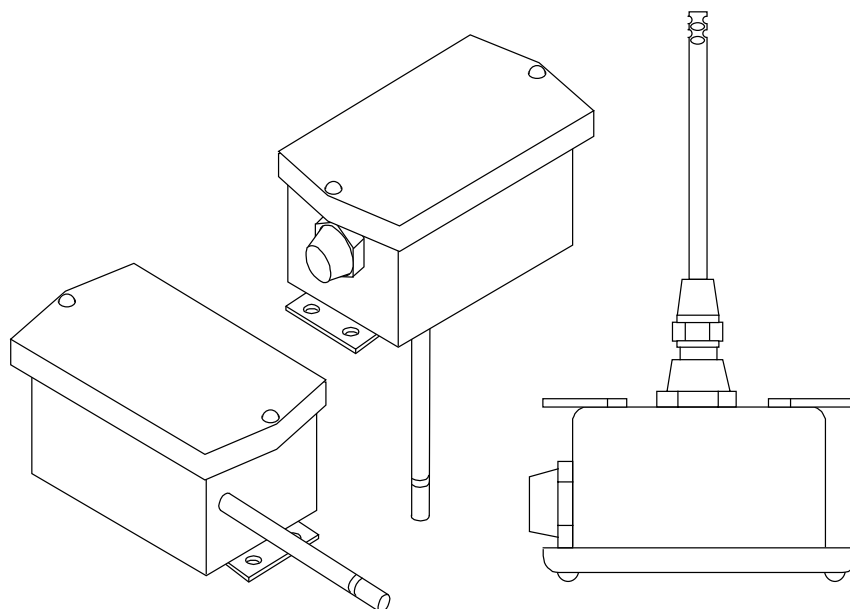


4114 Dew Point and Temperature Transmitter Specification

Overview

The Honeywell 4114 Dew Point and Temperature Transmitter offers high-performance water vapor measurement capabilities over a wide range of both moisture and temperature. It measures in-situ with an advanced solid state dual-element sensor assembly that is able to survive very harsh conditions. The 4114 is economically priced, has no routine maintenance requirements, and its moisture output signal can be scaled to a variety of psychrometric units. Both oem and end users will find it ideal for installation in a wide variety of systems and equipment, including environmental control systems, instrument air lines, high temperature drying equipment, dry gas systems, emission-monitoring equipment, environmental test chambers, dehumidification systems, and many others.



Description

The Honeywell 4114 Dew Point Transmitter is a direct intrusion point and dry bulb temperature transmitter.

Features

- In-situ use
- Unequaled contamination resistant sensor
- High resolution analog to digital conversion
- High performance probe design
- Rugged, no maintenance sensor
- Optional cooler for in-situ use in high temperature environments
- NIST traceable

Benefits

- Lowers energy costs
- Eliminates need for sampling systems
- Reduces calibration maintenance

Applications

- Industrial drying applications where FM approval for explosion-proof areas or intrinsic safety is not a requirement.

The 4112 provides

High Value with High Performance

The 4114 transmitter combines the key features of well-proven sensor technology, advanced probe design, and digital signal processing in a rugged low-cost package. Honeywell has once again set the standard of value for high-performance moisture measurement, and its maintenance requirements (traditionally the biggest cost factor in dew point measurement) are very low. This means that the 4114 is not only inexpensive to install, but also inexpensive to own and operate.

Advanced Thin Film Sensor Technology

The 4114 sensor assembly employs well proven, high performance thin film moisture and temperature sensing elements, both manufactured by Honeywell in the USA. The capacitance moisture sensor is constructed of layers of thermoset polymer. The temperature sensor is the world's smallest thin film RTD. Both have been qualified for use in various military and aerospace projects. They help to assure the long term accuracy and reliability of the 4114.

High-Performance Probe Design

The 4114 utilizes an advanced probe design that virtually eliminates temperature effects and parasitic capacitance. New materials and sensor assembly techniques greatly enhance performance in any environment, especially in high-temperature and/or high dew point-depression conditions. Every probe used on model 4114 B is tested for compliance with its 350 psig pressure specification. The probe passes a bubble leak test, but it is not considered hermetically sealed.

Unequaled Contamination Resistance

The 4114 sensor assembly is highly resistant to both chemical and airborne contaminants. The sensing layer is an inert thermoset polymer whose dielectric constant changes in response to changing vapor pressure. A porous platinum layer over the sensing polymer serves to reflect and contain the sensing capacitance field so that surface contaminants do not affect the sensor's accuracy. A final polymer topcoat provides physical protection. Response time may be slowed by a layer of surface contaminants, but as long as water vapor pressure can equilibrate across the contaminant layer, the accuracy is unaffected. This rugged sensor is unique in that it can be washed. If physical damage occurs, a new sensor can

be plugged in and the system recalibrated. Temporary condensing conditions are not a problem.

