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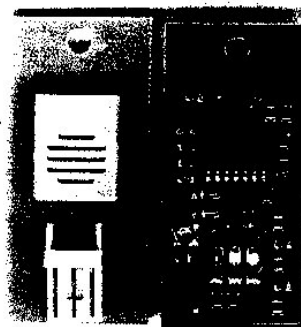
SC-600 9/00



INDUSTRIAL & ENVIRONMENTAL SENSORS, INSTRUMENTS & CONTROLS SINCE 1969

MODEL SC-600 SIGNAL CONDITIONER WITH UPS-600 HUMIDITY SENSOR COST EFFECTIVE UNIT PROVIDES DIRECT %RH TO VOLTAGE OUTPUT

- LINEAR VOLTAGE vs. %RH OUTPUT
- SENSOR RECOVERS FROM CONDENSATION
- HIGH RELIABILITY & REPEATABILITY
- NO HYSTERESIS - STABLE OUTPUT
- RANGE: 20-90% RH,
- SET POINT ACCURACY WITHIN $\pm 2\%$
- TEMPERATURE COMPENSATED
- COST-EFFECTIVE MODULE
- OEM DISCOUNTS, OFF-SHELF DELIVERY



SC-600 Signal Conditioning Cards are manufactured using state-of-the-art surface mount technology. A 3-pin socket (Power, Signal, Ground) enables direct connections. Each unit is supplied with an integral UPS-600 humidity sensor.

HUMIDITY SENSOR & SIGNAL CONDITIONER IN A MINIATURE PACKAGE

OHMIC Instruments Model SC-600 Signal Conditioners are cost-effective units for humidity measurement and control. As illustrated in Figure 1, the unit provides a close to linear voltage output over a wide humidity range. The module's small size and simplicity due to its thick film surface mount technology make the SC-600 an ideal choice for OEM applications. Long term set point accuracy can be maintained within $\pm 2\%$

UPS-600 sensors vary their electrical impedance in an inverse logarithmic function with changes in relative humidity (See data sheet on the UPS-600). The SC-600 module uses a RC sine wave oscillator to produce 440 Hz, 150 mV RMS excitation voltage. The circuitry also includes an amplitude stabilizer, logarithmic amplifier, and temperature compensation to produce a voltage output approximately proportional to relative humidity.

SC-600s are ideal for applications such as humidistats, data loggers, environmental and process controllers. Request application notes. Please call for latest OEM and small quantity pricing. Delivery is off-shelf.

