

ECtox Gas Sensor Device

Operating Manual



ECtox Gas Sensor Device Operating Manual

Easy Gas Sensor Device Innovations

Warning

Ensure that you have read and understood the instructions in this manual prior to initial operation and follow the relevant industry standards.

It is strictly prohibited to use this product in or near concentrated volatile fuels and chemicals.

Please do not paint the sensor and the sensor housing.

It is strictly prohibited to change the model, specifications and parameters of the circuit and related components of this product without authorization.

Product Overview

The ECtox Gas Sensor Device has numerous high-precision detection technologies, which are characterized by a long service life and a wide detection range, solving the problem of rapid sensitivity attenuation of conventional electrochemical gas sensors. Normally with highly concentrated gases, the consumption rate of the sensor accelerates, resulting in irreversible damage to the sensor and thus frequent replacement, which in turn increases maintenance and costs. ECtox has made targeted improvements to this problem by using solid-state polymer electrochemical gas sensors.

The Sensor Device is available in high temperature versions that can detect gases at temperatures of up to 200°C. ECtox has a built-in micro gas sampling device that easily supplies gases to the gas sensor. Thanks to the electrochemical solid-state polymer gas sensor technology, the entire ECtox product range is calibration and maintenance-free.

The ECtox Device provides RS485 (Modbus-RTU) output signals which can be connected to various system devices such as controllers, DCS, PLC, etc.

The ECtox Gas Sensor Devices have been developed according to the following standards:

GB 12358-2006 General technical requirements for gas detection and alarm devices for the workplace environment

GB 3836.1-2010 Explosive atmosphere Part 1: General requirements for equipment

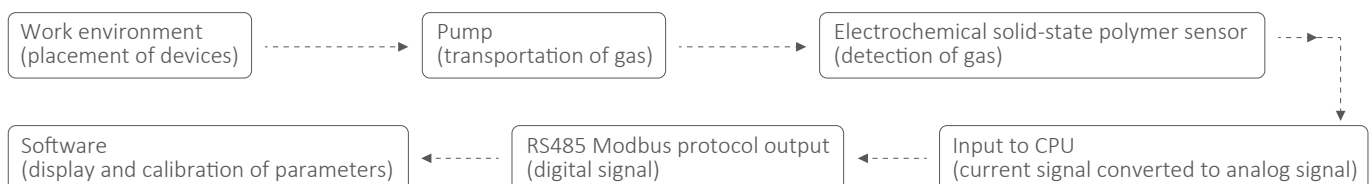
GB 3836.4-2010 Explosive atmosphere Part 4: Equipment protected by intrinsic safety type "i"

GB/T 4208-2017 Housing protection level (IP Code)

Detection Principle

The ECtox Gas Sensor Device operates with an electrochemical solid-state polymer sensor. Within the measurement range, the built-in gas sampling device delivers a quantitative amount of the measured gas to the working electrode of the sensor. Based on the principle of electrochemical catalytic reaction, electrochemical redox reactions occur on the porous micro surface of the electrode. The solid-state electrolyte conducts the electron transfer and emits a current signal, whose magnitude can characterize the gas concentration.

Functional Diagram:

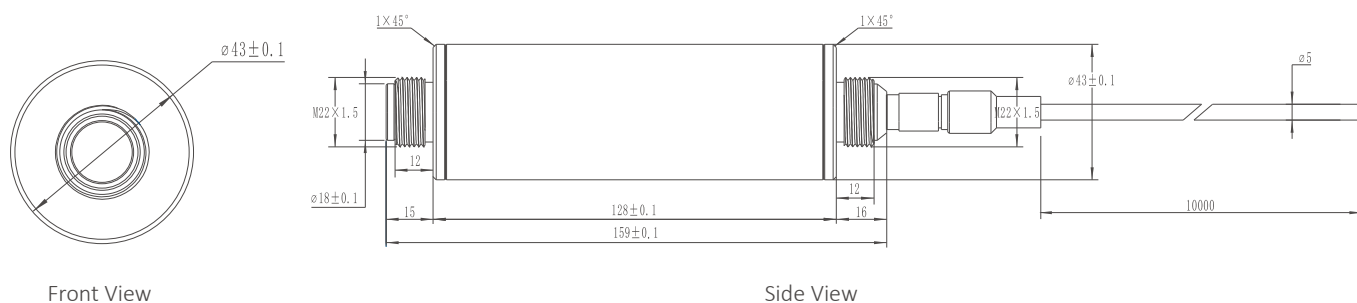


Technical Parameters (refer to Technical Specifications)

