

TRUERH™ Series HE-67xx Surface-mount Duct Humidity/Temperature Sensors

The TRUERH™ product line delivers ±2% and ±3% Relative Humidity (RH) Sensing Products in a full variety of packages. The humidity sensor's All-Polymer™ construction increases resistance to corrosion in HVAC (Heating, Ventilating, and Air Conditioning) environments.

HE-67xx Elements are products whose output signal is 0 to 5 VDC for humidity Indication.

The HE-67xx Series sensors combine humidity and temperature sensing in an all-plastic enclosure used inside ducts and economizer rooftop systems. These models are available with a nickel or one of two thermistor temperature sensors.

The thermistor temperature sensors have a negative temperature coefficient, and a reference resistance of 2.2k ohms or 10.0k ohms. The nickel temperature sensor has a reference resistance of 1.0k ohms. These units can be powered with 14 to 30 VDC or 20 to 30 VAC and feature a 0 to 5 VDC output.



Figure 1: HE-67xx Surface-mount Duct Humidity/Temperature Sensors

Features and Benefits

<input type="checkbox"/> TRUERH	Circuitry and calibration techniques for which patent protection is pending
<input type="checkbox"/> All-Polymer Humidity Sensor	Patented sensing element improves sensor's resistance to corrosion
<input type="checkbox"/> Humidity and Temperature Sensor in One Unit	Eliminates need for separate sensors; reduces installation time and cost
<input type="checkbox"/> The 2% RH accurate model includes a National Institute of Standards and Technology (NIST) certificate of conformance	Documents higher precision for 2% models
<input type="checkbox"/> Senses RH Over Full 0 to 100% Range	Accommodates a wide range of applications
<input type="checkbox"/> Protective Membrane	Protects sensors from contamination
<input type="checkbox"/> Quick-mount, 2-screw Installation	Reduces installation time
<input type="checkbox"/> Compact Enclosure for Mounting Inside Ducts	Designed for rooftop unit applications and retrofits; enables surface-mount installation

Product Overview

IMPORTANT: The HE-67xx Series sensor is intended to provide an input to equipment under normal operating conditions. Where failure or malfunction of the HE-67xx could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory systems) intended to warn of, or protect against, failure or malfunction of the HE-67xx must be incorporated into and maintained as part of the control system.

The HE-67xx sensors provide humidity and temperature sensing inside ducts and rooftop economizers. They are suitable for use with Johnson Controls direct mount Economizer controllers. The All-Polymer humidity element senses over the entire range of 0 to 100% RH and resists corrosion and is housed in a plastic enclosure that is easy to install.

These sensors are factory calibrated to NIST standards. The ±2% models ship with NIST certificates of conformance to validate use in demanding HVAC applications.

Temperature and humidity information from the HE-67xx can be used to precisely calculate enthalpy, which plays an important part in determining an energy-efficient and cost-effective economization strategy.

Duct humidity is an important factor in the overall quality of indoor air. The HE-67xx allows you to monitor and compare duct humidity with levels recommended in ASHRAE ventilation standards.

Theory of Operation

The humidity element is a non-metallic capacitor made with carbon-loaded polymer plates. The plates sandwich a water-permeable polymer that changes its dielectric constant through absorption of moisture in the air. The humidity-induced change in capacitance is used to produce a voltage signal proportional to the relative humidity of the sensed air.

The HE-67Tx-0N0GS has a thermistor temperature sensor with a negative temperature coefficient and a reference resistance of 2.2k ohms at 77°F (25°C). See Figure 2 and Table 1.

