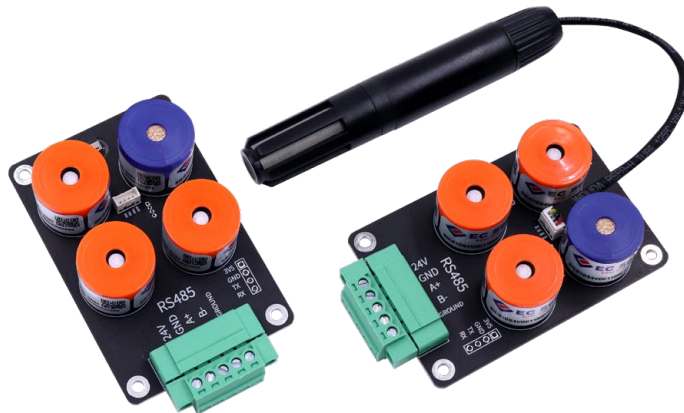




MP6 Multi Gas Sensor Module

Datasheet

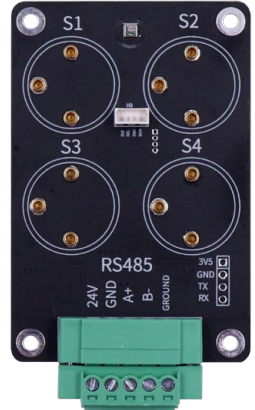
Overview

The MP6 Multi Gas Sensor Module is an intelligent module that monitors six parameters. They include four types of gases, together with an onboard temperature and humidity chip for detecting the temperature and humidity inside the housing. There is also an optional external digital temperature and humidity sensor for monitoring the ambient temperature and humidity.

The MP6 module supports the simultaneous connection of up to four DS4 digital intelligent gas sensors (which can be a combination of toxic and combustible gases) and can detect various types of gases. It offers high-precision gas detection, temperature and humidity monitoring, calibration, low-power operation modes, and more. It is widely used in fields such as industrial safety, energy monitoring, laboratories, and environmental monitoring.

The MP6 module uses the standard RS485 Modbus-RTU communication protocol, allowing real-time reading of monitoring data from each sensor and is compatible with various signal acquisition systems like PLC, DCS, and HMI.

With its modular design, the MP6 module can quickly form an integrated instrument solution by selecting different housing. It greatly shortens the development cycle for instruments and eliminates complex calibration processes, making it simple and easy to use.



Features

- Flexible sensor adaptability
- 5-24V DC wide-range power supply
- Modular structural design
- Small size
- Simultaneously collect measurement data from gas and temperature-humidity sensors
- Automatic monitoring of DS4 oxygen and toxic gas sensor lifespan
- Automatic determination of sensor operating status

Functional Description

RS485 Communication

- Supports Modbus RTU protocol, allowing the reading of gas sensor data, including concentration values, temperature and humidity data, sensor status, sensor lifespan, and other information.

Power Supply Stability

- 24V DC power supply, suitable for industrial environments.
- Built-in overcurrent, overvoltage, and reverse connection protection, ensuring the safety and reliability of the equipment.

Multi-Sensor Integration

- Supports connecting up to 4 DS4 smart digital gas sensors simultaneously, capable of detecting different types of gases (such as oxygen, combustible gases, toxic gases, etc.).
- Equipped with 1 surface-mounted MEMS temperature and humidity sensor (standard) and 1 external digital temperature and humidity sensor (optional), providing accurate temperature and humidity data.

Sleep Mode

- Allows the module to enter a low-power sleep mode via instruction, reducing power consumption, suitable for battery-powered operation.
- When waking up the module, another instruction can return it to normal working status.

Sensor Lifetime Monitoring

- Regularly obtain the performance and lifespan status of the DS4 smart digital gas sensor, ensuring the sensor's effectiveness and significantly reducing the safety risk of sensor failure in the event of a gas leak.

Status 0: Sensor performance is normal.

Status 1: Sensor performance is low (less than or equal to 20% of normal performance); sensor replacement or environment inspection is recommended.

Status 2: Sensor is damaged or not connected; sensor replacement or connection inspection is required.

Note: The DS4-LEL digital gas sensor does not have a self-lifetime check function and is only applicable to the smart DS4 toxic and digital gas sensors.

DS4 Sensor Status Monitoring

- Real-time status monitoring of DS4 smart digital gas sensors in channels 1-4, with four possible statuses:

Status 0: DS4 sensor is in unknown status.

Status 1: DS4 sensor is online and functioning normally.

Status 2: DS4 sensor is offline.

Status 3: DS4 sensor is in sleep mode.

