HTZ
## Smart HART® Humidity and Temperature Transmitter

July 2008

Description

The HTZ Smart HART® Transmitter simultaneously measures humidity and temperature in industrial, commercial, manufacturing, and HVAC applications. Based on the humidity and temperature values, the HTZ also provides a dew point measurement as a calculated variable.

The 2-wire (loop-powered) HTZ features dual isolated and scaleable 4-20mA outputs proportional to two of the following (user-selectable): relative humidity (RH), ambient temperature or dew point calculation. The analog output signals are ready for direct interface with HART or non-HART based DCS, PLC and other computer-based systems.

Figure 1. *The HTZ consists of two components: The HSM Humidity and Temperature Sensor Module and the HDM Humidity and Temperature Display Module.*

HDM Humidity and Temperature Display Module

Superimposed HART Digital Protocol

4-20mA Output #1

Humidity
Temperature
Dew Point
(User-Selectable)

4-20mA Output #2

HSM Humidity and Temperature Sensor Module
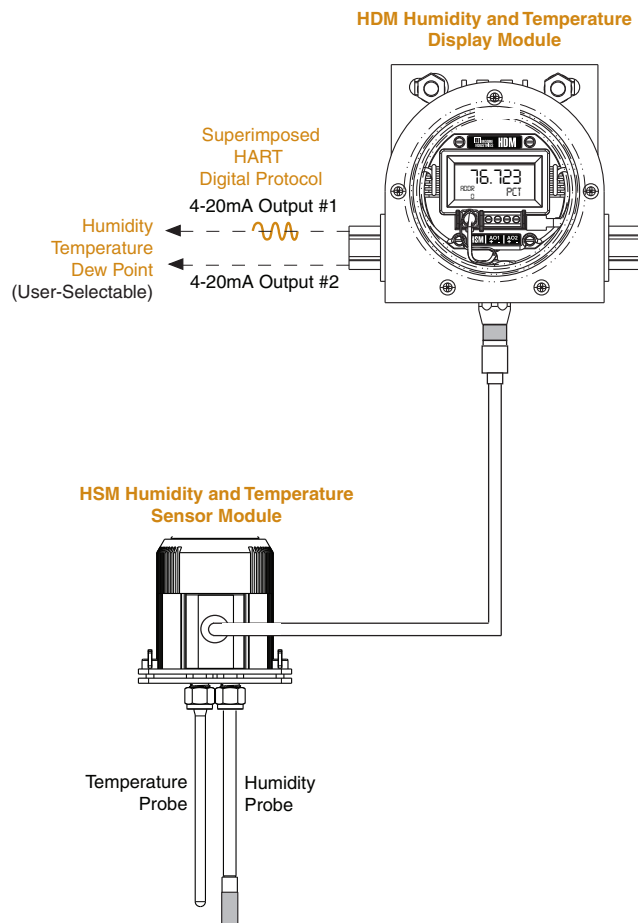
Temperature Probe   Humidity Probe

CE Conformant – EMC Directive 89/336/EEC EN 61326

The HTZ features a modular design *that allows the display to be remotely mounted up to 9m (30ft) from where the actual humidity and temperature measurements are taken.*
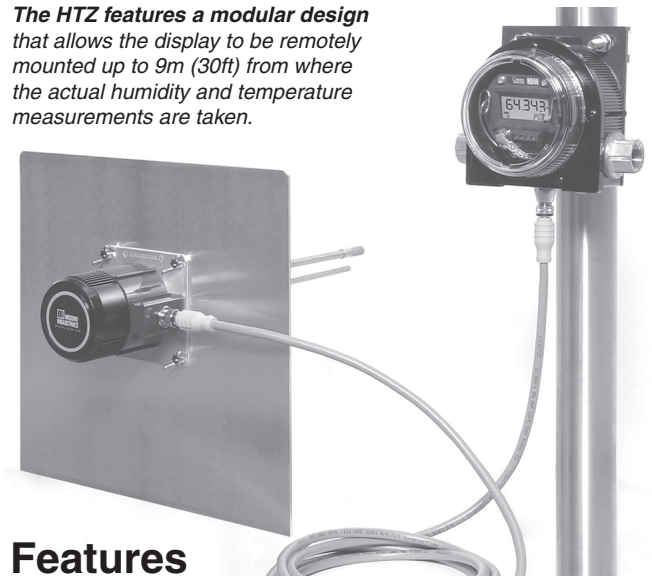
Features

