HIH-5030/5031 Series
Low Voltage Humidity Sensors

DESCRIPTION
The HIH-5030/5031 Series Low Voltage Humidity Sensors operate down to 2.7 Vdc, often ideal in battery-powered systems where the supply is a nominal 3 Vdc.

The HIH 5030/5031 complements our existing line of 5 Vdc SMD (Surface Mount Device) humidity sensors. SMD packaging on tape and reel allows for use in high volume, automated pick and place manufacturing, eliminating lead misalignment to printed circuit board through-holes.

The HIH-5030/5031 Series Humidity Sensors are designed specifically for high volume OEM (Original Equipment Manufacturer) users.

Direct input to a controller or other device is made possible by this sensor's near linear voltage output. With a typical current draw of only 200 μA, the HIH-5030/5031 Series is ideally suited for many low drain, battery operated systems.

Tight sensor interchangeability reduces or eliminates OEM production calibration costs.

FEATURES
- Operates down to 2.7 Vdc, often ideal in battery-powered systems where the supply is a nominal 3 Vdc.
- Tape and reel packaging allows for use in high volume pick and place manufacturing (1,000 units per tape and reel)
- Molded thermoset plastic housing
- Near linear voltage output vs %RH
- Laser trimmed interchangeability
- Low power design
- Enhanced accuracy
- Fast response time
- Stable, low drift performance
- Chemically resistant

POTENTIAL APPLICATIONS

Industrial
- Air compressors
- Battery-powered systems
- Drying equipment
- HVAC (includes air conditioning, air movement, thermostats, humidifiers, de-humidifiers, humidistats, enthalpy sensing)
- OEM assemblies
- Office automation equipment
- Process equipment
- Refrigeration (includes bulk and transport systems)
- Telecommunications cabinets
- Weather stations and meteorology equipment

Medical
- Hospital air compressors
- Infant incubators
- Microenvironments
- Sleep apnea equipment
- Treadmill stress monitoring equipment
## HIH-5030/5031 Series

### Table 1. Performance Specifications (At 3.3 Vdc supply and 25 °C [77 °F] unless otherwise noted.)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
<th>Typical</th>
<th>Maximum</th>
<th>Unit</th>
<th>Specific Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interchangeability (first order curve)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0% RH to 10% RH, 90% RH to 100% RH</td>
<td>-7</td>
<td>-</td>
<td>7</td>
<td>% RH</td>
<td></td>
</tr>
<tr>
<td>11% RH to 89% RH</td>
<td>-3</td>
<td>-</td>
<td>3</td>
<td>% RH</td>
<td></td>
</tr>
<tr>
<td>Accuracy (best fit straight line) 11% RH to 89% RH</td>
<td>-3</td>
<td>-</td>
<td>+3</td>
<td>% RH</td>
<td>4</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>% RH</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>-</td>
<td>±0.5</td>
<td>-</td>
<td>% RH</td>
<td></td>
</tr>
<tr>
<td>Setting time</td>
<td>-</td>
<td>-</td>
<td>70</td>
<td>ms</td>
<td></td>
</tr>
<tr>
<td>Response time (1/e in slow moving air)</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>Stability (at 50% RH in 5 years)</td>
<td>-</td>
<td>±1.2</td>
<td>-</td>
<td>% RH</td>
<td>1</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>2.7</td>
<td>-</td>
<td>5.5</td>
<td>Vdc</td>
<td>2</td>
</tr>
<tr>
<td>Current supply</td>
<td>-</td>
<td>200</td>
<td>500</td>
<td>μA</td>
<td></td>
</tr>
<tr>
<td>Voltage output (1st order curve fit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{OUT} = (V_{SUPPLY}) (0.00636 (sensor RH) + 0.1515)$, typical at 25 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature compensation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>True RH = (Sensor RH)/(1.0546 – 0.00216T), T in °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output voltage temp. coefficient at 50% RH, 3.3 V</td>
<td>-</td>
<td>-2</td>
<td>-</td>
<td>mV/°C</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40[-40]</td>
<td>See Figure 2.</td>
<td>85[185]</td>
<td>°C[°F]</td>
<td>-</td>
</tr>
<tr>
<td>Operating humidity (HIH-5030)</td>
<td>0</td>
<td>See Figure 2.</td>
<td>100</td>
<td>% RH</td>
<td>3</td>
</tr>
<tr>
<td>Operating humidity (HIH-5031)</td>
<td>0</td>
<td>See Figure 2.</td>
<td>100</td>
<td>% RH</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-50[-58]</td>
<td>-</td>
<td>125[257]</td>
<td>°C[°F]</td>
<td></td>
</tr>
<tr>
<td>Storage humidity</td>
<td></td>
<td></td>
<td></td>
<td>% RH</td>
<td>3</td>
</tr>
</tbody>
</table>

### Specific Notes:
1. Includes stress outside of recommended operating zone.
2. Device is tested at 3.3 Vdc and 25 °C.
3. Non-condensing environment. When liquid water falls on the humidity sensor die, output goes to a low rail condition indicating no humidity.
4. Total accuracy including interchangeability is ±3 %RH.

### General Notes:
- Sensor is ratiometric to supply voltage.
- Extended exposure to ≥90 % RH causes a reversible shift of 3 %RH.
- Sensor is light sensitive. For best performance, shield sensor from bright light.

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![ESD Sensitivity Class 3A](image-url)
Low Voltage Humidity Sensors

Figure 1. Operating Environment (Non-condensing environment for HIH-5030 catalog listings only.)

- Recommended operating zone
- Operating zone limited to <50 hours
- No specification zone

Figure 2. Storage Environment (Non-condensing environment for HIH-5030 catalog listings only.)

- Recommended storage zone
HIH-5030/5031 Series

Figure 3. Typical Output Voltage vs Relative Humidity (At 25 °C and 3.3 Vdc.)

Figure 4. Typical Output Voltage (BFSL) vs Relative Humidity (At 0 °C, 70 °C and 3.3 Vdc.)
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Figure 5. HIH-5030 Mounting Dimensions (For reference only. mm/[in])

Figure 6. HIH-5030 PCB Landing Pattern (For reference only. mm/[in])
HIH-5030/5031 Series

Figure 7. HIH-5031 Mounting Dimensions (For reference only. mm/[in])

![Diagram of HIH-5031 Mounting Dimensions]

Figure 8. HIH-5031 PCB Landing Pattern (For reference only. mm/[in])

![Diagram of HIH-5031 PCB Landing Pattern]
Order Guide

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIH-5030-001</td>
<td>Covered integrated circuit humidity sensor, SMD, 1000 units on tape and reel</td>
</tr>
<tr>
<td>HIH-5031-001</td>
<td>Covered, filtered integrated circuit humidity sensor, SMD, 1000 units on tape and reel</td>
</tr>
<tr>
<td>HIH-5030-001S</td>
<td>Sample pack: covered integrated circuit humidity sensor, SMD, five units on tape</td>
</tr>
<tr>
<td>HIH-5031-001S</td>
<td>Sample pack: covered, filtered integrated circuit humidity sensor, SMD, sample pack, five units on tape</td>
</tr>
</tbody>
</table>

Additional Humidity Sensor Information

See the following associated literature is available on the Web:
- Product installation instructions
- Application sheets:
  - Humidity Sensor Performance Characteristics
  - Humidity Sensor Theory and Behavior
  - Humidity Sensor Moisture and Psychrometrics
  - Thermoset Polymer-based Capacitive Sensors
WARNING

MISUSE OF DOCUMENTATION
- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

WARRANTY/REMEDY
Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell’s standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. The foregoing is buyer’s sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.

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