Sensor Calibration

- Measurement Accuracy and Zero Calibration: Calibration of DS4 smart digital gas sensors can be performed via instructions.
- The DS4 digital gas sensor and DS4-LEL digital gas sensor can also be detached from the MP6 sensor module and calibrated separately in the laboratory using the DS4 calibration tool and the appropriate Web online calibration software. Different calibration methods can be selected according to the product design.
- Restore Factory Calibration: Supports restoring the sensor to its factory calibration state through instructions.

Technical Parameters

Gas Sensors Parameters

Adapted Sensors	4 DS4 smart digital gas sensors (1-4 gas types, any combination).
	1 MEMS temperature and humidity sensor (Standard)
	1 External digital temperature and humidity sensor (optional)
Principle	The DS4 toxic gas smart digital sensor uses the solid-state polymer electrochemical principle.
	The DS4-LEL combustible gas digital sensor uses the catalytic combustion principle.
	Onboard and external temperature and humidity sensors use MEMS sensors.
Error Range	± 5% of the reading (measurement value error)
Repeatability	< 2% of the reading (measurement value repeatability error)
Linearity	Linear
Sensor Long-term Drift	< 5%/year
Gas Concentration Unit	Three different units (ppm / ppb / %vol) can be read through communication commands.
Sensor Expected Lifespan	Toxic gas sensor > 3 years
	Combustible gas sensor > 3 years

Temperature and Humidity Sensor Performance Parameters

(The following parameters apply to onboard and external temperature and humidity sensors)

Parameter	Range	Resolution	Accuracy Error	Repeatability	Response Time	Long-term Drift
Temperature	-40 °C to +120 °C	0.01 °C	± 0.3 °C	± 0.1 °C	5s to 30s @ t63%	< 0.1 °C/year
Humidity	0-100% RH	0.024% RH	± 2% RH	± 0.1% RH	< 8s @ t63%	< 0.1% RH/year

Electrical Performance Parameters

Working Voltage	5-24V DC (24V DC recommended)
	Standard RS485 Modbus-RTU, Baud Rate 9600
Output Signal Interface	Default Address: 0 x 01 (can be modified by user through the register)
	Four-wire output (V+, V-, RS485+, RS485-, GND), wire size (1.5 mm ² , 28-16 AWG).

Note: This module does not include signal wires. Users should select and configure according to demand.

The transmission performance of RS485 four-wire (full-duplex) is affected by multiple factors such as wire size, resistance, transmission distance, and the module's transmission rate. Below are key parameters for reference:

Cable Type

It is recommended to use twisted pair shielded cables (such as RVVP or STP cables) to avoid external interference.

- Short distance (< 500 m): 0.5 mm² or 0.75 mm² cables (e.g., RVVP 4×0.5 mm²).
- Medium distance (500~1500 m): Use 1.0 mm²~1.5 mm² cables (e.g., RVVP 4×1.5 mm²).
- For long distances, resistance increases, signal amplitude decreases, which may lead to reception errors at the receiving end.

Resistance Requirements

For long distances, resistance increases, signal amplitude decreases, which may lead to reception errors at the receiving end.

The RS485 standard requires that the minimum detectable signal at the receiving end be ± 200 mV. If the total resistance of the cable is too high, the signal may drop below the detectable range.

Impedance Matching: RS485 bus requires a 120 Ω terminating resistor. Mismatched impedance may cause signal reflections, affecting communication quality.

Selectable wire size resistance values (one-way):

Wire Size (mm ²)	Diameter (mm)	Resistance (Ω/km, one-way)
0.5 mm ²	0.8 mm	≈ 35 Ω/km
0.75 mm ²	1.0 mm	≈ 24 Ω/km
1.0 mm ²	1.13 mm	≈ 18 Ω/km
1.5 mm ²	1.38 mm	≈ 12 Ω/km

Other Requirements

- Grounding: Proper grounding can reduce common-mode interference and improve communication stability.
- Wiring Method: Avoid running parallel to high-voltage power lines to prevent electromagnetic interference (EMI).

Mechanical Parameters

Size (including sensor)	85.5×50×21 mm
Size (excluding sensor)	85.5×50×11.5 mm
Weight (excluding sensor)	22 g

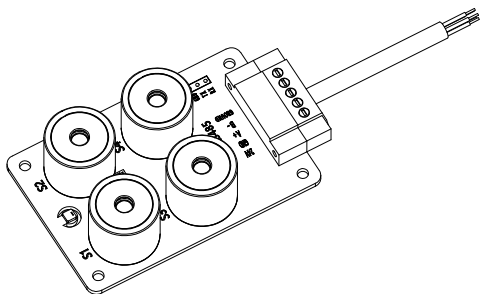
Lifetime

Warranty	12 Months from the date of shipment.
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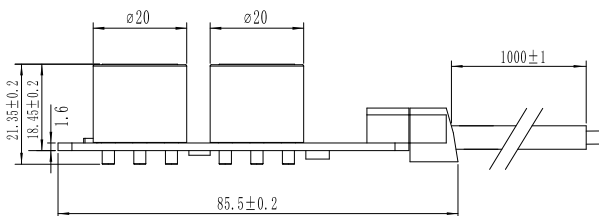
Environmental Parameters

