

# HIH-4000 Series

## Humidity Sensors

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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 linear voltage output. With a typical current draw of only 200  $\mu$ A, 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.

### FEATURES

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- Molded thermoset plastic housing
- Linear voltage output vs %RH
- Laser trimmed interchangeability
- Low power design
- High accuracy
- Fast response time
- Stable, low drift performance
- Chemically resistant

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.

### TYPICAL APPLICATIONS

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- Refrigeration equipment
- HVAC equipment
- Medical equipment
- Drying
- Metrology
- Battery-powered systems
- OEM assemblies

# HIH-4000 Series

**TABLE 1. PERFORMANCE SPECIFICATIONS (At 5 Vdc supply and 25 °C [77 °F] unless otherwise noted.)**  
 (%RH performance specifications include test system measurement errors (±0.5 % typical.)

Parameter	Minimum	Typical	Maximum	Unit
Interchangeability (best fit straight line)	—	—	—	—
0 % to 60 %	-5	—	5	%RH
60 % to 100 %	-8	—	8	%RH
Interchangeability (2nd order curve)	—	±3.5	—	%RH
Accuracy <sup>1</sup> (best fit straight line)	—	±3.5	—	%RH
Accuracy (2nd order curve)	—	±2.5	—	%RH
Hysteresis	—	3	—	%RH
Repeatability	—	±0.5	—	%RH
Settling time	—	—	70	ms
Response time (1/e in slow moving air)	—	15	—	s
Stability <sup>2</sup> (@ 50 %RH)	—	±1.2 (per year)	—	%RH
Stability <sup>3</sup> (@ 50 %RH)	—	±0.5 (per year)	—	%RH
Voltage supply	4	—	5.8	Vdc
Current supply	—	—	500	µA
Voltage output (1 <sup>st</sup> order fit)	$V_{out} = V_{supply} (0.0062(\text{sensor RH}) + 0.16)$			
Voltage output (2nd order curve fit)	$V_{out} = 0.00003(\text{sensor RH})^2 + 0.0281(\text{sensor RH}) + 0.820$ , typical @ 25 °C			
Temperature compensation	$V_{out} = (0.0305 + 0.000044T - 0.0000011T^2)(\text{Sensor RH}) + (0.9237 - 0.0041T + 0.000040T^2)$ , T=Temperature in °C			
Operating temperature	-40[-40]	See Figure 1.	85[185]	°C[°F]
Operating humidity	0	See Figure 2.	100	%RH
Storage temperature	-40[-40]	—	125[257]	°C[°F]
Storage humidity	See Figure 2.			%RH

**Notes:**

1. For HIH-4000-003 and -004 only.
2. Specification includes testing outside of recommended operating zone.
3. Specification includes testing for recommended operating zone only.

**NOTICE**

- Do not expose sensor to condensing environments. Exposure to condensing environments will cause sensor output to indicate 0 %RH.
- Sensor is light sensitive. For best performance, shield sensor from bright light.
- Sensor is static sensitive. Sensor connection protected to 15 kV maximum.
- Sensor output is ratiometric to supply voltage.

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



**FACTORY CALIBRATION DATA**

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

**TABLE 2. EXAMPLE DATA PRINTOUT**

Model	HIH-4000-001
Channel	92
Wafer	030996M
MRP	337313
Calculated values at 5 V	
V <sub>out</sub> @ 0 %RH	0.958 V
V <sub>out</sub> @ 75.3 %RH	3.268 V
Linear output for 2 %RH accuracy @ 25 °C	
Zero offset	0.958 V
Slope	30.680 mV/%RH
RH	(V <sub>out</sub> -zero offset)/slope (V <sub>out</sub> -0.958)/0.0307
Ratiometric response for 0 % to 100 %RH	
V <sub>out</sub>	V <sub>supply</sub> (0.1915 to 0.8130)

# Humidity Sensors

FIGURE 1. RECOMMENDED OPERATING CONDITIONS

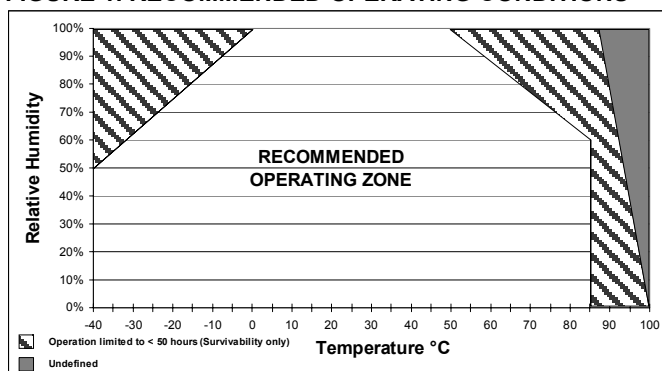


FIGURE 2. STORAGE ENVIRONMENT

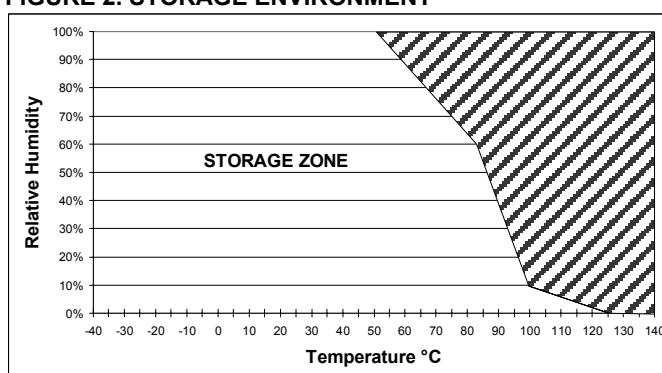


FIGURE 3. MOUNTING DIMENSIONS  
for reference only mm/[in]

