

Gas Sensor Module

Single-Channel 485 Module Specification

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Single Channel Module Data sheet

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1. Overview

The single-channel gas sensor module series is a high-performance, versatile, and integrated sensor module. Equipped with a high-performance microprocessor and a high-precision analog-to-digital converter (ADC), the module can accurately detect environmental gas concentrations.

The module standardizes the interface and packaging of various types of gas sensors. Each unit is precisely calibrated before delivery and features digital output for easy integration. It effectively addresses challenges such as the wide variety of gas types, incompatibility among different sensors, complex production calibration, and limitations in replacing core components.

Users can deploy the module without secondary development or recalibration. Standard signals can be directly collected for data transmission and real-time monitoring. The series includes two models to accommodate sensors of different sizes.

This module is suitable for portable and fixed gas detectors, as well as other gas monitoring devices. It significantly reduces the complexity of gas detection device development and strongly supports modular design in equipment manufacturing.



Top View



Front View

2. Product Features

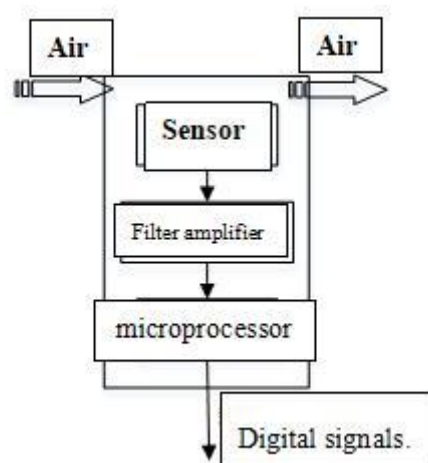
- Supports hot-swappable operation
- 5V power supply with low power consumption
- Factory-calibrated for high accuracy; no recalibration required
- Digital output via RS485 bus for easy integration
- Standard MODBUS communication protocol
- Compatible with various types of electrochemical sensors

3. Application

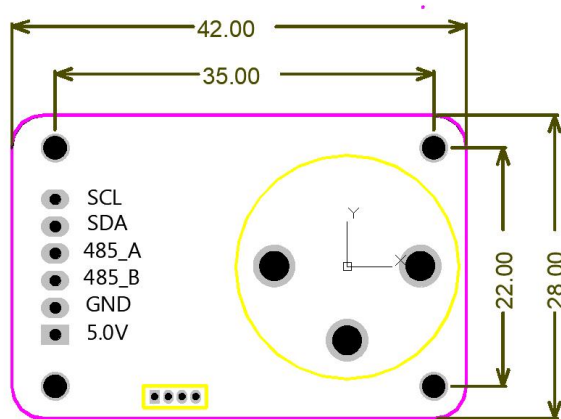
- Smart Public Restroom Gas Detection Projects
- Smart Agriculture Gas Detection Projects
- Smart Utility Tunnel and Tunnel Monitoring Projects
- Smart Manhole Gas Detection Projects
- Tunnel and Roadway Gas Detection Projects
- Smart Livestock Farming Gas Detection Projects
- Smart Grain Storage Gas Detection Projects
- Underground Parking Garage Gas Detection Projects
- Scientific Research and Environmental Monitoring Projects
- Industrial Intelligent Gas Detection Projects (e.g., Inspection Robots)
- Automotive Electronics, Smart Fire Protection, and Instrumentation Applications

4. Working Principle

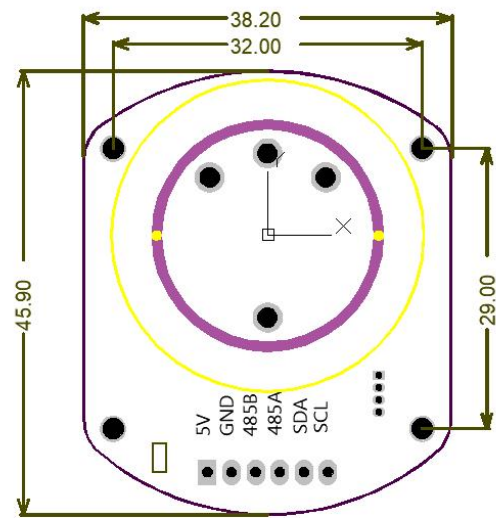
The signals from various gas sensors are amplified and filtered before being processed by the microprocessor, which performs theoretical calculations and outputs digital signals. The amplification and filtering circuits are customized for different types of sensors.