- **The HTZ delivers exceptional measurement accuracy**. The HTZ's high accuracy humidity, temperature and dew point measurements make it ideal for precision applications.

- **Versatile programming options allow set up with a HART Communicator, a HART-based system or a PC** on-site or from any point (with HART communications) on the 4-20mA wires of Analog Output #1.

- **Simple maintenance is provided** by humidity and temperature probes, as well as a RH sensor itself, that can be quickly removed for cleaning or replacement.

- **Set input failure mode,** using the Intelligent Configuration Software, for each 4-20mA output to drive upscale, downscale or hold the last value, should there be a sensor failure, or if the cable between the modules is disconnected.

- **FREE PC Configuration Software and Cable** are provided with each order.

- **The HDM display module shows** real-time status of relative humidity, temperature, dew point, analog output #1, analog output #2 or scrolls between all variables in four second intervals.

- **A wide ambient temperature operating range** of -40°C to +85°C (-40°F to +185°F) allows installation in most all environments, indoors and outdoors.

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Modular and Flexible Design

The HTZ Smart HART® Humidity and Temperature Transmitter consists of two components connected by a cable:

HSM Humidity and Temperature Sensor Module

Designed to mount on a surface (such as in duct ventilation systems) at the measurement site, the HSM has temperature and humidity probes that accurately collect and transmit real-time ambient conditions to the HDM Humidity and Temperature Display Module. Both probes can be removed for service and/or replacement. In addition, the RH sensor itself can be removed for replacement by unscrewing a removable, sintered filter at the end of the probe. The HSM comes in a rugged, NEMA 4X (IP66) enclosure that can be safely mounted outdoors and in wash-down areas.

HDM Humidity and Temperature Display Module

The surface-mount or pipe-mount HDM can be installed at the measurement point, or as far away as 9 meters (30ft) from the HSM. The HDM features a programmable display that can be set to indicate humidity, temperature, dew point, analog (current) output #1, analog (current) output #2, or scroll between the five values at four second intervals. A custom engineering unit (EGU) can also be assigned to the displayed temperature variable.

The HDM provides two loop-powered, isolated 4-20mA signals. Each output can be programmed to represent relative humidity, temperature or dew point.

Selectable Input Failure Mode—Each 4-20mA output can be set to drive upscale (selectable between 20.0-23.6mA), downscale (selectable between 3.6-4.0mA) or hold the last value should there be a sensor failure or if the cable between the HSM and HDM is disconnected.

The HDM comes in a field-mount, NEMA 4X (IP66) enclosure that can be mounted outdoors and in wash-down areas.

Connection Cable

The HSM connects to the HDM via a quick-connect IP66 cable that is available in 3m (10ft), a 6m (20ft) or 9m (30ft) lengths.