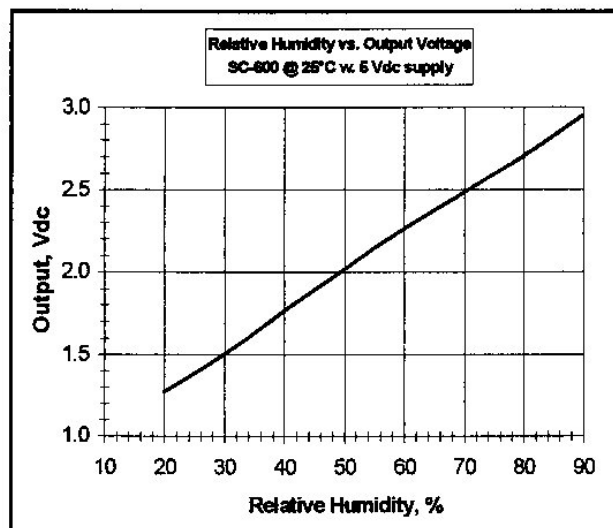


Figure 1

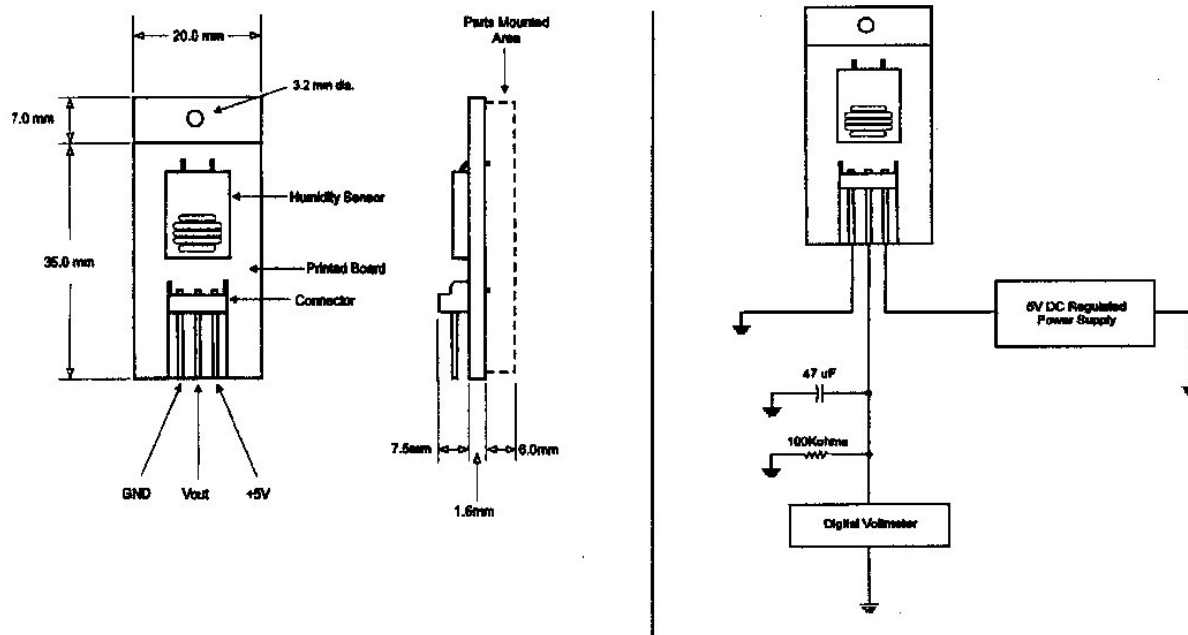
WARRANTY: All products manufactured by OHMIC Co. are warranted to be free of defects in material and workmanship for one year after delivery. Any equipment found to be defective within this period will be repaired or replaced free of charge.

SPECIFICATIONS: SC-600

Range:	20- 90% RH
Set Point Accuracy:	± 2 %RH
Output Signal:	1- 3 Vdc
Operating Temperature:	-4 to +140 °F
Response Time	15 Seconds for 63% Step Change
Hysteresis:	< 0.2%
Long-Term Drift:	< 2% RH/5 Years
Sensor Excitation:	150 mV @ 440 Hz
Power:	5 Vdc, (Regulated), current 5 mA max.
Output Filter:	100 KΩ /47 μF RC filter
Dimensions	20 x 42 x 17mm

SC-600 Humidity Signal Conditioners recover when exposure to condensation occurs, however, they should not be exposed to highly reactive or corrosive chemical vapors nor should the temperature limits be exceeded. In polluted environments, periodic sensor replacement may be necessary. When used in clean, chemical-free environments, SC-600's will maintain their accuracy specifications for many years.

DIMENSIONS & WIRING CONNECTIONS



ENGINEERING SUPPORT: OHMIC Instruments Co. designs and manufactures a full line of environmental and bio-medical sensors, instruments and controls. Many of our products are custom designed to meet specific requirements. Our engineers will be pleased to discuss your application.



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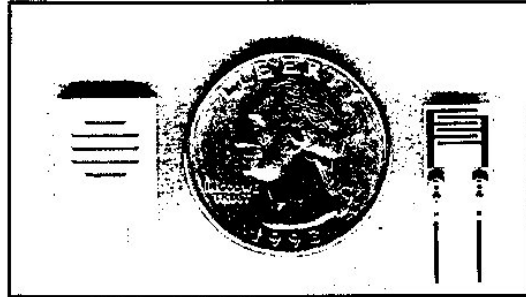
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INDUSTRIAL & ENVIRONMENTAL SENSORS, INSTRUMENTS & CONTROLS SINCE 1969

CERAMIC RESISTIVE HUMIDITY SENSOR - UPS-600 ECONOMICAL SENSOR SUITABLE FOR CONDENSING ENVIRONMENTS

- RANGE: 20-90% RH ACCURACY: ±2%
- UTILIZES ADVANCED CERAMIC TECHNOLOGY
- FULL RECOVERY FROM CONDENSATION
- HIGH SENSITIVITY & FAST RESPONSE
- EXCELLENT REPEATABILITY & STABILITY
- INTERCHANGEABLE WITHIN 2% RH
- NEGLIGIBLE HYSTERESIS
- NIST TRACEABLE CALIBRATION AVAILABLE

