The HIH-4000 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-4000 Series is often ideally suited for low drain, battery operated systems.

Tight sensor interchangeability reduces or eliminates OEM production calibration costs. Individual sensor calibration data is available.

The HIH-4000 Series delivers instrumentation-quality RH (Relative Humidity) sensing performance in a competitively priced, solderable SIP (Single In-line Package).

Available in two lead spacing configurations, the RH sensor is a laser trimmed, thermoset polymer capacitive sensing element with on-chip integrated signal conditioning.

The sensing element’s multilayer construction provides excellent resistance to most application hazards such as wetting, dust, dirt, oils and common environmental chemicals.

**DESCRIPTION**

- 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

**FEATURES**

**POTENTIAL APPLICATIONS**

- Refrigeration equipment
- HVAC (Heating, Ventilation and Air Conditioning) equipment
- Medical equipment
- Drying
- Metrology
- Battery-powered systems
- OEM assemblies
**HIH-4000 Series**

**Table 1. Performance Specifications (At 5 Vdc supply and 25 ºC [77 ºF] 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 59% RH</td>
<td>-5</td>
<td>–</td>
<td>5</td>
<td>% RH</td>
<td>–</td>
</tr>
<tr>
<td>60% RH to 100% RH</td>
<td>-8</td>
<td>–</td>
<td>8</td>
<td>% RH</td>
<td>–</td>
</tr>
<tr>
<td>Accuracy (best fit straight line)</td>
<td>-3.5</td>
<td>–</td>
<td>+3.5</td>
<td>% RH</td>
<td>1</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>–</td>
<td>±0.5</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 ms</td>
<td>–</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)</td>
<td>–</td>
<td>1.2</td>
<td>–</td>
<td>% RH</td>
<td>–</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>4</td>
<td>–</td>
<td>5.8 Vdc</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Current supply</td>
<td>–</td>
<td>200 µA</td>
<td>500 µA</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Voltage output (1st order curve fit)</td>
<td>$V_{OUT} = (V_{SUPPLY})(0.0062(sensor RH) + 0.16)$, typical at 25 ºC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature compensation</td>
<td>True RH = (Sensor RH)/(1.0546 – 0.00216T), T in ºC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output voltage temperature, coefficient at 50% RH, 5 V</td>
<td>–</td>
<td>-4</td>
<td>–</td>
<td>mV/ºC</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40[-40]</td>
<td>See Figure 1.</td>
<td>85[185]</td>
<td>ºC[ºF]</td>
<td>–</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>0</td>
<td>See Figure 1.</td>
<td>100</td>
<td>% RH</td>
<td>3</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-50[-58]</td>
<td>–</td>
<td>125[257]</td>
<td>%RH</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. Can only be achieved with the supplied slope and offset. For HIH-4000-003 and HIH-4000-004 catalog listings only.
2. Device is calibrated at 5 Vdc and 25 ºC.
3. Non-condensing environment.

**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.

**FACTORY CALIBRATION DATA**

HIH-4000 Sensors may be ordered with a calibration and data printout. See Table 2 and the order guide on the back page.

**Table 2. Example Data Printout**

<table>
<thead>
<tr>
<th>Model</th>
<th>HIH-4000-003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>92</td>
</tr>
<tr>
<td>Wafer</td>
<td>030996M</td>
</tr>
<tr>
<td>MRP</td>
<td>337313</td>
</tr>
<tr>
<td>Calculated values at 5 V</td>
<td></td>
</tr>
<tr>
<td>$V_{OUT}$ at 0% RH</td>
<td>0.826 V</td>
</tr>
<tr>
<td>$V_{OUT}$ at 75.3% RH</td>
<td>3.198 V</td>
</tr>
<tr>
<td>Linear output for 3.5% RH accuracy at 25 ºC</td>
<td></td>
</tr>
<tr>
<td>Zero offset</td>
<td>0.826 V</td>
</tr>
<tr>
<td>Slope</td>
<td>31.483 mV/%RH</td>
</tr>
<tr>
<td>RH</td>
<td></td>
</tr>
<tr>
<td>Ratiometric response for 0% RH to 100% RH</td>
<td></td>
</tr>
<tr>
<td>$V_{OUT}$</td>
<td>$V_{SUPPLY} (0.1652 to 0.7952)$</td>
</tr>
</tbody>
</table>
Figure 1. Operating Environment (Non-condensing environment.)

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

Figure 2. Storage Environment (Non-condensing environment.)

- Recommended storage zone
HIH-4000 Series

Figure 3. Typical Output Voltage vs Relative Humidity (At 25 ºC and 5 V.)

Figure 4. Typical Output Voltage (BFSL) vs Relative Humidity (At 0 ºC, 70 ºC and 5 V.)
Figure 5. Mounting Dimensions (For reference only. mm/[in])

HIH-4000-002
HIH-4000-004

HIH-4000-001
HIH-4000-003
HIH-4000-005

Figure 6. Typical Application Circuit

HIH-40XX

+ Ve

Supply Voltage (5 V)

OUT

VOLTAGE OUT

- Ve

Minimum Load

0 V

80 kOhm

ORDER GUIDE

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIH-4000-001</td>
<td>Integrated circuit humidity sensor, 2.54 mm [0.100 in] lead pitch SIP</td>
</tr>
<tr>
<td>HIH-4000-002</td>
<td>Integrated circuit humidity sensor, 1.27 mm [0.050 in] lead pitch SIP</td>
</tr>
<tr>
<td>HIH-4000-003</td>
<td>Integrated circuit humidity sensor, 2.54 mm [0.100 in] lead pitch SIP, calibration and data printout</td>
</tr>
<tr>
<td>HIH-4000-004</td>
<td>Integrated circuit humidity sensor, 1.27 mm [0.050 in] lead pitch SIP, calibration and data printout</td>
</tr>
<tr>
<td>HIH-4000-005</td>
<td>Equivalent to HIH-4000-001</td>
</tr>
</tbody>
</table>

ADDITIONAL HUMIDITY SENSOR INFORMATION

See the following associated literature at www.honeywell.com/sensing:

- 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.

**WARNING**

**PERSONAL INJURY**
DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.
Failure to comply with these instructions could result in death or serious injury.

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