Figure 2. *HSM Humidity and Temperature Sensor Module.*
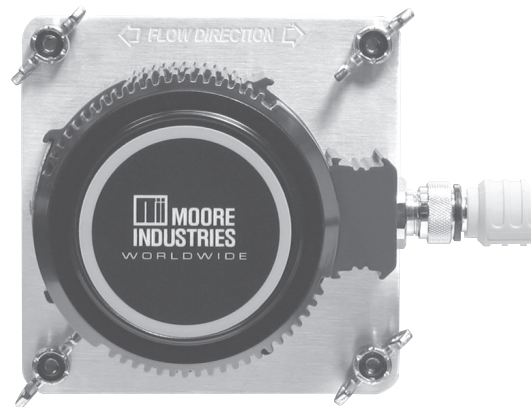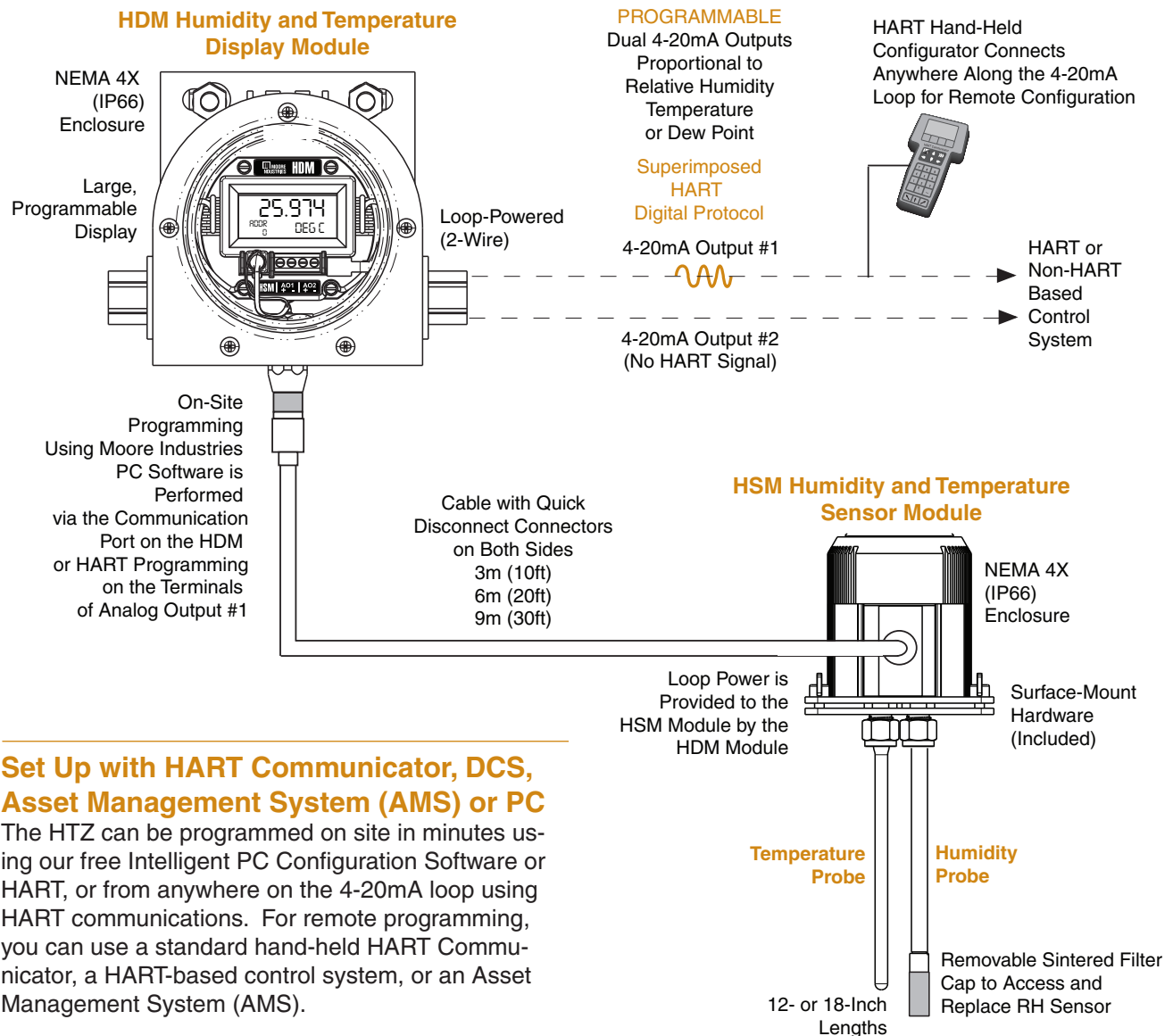

