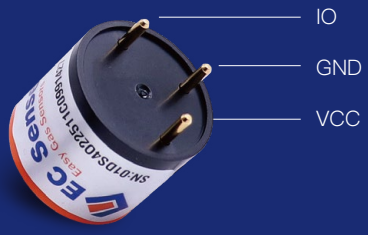
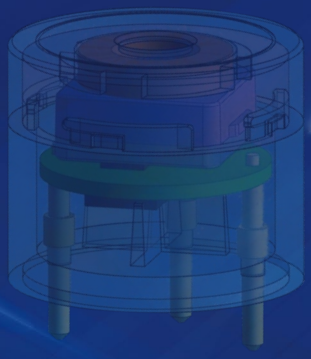
EC Sense
Easy Gas Sensors

Smart Gas Sensor

Datasheet

DS4-CO Carbon Monoxide





Easy Gas Sensor Solutions

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DS4 Smart Gas Sensor_Carbon Monoxide

Overview

The DS4 smart gas sensor from EC Sense in Germany uses reliable printed solid-state polymer electrochemical sensor technology and is an industrial-grade intelligent gas sensor.

With a small and compact design, high-performance microprocessors, high-precision analog-to-digital converters, and intelligent algorithms, the sensor can be easily integrated into the Internet of Things and other monitoring systems. It is widely used in industrial, commercial, civil, and medical fields.

Providing a convenient evaluation kit

We provide a single intelligent gas sensor evaluation kit, mainly used for sensor testing. The kit adopts the UART to USB mode, and the sensor data can be obtained through the testing software.

We also provide evaluation kits for 25 or more intelligent gas sensors, mainly used for sensor testing, calibration, and quality control. The kit adopts the RS485 to USB mode and the sensor data can be obtained through the testing software. Batch calibration can also be conducted. Multiple evaluation kits can be connected in series to achieve large-scale testing.

Features

- The sensor is designed for low power consumption and can be powered by a 3.3V to 12V DC power supply, with a recommended power supply of 5V DC.
- It has a wide operating temperature range for humidity and temperature from-40℃ to +55℃.
- The sensor has a strong long-term stability in the zero point.
- It has a fast response time, which can quickly and timely capture changes in gas concentration.
- The linearity of the sensor is excellent.
- It is resistant to poisoning and has a long life.
- The electrochemical electrolyte is solidified, avoiding the risk of electrolyte leakage caused by high humidity or material aging.

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Features

Standard Industrial Dimensions

The sensor has a standard industrial 4-series size design, with a 20 x 16.6mm cylindrical outer casing. Users can easily iterate new product designs and can be used for fixed gas detectors and portable detection instruments, saving the cost of redesigning the housing for new product upgrades. The sensor has standard three electrode pin sizes for VCC (power positive), GND (power negative), and IO (data receiving and sending).

User-defined Encryption Code Function

Users can customize their own unique user code, which can be used for instrument identification. When another type of sensor is inserted, the instrument can automatically detect whether the user code is correct. If the user code is incorrect, the instrument can display an error message to remind the user to insert the correct sensor.

Low-power Sleep Function

The sensor has a sleep mode function that allows users to customize the sleep and wake-up modes, making it suitable for low-power battery or IoT applications.

Self-identification Function

The DS4 sensor outputs identity information such as gas type and detection range, which is useful for designing self-identification features, providing more flexibility in usage.

Use Without Preheating

The intelligent hardware design ensures that the gas sensor remains operational even when it is not powered, ensuring that gas monitoring can be carried out immediately after power is supplied, regardless of the time and place. This is particularly useful in applications where the sensors are part of an IoT or battery-powered system, where energy efficiency and low power consumption are critical concerns. Users need not worry about long preheating times or slow data acquisition in energy-efficient and low-power design.

Features

Easy-to-use UART Digital Output

The DS4 sensor uses UART 3.3V half-duplex single bus mode output signal, which eliminates the need for complex communication protocols. The sensor directly outputs gas concentration values, making secondary development of application programs flexible, simple, and quick.