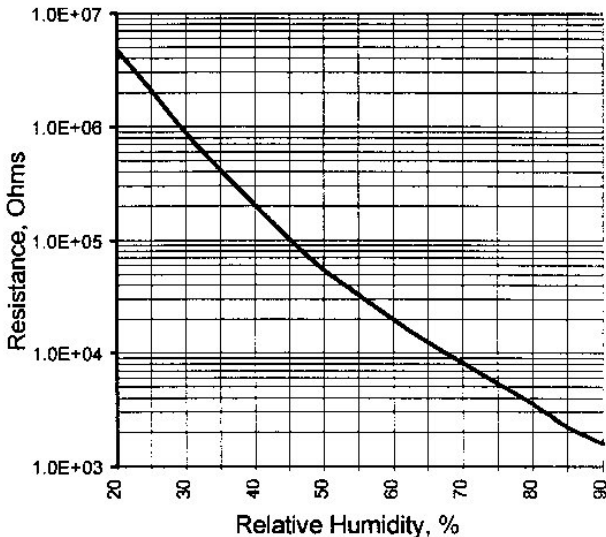


UPS-600s sensors (left) are assembled in a slotted polycarbonate housing with a protective filter. The sensing element is shown on the right. The compact size enables installation in probes and direct soldering to printed circuit boards. Low OEM pricing is available.

UPS-600's CAN DIRECTLY REPLACE MOST RESISTIVE HUMIDITY SENSORS WITH IMPROVED, COST EFFECTIVE PERFORMANCE

ACCURATE & REPEATABLE HUMIDITY MEASUREMENT AT ECONOMICAL PRICES

RESISTANCE vs. %RH @ 25°C,



UPS-600 Humidity Sensors overcome the limitations of other resistance-based humidity sensors that utilize water-soluble polymer coatings. Advanced ceramic technology enables these sensors to recover fully from condensation. Engineers rely on the UPS-600 Series' high accuracy and interchangeability at competitive cost. These sensors are ideal for HVAC controls, appliances, humidistats, data loggers and other high volume applications. To verify performance, an Evaluation Kit is available, which consists of five sensors, application notes and a signal conditioning test circuit that provides a temperature-compensated linear voltage output. The application notes include the sensor's equation, response curves and tables at various temperatures. Sensors are in stock at attractive OEM prices. Request further information from OHMIC application engineers.

WARRANTY: All products manufactured by OHMIC Co. are warranted to be free of defects in material and workmanship for one year after delivery. Any equipment found to be defective within this period will be repaired or replaced free of charge.

MODEL UPS-600: PRINCIPLE OF OPERATION

UPS-600 sensors consist of a ceramic substrate having inter-digitated metal alloy electrodes. The substrate is coated with a proprietary hygroscopic polymer, over which a porous ceramic material is deposited. Since the ceramic surface allows only vapor to enter, the sensor recovers from condensation or from direct water contact.

When a symmetrical AC voltage is applied, the UPS-600 sensor varies its electrical impedance in an inverse logarithmic function proportional to the amount of water vapor in the surrounding environment.

USING A SIGNAL CONDITIONER

The optional signal conditioning circuit has a sine wave R-C oscillator operating at 440 Hz, 150 mV RMS. It also includes an amplitude stabilizer, logarithmic amplifier, linearizer, and temperature compensation to provide an output voltage directly proportional to relative humidity. Model SC-600 signal conditioner is available in a small surface mounted circuit card.

Sensor interchangeability is within +/-2% tolerance, therefore; the signal conditioning circuit may be calibrated independent of humidity standards by using reference resistors. This circuit card is ideal for integration into many OEM applications. Low OEM

pricing with off-shelf delivery. Call for latest price.

UPS-600 SENSOR EQUATION

The general relative humidity equation of the UPS-600 sensor, in terms of temperature and impedance is expressed as follows:

$$\%RH = A\{(CZ)^{[(T+459.7)/D(T+459.7)+B]}\}$$

A, B, C & D = Constants Related to Specific Ranges

Z = Sensor's Impedance in MΩ

T = Temperature in °F

Request free technical data which includes constants for all ranges.

Computerized printout at desired temperature and RH values are supplied with the sensor. Temperature compensation method for remote sensor locations is also available. For additional test data or product applications, please contact OHMIC engineers.

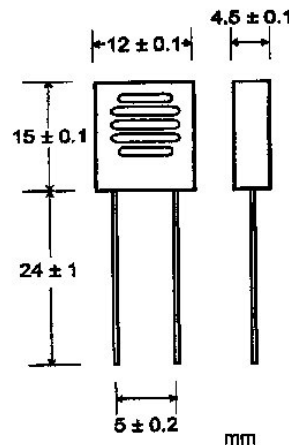
PRECAUTIONS

To avoid polarization and overheating, the UPS-600's are to be excited with symmetrical current under 0.1 mA. In normal ambient conditions, UPS-600 will maintain +/- 2% RH accuracy for many years. As the sensor has high accuracy, it may be field-replaced without the need for recalibration.