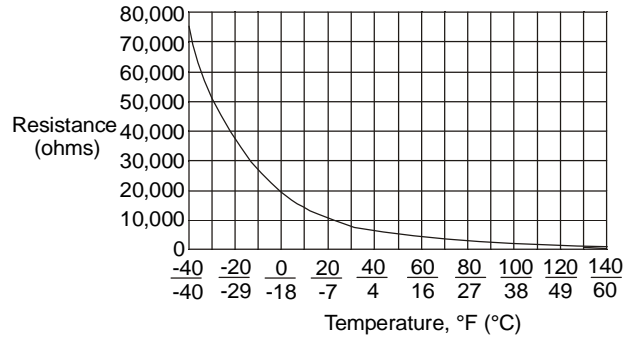


Figure 2: Resistance as a Function of Temperature for the 2.2k ohm Thermistor Sensor

Table 1: Temperature vs. Resistance

Temperature		Resistance (ohms)		
°F	°C	Nickel (1.0k)	Thermistor (2.2k)	Thermistor (10.0k)
-40	-40	699	75466	239828
-30	-34	725	52571	173671
-20	-29	751	37116	127178
-10	-23	777	26539	94111
0	-18	803	19208	70345
10	-12	830	14062	53073
20	-7	858	10408	40422
30	-1	885	7784	31055
40	4	914	5880	24058
50	10	942	4484	18787
60	16	971	3450	14783
70	21	1000	2678	11717
80	27	1030	2095	9353
90	32	1060	1652	7516
100	38	1090	1313	6079
110	43	1121	1051	4947
120	49	1152	847	4050
130	54	1184	687	3334
140	60	1216	561	2760

The HE-67Yx-0N0GS thermistor temperature sensor with a negative temperature coefficient and a reference resistance of 10.0k ohms at 77°F (25°C). See Figure 3 and Table 1.

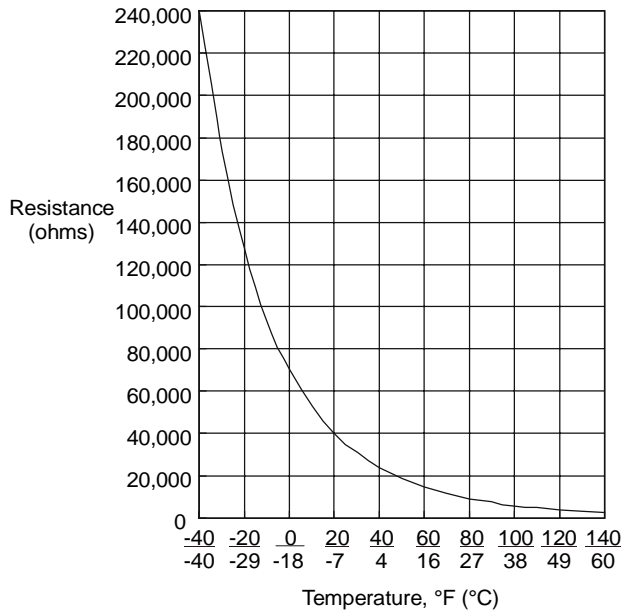


Figure 3: Resistance as a Function of Temperature for the 10.0k ohm Thermistor Sensor

The HE-67Nx-0N0GS nickel temperature sensor with a positive temperature coefficient and a reference resistance of 1.0k ohms at 70° (21°C). See Figure 4 and Table 1.

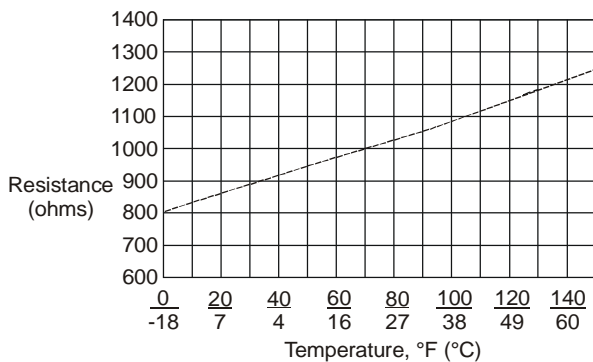


Figure 4: Resistance as a Function of Temperature for the 1.0k ohm Nickel Temperature Sensor

Dimensions

See Figure 5 for HE-67xx dimensions.

