify that unit is still within calibration at the low humidity calibration point.

**Warranty**

Items returned within one year from the date of sale, transportation prepaid, which Minco Products, Inc. (the "seller") reasonably determines to be faulty by reason of defective materials or faulty workmanship will be replaced or repaired at the seller's discretion, free of charge.

This remedy is to be the sole and exclusive remedy available to the buyer in the event of a breach by the seller. Items that show evidence of mishandling or misapplication may be returned by the seller at the customer's expense.

Furthermore, the seller is not to be held responsible for consequential damages caused by this product except as required under Minnesota Statutes, Section 336.1-719 (3).

This warranty is in lieu of any other expressed warranty or implied warranty of merchantability or fitness for a particular purpose, and of any other obligations or liability of the seller or its employees or agent.

## How to Order

AH73	Model Number: AH71 – Industrial Grade Humidity Transmitter with Optional Temperature Transmitter CH106 Connection Head, Display Not Available AH72 – Industrial Grade Humidity Transmitter with Optional Temperature Transmitter XIHMFCXL Connection Head, Display Not Available AH73 – Industrial Grade Humidity Transmitter with Optional Temperature Transmitter XIHMFGCXL Connection Head, Display Available															
1	Probe Diameter: 1 = 0.375"															
P3	Pipe Thread Code: <table border="1"> <thead> <tr> <th>Code</th> <th>Process Thread</th> <th>Conduit Thread</th> </tr> </thead> <tbody> <tr> <td>P3</td> <td>½-14 NPT</td> <td>½-14 NPT</td> </tr> <tr> <td>P4</td> <td>½-14 NPT</td> <td>¾-14 NPT</td> </tr> <tr> <td>P5</td> <td>G ½ A</td> <td>½-14 NPT</td> </tr> <tr> <td>P6</td> <td>G ½ A</td> <td>¾-14 NPT</td> </tr> </tbody> </table>	Code	Process Thread	Conduit Thread	P3	½-14 NPT	½-14 NPT	P4	½-14 NPT	¾-14 NPT	P5	G ½ A	½-14 NPT	P6	G ½ A	¾-14 NPT
Code	Process Thread	Conduit Thread														
P3	½-14 NPT	½-14 NPT														
P4	½-14 NPT	¾-14 NPT														
P5	G ½ A	½-14 NPT														
P6	G ½ A	¾-14 NPT														
L120	Probe Length: L60 = 6" L120 = 12"															
T1	Filter Type: T1 = Sintered Stainless Steel T2 = Slotted Stainless Steel															
HT480	Transmitter Model Number: HT480 = Explosionproof with Intrinsically Safe Sensor (Transmitter range code must = "NT") HT490 = Intrinsically Safe															
N	Display: C = Display, Metric Units (AH73_ Series Only) F = Display, English Units (AH73_ Series Only) N = No Display (AH71_ and AH72_ Series Only)															
1	Signal Output: 1 = 4-20mA															
N25	Calibration Accuracy: N25 = ±2.5% from 10% to 80% (25°C) with NIST Certificate S25 = ±2.5% from 10% to 80% (25°C)															
S	Temperature Transmitter Range: NT = No Temperature Transmitter EN = -20°F to 140°F S = 0°F to 100°F A = 20°F to 120°F BI = 30°F to 130°F KK = 30°F to 180°F N = 32°F to 122°F H = 40°F to 90°F															
AH731P3L120T1HT480C1N25NT ← Sample part number																

