Humidity Sensing and Control Products

Features and Benefits

- **All-Polymer™ Humidity Sensor and Electronic Circuitry**: Provides accurate and reliable humidity sensing with improved resistance to chemical corrosion.

- **Humidity and Temperature Sensors in One Unit**: Eliminates need for separate sensors; reduces installation time and cost.

- **Several Models Available**: Provides choice of temperature sensors while retaining accurate and reliable sensing.

- **Senses RH Over Full 0 to 100% Range**: Accommodates a wide range of applications.

- **User-selectable Output Range (Transmitters and Controllers)**: Allows choice of standard outputs for ease of use with new and existing systems.

- **Field-adjustable Offset**: Allows minor (± 5%) changes in output to match other equipment or standards.
Johnson Controls World Leadership

Since 1885, when Warren Johnson invented the first thermostat, Johnson Controls has been working with schools, hospitals, government, and other facilities to help create comfortable, productive, and safe building environments.

Today, we are a world leader in the control of building environments. We still manufacture thermostats, in addition to thousands of other HVAC and refrigeration control products, including Metasys®, the most advanced facility management system of its kind. We also provide complete operations and maintenance services for hundreds of government and commercial facilities around the world.

Indoor Air Quality Control

Humidity plays a critical role in achieving optimum Indoor Air Quality (IAQ) in buildings. A certain level of Relative Humidity (RH) is not only required to assure human health and comfort, but also to minimize the growth of microorganisms and the speed of chemical interactions in buildings.

These contagions and products of various chemical interactions contribute to what is widely known as Sick Building Syndrome (SBS). The ASHRAE 62-1989 standard of 30% to 60% helps alleviate many of the health and comfort problems that exist in energy-efficient buildings.*

Note: A decrease in the bar width indicates a decrease in effect.

Because we have been building and testing elements for the past 80 years. Here’s a snapshot of our accomplishments:

1915   Horn Element
1936   Bi-wood Element
1938   Nylon Element
1955   Human Hair Element
1965   CAB (Cellulose Acetate Butyrate) Type
1989   All-Polymer Element

The patented All-Polymer sensor is a result of over 50 years of experience working with plastics for humidity sensing. No other element will hold up in harsh HVAC conditions like the All-Polymer element can. Our goal is to continue our leadership role in humidity sensing technology.

Our line of humidity sensing and control products are produced in our new manufacturing cell in the Reynosa/Pharr plant located on the U.S./Mexican border in the states of Texas and Tampaulipas, Mexico.

Leadership in the Humidity Business

The All-Polymer sensor used in the Johnson Controls humidity product line is one of the best humidity sensors in the HVAC industry. How can we make such a statement?

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The All-Polymer humidity products are assembled in a series of tightly controlled processes. The electronic board is assembled with numerically controlled, surface-mount technology that utilizes robotics to place the very small electronic components precisely on the boards.

These sensors are then calibrated and tested in one of four state-of-the-art temperature and humidity-controlled chambers. A computerized man/machine interface seamlessly integrates the chamber with the operator to control every aspect of the calibration and auditing process. Every sensor is calibrated and then audited at specific humidity setpoints along the product’s performance curve.

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Our ISO-9000-certified manufacturing processes ensure consistent delivery of the highest quality and reliable sensors available in the growing global market.

Johnson Controls currently offers All-Polymer sensing technology in a variety of products, including transmitters, humidistats, and controllers. These products are used all over the world in a wide variety of applications, for example:

- Printing industry, including the U.S. Government Currency Printing Office
- Art museums, including the Museum of Modern Art in New York and the Metropolitan Museum of Art in Chicago
- Libraries, including the Library of Congress
- Appliances
- Air conditioning units
- School buildings
- Agriculture
- Food processing
- Dry goods storage
- Paper industry
- Greenhouses

Instrument Grade Humidity Element

All of these humidity products use the Johnson Controls proprietary patented humidity sensor, the All-Polymer sensor.