Figure 3. *HDM Humidity and Temperature Display Module.*

Figure 4. *The HTZ Smart HART Humidity and Temperature Transmitter programs to provides dual 4-20mA signals proportional to relative humidity, temperature or dew point (user-selectable).*

Set Up with HART Communicator, DCS, Asset Management System (AMS) or PC

The HTZ can be programmed on site in minutes using our free Intelligent PC Configuration Software or HART, or from anywhere on the 4-20mA loop using HART communications. For remote programming, you can use a standard hand-held HART Communicator, a HART-based control system, or an Asset Management System (AMS).

HTZ Device Description (DD)

Moore Industries' HTZ Device Description (DD) is the device-specific programming information that is loaded into a standard HART Communicator. It allows access to all of the unit's programming functions.

How to Determine if Your HART Communicator Has a HTZ Device Description

Hand-held HART Communicators typically feature a list of companies in a DD library. The Moore Industries HTZ will appear if you have the proper DD installed. If the hand-held does not have the proper DD, contact the Moore Industries Interface Solution Center nearest you. If you are using a Emerson Process Management Model 375 HART Communicator, the DD can be found on the configuration tools CD that comes free with the HTZ, or you may download the latest HTZ DD from our web site at: www.miinet.com

Also Programs with the Generic HART DD

Even if your communicator is not up to date, most of the important programming features can be accessed without the HTZ DD by using the "Generic" HART DD available on HART Communicators.

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One Window. One Minute. One Set Up.
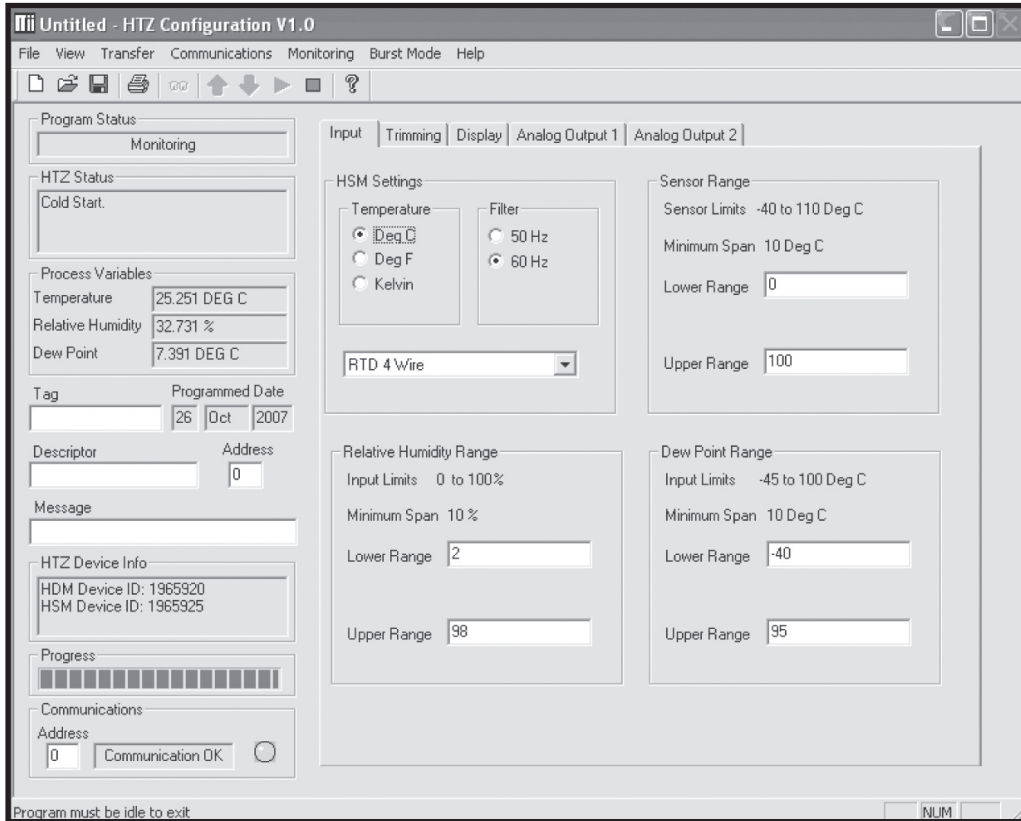
FREE Intelligent PC Configuration Software with Versatile Programming Options