High-Temperature Operation to 185°C

The 4114 sensor is designed to operate continuously at temperatures of 185°C (365°F), and will survive brief excursions to 204°C (400°F). Many applications that previously required sampling systems can now be measured in-situ with the 4114. For unusual high-temperature applications, a cooler option is available.

Capable of 100+°C Dew Point Depression

Chilled sensor systems literally "depress" the temperature of a sensor until dew or frost forms, thus dew point depression is simply the difference between dry bulb and dew point temperatures. The 4114 sensor, unlike chilled sensors, remains at operating temperature and is not cooled to the actual dew point temperature. The maximum depression capability of the 4114 depends on the dry bulb temperature at the sensor. At high temperatures, it will easily measure dew points that are more than 100°C (212°F) below dry bulb. See the Minimum Dew Point Capability graph for more detail.

Low Dew Point Operation to -40°C

The specially ranged "D3" and "H3" versions of the 4114 provide reliable measurements of frost point as low as -40°C (-40°F) at temperatures approaching 20°C. Even at temperatures as high as 40°C (104°F), this unit will still measure frost points as low as -40°C (-40°F). This represents outstanding dew point depression capability for dry gas and instrument air applications.

Loop Powered, Dual 4-20 mA Outputs

The 4114 is powered by user-supplied dc loop power, 24 Vdc

nominal, 45 Vdc maximum. There are two individual 2-wire 4-20 mA output signals, one for dry bulb temperature and the second for dew point temperature or other moisture unit. For proper operation, both loops must be powered even if only one signal is being used. Only three wires are required, because the positive dc connection is common to both loops.

0.05°C Dry Bulb Temperature Accuracy

The 4114 uses Honeywell's own precision ULTRA-7 thin film platinum RTD for dry bulb temperature measurement. System calibration in highly accurate temperature calibration baths ensures outstanding $\pm 0.05^\circ\text{C}$ ($\pm 0.09^\circ\text{F}$) accuracy over the transmitter's full dry bulb temperature span. The unit's analog temperature transmitter section directly generates a linear highly stable 4-20 mA current signal that is suitable for applications that demand high precision.

Digital signal Processing

The 4114 does not attempt to use imprecise analog humidity signals. Its sensor assembly is precisely characterized for both temperature and moisture response. The microprocessor in the 4114 processes the capacitive signal from the Ultra-D² sensor directly in digital format. Then, from the analog temperature transmitter section it obtains the temperature value via a 12-bit A/D converter. It checks the internal characterization data, and through a 12-bit D/A converter updates the dew point 4-20 mA signal, and it does all of this in less than a third of a second. The digital scheme also allows alternative output units such as humidity ratio (lb/lb), wet bulb temperature, and relative humidity. Honeywell fully calibrates every unit against accurate reference standards, and encloses a calibration certificate, traceable to NIST, with each unit.

Easy to Use*Direct immersion/easy*

installation—The 4114's sensor is designed for direct immersion into the air stream or other bulk gas to be measured. The 4114 A is normally mounted by attaching the housing's mounting feet to the wall of a duct or to any flat surface. The 4114 B uses the same housing but its probe has a 1/2" NPT fitting that is typically used to mount the unit, especially in pressurized lines or contaminants.

Free of routine maintenance—

Unlike other dew point instruments, the Honeywell 4114 does not require frequent periodic servicing, cleaning, or sensor replacement. The architecture of the sensor provides strong immunity to airborne contaminants, and the sensor's material is a thermoset polymer that is inherently very inert. The result is a sensor free of systemic drift characteristics. Such is not the case with other thermoplastic or aluminum oxide type humidity sensors. Some applications characterized by extreme levels of contaminants such as dirt, ash, or oil vapors may

require occasional cleaning of the 4114 sensor and/or the sintered stainless steel sensor filter. In this situation, the cleaning can typically be performed by using a simple pump spray bottle filled with a solution of isopropyl alcohol (common rubbing alcohol). Such cleaning does not affect calibration. For most applications, however, the unit is maintenance-free. Whether a new installation or a replacement installation, the 4114 will provide quick payback and added value through significantly reduced maintenance manhours. Original equipment manufacturers who employ the 4114 can count on fewer service problems, greater customer satisfaction, and the marketing edge that comes from increased system performance.