### Accessories:

Sintered Filter Replacement

Part Number: AC103512

Slotted Filter Replacement

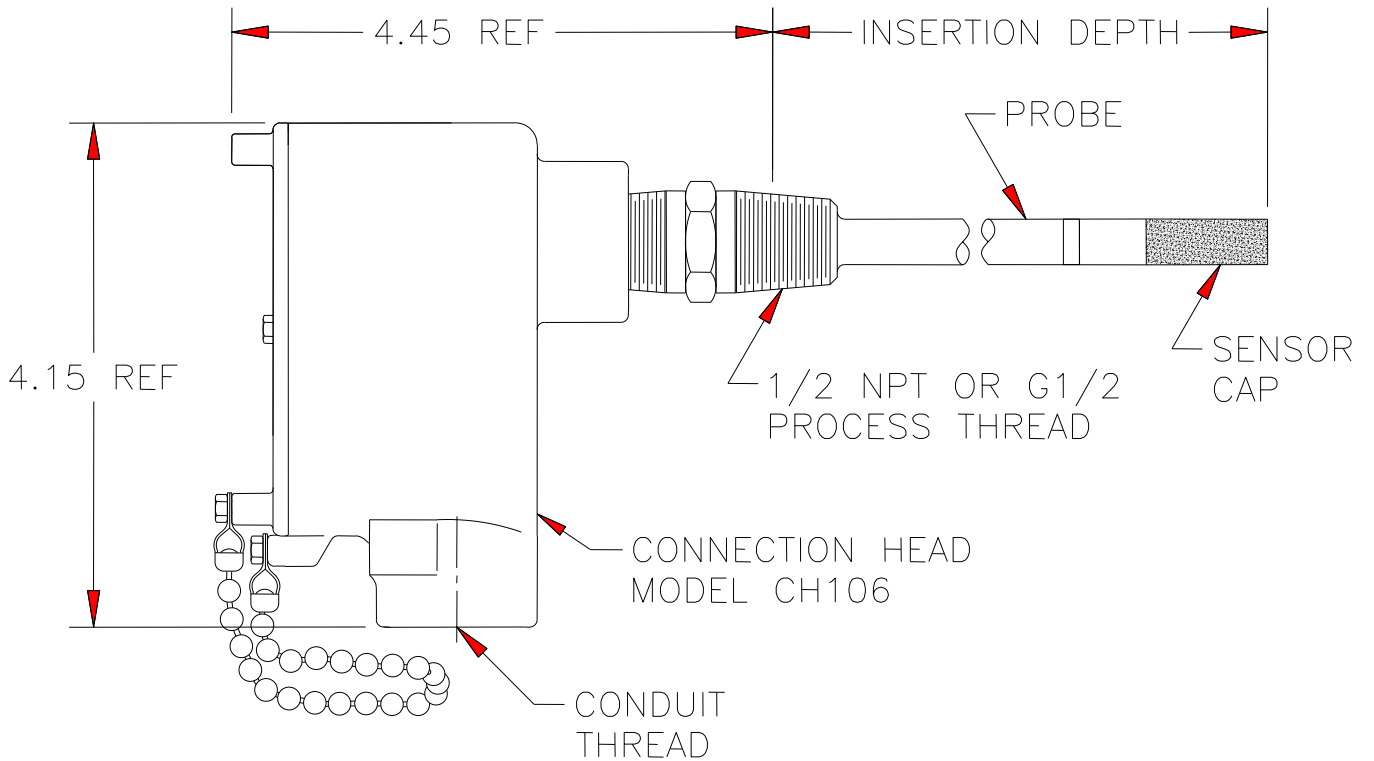
Part Number: AC103513

Pipe Mounting Kit for AH72/AH73

Part Number: AC102765

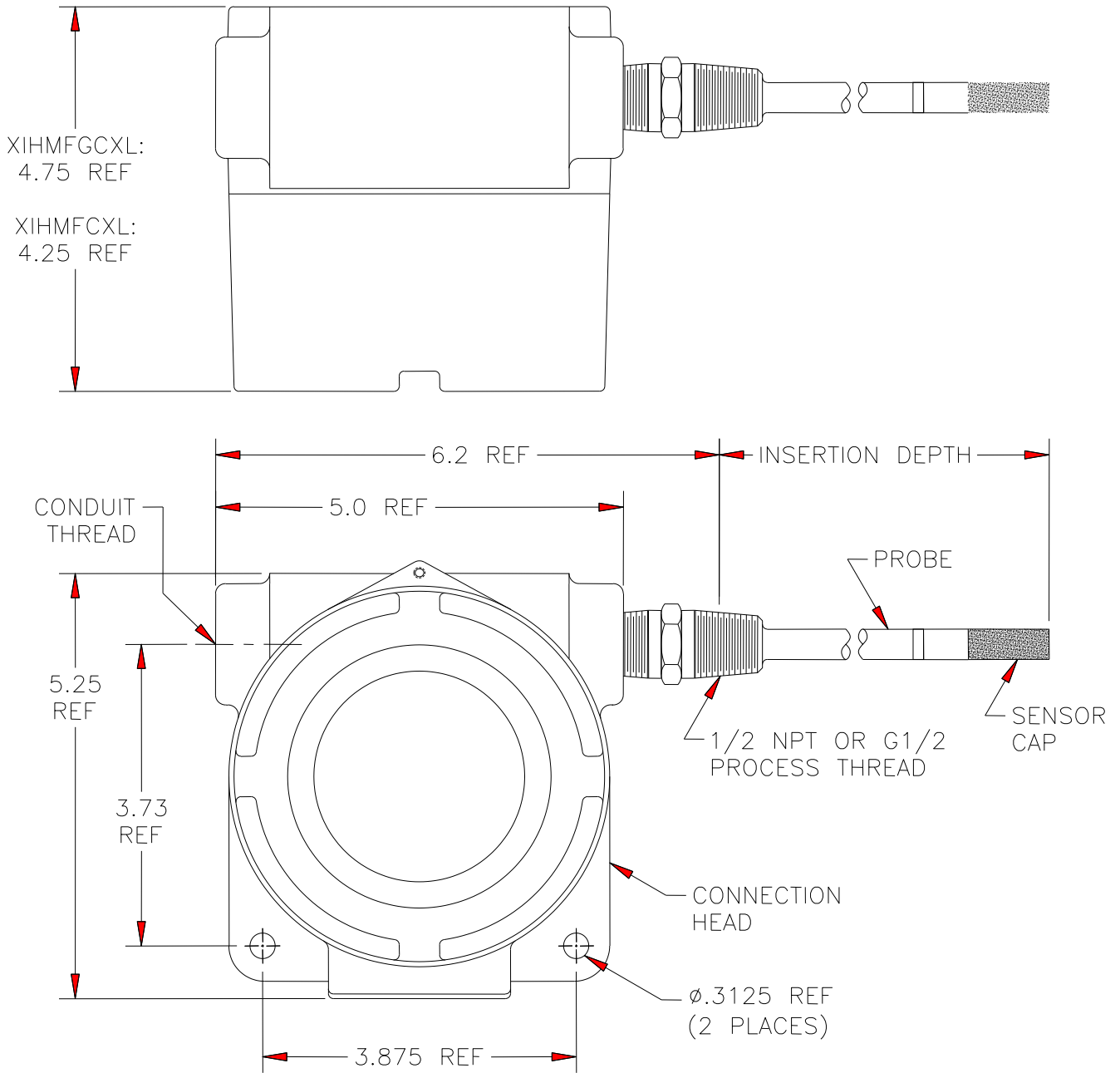
## Dimensions

### AH71 (CH106)



# Dimensions

## AH72 (XIHMFCL) and AH73 (XIHMFCL)



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