Our FREE Intelligent PC Configuration Software and Interface Cable allow you to set up all transmitter settings from one PC window, in about one minute.

For programming from any access point on the loop, a HART-to-RS232 Smart Interface Cable (modem) can be purchased separately (see Ordering Information for details) to access the HTZ programming options. The HART modem can also be connected directly to the transmitter.

Once a configuration is created, it can be downloaded to multiple transmitters. The HTZ software also lets you save, E-mail, and print copies for documentation purposes. Just a few of the time saving and performance enhancing features include:

Set Up Safeguards—It is nearly impossible to make incompatible configuration selections.

Transmitter/Configuration Auto Recognition— The program software automatically recognizes the transmitter model and its configuration parameters.

Toolbar for Frequently Used Commands— A conveniently located toolbar provides quick access to often used configuration functions.

Real-Time Process Readout—The process measurement and the communication status between the transmitter and PC is continually shown on the software window.

Precise Digital Output Trimming—This essentially eliminates the impact of measurement errors introduced by inaccurate readout devices.

Selectable Under Range, Over Range and Sensor Failure Values—By setting different default values for each condition, you can distinguish between the failure modes when they occur.

Store and Print Files—The configuration record you've created may be downloaded to any number of transmitters, stored for recordkeeping or printed.

Specifications

Performance — **Humidity Input**

Measurement Range: 0-100% RH

Accuracy*: ±1.8% RH between 20-80% RH; ±2-3% below 20% RH and above 80% RH; Trimming: ±0.75% RH plus relative humidity test chamber accuracy between 20-80% RH after trimming via Intelligent PC Configuration Software

Ambient Temperature Effect: 0.005%/°C

Long Term Stability: ±1% RH/year

Response Time: 10 seconds to 90% of final value on a step input change @25°C, 1m/s air

Temperature Input

Measurement Range: -40°C to +110°C (-40°F to +230°F)

Accuracy*: ±0.1°C nominal; ±0.036°C at trim points (with -VTB calibration option)

Ambient Temperature Effect: 0.003°C/°C

Long Term Stability:
1 year: 0.1°C
3 years: 0.17°C
5 years: 0.24°C

Response Time: 200msec maximum for the output to change from 10% to 90% of its scale for an input step change of 0% to 100%

Dewpoint

Range: -45°C to +100°C (-49°F to +212°F) (calculated from temperature and RH inputs)

Accuracy*: Typical @25°C, ±0.5°C between 40-95% RH; ±1-2°C between 10-40% RH

Performance (continued) — **Ambient Temperature Effect:** 0.005°C/°C

Long Term Stability: ± 0.5°C RMS over 1 year

Response Time: 10 seconds to 90% of final value

Dew Point Calculation: EW * RH / 100 (refer to Equation 1 for explanation)

Analog Output

Output Range: 4-20mA

Linear Region: 3.8-21.4mA

Hardware Limits: 3.6-23.6mA

Accuracy: ±2 microamps

Ambient Temperature Effect: 0.009% of span (16mA)/°C

Long-Term Stability:
1 year: 0.012%
3 years: 0.020%
5 years: 0.026%

Rise Time: 100msec maximum for the output to change from 10% to 90% of its scale for a step change of the sourcing variable of 0% to 100%

