FORMALDEHYDE GAS MODULE

TB600B-WQ-HCHO

Application Specification

Printed solid polymer Gas sensor

Small size | Long lifetime | Low cost | High accuracy | Fast response | Micro-power consumption

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TB600B Formaldehyde Gas Detection Module Specification

→New improvement and upgrade of formula, material and production process for 4th generation formaldehyde sensors.

→Strong anti-interference performance, good anti-interference ability to low concentration of ethanol, CO, Aromatic Hydrocarbons, Odor, Smoke, Air freshener etc.

→The new micro circuit design, easy to use, short warm time

→T100 is quickly response, F100 is quickly go down

→Independent temperature and humidity digital sensor, combined with intelligent algorithm leads to stronger environmental adaptability, higher accuracy and long-term stability.

General description

TB600B Formaldehyde module is high quality product, the core sensor adopts EC Sense solid polymer HCHO gas sensor which is the smallest volume of electrochemistry field in the world. It can replace our nose to detect toxic and harmful air elements, and achieve monitoring to air pollution gas, accurately. UART digital signal output gets rid of customers' understanding of sensor application and tedious work of calibration.

Application

Household and furniture decoration of commercial area and materials ---generating For maldehyde gas Air pollution detection from household and commercial decoration

Air purification equipment

The effect of purification can be monitored through the detection of formaldehyde in the air before and after purification result at anytime and anywhere, and to realize automatic control of purification and primary air equipment, achieve efficient removal of formaldehyde and a clean air environment

Vehicle air pollution detection

our nose insensitivity to harmful gas when adaptive air situation in the car. but the detection module can detect the air in real time, realize internal/external circulation setting by the linkage with air conditioning, or prompt to open the Windows, or the linkage of vehicle-mounted air cleaner equipment to ensure good air quality in the Vehicle, and ensure our health and comfort.

→**Household and commercial air cleaning equipment**

→**air quality detection**

→**Instrument and vehicle indoor air quality detection and vehicle indoor air cleaning**

→**Fresh air system and equipment**

→**Wearable devices**

Future

→ high precision, long lifetime, low temperature resistance

→ Fast response, Back to zero quickly. On the measurement, No warm-up

→ Good anti-toxicity

→ using simple, UART Digital signal output

→ Durable and reliable of German sensors

→ Excellent accuracy, repeatability, linearity and consistency

→ No calibration, no zero drift

→ strong resist to electromagnetic interference

→ Fixed mounting hole, easy to assemble
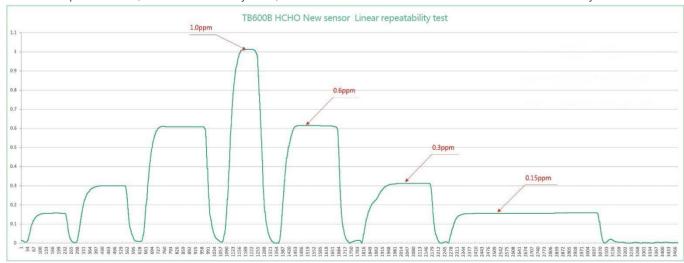
Principle - Solid Polymer Electrochemistry

The electrochemical sensing technology of solid polymer is a revolutionary innovation of electrochemical detection technology field. The principle is based on the of electrochemical gas detection, which is used to detect gases that can be chemically decomposed.

The sensor consists of 3 electrodes in contact with the electrolyte, typical electrodes that composed of large surface area noble metals and othermatrix materials. The electrode and electrolyte by contact air, and the gas diffuses into the working electrode of the sensor through the back of the porous film. The gas is oxidized or reduced reaction on the electrode. This electrochemical reaction generation the electricity flowing through the
external circuit.

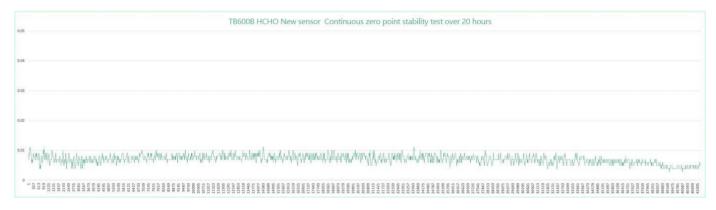## Linear repeatability test of formaldehyde sensor

Environment temperature：19℃；Environment humidity：50%； Air chamber volume：25cm^3；   Vent flow rate of the distribution system：6000sccm