SPECIFICATIONS

Range:	20-90%RH at 77°F
Accuracy:	±2% RH
Interchangeability:	< 2% RH
Hysteresis:	< 0.4% RH
Long Term Drift:	< 2%RH/5 Years
Response:	15 Seconds For 63% Step Temp
Coefficient:	-0.4%RH/°F (Average at 20-80%RH from 60-100°F)
Temperature Limits:	-20 to +160°F
Excitation Voltage:	150 mV RMS
Excitation Frequency:	33 Hz to 1KHz, 440 Hz nominal
Case Construction:	Slotted Polycarbonate with

DIMENSIONS



CAUTION !

TO PREVENT PERMANENT SENSOR DAMAGE DO NOT MEASURE RESISTANCE WITH A DC OHMMETER. USE ONLY AC OHMMETERS.

ENGINEERING SUPPORT: OHMIC Instruments Co. designs and manufactures a full line of environmental and bio-medical sensors, instruments and controls. Many of our products are custom designed to meet specific requirements. Our engineers will be pleased to discuss your application.



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HANDLING PRECAUTIONS FOR UPS-600

DC VOLTAGE:

Never apply a DC voltage to the UPS-600. Only a symmetrical AC excitation voltage under 6 VAC should be used. The nominal frequency should be between 33 to 1000 Hz. Be sure to allow enough time for the UPS-600 to stabilize as it has a longer response time than the UPS-500. The excitation can be a sawtooth, square, or sine wave with no DC bias. DC voltage (including DC pulses) will polarize the sensor resulting in an irreversible shift. Never connect the sensor to an ohmmeter.

CONDENSATION, FOG, MIST OR LIQUID WATER:

The polymer coating of the UPS-600 allows it to be exposed to condensation with recovery after the sensor dries out. The dryout period may take several minutes; however, there will not be a permanent shift in calibration. Faster dryout periods are facilitated with moving air. Immersion in water or any other liquid is not recommended.

TEMPERATURE LIMITS:

The operating temperature limit for the UPS-600 is -20° to +160°F.

CHEMICAL VAPORS:

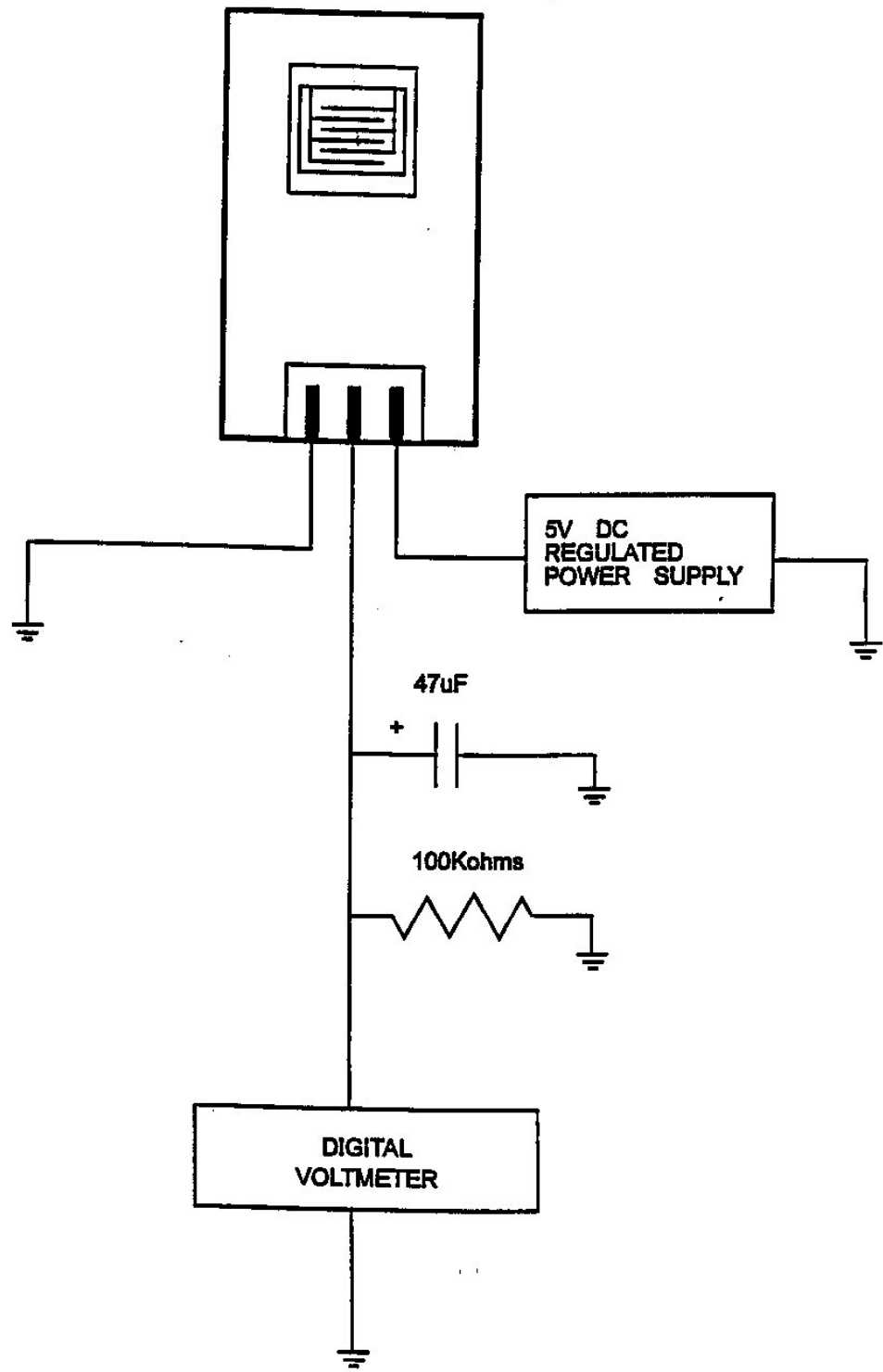
Alcohols and other polar compounds typically cause a temporary shift. Reactive chemicals such as sulfides, halogens, mercury vapor, acids and ketones should be avoided. Hydrocarbons or oil mist tend to condense as a varnish which slows the response time of the sensor.