5. Appearance and Interface Definition



4-Series Module Mechanical Dimensions



7-Series Module Mechanical Dimensions

Pin	Function	(MIN) V	(TYP) V	(MAX) V
5.0V	Power	4.5	5.0	5.5
GND	Ground	-0.3	0	0.3
485_B	RS485	0	3.0	----
485_A	RS485	0	3.0	----

Terminal Type XH2.54mm-6P

6. Technical Specification

Working Voltage	DC 5V±0.5V
Consumption	0.15mW
Working Temp.	-20℃ ~ 50℃
Working Humidity	10%-95%RH (no condensing)
Method	Natural diffusion (Customizable circulation type for special needs)
Tech Principle	Electrochemical
Communication format	RS485 (Baud rate9600, Data bits: 8; Stop bit: 1; Check bit: None)
Preheating Time	30s
Service Life	2 years
Weight	10g

7. Model Description

Model	Description	Dimension
YQJC01	Compatible with 4-SERIES	Picture above
YQJC02	Compatible with 7-SERIES	Picture above

8. Communication Format

Baud rate	9600
Data bits	8
Stop bit	1
Check bit	None

Read Data:

host sends frame format

Address	Function Code	high byte of the starting address of the register	low byte of the starting address of the register	high byte of the quantity of the register	low byte of the quantity of the register	CRC low byte	CRC high byte
0xFF (default)	0x03						

successfully returning the frame format

Address	Function Code	quantity of data	Data 1	Data 2		Data n	CRC low byte	CRC high byte
0xFF (default)	0x03							

error returning frame format

Address	error response function code	error code	CRC low byte	CRC high byte
0xFF (default)	0x83			

Write data:

host sends frame format

Address	Function Code	high byte of the starting address of the register	low byte of the starting address of the register	high byte of the quantity of the register	low byte of the quantity of the register	quantity of data	High byte of data	Low byte of data	CRC low byte	CRC high byte
0xFF Default	0x10									

successful return frame format

Address	Function Code	high byte of the starting address of the register	low byte of the starting address of the register	High Byte of Register Count	Low Byte of Register Count	CRC low byte	CRC high byte
0xFF (default)	0x10						

Modbus-RTU Communication Protocol, CRC16 is ModbusCRC16

Register logical address description

logical address	register description	number of registers	remarks	mode
02011	module communication ID	1	MODBUS communication address 0-254	Read and write
0x2027	gas name code		Table 1	read-only
0x202b	range	1		read-only
0x2030	Unit code	1	Table2	Read and write
0x2031	number of decimal places	1		Read and write
0x6000	Alarm Status	1	Table 4	read-only
0x6001	Concentration Value	1		read-only
0x6002	AD Value	1		read-only
0x6006	Operating Status	1	Table 5	Read and write
	Command Parameters	1	Table 6	

0x6001-reading concentration value							
send command							
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Sensor ID	Function Code	high 8 bits of the register address	low 8 bits of the register address	high 8 bits of the number of registers	low 8 bits of the number of registers	CRC low byte	CRC high byte
FF	03	60	01	00	01	DE	14
return value							
Sensor ID	Function Code	number of data	Data 1 (high 8 bits of the concentration value)	Data 2 (low 8 bits of the concentration value)	CRC low byte	CRC high byte	
FF	03	02	-	-	-	-	-
E.g. send: FF 03 60 01 00 01 DE 14 return: FF 03 02 00 05 51 93 return value5, Concentration=Return Value/10^number of decimal points Like there is 1 decimal point, concentration=5/10=0.5, If there are 2 decimal points , concentration=5/100=0.05							

0x2031-Read the number of decimal points							
Send Command							
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Sensor ID	Function Code	high 8 bits of the register address	low 8 bits of the register address	high 8 bits of the number of registers	low 8 bits of the number of registers	CRC low byte	CRC high byte
FF	03	20	31	00	01	CB	DB
Return value							
Sensor ID	Function Code	Quantity of data	Data 1 (High 8 bits of decimal point count)	Data 2 (Low 8 bits of decimal point count)	CRC low byte	CRC high byte	
FF	03	02	-	-	-	-	-
E.g Send:FF 03 20 31 00 01 CB DB Return:FF 03 02 00 01 50 50 Represents that there is 1 decimal point. Note: If there is 1 decimal point, divide the read concentration value by 10. If there are 2 decimal points, divide the read concentration value by 100. For other cases, follow the similar pattern.							