TB600B HCHO New sensor Linear repeatability test

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Interference gas

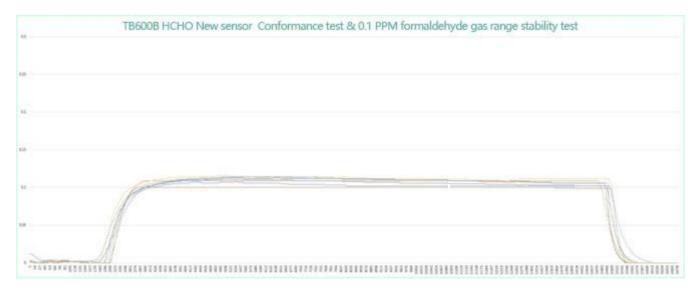| Gas name	Gas molecules	Aeration concentration (ppm)	Interference response (ppm)
Ethyl alcohol	C2H6O	10	0.35
Carbon monoxide	CO	5	0.35
Carbon dioxide	CO2	2000	0
Hydrogen	H2	1000	6.4
Hydrogen sulfide	H2S	1	1.15
Nitrogen dioxide	NO2	10	0
Sulfur dioxide	SO2	3	0
Methane	CH4	1000	0
Methylbenzene	C7H8	0.5	0
Xylene	C7H10	0.5	0

Formaldehyde sensor Continuous zero point stability test over 20 hours

Environment temperature：19℃； Environment humidity：45%； Environment space：3m³clean room，Turn on the fresh air system and air purifier before the test to ensure relatively clean air indoor.

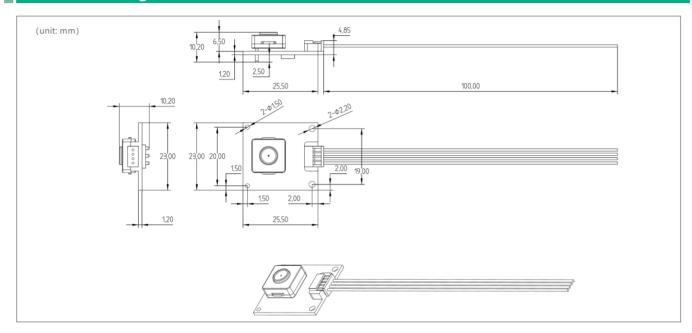TB600B HCHO New sensor Continuous zero point stability test over 20 hours

Formaldehyde sensor Conformance test & 0.1 PPM formaldehyde gas range stability test

Environment temperature：19℃； Environment humidity：50%； Air chamber space：25cm3； Vent flow rate of the distribution system：7000sccm；
Formaldehyde gas concentration：0.1ppm

TB600B HCHO New sensor Conformance test & 0.1 PPM formaldehyde gas range stability test

Structure diagram

(unit: mm)

Selection table

Product name	Order number	Detection range	Index resolution
TB600B type Formaldehyde gas detection module	TB600B -WQ-HCHO-1	0-1ppm	0.001ppm

Note: If you have any special requirements, please contact our company for customization

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Technical parameters

Detection Principle	EC Sense solid polymer electrochemical detection technology Part number
Part number	TB600B-WQ-HCHO-1；
Gas	Formaldehyde
Detection range	0-1ppm · Maximum load range：2ppm；
Minimum detection limit	0.01ppm
Linear accuracy error	0.08ppm error±5ppb； 0.15ppm error ±8ppb；
	0.30ppm error ±10ppb； Above0.60ppm error±20ppb；
Warm-up time	Store in clean air, first power on<60s
	Store in unclean air, first power on <180s
Response time	<3s （T50: <40s； T90: <80s； T100: <120s；）
Reset time	0.10ppm reset time<40s； 0.15ppm reset time<60s；
	0.30ppm reset time<80s； 0.60ppm reset time<120s；
Calibration material	0.6ppm range：0.3ppm Formaldehyde gas calibration; 1ppm range：0.6ppm Formaldehyde gas calibration；
	Note: the smaller the range, the higher the detection accuracy. Users are not
Lifetime expectancy	Over 3 years under clean air、temperature within 0-25℃、humidity within 30-70%
Safety alarm value	First class：0.05ppm sensitization；second class：0.08ppm carcinogenesis
Relative temperature error	±0.2℃（typical value）
Relative humidity error	±2%（typical value）
Output signal	3.3V level UART digital signal (See below for communication protocol)
	Interface definition: VCC- red, GND- black, RX- yellow, TX- green;
	Poter rate: 9600, data bits: 8 bits, stop point: 1 bit；
Get data command	For the convenience of user testing, factory default for active upload, concentration value is upload every 1
	second Gas concentration = high gas concentration *256+ low gas concentration.
	See details in《TB600 Gas detection module series operating instructions 》
Working voltage	4.5-5.5V DC
Working current	5V DC @ 5mA
Power consumption	25mW @ 5V DC
Accuracy	±5% FSD
Repeatability	±1% FSD
Operating temperature	-20~55℃
Optimum operating temperature	25℃
Operating humidity	10%-95% RH.
Optimum operating humidity	50% RH.
Operating pressure	Barometric pressure±10%
Circuit board size	23 x 25.5X10.2mm（with sensor）
Circuit board size	23 x 25.5X4.85mm（without sensor）
Weight	3.1g
Signal line	Standard length is shown in the figure. It can be customized for special requirements

Notes and Instructions

Thank you for choosing the solid polymer gas sensor of German EC Sense. Before use, please read this document carefully to use our products correctly and effectively.