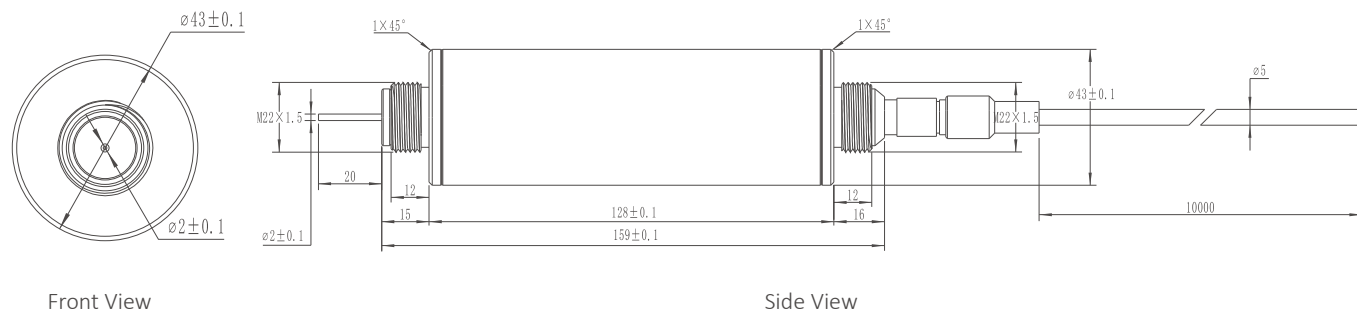
Principle	Solid Polymer Electrochemical Detection Technology	
Full-scale Accuracy Error	± 5% F.S	
Repeatability	≤ 2%	
Settling Time	It takes 60 minutes to reach measurement stability in the measured environment after powering on for the first time.	
Response Time	Real-time monitoring, data collection cycle customization	
Sensor Expected Life Time	≥ 2 years	
Output	RS485 (Modbus protocol), Baud rate: 9600 4Pin Leomo Cable with 10m (Other lengths on request)	
Get Data Command	See ECtox protocol document for details	
Working Voltage	5V to 12V DC	
Maximum Current Consumption	1A	
Maximum Power Consumption	5W	
Working Temperature	-20°C to +55°C	
Optimal Working Temperature	25°C	
Working Humidity	15% to 95% RH. Non-condensing	
Optimum Working Humidity	50% RH.	
Working Pressure	Atm ± 10% Keep Stable Pressure	
Measured Gas Environment Temperature and Humidity Range	-20°C to +200°C, 5% to 95% RH. Non-condensing	
Size	159 x 43 (mm)	
Weight	ECtox: 450 g	
Temperature and Humidity Sensor Data	Temperature Range: -40°C to +85°C Humidity Range: 10% to 95% RH. Non-condensing	Relative Error: ± 0.2°C Relative Error: ± 2%
Warranty	12 months from date of shipment	

