腾星传感
TENSEN

Macromolecule Humidity Sensor

Manual

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Taiyuan Tengxing Sensor Technology Co., Ltd

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Macromolecule Humidity Sensor

Overview

The humidity sensor is made of high polymer humidity sensitive material. In wet conditions, water molecules are adsorbed by polar group on the surface of martial. And as the humidity increases, the quantity of water molecules will be changed accordingly. The adsorbed water is gradually condensing and coming into be liquid, which is electrolyte solution with current channel quality.

With the humidity increasing, macromolecule will swell, interior free volume will be bigger, carrier will be increased and the activated energy of macromolecule polyelectrolyte counter-ions will decrease, drift mobility will increase and impedance will decrease. And then when humidity decreases, water molecules are released from ion polymer and the resistor of material will increase. The environment humidity can be monitored through testing the impedance.

Features

Wide humidity detected rang
Fast response
Small Humidity hysteresis error
Simple manufacture
Easy integration

Application

Humidity sensor, as an important chemical sensor, which is widely used in fields of warehousing, industry production, and process control, environmental monitoring, home appliances and meteorology etc.

Technical specification Basic testing circuit

	Temperature	Humidity
Working range	0~60°C	10~90%RH
Storage range	-25~70°C	≤60%RH
Detection range	10~90%RH(0~60℃)	
Rated voltage	1.5V AC(MAX, sine wave)	
Rated power	0.2mW(MAX, sine wave)	
Working frequency	500Hz~2kHz	
Nominal value &range	31 (20～50) KΩ(60%RH, 25°C)	
Temperature Character	≤0.5%RH/°C	
Hysteresis	±2%RH	
Response time	Moisture absorption：≤30s Dehumidification：≤40s	
Stability	2%RH/year	
Accuracy	3%RH	
Lifespan	3-5years	

Testing voltage：2.5V

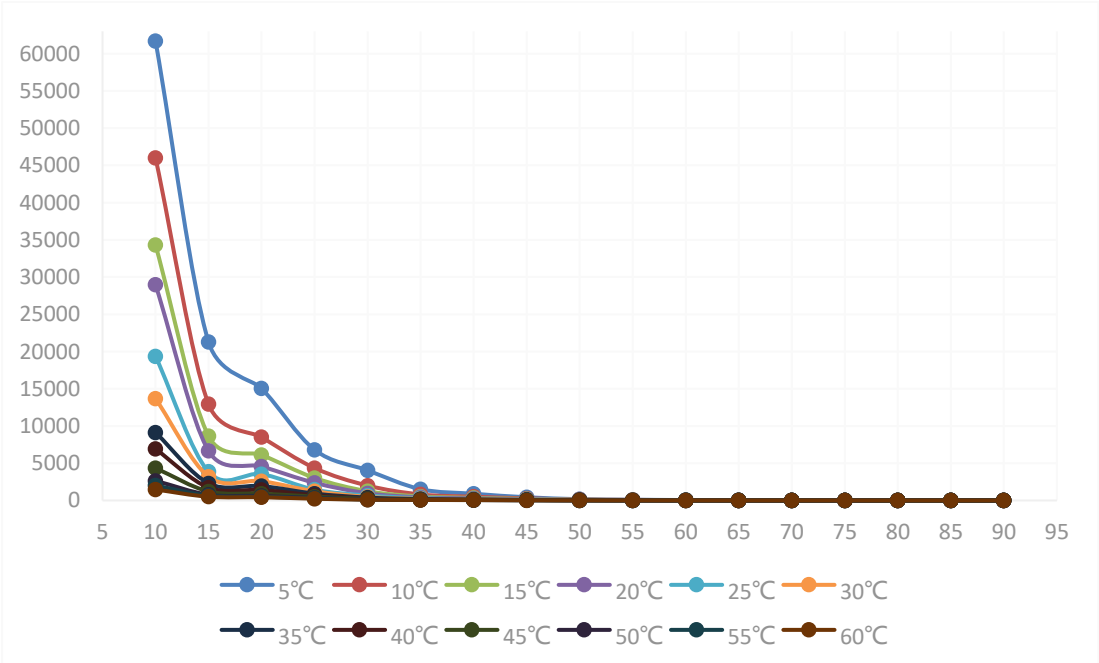
Impedance characters

Test conditions: 1V, 1KHz, temperature and humidity verification box, cold mirror dew point instrument to monitor the temperature and humidity environment, impedance unit: KΩ

