MEDICAL AND INDUSTRIAL APPLICATIONS

Application Note

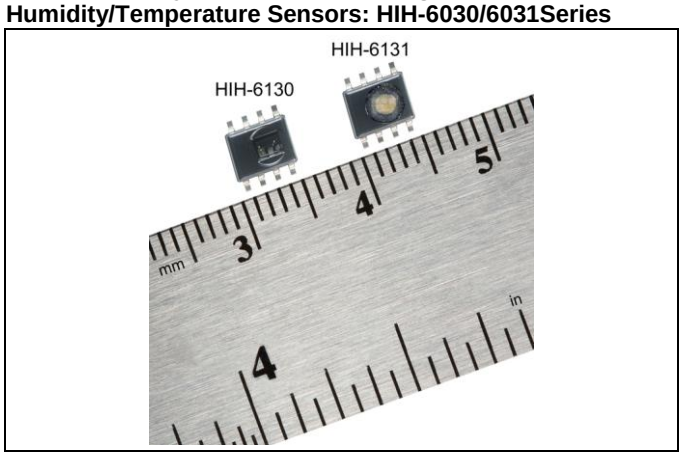
Honeywell HumidIcon™ Digital Humidity/Temperature Sensors: HIH-6130/6131 Series

INTRODUCTION

Honeywell's Honeywell HumidIcon™ Digital Humidity/Temperature Sensors: HIH-6130/6131 Series is a digital output-type relative humidity (RH) and temperature sensor combined in the same package (see Figure 1). These devices offer several competitive advantages, including:

1. Industry-leading Total Error Band
2. Industry-leading long term stability
3. Industry-leading reliability
4. Lowest total cost solution
5. True temperature-compensated digital I^2C output
6. Energy efficiency
7. Ultra-small package

Figure 1. Honeywell HumidIcon™ Digital Humidity/Temperature Sensors: HIH-6030/6031Series



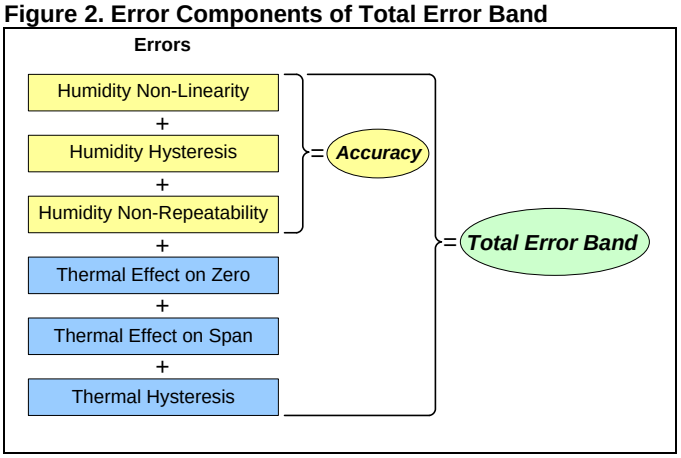
VALUE PROPOSITIONS (★ = *competitive differentiator)*

★ **Industry-leading Total Error Band (TEB) (±5 %RH):** Honeywell specifies Total Error Band–the most comprehensive, clear, and meaningful measurement–that provides the sensor's true accuracy of ±5 %RH over a compensated range of 5 °C to 50 °C [41 °F to 122 °F] and 10 %RH to 90 %RH. TEB includes all errors due to:

- Humidity non-linearity
- Humidity hysteresis
- Humidity non-repeatability
- Thermal effect on zero
- Thermal effect on span
- Thermal hysteresis

Total Error Band should not be confused with "accuracy", which is actually a component of Total Error Band, as shown in Figure 2.

Figure 2. Error Components of Total Error Band



Many competitors simply specify the "accuracy" of their device; however, the specification may exclude hysteresis and temperature effects, and may be calculated over a very narrow range, at only one point in the range, or at the absolute best accuracy level. It is then up to the customer to calibrate the device to make sure it has the accuracy needed for the life of the application.

Honeywell's industry-leading Total Error Band provides the following benefits to the customer:

- Eliminates individually testing and calibrating every sensor, helping to reduce manufacturing time and process.
- Supports system accuracy and warranty requirements.
- Helps to optimize system uptime.
- Provides excellent sensor interchangeability–the customer can remove one sensor from the tape, remove the next sensor from the tape, and there is no part-to-part variation in accuracy.

For more information about Total Error Band, please see the Technical Note, "Total Error Band Specification for the Honeywell Digital Humidity/Temperature Sensor" on the Web.

Honeywell HumidIcon™ Digital Humidity/Temperature Sensors: HIH-6130/6131 Series

★ **Industry-leading long term stability (1.2 %RH over five years):** Competitive humidity sensors need to go through a 12 hour at 75 %RH rehydration process (which requires special equipment chambers) to correct reflow temperature offset. Honeywell's sensor also experiences an offset after reflow; however, it only requires a five hour rehydration under ambient conditions (>50 %RH). Honeywell's industry-leading long term stability provides the following benefits to the customer:
- Minimizes system performance issues
- Helps support system uptime by eliminating the need to service or replace the sensor during its application life
- Eliminates the need to regularly recalibrate the sensor in the application, which can be inconvenient and costly

★ **Industry-leading reliability:** Honeywell's new HIH-613X Series sensors use a laser trimmed, thermoset polymer capacitive sensing element. The element's multilayer construction provides resistance to most application hazards such as condensation, dust, dirt, oils, and common environmental chemicals which help provide industry-leading stability and reliability.