Product Structure Diagram

Standard Structure Diagram



High Temperature Version Structure Diagram



Installation

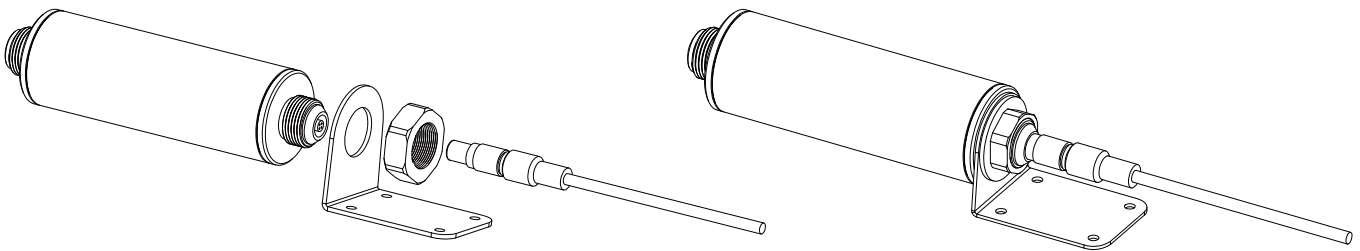
Selection of Diffusion Installation Position

- The installation position of the ECtox Gas Sensor Device should be as close as possible to the leakage source.
- The installation height of the sensor device must be determined based on the density of the target gas. In open outdoor spaces, for lighter-than-air gases, it is recommended to install the device approximately 30 cm above the horizontal plane of potential gas leakage points. For gases heavier than air, it is recommended to install the device 30 cm below the leakage point. For gases with a density equivalent to that of air, it is recommended to install the device at a vertical distance of 1.5 m above the ground.
- When used indoors, in addition to the above instructions, the gas sensor device can also be installed on the wall closest to the leakage source. Depending on the three situations mentioned above, it can be installed 30 cm from the top of the building, 30 cm or 1.5 m from the ground.
- For gas detection in pipes, storage facilities and tanks, the device should be positioned as close as possible to the main channel for the flow or diffusion of the measured gas. In any case, avoid having the inlet end of the sensor device pointing directly upwards to prevent dust and water droplets from blocking the inlet or causing hardware short circuits inside the instrument.

Installation Precautions

1. The ECtox devices should not be installed directly above liquids such as water, solvents, reagents, etc.
2. Do not install the device hanging from the built-in wires.
3. This product is suitable for use in semi-enclosed spaces and is not suitable for environments with high airflow rates.
4. Ensure that the operating environment is under atmospheric pressure and dust-free.

Installation Diagram



Electrical Wiring

Installation should be carried out by qualified installation personnel with the power disconnected.

Signal Line Specification:

The gas sensor device comes with a 1-meter connection cable. If an extension cable is needed, it is recommended to use an industrial grade soft core shielded cable with a diameter of $\geq 4 \times 1.0 \text{ mm}^2$. Select the appropriate cable according to the flame retardant and anti-corrosion requirements at the application site.

Specification of the standard 1-meter signal cable:

The ECtox device is equipped with a 1-meter signal line made of 4-core shielded cable, and the color of the line corresponds to the wiring:

Red wire: Positive power supply

Black wire: Negative power supply

Green wire: RS485 A+

White wire: RS485 B-

Power Specification:

5-12V DC power supply.

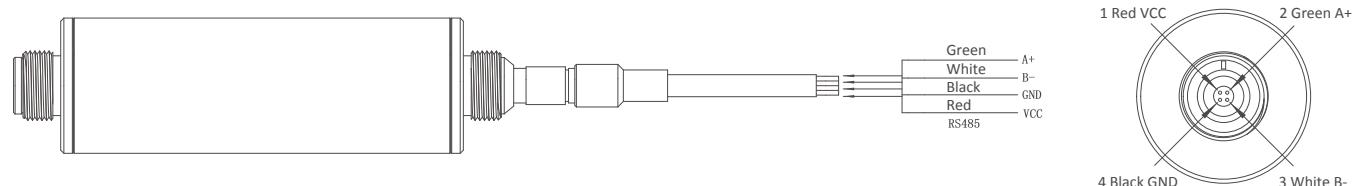
It is recommended that 8 or fewer devices work simultaneously on the same power supply.