Write the sensor address: First, send the unlock command, then send the write address command.										
0x4FFF-Remove write protection										
Send Command										
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10
Sensor ID	Function Code	high 8 bits of the register address	low 8 bits of the register address	high 8 bits of the number of registers	low 8 bits of the number of registers	Quantity of data	High byte of sensor address	low byte of sensor address	CRC low byte	CRC high byte
FF	10	4F	FF	00	01	02	55	AA	FB	D0
Return Value										
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7			
Sensor ID	Function Code	high 8 bits of the register address	low 8 bits of the register address	high 8 bits of the number of registers	low 8 bits of the number of registers	CRC low byte	CRC high byte			
FF	10	4F	FF	00	01	32	F3			
0x2011-Set Sensor ID										

Send Command										
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10
Sensor ID	Function Code	high 8 bits of the register address	low 8 bits of the register address	high 8 bits of the number of registers	low 8 bits of the number of registers	Quantity of data	High byte of sensor address	low byte of sensor address	CRC low byte	CRC high byte
FF	10	20	11	00	01	02	-	-	-	-
Return value										
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7			
Sensor ID	Function Code	high 8 bits of the register address	low 8 bits of the register address	high 8 bits of the number of registers	low 8 bits of the number of registers	CRC low byte	CRC high byte			
FF	10	4F	FF	00	01	01	-			
E.g. (Set Sensor ID As 1) Send unlock write protection command first Send: FF 10 4F FF 00 01 02 55 AA FB D0 Return: FF 10 4F FF 00 01 32 F3 After that, send the command to write the sensor ID Send: FF 10 20 11 00 01 02 00 01 0D 77 Return: FF 10 20 11 00 01 4F D2										

Calibration: Send the unlock command first, then send the calibration command, and then send the command to check if the calibration was successful.										
0x4FFF-Remove write protection										
Send Command										
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10
Sensor ID	Function Code	high 8 bits of the register address	low 8 bits of the register address	high 8 bits of the number of registers	low 8 bits of the number of registers	Quantity of data	High byte of sensor address	low byte of sensor address	CRC low byte	CRC high byte
FF	10	4F	FF	00	01	02	55	AA	FB	D0
Return value										

Byte0		Byte1		Byte2		Byte3		Byte4		Byte5		Byte6		Byte7	
Sensor ID		Function Code		high 8 bits of the register address		low 8 bits of the register address		High Byte of Register Count		Low Byte of Register Count		CRC low byte		CRC high byte	
FF		10		4F		FF		00		01		32		F3	
0x6006-Write calibration command (without considering return value)															
Send Command															
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte1 1	Byte 12			
Sens or ID	Function Code	high 8 bits of the register address	low 8 bits of the register address	high 8 bits of the number of registers	low 8 bits of the number of registers	Quantity of data	High Byte of Command Parameter (Table 6)	Low Byte of Command Parameter (Table 6)	High byte of data (high byte of calibration concentration value)	Low byte of data (high byte of calibration concentration value)	CRC low byte	CRC high byte			
FF	10	60	06	00	02	04	-	-	-	-	-	-			
0x6006-Read command for checking if the calibration was successful															
Send Command															
Byte0		Byte1		Byte2		Byte3		Byte4		Byte5		Byte6		Byte7	
Sensor ID		Function Code		high 8 bits of the register address		low 8 bits of the register address		High Byte of Register Count		Low Byte of Register Count		CRC low byte		CRC high byte	
FF		03		60		06		00		01		6F		D5	
Return value															
Byte0		Byte1		Byte2		Byte3		Byte4		Byte5		Byte6			
Sensor ID		Function Code		Number of Date		Data 1		Data 2 (Table 5)		CRC low byte		CRC high byte			
FF		03		02		00		-		-		-			
E.g.: Zero Calibration															
Send unlock write protection command first															
Send:FF 10 4F FF 00 01 02 55 AA FB D0															

Return: FF 10 4F FF 00 01 32 F3

Then send calibration writing

Send: FF 10 60 06 00 02 04 10 00 00 00 E8 AC

Send check if the reading calibration was successful

Send: FF 03 60 06 00 01 6F D5

Return: FF 03 02 00 01 50 50 (01 represents calibration success, see attached table 5)

See the attached table for details of the calibration command parameters, up to 6 points can be calibrated at most.