Accurate Factory Pre-calibration

Each DS4 intelligent gas sensor undergoes professional gas calibration in the factory, and the calibration information is stored in the internal chip of the product, so users can use it directly without the need for additional gas calibration. The factory calibration uses a diffusion gas calibration and an analog environment climate calibration, which is closer to the users' actual application environment, thus improving the accuracy of data obtained from the gas detection instrument using a diffusion measurement method. (When using a pump-suction measurement method, a secondary calibration is required according to the design parameters of the instrument system.)

Lifespan and Performance Testing

The intelligent gas sensor has a self-check function to periodically perform self-diagnosis on the lifespan and performance indicators, whether in the presence or absence of the test gas. The sensor will output warning signals to prompt sensor maintenance or replacement. This function provides reliable basic data for the design of intelligent instruments, making gas detection instruments safe, reliable, and capable of remote maintenance. Users can obtain sensor fault information, such as normal operation, weak performance, failure, or detachment, through commands. This provides users with early warning of sensor abnormalities, greatly improving safety assurance.

Easy Maintenance

The sensor is plug-and-play and can be hot-swapped with power attached. It also has an open calibration protocol that supports secondary offline calibration for after-sales service and one-key reset to factory calibration. The plug-and-play feature enables offline calibration, which eliminates the need to bring dangerous gases into the testing environment to calibrate the instrument, thereby avoiding safety risks and pollution to the site environment. It makes maintenance safer, more convenient, and simpler.

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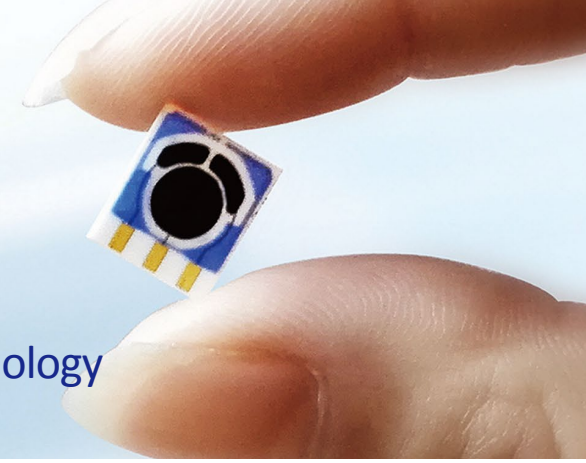

Principle

Solid Polymer Electrochemical Sensing Technology

High humidity resistance, long life, anti-poisoning, high reliability, suitable for use in harsh working conditions

Solid Polymer Electrochemical Sensing Technology. The principle is to place two reaction electrodes, a working electrode and a counter electrode, and a reference electrode in a specific electrolyte, and then apply sufficient voltage between the reaction electrodes to make the gas to be measured passing through the heavy metal catalyst film carry out redox reactions. Then, the electric current generated during gas electrolysis is measured through the circuit system in the instrument, and then the gas concentration is calculated by the microprocessor in it.

Applications

- Industrial Emissions Monitoring

- Gas Safety Monitoring in Power Industry

- Industrial Process Gas Analysis

- Gas Leak Monitoring

- Fire Safety

- Smart City Underground Pipe Gallery

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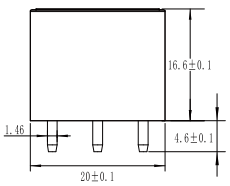
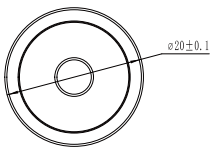
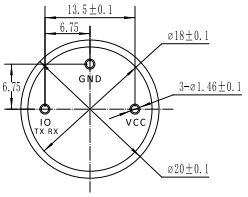
Dimensions Unit: mm

- Product Schematic
- Side View
- Top
- Bottom







Pin Description

Pin Definitions	Pin Description	Minimum Value	Typical Value	Maximum Value
VCC	Positive terminal of power supply	3.3V	5V	12V
IO	Serial data transceiver	-0.3V	3.3V	3.3V
GND	Ground of power supply	-0.3V	0	-

Technology Specifications

Performance Parameters of Gas Sensors

Principle	Solid Polymer Electrochemical Sensing Technology
Accuracy	± 5% F.S
Repeatability	< ± 2%
Linearity	Linear
Setting Time	< 2min (electric test without heating machine)

Electrical Performance Parameters

Output	UART 3.3V half duplex single bus. Baud rate: 9600 Data bit: 8 Stop bit: 1 Check bit: None
Supply Voltage	3.3 to 12V DC, Recommended 5V DC
Supply Current	0.65mA @ 5VDC
Peak Current	1mA @ 5V DC
Sleep Mode Current	0.35mA @ 5V DC
Power Consumption	≤ 5mW @ 5V DC

Note: The current data above will have slight differences due to the different stabilization times of different sensors at the first power-on. Please refer to the actual measurement data.