Easy field calibration—Unlike other dew point instruments, the 4114 does not require periodic recalibration; however, if recalibration is desired in order to meet internal quality standards, for example, or if a damaged sensor is replaced, a simple 2-point calibration can be performed with the optional field calibration kit.

This kit includes a dry gas standard and a wet gas standard. The dry gas standard consists of a chemical molecular sieve (high-performance desiccant) that is placed into an aluminum bottle that is fitted over the probe. After a brief period, a DIP switch in the instrument is moved and the microprocessor sets its own zero. The wet gas standard is a 75.3% relative humidity saturated salt cell (pure sodium chloride and distilled water). Another DIP switch changes the instrument's output to relative humidity for the wet gas calibration. Normally only the wet gas standard is used for routine calibration checks. If an error is made in moisture calibration, the original factory calibration can easily be restored. Both the dry and wet standards must be used when the sensor is replaced. Because the thin film platinum RTD temperature sensor is inherently very stable over the 4114's operating range and because the temperature section is very tightly calibrated, temperature calibration should not normally be adjusted in the field unless the calibration equipment is accurate to 0.01°C (0.02°F).

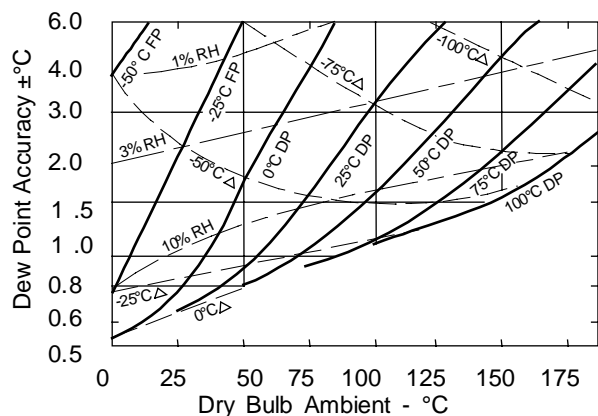
Specifications

Performance	
Sensing Element	Moisture: ULTRA-D II [□] Dry bulb temperature: ULTRA-7 [□] 1000 ohm Pt RTD
Calibrated Accuracy	Moisture: See accuracy charts Dry bulb temperature: +/-0.05°C (0.09°F) over the full span
Outputs	Moisture: 4-20 mA, linear Dry bulb temperature: 4-20 mA, linear (See Ordering Information for available ranges and output units.)
Signal Update	Moisture: 3 times per second Dry bulb temperature: Continuous Analog
Input Voltage Effect	0.002%/V max. (negligible) from 11 to 45 Vdc
Time Constant	16 seconds in slowly moving air at 25°C with fluted shield 50 seconds in slowly moving air at 25°C with sintered stainless steel filter
Installation	
Transmitter Housing	Coated steel, rated NEMA 4X
Sensor Housing	Stainless steel probe, porous stainless steel filters, fluted shield
Sensor Operating Environment	-50°C to 185°C (-58°F to 365°F)
Transmitter Operating Environment	-40°C to 80°C (-40°F to 176°F)
Storage Environment	-55°C to 85°C (-67°F to 185°F)
Power Requirements	11 Vdc + (Rload x 0.02 A) min. to 45 Vdc max. for dual 2-wire operation. (Requires three wires for installation, even if monitoring only one signal.)
Signal Connection	Screw terminals
Sensor Mounting	1/2" NPT probe fitting or mounting flanges on housing Dual sensor assembly plugs in to probe with four gold-plated pins
Pressure	0 psig to 350 psig for 4114-B, (Max. dew point of 100°C for D1 version) 0 psig to 50 psig for 4114-A
Serviceability	
Periodic Maintenance	Verify calibration periodically. Wash sensor as needed.
Adjustments	Vernier, noninteracting, multiturn potentiometers for zero and span control of dry bulb temperature. Momentary pushbutton switches for moisture signal calibration. Adjustments are accessed by removing the top cover.
RTD Sensor Short Indication	Dry bulb temperature signal goes downscale to 4.0 ±0.01 mA (useful for system check)
Sensor Cleaning	Wash with detergent solution and deionized water rinse. Can also use isopropyl alcohol. Camel hair (organic) brush can be used during cleaning when required.