Damping: User-set between 0-30 seconds

Power Supply Requirements: 12-42Vdc at output terminals

Power Supply Effect: ±0.002 of span per 1V change

Load Effect: Negligible within specified power limits

Load Capability: (500 ohms@24V)

$$\frac{\text{Supply Voltage - 12V}}{0.024A} = \text{Ohms}$$

Ripple: 10mVpp, frequencies up to 120Hz, measured across a 250 ohm load resistor

Performance (continued) — **Start up Time:** <5sec (trimming disabled)

Isolation: 500Vac between each output and between outputs and case

Overall Accuracy: Sum of input and output accuracy, ambient temperature effect and long term stability

Overall Response Time: 500msec from step input until the analog output reaches 90% of its final value (RTD response time excluded)

Ambient Conditions — **Operating and Storage Range:** -40°C to +85°C (-40°F to +185°F)

Relative Humidity: 0-95% relative humidity, non-condensing

RFI/EMI Protection: 20V/m@80-1000MHz, 1kHz AM, when tested to IEC61326, 1998

Adjustments All adjustments made using Moore Industries' Intelligent PC Configuration Software or HART-enabled hand-held or host

Indicators **LCD:** 2x5 14-segment characters, alphanumeric readout accurate to the nearest digit.
Range: -99999 to 99999; Decimal point can be user-set

Weight **HDM:** 918g (32.4 oz)
HSM: 601g (21.2 oz)
Cable, 3m: 250g (8.8 oz)
Cable, 6m: 454g (1.0 lbs)

* High accuracy relative humidity measurements are achieved within a RH range of 20-80% using the trimming feature of Moore Industries' Intelligent PC Configuration Software in a relative humidity test chamber. High accuracy temperature measurements are achieved using the trimming feature of the Intelligent PC Configuration Software with the temperature sensor immersed in a temperature calibration bath (Sensor-to-Transmitter matching factory calibration; See the -VTB option under "Sensor Length/Calibration" in Ordering Information). High accuracy dew point measurements are achieved using the trimming feature of the Intelligent PC Configuration Software at 25°C, between 40-90% RH. Stated accuracies do not include ambient temperature effects.

Equation 1. *Dew Point Calculation*

$$EW = 10^{\wedge} (0.66077 + (7.5 * T / (237.3 + T)))$$ ◄———— This is the saturation vapor pressure over water

$$EW\_RH = EW * RH / 100$$ ◄——————— Multiply EW with RH

$$\text{Dew Point (Dp)} = ((0.66077 - \log10 (EW\_RH)) * 237.3) / (\log10 (EW\_RH) - 8.16077)$$

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Ordering Information

IMPORTANT: Specify **ONE** HSM Humidity and Temperature Sensor Module and **ONE** HDM Humidity and Temperature Display Module for each HTZ system. HSM and HDM modules cannot be used independently of one another, but can be ordered separately as replacement modules.

Unit	Input	Output	Power	Sensor Length/Calibration	Housing
HSM Humidity and Temperature Sensing Module **(One HSM is required per installation)**	**PT-RH** One Temperature (RTD) input and one Relative Humidity input	**HDM** Signal outputs to the HDM Smart HART Display Module	**HDM** Loop-power supplied by the HDM Module	**-CL12** (either -CL12 or -CL18 is required) 12-inch temperature (RTD) and RH probes **-CL18** (either -CL12 or -CL18 is required) 18-inch temperature (RTD) and RH probes **-VTB** Factory temperature sensor calibration using Sensor-to-Transmitter Trimming with NIST traceable test report; available customer-specified ranges: -40°C to +110°C (-40°F to +230°F); default, 50-100°F	**LH3P** Surface or pipe-mount enclosure (NEMA 4X, IP66) includes 2-inch pipe-mount hardware **LH3Z** Surface or duct-mount enclosure (NEMA 4X, IP66)

To order, specify:
Unit / Input / Output / Power / Sensor Length/Calibration [Housing]
Model Number Example:
HSM / PT-RH / HDM / HDM / -CL12 -VTB [LH3Z]