Sensor storage：

1. The best environment conditions for TB600B formaldehyde sensor module storage: temperature 5 ℃ ~25 ℃, relative humidity 25% ~ 50% (condensation);
2. The storage environment shall be kept clean with no pollution gas, high concentration organic gas, dust and smoke;
3. Avoid storage with liquid and solid states of alcohol (ethanol), perfume, sodium silicate and polyurethane components.

Packaging and transportation of sensors：

1. Avoid direct sunlight for a long time in the transportation process to prevent the rain from penetrating;
2. Transport packaging should be shockproof bubble film or no odor environmental friendly sponge;
3. During long-term and long-distance transportation process, temperature inside sensor packaging should be kept within 50 ℃, the highest temperature should not exceed 55 ℃;

Sensor usage：

1. The main function of the gas sensor is to detect the composition and content of the gas, please avoid liquid contact with any parts of sensor.

2. The three pin electrodes of the sensor cannot be connected reversely. Reverse connection may lead to permanent damage of the internal electrode of the sensor due to high current.

3. Different gas sensors have different concentration measurement span (range), it is not allowed to measure high concentration gas over the measuring range for a long time in use.

4. The white or yellow sheet on the sensor is waterproof and breathable film, please pay attention not to scratch it off.

5. The ventilation surface of the sensor should not be blocked or contaminated. Sometimes, blockage is the reason for the reduced sensitivity and response time.

6. When using the sensor in the condition of pumping and suction detection, the gas flow shall be controlled within 400ml-800ml per minute.

7. Avoid measured gas blowing from the front side when determining the gas sensitivity, and use the standard gas cap with both inlet and outlet

 (small inlet and large outlet in normal conditions).

8. The pin shall not be broken or bent or the internal structure of the sensor may be damaged.

9. Avoid excessive impact or vibration. If the shell is damaged, please make sure the structure is intact. If the shell is cracked and the internal structure is exposed, the output is not reliable anymore (the signal may be too large, too small or with no output).

10. It takes time to recover to the initial state after long-term use in high concentration gas environment, and the recovery speed is proportional to the multiple of the over range.

11. Avoid long-term contact with high concentration and strong viscosity of the gas when the sensor works under a low range within 2ppm.

12. Please do not disassemble the sensor optionally, or it will damage the sensor.

13. Not need to do electrical level pin short connection for EC Sense sensor.

14. ES1 series sensor pin can be directly welded (temperature should not be too high< 300 ° C, and the shorter the duration, the better, high

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15. Calibration and testing, the electrochemical gas sensor and reactivity of target gas will change over time with temperature and humidity, and they are detected using the relative comparison method: Use a zero and a standard concentration gas to calibrate linear change for a standard curve. When measuring, compare the electrical signals generated from target gas with that generated from standard gas to calculate the accurate gas density. Therefore, zero calibration of equipment at any time and constant calibration of equipment are necessary to ensure accurate measurement.

16. Cross-interference of sensors. Generally speaking, each sensor corresponds to a specific detection gas, but no gas sensor can be absolutely specific. Therefore, when using the gas sensor, the interference of other gases should be avoided to ensure the accurate detection of the specific gas.

17. Measuring range and accuracy: Select the gas sensor that matches the range and precision according to the application and requirements; Otherwise, it may not be able to distinguish the gas and provide accurate data and the sensor can be damage.

Notes and Instructions

Sensor quality inspection

1.Each sensor produced by EC Sense has an ex-factory inspection and test report, and the comprehensive performance test is carried out on the main indicators of the sensor;

2.All formaldehyde modules are ventilated and calibrated through formaldehyde standard gas to ensure the consistency and accuracy of the sensor.

Special remarks

1. When the TB600B Formaldehyde sensor module is with no electricity for a long time, it needs a certain stable time for the first time when it is powered on. Generally, in the condition of clean air, the stable time of the sensor can reach optimal working state within 3 minutes.

2. During on-site detection of formaldehyde gas, the interference of other on-site gases on the formaldehyde sensor should be avoided or it may lead to a larger error rate of detection results;

3.To ensure the long life of the sensor and the best working state, the sensor should be kept in the continuous power state as far as possible due to the characteristics of the electrochemical sensor.

4.Formaldehyde gas detection module shall not be stored and used in conditions with humidity below 10% and temperature above 60 ° C degrees for a long time. Otherwise, the sensor life will be reduced or failure will occur;

5.When the formaldehyde sensor module encounters high concentration gas in use, such as formaldehyde gas, ethanol gas and volatile organic gas, the normal recovery time is slow, and the recovery time can be shortened by placing in a clean air environment.

Disclaimer for product usage

To ensure the normal use, users should strictly follow the relevant instructions listed in this document when using the tb600b-hcho-1 formaldehyde sensor module due to the principle and characteristics of the solid-state polymer electrochemical sensor. EC Sense does not accept any responsibility for any quality problems caused by improper storage and usage.

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