PHYSICAL CONTAMINANTS:

When used in environments with dust and oil mist, a filter must be utilized. The UPS-600 may be used at high static pressures (>6000 psi). High absolute vacuum should be avoided.

INSTALLATION OF SENSORS:

Sensors must be hand soldered. Heat sink should be used on the sensor legs when soldering to prevent excessive heat reaching the pad on the sensor body. Carefully clean solder excess with a solder cleaner, but do not get any cleaner on the sensor itself.



UPS-600 RESISTIVE HUMIDITY SENSORS

Temperature Compensation

The average coefficient for temperature compensation of the UPS-600 Sensor works out to -0.7% RH/ °C (-0.4% RH/ °F). The correction factor is computed with the expression:

$$C = -0.7(T-25)$$

C = the correction factor in percent to be algebraically added.
T = the temperature in °C.

For example: A sensor in an environmental condition of 35 °C and 50% RH provides an impedance of 18.5kΩ. This impedance with reference to 25 °C equals about 57% RH therefore 7% must be subtracted to obtain the correct reading. Likewise with a sensor in an environmental condition of 15 °C and 50% RH will read an impedance of 80.9kΩ. This impedance when referenced to 25 °C equals about 43 % RH, therefore 7% must be added.

The temperature coefficient is optimized for the median %RH and temperature range between 30 and 70% RH and 15 to 35 °C. When the sensor is operated outside these limits the accuracy of the coefficient decreases.

UPS-600 Equation

With microprocessor based circuitry an alternative method of converting the sensor's impedance to %RH with respect to temperature is expressed as:

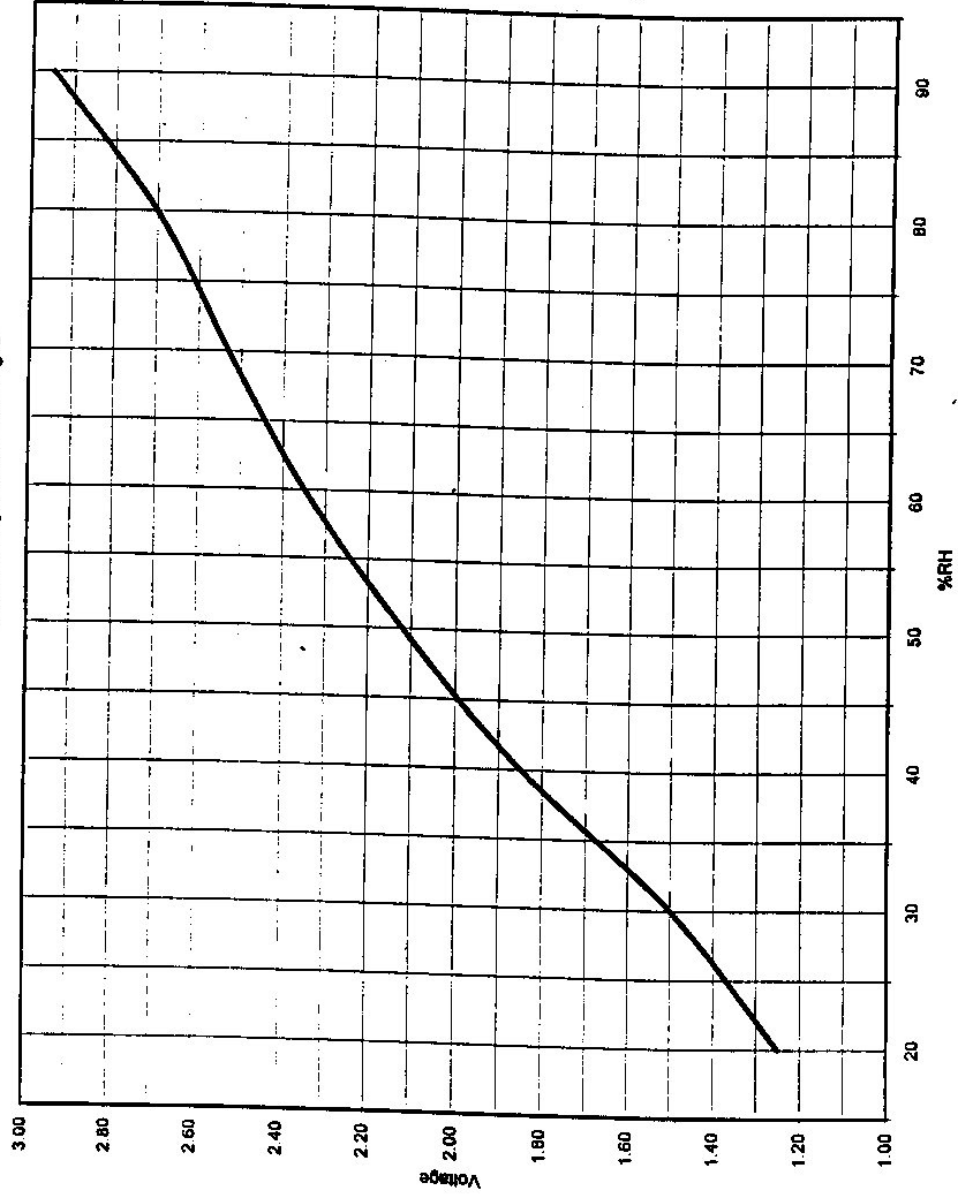
$$\%RH = A(CZ)^{\frac{T+459.7}{D(T+459.7)+B}}$$

Z = the impedance of the UPS-600 sensor in MΩ.
A, B, C, D = constants for specific impedance ranges.
T = Dry bulb temperature in °F.

Z in MΩ	A	B	C	D
0.4 < Z	5.587129	-5315.366	192689.2	5.895
0.005 < Z <= 0.4	2.269574	-7781.989	74643.52	9.2477
Z <= 0.005	6.385429	-4788.52	189596900	2.5813

The equation is valid over the temperature range of 59 to 113 °F (15 to 45 °C). Agreement to the empirical data is about 2% from 25 to 90 %RH and 3% from 10 to 25 %RH.

SC-600 Voltage vs %RH at 25 deg. C



UPS-600 DATA SHEET

10	%RH	208.09E+6	OHMS	deg C	15	37	%RH	700.91E+3	OHMS	deg C	15	64	%RH	19.54E+3	OHMS	deg C	15
11		137.44E+6		15		38		624.11E+3		15		65		17.87E+3		15	
12		94.12E+6		15		39		557.40E+3		15		66		16.37E+3		15	
13		66.44E+6		15		40		499.26E+3		15		67		15.01E+3		15	
14		48.12E+6		15		41		448.39E+3		15		68		13.79E+3		15	
15		35.64E+6		15		42		403.75E+3		15		69		12.67E+3		15	
16		26.92E+6		15		43		192.72E+3		15		70		11.67E+3		15	
17		20.67E+6		15		44		168.83E+3		15		71		10.75E+3		15	
18		16.12E+6		15		45		148.35E+3		15		72		9.92E+3		15	
19		12.74E+6		15		46		130.72E+3		15		73		9.16E+3		15	
20		10.19E+6		15		47		115.51E+3		15		74		8.47E+3		15	
21		8.24E+6		15		48		102.33E+3		15		75		7.84E+3		15	
22		6.73E+6		15		49		90.88E+3		15		76		7.27E+3		15	
23		5.55E+6		15		50		80.90E+3		15		77		6.74E+3		15	
24		4.61E+6		15		51		72.19E+3		15		78		6.26E+3		15	
25		3.86E+6		15		52		64.55E+3		15		79		5.82E+3		15	
26		3.25E+6		15		53		57.85E+3		15		80		5.41E+3		15	
27		2.76E+6		15		54		51.95E+3		15		81		5.04E+3		15	
28		2.36E+6		15		55		46.74E+3		15		82		4.47E+3		15	
29		2.02E+6		15		56		42.14E+3		15		83		4.12E+3		15	
30		1.75E+6		15		57		38.06E+3		15		84		3.81E+3		15	
31		1.51E+6		15		58		34.43E+3		15		85		3.52E+3		15	
32		1.32E+6		15		59		31.21E+3		15		86		3.26E+3		15	
33		1.15E+6		15		60		28.33E+3		15		87		3.01E+3		15	
34		1.01E+6		15		61		25.76E+3		15		88		2.79E+3		15	
35		892.65E+3		15		62		23.46E+3		15		89		2.59E+3		15	
36		789.66E+3		15		63		21.39E+3		15		90		2.41E+3		15	