Dew Point Accuracy Graphs

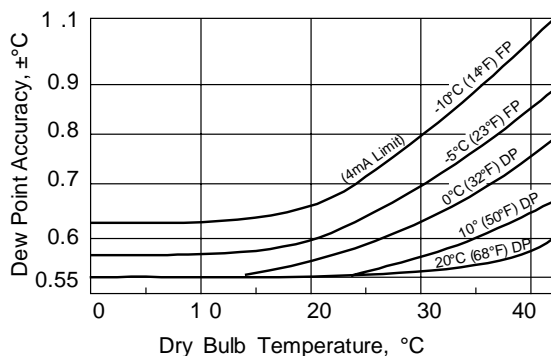
To use the dew point accuracy graphs, first determine the operating temperature and dew point for the application. For example, if a D1 unit is measuring a dry bulb temperature of 150C and a dew point of 50C, then locate the 150C point on the X-axis of the D1 graph. Follow a line straight left to the Y-axis. That point represents accuracy of about $\pm 4.5^{\circ}\text{C}$. And the D3 unit, for example has dew point accuracy of about $\pm 2^{\circ}\text{C}$ when dry bulb is 20C and frost point is 30C.

Dew Point Accuracy, D1 Version



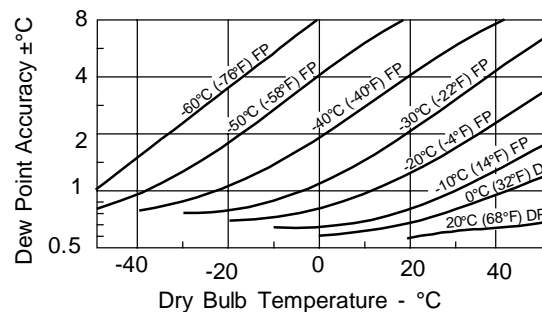
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Dew Point Accuracy for D2 Version

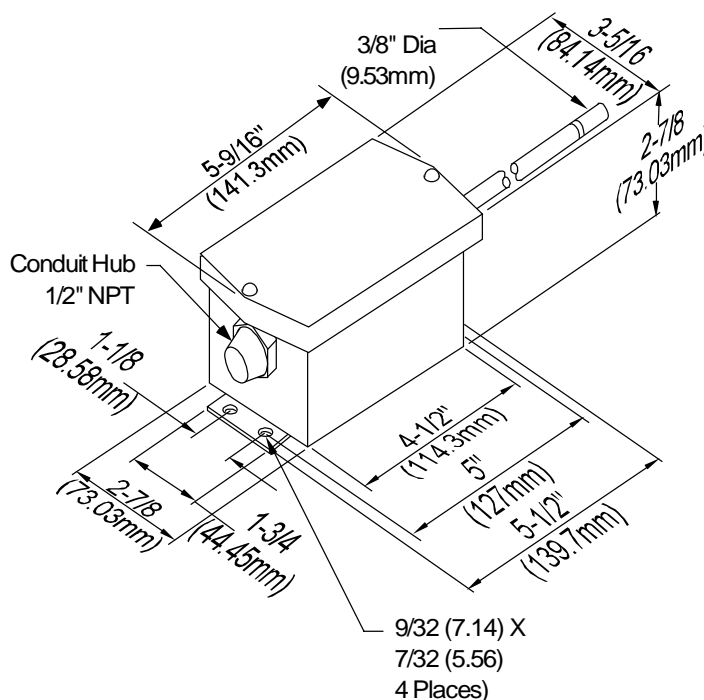


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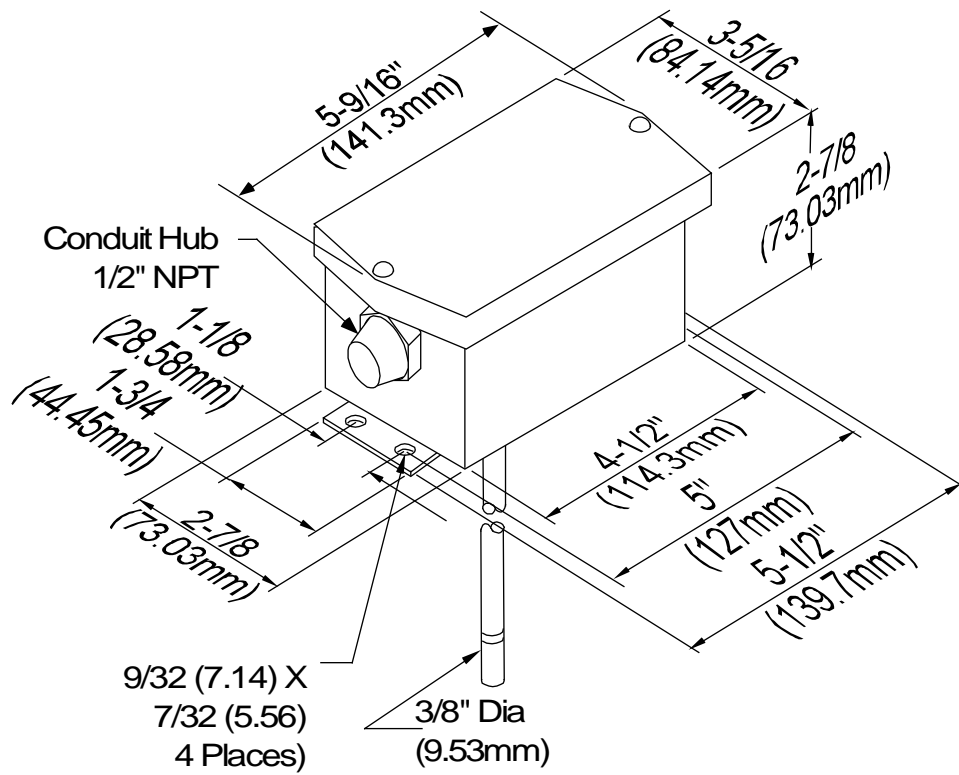
Dew Point Accuracy for D3 Version