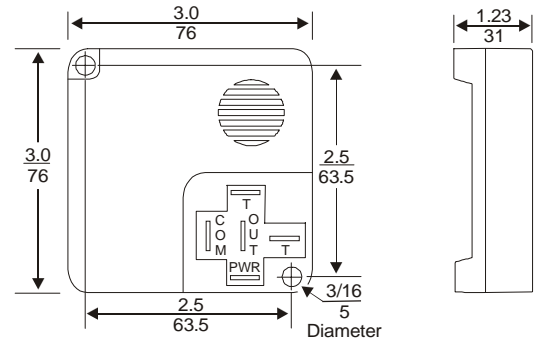


Figure 5: HE-67xx Dimensions, in. (mm)

Ordering Information

To order a duct-mount humidity/temperature sensor, contact the nearest Johnson Controls representative. Specify the product code number from Table 2 for a sensor and Table 3 for an accessory.

Table 2: Humidity/Temperature Sensors

Product Code Number	Temperature Sensor Type	RH Accuracy	
		±2%	±3%
HE-67N2-0N0GS	1.0k ohm Nickel	X	
HE-67T2-0N0GS	2.2k ohm Thermistor	X	
HE-67Y2-0N0GS	10.0k ohm Thermistor	X	
HE-67N3-0N0GS	1.0k ohm Nickel Sensor		X
HE-67T3-0N0GS	2.2k ohm Thermistor		X
HE-67Y3-0N0GS	10.0k ohm Thermistor		X

Table 3: Accessories

Product Code Number	Description
ACC-BRKT-100	Mounting Bracket for mounting the sensor perpendicular to the duct; 3.25 H x 3.62 W x 0.75 in. D (83 x 92 x 19 mm)
ACC-CBL-100	Wiring Harness, 53 in. (1.3 m)

Specifications

Product	TRUERH Series HE-67xx Surface-mount Duct Humidity/Temperature Sensors
Power Requirements	14 to 30 VDC or 20 to 30 VAC at 50/60 Hz, Class 2
Current Draw	3 mA with no load; 25 mA maximum
Output Signal	0 to 5 VDC, 1k ohm maximum load
Humidity Transmitter	Accuracy: HE-67x2: ±2% RH for 20 to 80% RH at 77°F (25°C) ±4% RH for 10 to 20% and 80 to 90% RH at 77°F (25°C) HE-67x3: ±3% RH for 20 to 80% RH at 77°F (25°C) ±5% RH for 10 to 20% and 80 to 90% RH at 77°F (25°C) Temperature Coefficient: -0.1 to 0.05% RH/C at 41°F (5°C) -0.07 to -0.21% RH/C at 149°F (65°C)
Temperature Sensor with Accuracy at 70°F (21°C)	HE-67Nx-0N0GS: ±0.34 F° (0.18C°); reference resistance of 1.0k ohms at 70°F (21°C) HE-67Tx-0N0GS: ±0.9 F° (0.50C°); reference resistance of 2.25k ohms at 77°F (25°C) HE-67Yx-0N0GS: ±0.36 F° (0.20C°); reference resistance of 10.0k ohms at 77°F (25°C) Note: HE-67Tx-0N0GS and HE-67Yx-0N0GS: Resistance change is nonlinear with a negative temperature coefficient.
Ambient Operating Conditions	32 to 140°F (0 to 60°C) 0-100% RH, 85°F (29.4°C) maximum dew point
Survival Operating Conditions	-20 to 140°F (-29 to 60°C) 0 to 100% RH, 85°F (29.4°C) maximum dew point
Ambient Storage Conditions	-40 to 140°F (-40 to 60°C) 0-100% RH, 85°F (29.4°C) maximum dew point
Terminal Connections	1/4 in. (6.35 mm) male spade
Acceptable Wire Gauge	16 to 24 AWG wire (18 AWG wire recommended)
Dimensions (H x W x L)	3.00 x 3.00 x 1.23 in. (76 x 76 x 31 mm)
Shipping Weight	0.50 lb (0.23 kg)

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.



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