UPS-600 DATA SHEET

%RH	OHMS	deg C	%RH	OHMS	deg C	%RH	OHMS	deg C	%RH	OHMS	deg C
10	52.21E+6	25	37	183.72E+3	25	64	10.34E+3	25			
11	35.63E+6	25	38	159.71E+3	25	65	9.53E+3	25			
12	25.14E+6	25	39	139.35E+3	25	66	8.79E+3	25			
13	18.24E+6	25	40	122.00E+3	25	67	8.13E+3	25			
14	13.55E+6	25	41	107.16E+3	25	68	7.52E+3	25			
15	10.28E+6	25	42	94.42E+3	25	69	6.96E+3	25			
16	7.94E+6	25	43	83.44E+3	25	70	6.46E+3	25			
17	6.23E+6	25	44	73.95E+3	25	71	5.99E+3	25			
18	4.95E+6	25	45	65.72E+3	25	72	5.57E+3	25			
19	3.99E+6	25	46	58.56E+3	25	73	5.18E+3	25			
20	3.25E+6	25	47	52.30E+3	25	74	4.54E+3	25			
21	2.67E+6	25	48	46.83E+3	25	75	4.17E+3	25			
22	2.21E+6	25	49	42.02E+3	25	76	3.83E+3	25			
23	1.85E+6	25	50	37.79E+3	25	77	3.53E+3	25			
24	1.56E+6	25	51	34.06E+3	25	78	3.25E+3	25			
25	1.33E+6	25	52	30.76E+3	25	79	3.00E+3	25			
26	1.13E+6	25	53	27.83E+3	25	80	2.77E+3	25			
27	974.76E+3	25	54	25.23E+3	25	81	2.56E+3	25			
28	842.55E+3	25	55	22.91E+3	25	82	2.37E+3	25			
29	732.00E+3	25	56	20.84E+3	25	83	2.19E+3	25			
30	639.00E+3	25	57	18.99E+3	25	84	2.03E+3	25			
31	560.31E+3	25	58	17.33E+3	25	85	1.88E+3	25			
32	493.36E+3	25	59	15.84E+3	25	86	1.75E+3	25			
33	436.12E+3	25	60	14.51E+3	25	87	1.63E+3	25			
34	286.44E+3	25	61	13.30E+3	25	88	1.51E+3	25			
35	245.99E+3	25	62	12.21E+3	25	89	1.41E+3	25			
36	212.16E+3	25	63	11.23E+3	25	90	1.31E+3	25			