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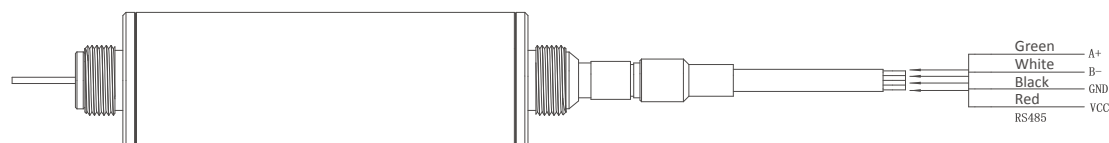
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Wiring Diagram

Standard Wiring Diagram



High Temperature Version Wiring Diagram



First Power On Stabilization Time:

When the instrument is first powered on, it needs to remain switched on continuously to warm up the device. Normally, the first warm-up phase takes 10 - 30 minutes when switching on. During the warm-up process, the sensor device can also output measurement values, but these usually exceed the normal error range. The warm-up process is the process by which the measured value of the ECtox device gradually approaches the true value.

Signal Detection Frequency:

After the warm-up phase is completed, the device starts to collect signal at a frequency of 1 - 10 min/signal. After the data acquisition, the concentration value changes in real time.

Determination whether the ECtox Gas Sensor Device is working properly:

When the detector works properly, it will make a "click" sound at regular intervals. This sound is caused by the air pump as it pumps air and passes it to the sensor for detection.

Product Calibration

No calibration is needed for this product.

The product has been calibrated and retested before leaving the factory and can be installed and used immediately. If you need to recalibrate the sensor device, please contact our professional technical personnel for a factory calibration.

Maintenance

Cleaning the ECtox device is limited to the surface of the housing and the filter screen of the sensor. It is prohibited to disassemble the device and touch the internal circuit board.

Use a dry and soft brush to remove dust on the filter screen of the device. It is prohibited to blow high-pressure air directly onto the filter screen.

The waterproof design of the ECtox Gas Sensor Device is aimed at the connection between the output port and the housing structure. It is prohibited to immerse the entire device in liquid.

Regularly check the installation and mounting of the device for looseness and vibrations at the installation position.

Storage and Transportation

The sensor device should be stored in ventilated rooms with dry and clean air at a temperature of 0 °C to 25 °C. The stacking height should not exceed 1 m.

The device should always be placed in a dedicated packaging box before transportation, storage and installation. Handle with care and avoid strong shocks.

Avoid any alcohol or ketone gases in the storage environment.

Order Information

Product Name	Part Number	Range	Resolution
ECtox Ammonia Gas Sensor Device	05-ECtox-NH ₃ -50-01	0-50 ppm	0.01 ppm
ECtox Ammonia Gas Sensor Device	05-ECtox-NH ₃ -100-ABS-01	0-100 ppm	0.1 ppm
ECtox Ammonia Gas Sensor Device	05-ECtox-NH ₃ -500-01	0-500 ppm	0.1 ppm
ECtox Ammonia Gas Sensor Device	05-ECtox-HT-NH ₃ -50-01	0-50 ppm	0.01 ppm
ECtox Ammonia Gas Sensor Device	05-ECtox-HT-NH ₃ -500-01	0-500 ppm	0.1 ppm
LEMO Connector - Male	02-LEMO-HXT-1423-10M-01	10-meter Wire	
ECtox Installation Bracket	02-ECtox-Bracket-SS-01	Stainless Steel Bracket	

Note: The "HT" in order number indicates the high-temperature version; "ABS" indicates that the housing is made of ABS material.

Disclaimer

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Warning

This gas device is designed to be used under various environmental conditions. However, during storage, assembly and operation, due to the principles and characteristics of solid polymer electrochemical sensors, in order to ensure normal use, users should please Strictly follow this article and general instrument application methods. Applications that violate regulations will not be covered by the warranty. While our products are highly reliable, we recommend checking the module's reaction to the target gas before use to ensure suitability for on-site use. At the end of the product's service life, please do not dispose of any product components in household waste, but in accordance with local electronic waste recycling regulations.



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ECTox Gas Sensor Device_Operating Manual_V0.1_20240507

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