All-Polymer technology offers you a capacitive element that senses the full range of 0 to 100% RH in difficult sensing environments.

Positioning

Most electronic sensors on the market use polymers that require a metallic interface. University research has shown that these sensors are likely to fail at this bond between the polymer and the metal. In response to this problem, Johnson Controls developed the All-Polymer sensor.

The All-Polymer sensor, unlike other sensors that require metalization, offers three major benefits:

- Resists corrosion in harsh HVAC environments
- Operates over the full range of 0 to 100% RH
- Recovers fully after being saturated

Over the long run, sensors requiring metalization fall out of calibration and eventually corrode. The All-Polymer sensor, however, will provide many years of accurate sensing even in difficult sensing environments.

<table>
<thead>
<tr>
<th>ELEMENT SPECIFICATIONS</th>
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<tbody>
<tr>
<td><strong>Humidity Range:</strong></td>
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<tr>
<td><strong>Durability:</strong></td>
</tr>
<tr>
<td><strong>Response Time:</strong></td>
</tr>
<tr>
<td><strong>Hysteresis/Repeatability:</strong></td>
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<tr>
<td><strong>Vibration:</strong></td>
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Environmental Stability

The All-Polymer humidity sensing element resists corrosion from the following vapors:

- chlorine (and other chemicals in swimming pool areas)
- acetone
- pentane
- xylene
- formaldehyde
- hospital germicide
- refrigerant

Note: Long-term performance depends on length of exposure and vapor concentration.

The humidity sensing element withstands exposure to the following vapors, although slight (approximately 2%) drift may occur:

- Chlorine: 10x typical swimming pool environment
- Acetone, pentane, and xylene: 10x short-term exposure limit**
- Formaldehyde: 1000x short-term exposure limit**
- Hospital germicide: 1.5% solution (manufacturer’s recommended concentration)

** 1990-91 Threshold Limit Values and Physical and Biological Exposure Indices, American Conference of Environmental Industrial Hygienists.
<table>
<thead>
<tr>
<th>HC-6406S-2001 Room Controller</th>
<th>HC-6310-1 Duct Controller</th>
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<tbody>
<tr>
<td><strong>Power Requirements</strong></td>
<td>14 to 30 VDC at 6 mA or 20 to 30 VAC, 50/60 Hz at 15 mA with no load</td>
</tr>
<tr>
<td><strong>Control Action</strong></td>
<td>Jumper-selectable, direct or reverse acting</td>
</tr>
<tr>
<td><strong>Output Range</strong></td>
<td>Jumper-selectable, 0 to 10 VDC or 6 to 9 VDC (5k ohms minimum load impedance)</td>
</tr>
<tr>
<td><strong>Humidity Setpoint</strong></td>
<td>Adjustable from 20 to 80% RH</td>
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<tr>
<td><strong>Proportional Band</strong></td>
<td>Adjustable from 2 to 20% RH</td>
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<tr>
<th>HE-6400S-2001 Room Transmitter</th>
<th>HE-6314-1 Duct Transmitter</th>
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<tbody>
<tr>
<td><strong>Power Requirements</strong></td>
<td>If 0 to 10 VDC Output Jumper is used: 20 to 30 VAC, 50/60 Hz at 15 mA or 14 to 30 VDC at 6 mA If 4 to 20 mA Output Jumper is used: 16 to 30 VDC at 20 mA</td>
</tr>
<tr>
<td><strong>Output Range</strong></td>
<td>Jumper-selectable, 0 to 10 VDC (5k ohms minimum load impedance) or 4 to 20 mA DC (2-wire current loop)</td>
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<tr>
<th>HLC-6110-1 Duct High-limit Controller</th>
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<tbody>
<tr>
<td><strong>Power Requirements</strong></td>
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<tr>
<td><strong>Output</strong></td>
</tr>
<tr>
<td><strong>Humidity Setpoint</strong></td>
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<tr>
<td><strong>Differential</strong></td>
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*The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products. Information in this document is subject to change without notice.*