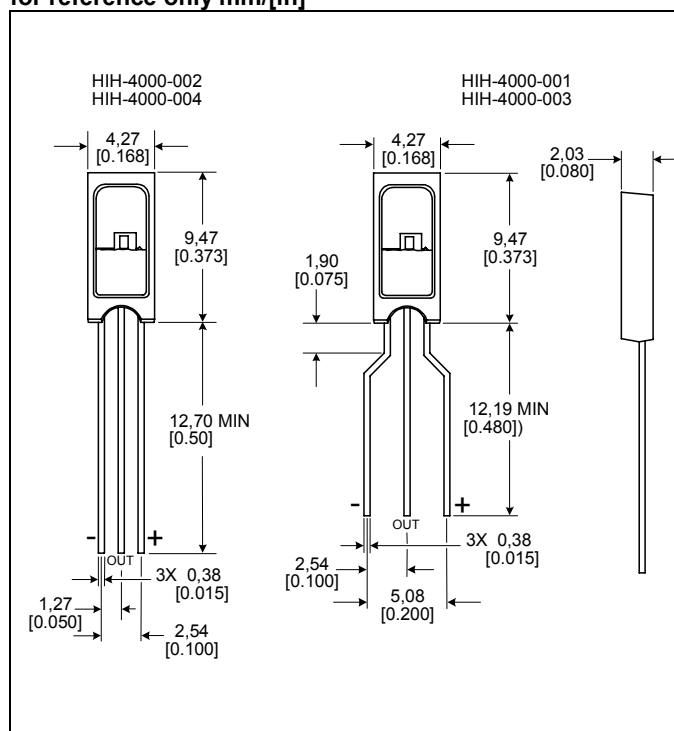


FIGURE 4. TYPICAL BEST FIT STRAIGHT LINE

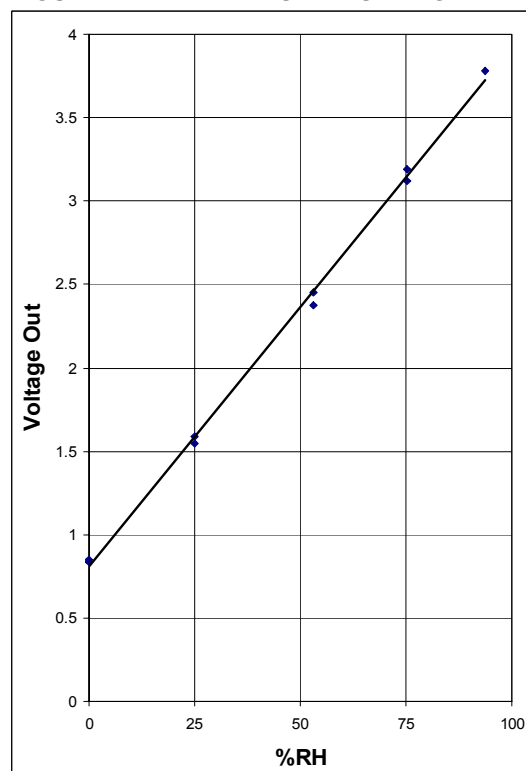
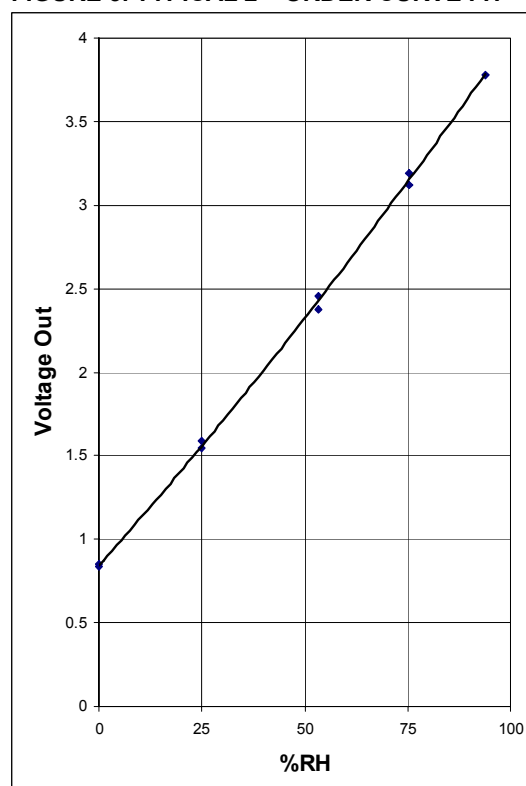


FIGURE 5. TYPICAL 2<sup>nd</sup> ORDER CURVE FIT



## ORDER GUIDE

Catalog Listing	Description
HIH-4000-001	Integrated circuitry humidity sensor, 0.100 in lead pitch SIP
HIH-4000-002	Integrated circuitry humidity sensor, 0.050 in lead pitch SIP
HIH-4000-003	Integrated circuitry humidity sensor, 0.100 in lead pitch SIP with calibration and data printout
HIH-4000-004	Integrated circuitry humidity sensor, 0.050 in lead pitch SIP with calibration and data printout

 **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.**