★ **Lowest total cost solution:** Offers customers the lowest total cost solution due to the sensor's industry-leading Total Error Band and being a combined humidity/temperature sensor.

★ **True, temperature-compensated digital I^2C output:** Typically allows the customer to remove the components associated with signal conditioning from the PCB to free up space and reduce costs associated with those components (e.g., acquisition, inventory, assembly). Often eliminates problems that could occur from having multiple signal conditioning components across the PCB. Simplifies integration to the microprocessor, eliminating the need for customer-implemented, complex signal conditioning.

★ **Energy efficient:**
- Low supply voltage: Can operate down to 2.3 Vdc, which allows use in low energy and wireless-compatible applications to enhance energy savings and prolong system battery life.
- Low power consumption: The sensor goes into sleep mode when not taking a measurement within the application, consuming only 1 µA of power versus 650 µA in full operation in a battery operated system. Sleep mode helps maximize battery life, reduces power supply size, and reduces the application's overall weight.

★ **Ultra-small package:** SOIC-8 SMD (Surface Mount Device) package is ultra small, including the condensation-resistant model with hydrophobic filter on-board (HIH-6131). Allows for flexibility of use within the application, occupies less space on the PCB, and typically simplifies placement on crowded PCBs or in small devices.

- **Combined humidity and temperature sensor:** The humidity and temperature sensors are co-located in the same package. This allows the RH measurement to be temperature compensated and provides a second, standalone temperature sensor output. This allows the user to purchase one sensor instead of two.

- **Tape and reel packaging:** Cost-effective tape-and-reel packaging allows for use in high volume, automated pick-and-place manufacturing, eliminating lead misalignment to the PCB and helping the customer to reduce manufacturing costs.

- **High resolution:** High 14-bit humidity sensor resolution and 14-bit temperature sensor resolution within the application help the user's system detect the smallest relative humidity or temperature change.

FEATURES AND BENEFITS
- **Wide operating temperature range** of -25 °C to 85 °C [-13 °F to 185 °F] allows for use in many applications.
- **Optional one or two %RH level alarm outputs** provide the user the ability to monitor whether the RH level has exceeded or fallen below pre-determined and critical levels within the application.
- **Multi-function ASIC** provides flexibility within the application by lowering or eliminating the risk and cost of OEM calibration.
- **Industry-standard package** provides easy design-in.
- **RoHS and WEEE compliant; halogen-free.**
- **Two configurations** increase flexibility of use: HIH-6130: no filter, non-condensing; HIH-6131: hydrophobic filter and condensation-resistant allow use in many condensing environments.

POTENTIAL APPLICATIONS

Figures 3 through 8 show a variety of potential applications in which the HIH-6130/6131 Series may be used.

Honeywell HumidIcon™ Digital Humidity/Temperature Sensors: HIH-6130/6131 Series

Figure 3. HVAC/R

May be used to provide precision RH and temperature measurement in air conditioning/air movement systems, enthalpy sensing, thermostats, humidifiers/de-humidifiers, and humidistats to maintain occupant comfort and ideal storage humidity/temperature while achieving low energy consumption, supporting system accuracy and warranty requirements, maximizing system uptime, and improving overall system quality.

Figure 4. Respiratory Therapy (Sleep Apnea Machines, Ventilators)

May be used to provide precision RH and temperature measurement in sleep apnea machines and ventilators, enhancing patient comfort, safety and treatment effectiveness with warm and humidified air.

Figure 5. Incubators/Microenvironments

May be used to provide optimal temperature and RH levels to support critical processes and experiments, enhancing process efficiency with desired climate conditions.

Figure 6. Air Compressors

May be used to provide precision RH measurement in compressed air lines, allowing the system to remove any condensation; dry compressed air is critical for customer process control measurement.

Honeywell HumidIcon™ Digital Humidity/Temperature Sensors: HIH-6130/6131 Series

Figure 7. Weather Stations

May be used to provide precision RH and temperature measurement in ground-based and air-born weather stations, allowing real time and highly accurate monitoring and reporting of actual weather conditions.

Figure 8. Telecom Cabinets

May be used to provide precision RH and temperature measurement in the telecom cabinet HVAC system; maintaining proper temperature and humidity levels in the cabinet provides maximum system uptime and performance.

⚠ 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.

⚠ WARNING

MISUSE OF DOCUMENTATION

- The information presented in this application note 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.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

SALES AND SERVICE

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office or:

E-mail: info.sc@honeywell.com
Internet: www.honeywell.com/sensing
Phone and Fax:

Asia Pacific	+65 6355-2828
	+65 6445-3033 Fax
Europe	+44 (0) 1698 481481
	+44 (0) 1698 481676 Fax
Latin America	+1-305-805-8188
	+1-305-883-8257 Fax
USA/Canada	+1-800-537-6945
	+1-815-235-6847
	+1-815-235-6545 Fax

Sensing and Control
Honeywell
1985 Douglas Drive North
Golden Valley, MN 55422
www.honeywell.com/sensing

009065-1-EN IL50 GLO Printed in USA
August 2011