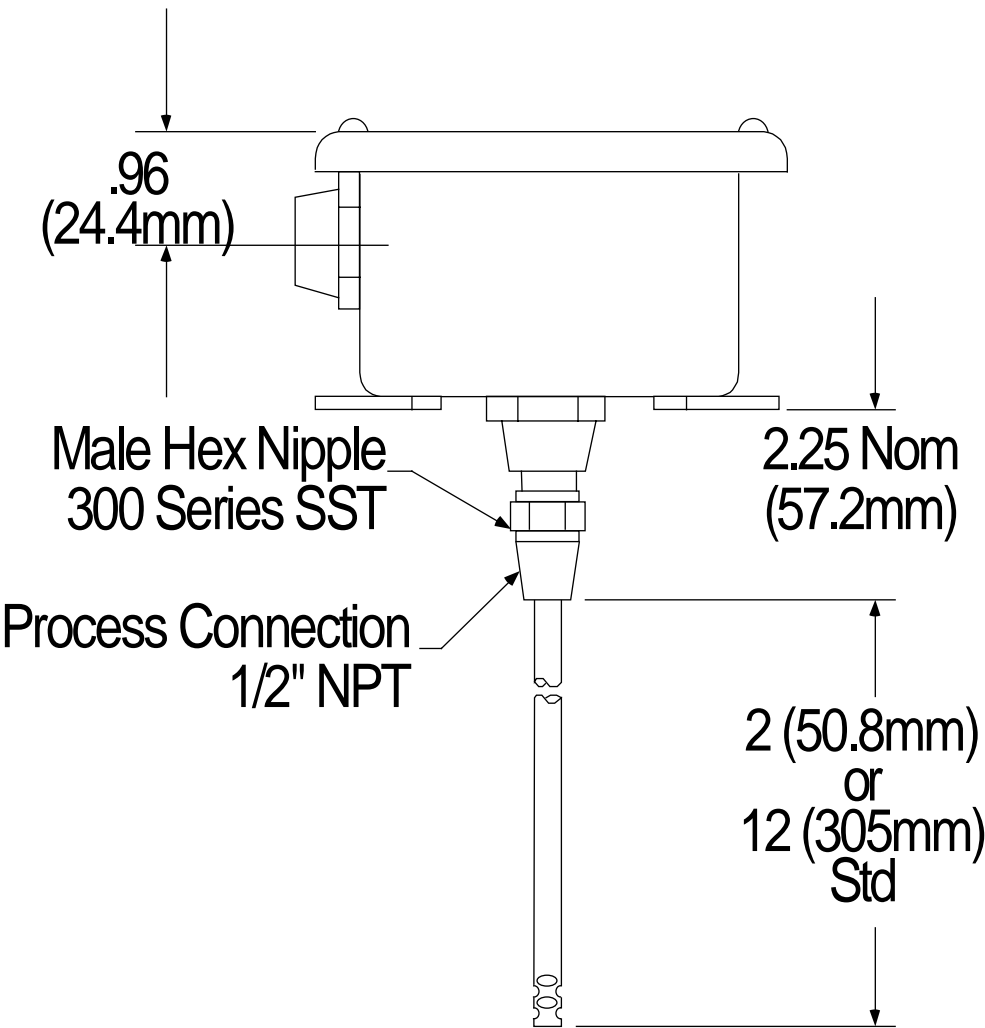
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Shown with Integral Probe, Room Mount



Shown with Integral Probe, Duct Mount



Side View

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