Operating Temperature Range	-40 °C to +55 °C
Operating Humidity Range	15-95% RH, non-condensing
Operating Pressure Range	Atmospheric pressure ± 10%
Storage Temperature Range	0 °C to 20 °C

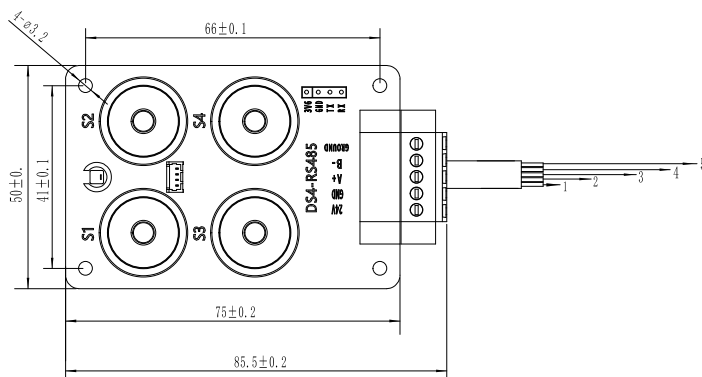
Mechanical Drawing Unit: mm



Product Schematic



Side View



Top View

Item	Name	Color
1	V+	Red
2	V-	Black
3	RS485 A+	White
4	RS485 B-	Grey
5	GND	/

Order Information

Based on the MP6 multi gas sensor module, you can select any digital sensor from the external temperature and humidity sensor selection table, toxic gas sensor selection table, and combustible gas sensor selection table for customized combination.

MP6 Product List

Product Name	Order Number
MP6 Multi Gas Sensor Module	04-MP6-01

Note: The basic parameters of this module include the onboard MEMS temperature and humidity sensor. The digital smart gas sensors and external temperature and humidity sensors can be selected from the table below.

External Temperature and Humidity Sensor Product List

Product Name	Order Number
Digital Temperature and Humidity Sensor	04-DS-TH-01

Digital Gas Sensor Product List

Product Name	Formula	Order Number	Range	Resolution	Response Time
DS4 Smart Digital Arsine Gas Sensor	AsH ₃	04-DS4-AsH ₃ -1-01	0-1 ppm	0.001 ppm	< 3 s (T90 < 80 s)
DS4 Smart Digital Diborane Gas Sensor	B ₂ H ₆	04-DS4-B ₂ H ₆ -1-01	0-1 ppm	0.001 ppm	< 3 s (T90 < 80 s)
DS4 Smart Digital Methyl Mercaptan Gas Sensor	CH ₄ S	04-DS4-CH ₄ S-10-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		04-DS4-CH ₄ S-100-01	0-100 ppm	0.01 ppm	< 3 s (T90 < 80 s)
		04-DS4-CH ₄ S-5000-01	0-5000 ppm	0.1 ppm	< 3 s (T90 < 80 s)
DS4 Smart Digital Chlorine Gas Sensor	Cl ₂	04-DS4-Cl ₂ -100-01	0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
DS4 Smart Digital Carbon Monoxide Gas Sensor	CO	04-DS4-CO-10-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		04-DS4-CO-100-01	0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		04-DS4-CO-1000-01	0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		04-DS4-CO-2%-01	0-2% vol.	0.001% vol.	< 3 s (T90 < 30 s)
DS4 Smart Digital Ethylene Oxide Gas Sensor	ETO (C ₂ H ₄ O)	04-DS4-ETO-10-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		04-DS4-ETO-200-01	0-200 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		04-DS4-ETO-1000-01	0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
DS4 Smart Digital Germane Gas Sensor	GeH ₄	04-DS4-GeH ₄ -5-01	0-5 ppm	0.001 ppm	< 3 s (T90 < 80 s)
DS4 Smart Digital Hydrogen Gas Sensor	H ₂	04-DS4-H ₂ -1000-01	0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		04-DS4-H ₂ -5000-01	0-5000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		04-DS4-H ₂ -5%-01	0-5% vol.	0.001% vol.	< 35 s (T90 < 90 s)
DS4 Smart Digital Hydrogen Sulfide Gas Sensor	H ₂ S	04-DS4-H ₂ S-10-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		04-DS4-H ₂ S-100-01	0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		04-DS4-H ₂ S-1000-01	0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		04-DS4-H ₂ S-5000-01	0-5000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
DS4 Smart Digital Formaldehyde Gas Sensor	HCHO	04-DS4-HCHO-5-01	0-5 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		04-DS4-HCHO-100-01	0-100 ppm	0.01 ppm	< 3 s (T90 < 60 s)
DS4 Smart Digital Hydrogen Cyanide Gas Sensor	HCN	04-DS4-HCN-50-01	0-50 ppm	0.01 ppm	< 3 s (T90 < 30 s)
DS4 Smart Digital Ammonia Gas Sensor	NH ₃	04-DS4-NH ₃ -10-01	0-10 ppm	0.001 ppm	< 3 s
		04-DS4-NH ₃ -100-01	0-100 ppm	0.01 ppm	< 3 s
DS4 Smart Digital Nitrogen Dioxide Gas Sensor	NO ₂	04-DS4-NO ₂ -50-01	0-50 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		04-DS4-NO ₂ -100-01	0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		04-DS4-NO ₂ -1000-01	0-1000 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		04-DS4-NO ₂ -2000-01	0-2000 ppm	0.01 ppm	< 3 s (T90 < 30 s)
DS4 Smart Digital Oxygen Gas Sensor	O ₂	04-DS4-O ₂ -25%-01	0-25% vol.	0.01% vol.	< 3 s (T90 < 30 s)
DS4 Smart Digital Ozone Gas Sensor	O ₃	04-DS4-O ₃ -5-01	0-5 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		04-DS4-O ₃ -50-01	0-50 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		04-DS4-O ₃ -100-01	0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)