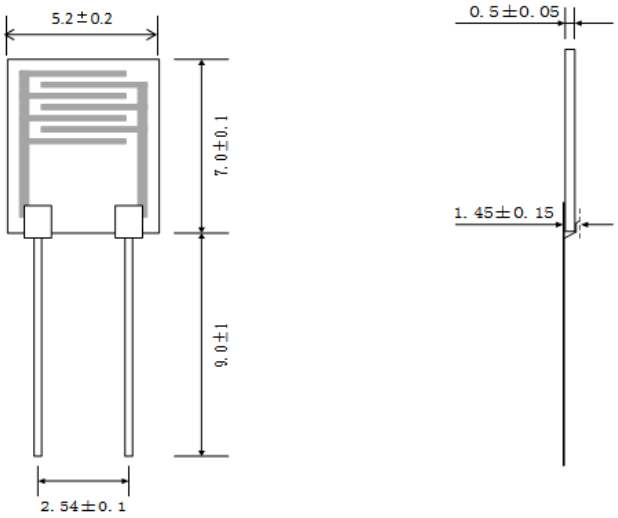
	Temperature/℃											
Hum/ %RH	5	10	15	20	25	30	35	40	45	50	55	60
10	61700	46000	34300	28964	19367	13681	9123	6910	4337	2642	2012	1474
15	21288	12942	8644	6655	3856	3204	2302	1732	1213	765	640	503
20	15039	8504	6113	4576	3535	2592	1938	1404	919	612	506	434
25	8308	4751	3724	2876	1747	1539	1125	704	523	343	295	235
30	4036	2597	1539	1163	769	583	465	277	220	149	125	104
35	1915	1308	671	517	401	289	241	140	121	86.4	76.5	69.2
40	1101	787	452	335	233	207	143	99.1	84.6	62.8	55.6	50.7
45	431	278	199	157	120	92.6	73.8	58	48.7	36.8	31.8	27.6
50	173	125	99	73	59	43.3	39.2	28.1	23.6	18.3	16.1	13.5
55	101	78.2	62	49.5	41.8	32.1	25.3	18.7	15.7	12.3	10.5	9
60	55.8	45.9	38.6	33.2	31	21.5	16.3	12.2	10.1	8.4	7.2	6.3
65	35.3	27.9	22.3	18.3	15.1	13.1	10.8	8.6	7.2	5.8	5.1	4.3
70	16.6	13.3	11.2	9.7	8.7	7.1	6.3	5.8	5.1	4.5	3.9	3.3
75	13.2	10.4	8.5	7.3	6.3	5.1	4.1	3.7	3.2	2.4	1.9	1.4
80	9.9	7.1	5.9	4.4	3.8	3.2	2.8	2.6	2.0	1.5	1.2	1
85	6.4	5.4	4.2	3.1	2.7	2.4	2.2	2	1.6	1.3	1	0.8
90	4	3.2	2.6	1.8	1.5	1.3	1.2	1.1	1	0.9	0.8	0.6

Temperature & Humidity Characteristic Curve

Y-axis: resistance value



Sensor Structure

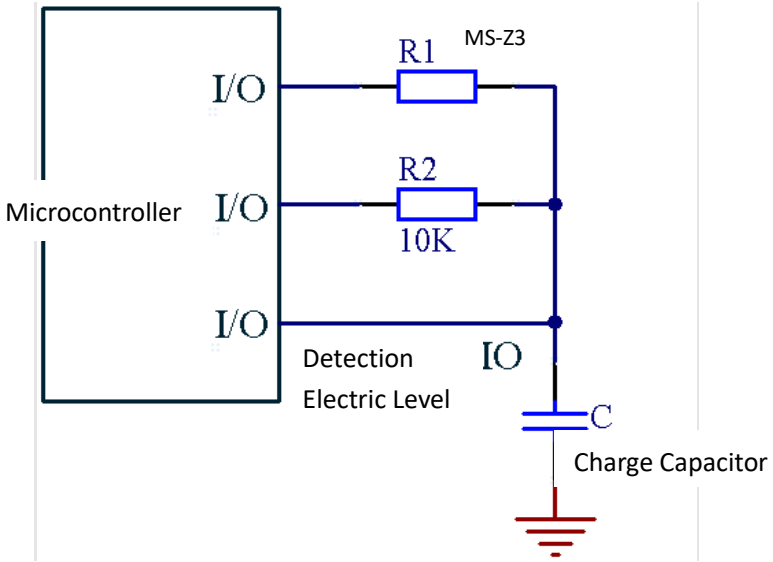


Application Circuit

Working principle: Use IO port of single-chip microcomputer to have an output of a square wave of 1KHz. Charge capacitor through R1 (humidity resistor MS-Z3).

Note down charging time when IO port's low level reverts to high level, and then get humidity value by calculation.

Note: the ratio of the high level should be higher than that of low level, otherwise it cannot be fully charged.



Note

- In order to prevent polarization, the voltage or current used to drive the sensor should not contain DC components;
- Do not touch the surface of the component;
- Use the LCR AC bridge for measurement. Do not use a multimeter for measurement.
- Avoid condensation;
- It is strictly prohibited to put the product in the gas environment with corrosive &

organic steam for a long time;

- Do not use reflow welding to weld components. The welding time should be controlled within 5S.
- Recommended storage conditions: The temperature ranges from 10 °C to 40 °C, and the humidity is below 60%RH.