Life Expectancy Parameters

Long-Term Drift	< 1% / month
Expected Lifetime	> 3 years
Warranty	自发货之日起12个月

Environmental Parameters

Operating Temperature	-40 to +55℃
Operating Humidity	15-95%RH. Non-condensing
Operating Pressure	Atmospheric pressure ± 10%
Storage Temperature	0 to 20℃

Mechanical and Packaging Parameters

Material	ABS
Weight	4.56g
Package	Blister independent packaging

Product Selection Table

Product	Formula	Partnumber	Range	Resolution	Response Time
Smart Carbon Monoxide Gas Sensor	CO	04-DS4-CO-100-01	0-100ppm	0.1ppm	< 3s (T90 < 60s)
		04-DS4-CO-1000-01	0-1000ppm	1ppm	< 3s (T90 < 60s)
		04-DS4-CO-10000-01	0-10000ppm	1ppm	< 3s (T90 < 60s)

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Cross Sensitivity

Gas	Formula	Test Concentration	Sensor Reading
Acetylene	C_2H_2	1 ppm	0 ppm
Ethyl Alcohol	C_2H_6O	1 ppm	0 ppm
Ammonia	NH_3	1 ppm	0 ppm
Benzene	C_6H_6	1 ppm	0 ppm
Methane	CH_4	1 %	0 ppm
Carbon Dioxide	CO_2	10 %	0 ppm
Carbon Monoxide	CO	1 ppm	1 ppm
Chlorine	Cl_2	1 ppm	0 ppm
Ethene	C_2H_4	1 ppm	0 ppm
Hydrogen	H_2	2000 ppm	200 ppm
Hydrogen Cyanide	HCN	1 ppm	0 ppm
Hydrogen Sulfide	H_2S	1 ppm	0 ppm
Nitric Oxide	NO	5 ppm	0 ppm
Nitrogen Dioxide	NO_2	1 ppm	0 ppm
Sulfur Dioxide	SO_2	1 ppm	0 ppm
Isopropyl Alcohol	C_3H_8O	1 ppm	0 ppm

Note:

1) The above interference factors may vary due to different sensors and service life, please refer to the actual test results.
2) This table is not complete for all cross gases. Please contact us for other gases.
3) The above parameters are the test results at a temperature of 25°C, a relative humidity of 50%RH and a normal pressure environment. The performance of the sensor varies under different environmental conditions. If you have any questions, please contact us.
4) The above cross interferences are represented by a low concentration of the gas.

This technical specification document is translated directly from the Chinese version, and there may be certain differences in the expression of some words compared to the Chinese version. If there are any issues, please contact the manufacturer directly for communication. This version is temporary.

Disclaimer

The EC Sense performance data stated above is based on data obtained under test conditions using the EC Sense gas distribution system and AQS test software. In the interest of continuous product improvement, EC Sense reserves the right to change design features and specifications without notice. We are not responsible for any loss, injury or damage caused by this. EC Sense assumes no responsibility for any indirect loss, injury or damageresulting from the use of this document, the information contained therein or any omissions or errors herein. This document does not constitutean offer to sell. The data it contains are for informational purposes only and cannot be considered a guarantee. Any use of the given data must beevaluated and determined by the user to comply with federal, state and local laws and regulations. All specifications outlined are subject to change without notice.

Warning

EC Sense sensors are designed for use in a variety of environmental conditions. However, due to the principles and characteristics of solid polymer electrochemical sensors and to ensure normal use, users must strictly follow this article during storage, assembly and operation of the sensor. Avoid cleaning the sensors with alcohol, acetone or other strong solvents. General-purpose PCB circuit board application methods and illegal applications / violation of the application will not be covered by the warranty. Although our products are highly reliable, we recommend checking the sensor's response to the target gas prior to utilization to ensure on-site use. At the end of the product's service life, please do not discard any electronics in the domestic waste, instead follow the local governments electronic waste recycling regulations for disposal.

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