UPS-600 DATA SHEET

%RH	OHMS	deg C	%RH	OHMS	deg C	%RH	OHMS	deg C
10	14.33E+6	35	37	78.26E+3	35	64	5.70E+3	35
11	10.08E+6	35	38	68.89E+3	35	65	5.29E+3	35
12	7.32E+6	35	39	60.84E+3	35	66	4.92E+3	35
13	5.45E+6	35	40	53.91E+3	35	67	4.58E+3	35
14	4.15E+6	35	41	47.90E+3	35	68	4.26E+3	35
15	3.21E+6	35	42	42.69E+3	35	69	3.71E+3	35
16	2.53E+6	35	43	38.15E+3	35	70	3.40E+3	35
17	2.03E+6	35	44	34.18E+3	35	71	3.12E+3	35
18	1.64E+6	35	45	30.69E+3	35	72	2.87E+3	35
19	1.34E+6	35	46	27.63E+3	35	73	2.64E+3	35
20	1.11E+6	35	47	24.93E+3	35	74	2.43E+3	35
21	929.79E+3	35	48	22.54E+3	35	75	2.24E+3	35
22	783.25E+3	35	49	20.43E+3	35	76	2.07E+3	35
23	664.86E+3	35	50	18.55E+3	35	77	1.91E+3	35
24	568.32E+3	35	51	16.87E+3	35	78	1.77E+3	35
25	488.92E+3	35	52	15.38E+3	35	79	1.64E+3	35
26	423.10E+3	35	53	14.04E+3	35	80	1.52E+3	35
27	353.02E+3	35	54	12.84E+3	35	81	1.41E+3	35
28	296.67E+3	35	55	11.76E+3	35	82	1.31E+3	35
29	250.85E+3	35	56	10.79E+3	35	83	1.21E+3	35
30	213.31E+3	35	57	9.91E+3	35	84	1.13E+3	35
31	182.36E+3	35	58	9.12E+3	35	85	1.05E+3	35
32	156.67E+3	35	59	8.41E+3	35	86	979.41E+0	35
33	135.24E+3	35	60	7.76E+3	35	87	913.24E+0	35
34	117.25E+3	35	61	7.17E+3	35	88	852.21E+0	35
35	102.07E+3	35	62	6.63E+3	35	89	795.89E+0	35
36	89.21E+3	35	63	6.14E+3	35	90	743.86E+0	35

UPS-600 DATA SHEET

%RH	OHMS	deg C	%RH	OHMS	deg C	%RH	OHMS	deg C
10	4.27E+6	45	37	35.17E+3	45	64	3.14E+3	45
11	3.09E+6	45	38	31.33E+3	45	65	2.87E+3	45
12	2.30E+6	45	39	27.99E+3	45	66	2.63E+3	45
13	1.76E+6	45	40	25.07E+3	45	67	2.41E+3	45
14	1.37E+6	45	41	22.53E+3	45	68	2.21E+3	45
15	1.08E+6	45	42	20.29E+3	45	69	2.03E+3	45
16	869.01E+3	45	43	18.32E+3	45	70	1.87E+3	45
17	707.77E+3	45	44	16.58E+3	45	71	1.72E+3	45
18	583.25E+3	45	45	15.04E+3	45	72	1.59E+3	45
19	485.69E+3	45	46	13.67E+3	45	73	1.47E+3	45
20	408.27E+3	45	47	12.45E+3	45	74	1.36E+3	45
21	411.01E+3	45	48	11.36E+3	45	75	1.25E+3	45
22	335.86E+3	45	49	10.39E+3	45	76	1.16E+3	45
23	276.93E+3	45	50	9.52E+3	45	77	1.08E+3	45
24	230.22E+3	45	51	8.73E+3	45	78	999.58E+0	45
25	192.84E+3	45	52	8.03E+3	45	79	928.62E+0	45
26	162.65E+3	45	53	7.39E+3	45	80	863.51E+0	45
27	138.08E+3	45	54	6.82E+3	45	81	803.68E+0	45
28	117.91E+3	45	55	6.29E+3	45	82	748.65E+0	45
29	101.25E+3	45	56	5.82E+3	45	83	698.00E+0	45
30	87.40E+3	45	57	5.39E+3	45	84	651.32E+0	45
31	75.80E+3	45	58	5.00E+3	45	85	608.25E+0	45
32	66.05E+3	45	59	4.64E+3	45	86	568.49E+0	45
33	57.79E+3	45	60	4.55E+3	45	87	531.75E+0	45
34	50.77E+3	45	61	4.14E+3	45	88	497.76E+0	45
35	44.76E+3	45	62	3.77E+3	45	89	466.29E+0	45
36	39.61E+3	45	63	3.44E+3	45	90	437.13E+0	45

UPS-600 DATA SHEET

		All resistance values are in K-ohms			
	RH	45 DEG C	35 DEG C	25 DEG C	15 DEG C
	10	3872.22			
	15	1261.11	3555.56	8352.63	
	20	414.72	1087.94	3231.58	
	25	197.22	488.11	1405.26	4947.37
	30	91.72	211.50	524.53	1936.84
	35	45.56	99.67	238.68	768.95
	40	24.39	50.56	114.16	305.00
	45	15.00	30.17	66.37	138.53
	50	9.44	18.89	38.00	90.68
	55	6.21	11.94	23.00	48.16
	60	4.42	7.78	14.74	28.32
	65	2.84	5.56	9.63	18.47
	70	2.15	3.27	6.46	11.16
	75	1.23	2.23	4.30	7.47
	80	0.79	1.52	2.65	5.32
	85		1.10	1.83	3.58
	90		0.79	1.24	2.58