Unit	Input	Output	Power	Cable Length	Housing
HDM Humidity and Temperature Display Module **(One HDM is required per installation)**	**HSM** Signal input from the HSM Module	**2X4-20MA** Dual isolated, scaleable 4-20mA outputs user-selectable for two of the following: Relative Humidity Temperature Dew Point	**12-42DC**	**-3M** 3m (10ft) connection cable **-6M** 6m (20ft) connection cable **-9M** 9m (30ft) connection cable	**D3LCP** Surface/pipe-mount enclosure (NEMA 4X, IP66) includes 2-inch pipe-mount hardware

To order, specify:
Unit / Input / Output / Power / Connection Cable Length [Housing]
Model Number Example:
HDM / HSM / 2X4-20MA / 12-42DC / -3M [D3LCP]

Everything You Need is Included
Each HTZ order comes with one copy of our Intelligent PC Configuration Software (Windows® compatible) and a configuration cable. Use the following information to order additional parts:

Replacement Parts and Accessories:

P/N 238-201-04*–Temperature (RTD) Probe (12-Inch)
P/N 238-201-24*–Temperature (RTD) Probe (18-Inch)
P/N 238-201-06*–Humidity Probe (12-Inch)
P/N 238-201-26*–Humidity Probe (18-Inch)
P/N 801-880-75–Humidity Sensor (SHT75)
P/N 208-202-20–Replacement HDM Electronics, Display in HP (Hockey-Puck) Housing with Spring Clips
P/N 803-847-26–Replacement 3m (10ft) Connection Cable
P/N 803-862-26–Replacement 6m (20ft) Connection Cable
P/N 803-863-26–Replacement 9m (30ft) Connection Cable

* Return to the Factory for replacement and recalibration.

Programming Accessories:

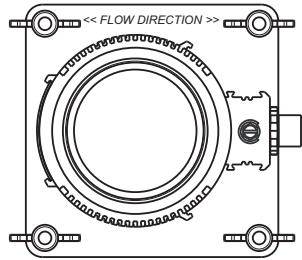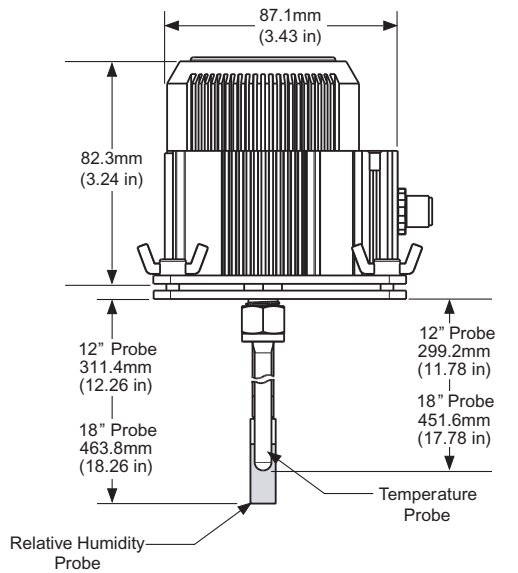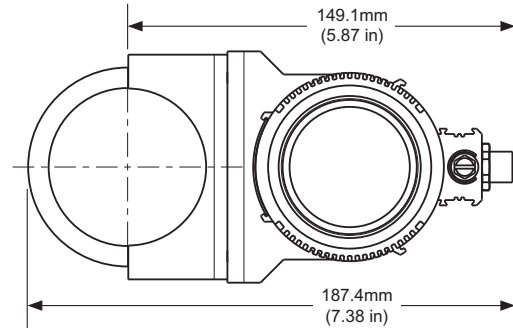| |
|---|
| **P/N 750-75E05-01**–Interface Solution PC Configuration Software on CD (one copy comes free with each order) |
| **P/N 803-040-26**–Non-Isolated PC Configuration Cable (one comes free with each order) |
| **P/N 803-039-26**–Isolated PC Configuration Cable |
| **P/N 235-829-02**–PC-Programming Kit includes one copy of our Intelligent PC Configuration Software and one HART-to-RS232 Cable with HART modem |
| **P/N 803-048-26**–HART-to-RS232 Smart Interface Cable with HART Modem |