Product Name	Formula	Order Number	Range	Resolution	Response Time
DS4 Smart Digital Phosphine Gas Sensor	PH ₃	04-DS4-PH ₃ -5-01	0-5 ppm	0.001 ppm	< 3 s (T90 < 80 s)
		04-DS4-PH ₃ -20-01	0-20 ppm	0.01 ppm	< 3 s (T90 < 80 s)
		04-DS4-PH ₃ -100-01	0-100 ppm	0.01 ppm	< 3 s (T90 < 80 s)
		04-DS4-PH ₃ -2000-01	0-2000 ppm	0.1 ppm	< 3 s (T90 < 80 s)
DS4 Smart Digital Silane Gas Sensor	SiH ₄	04-DS4-SiH ₄ -10-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 80 s)
DS4 Smart Digital Odor Gas Sensor	SMELL	04-DS4-SMELL-5-01	0-5 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		04-DS4-SMELL-10-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		04-DS4-SMELL-200-01	0-200 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		04-DS4-SMELL-500-01	0-500 ppm	0.1 ppm	< 3 s (T90 < 30 s)
DS4 Smart Digital Sulfur Dioxide Gas Sensor	SO ₂	04-DS4-SO ₂ -50-01	0-50 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		04-DS4-SO ₂ -100-01	0-100 ppm	0.01 ppm	< 3 s (T90 < 30 s)
		04-DS4-SO ₂ -1000-01	0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		04-DS4-SO ₂ -2000-01	0-2000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
DS4 Smart Digital Volatile Organic Compounds Gas Sensor	TVOC	04-DS4-TVOC-10-01	0-10 ppm	0.001 ppm	< 3 s (T90 < 30 s)
		04-DS4-TVOC-200-01	0-200 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		04-DS4-TVOC-1000-01	0-1000 ppm	0.1 ppm	< 3 s (T90 < 30 s)
		04-DS4-TVOC-2000-01	0-2000 ppm	0.1 ppm	< 3 s (T90 < 30 s)

Digital Combustible Gas Sensor Product List

Product Name	Order Number	Description
Digital Combustible Gas Sensor	04-DS4-LEL-100%-01	Suitable for combustible gas monitoring in civilian and commercial fields.
Digital Combustible Gas Sensor	04-DS4-LEL-100%-PR-01	Suitable for combustible gas monitoring in industrial fields.

Disclaimer

The above performance data stated by EC Sense is obtained under test conditions using EC Sense gas distribution system and AQ Sense testing software. EC Sense reserves the right to modify design features and specifications for continuous product improvement without prior notice, and we do not assume any legal liability for any losses, injuries or damages from this. EC Sense also bears no responsibility for any indirect losses, injuries, or damages resulting from the use of the information contained in this document or any omissions or errors herein. This document does not constitute a sales offer, the data provided herein is for reference only and should not be considered as a guarantee. The use of the given data must be evaluated and determined by the user to comply with federal, state, and local laws and regulations. All specifications outlined are subject to change without prior notice.

Warning

EC Sense sensors module are designed for various environmental conditions. However, due to the principles and characteristics of electrochemical sensors, strict adherence to this document and the general application methods for PCB circuit boards is required during storage, assembly, and operation to ensure standard performance. Any damage caused by the non-compliant usage will not be covered by the warranty. While our products are highly reliable, we recommend checking the sensor'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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