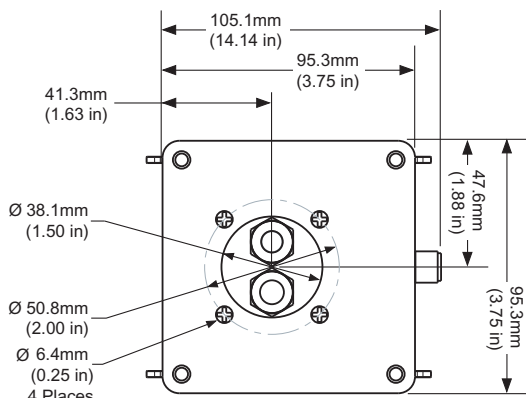**Figure 5.** *HSM Humidity and Temperature Sensor Module Dimensions.*

LH3Z Housing

Back Plate

87.1mm
(3.43 in)

82.3mm
(3.24 in)

12" Probe
311.4mm
(12.26 in)

18" Probe
463.8mm
(18.26 in)

12" Probe
299.2mm
(11.78 in)

18" Probe
451.6mm
(17.78 in)

Relative Humidity Probe

Temperature Probe

<< FLOW DIRECTION >>

105.1mm
(14.14 in)

95.3mm
(3.75 in)

41.3mm
(1.63 in)

Ø 38.1mm
(1.50 in)

Ø 50.8mm
(2.00 in)

Ø 6.4mm
(0.25 in)
4 Places

47.6mm
(1.88 in)

95.3mm
(3.75 in)

Z Plate

LH3P Housing

149.1mm
(5.87 in)

187.4mm
(7.38 in)

87.1mm
(3.43 in)

82.3mm
(3.24 in)

110.2mm
(4.34 in)

120.4mm
(4.74 in)

68.6mm
(2.70 in)

88.9mm
(3.50 in)

HTZ
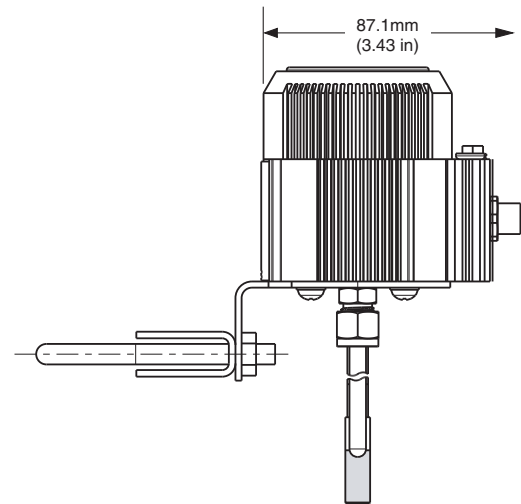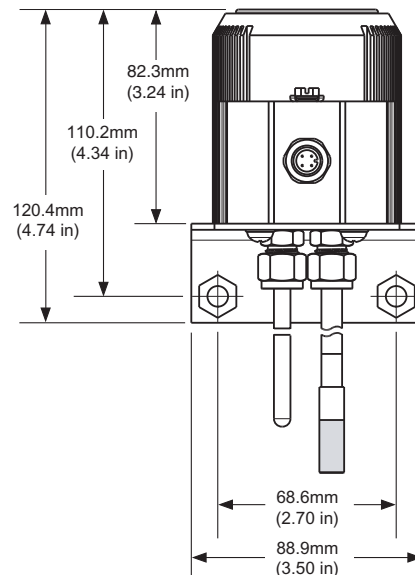
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Figure 6. *HDM Humidity and Temperature Display Module Dimensions.*