CRC Calculation of Verification Value

const u16 u16CrcTalbeAbs[] =

{

0x0000, 0xCC01, 0xD801, 0x1400, 0xF001, 0x3C00,

0x2800, 0xE401, 0xA001, 0x6C00, 0x7800, 0xB401,

0x5000, 0x9C01, 0x8801, 0x4400,

};

u16 Crc16(u8p pchMsg, u8 wDataLen)

{

u16 wCRC = 0xFFFF;

u8 chChar;

while(wDataLen--)

{

chChar = *pchMsg++;

wCRC = u16CrcTalbeAbs[(chChar ^ wCRC) & 15] ^ (wCRC >> 4);

wCRC = u16CrcTalbeAbs[((chChar >> 4) ^ wCRC) & 15] ^ (wCRC >> 4);

}

return wCRC;

}

9. Attention

- Do not plug or unplug the sensor on the module
- It is forbidden to weld the pin of the module directly, and the socket of the pin can be welded
- The module shall avoid contacting with organic solvents (including silica gel and other adhesives), coatings, chemicals, oils and high concentration gases
- The module shall not be subjected to excessive impact or vibration
- The module needs to be preheated for more than 5 minutes when it is first powered on, and it is recommended to preheat for more than 24 hours when it is not used for a long time
- Do not place the mold in high concentration organic gas for a long time
- When selecting modules, products with different ranges should be selected according to different application fields and different application occasions

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10. Attached Tables

Table 1 Gas name Code

Serial Number	Code	Gas	Serial Number	Code	Gas
1	0x01	一氧化碳 (CO)	2	0x02	硫化氢 (H2S)
3	0x03	可燃气体 (EX)	4	0x04	氧气 (O2)
5	0x05	二氧化硫 (SO2)	6	0x06	甲烷 (CH4)
7	0x07	一氧化氮(NO)	8	0x08	二氧化氮 (NO2)
9	0x09	氯气 (CL2)	10	0x0A	氨气 (NH3)
11	0x0B	氢气 (H2)	12	0x0C	氰化氢 (HCN)
13	0x0D	氯化氢 (HCL)	14	0x0E	磷化氢 (PH3)
15	0x0F	臭氧 (O3)	16	0x10	二氧化氯 (CLO2)
17	0x11	环氧乙烷 (C2H4O)	18	0x12	二氧化碳 (CO2)
19	0x13	苯 (C6H6)	20	0x14	甲醛 (CH2O)
21	0x15	VOC (VOC)	22	0x16	甲苯 (C7H8)
23	0x17	二甲苯 (C8H10)	24	0x18	氮氧化物 (NOx)
25	0x19	正己烷 (C6H14)	26	0x1A	氟化氢 (HF)
27	0x1B	氟化物 (xF)	28	0x1C	甲醇 (CH3OH)
29	0x1D	丙烷 (C3H8)	30	0x1E	甲酚 (C7H8O)
31	0x1F	乙烷 (C2H6)	32	0x20	乙醚 (C4H10O)
33	0x21	煤气 (CH4)	34	0x22	二硫化碳 (CS2)
35	0x23	硅烷 (SiH4)	36	0x24	乙炔 (C2H2)
37	0x25	一氯甲烷 (CH3CL)	38	0x26	氮气 (N2)
39	0x27	苯乙烯 (C8H8)	40	0x28	砷化氢 (AsH3)
41	0x29	乙醇 (C2H6O)	42	0x2A	氯乙烯 (C2H3CL)
43	0x2B	二氯乙烷 (C2H4Cl2)	44	0x2C	乙酸乙酯 (C4H8O2)
45	0x2D	二氯甲烷 (CH2Cl2)	46	0x2E	丙烯腈 (C3H3N)
47	0x2F	苯胺 (C6H7N)	48	0x30	天然气 (EX)
49	0x31	溴气 (Br2)	50	0x32	光气 (COCL2)
51	0x33	联氨 N2H4	52	0x34	甲酸 CHOOH
53	0x35	溴化氢 HBr	54	0x36	甲硫醇 CH4S
55	0x37	丁烯 C4H8	56	0x38	乙烯 C2H4
57	0x39	丙烯 C3H6	58	0x3A	醋酸乙烯酯 C4H6O2
59	0x3B	异丙醇 C3H8O	60	0x3C	乙醛 C2H4O
61	0x3D	丁二烯 C4H6	62	0x3E	氧硫化碳 COS
63	0x3F	甲硫醚 C2H6S	64	0x40	四氢噻吩 C4H8S
65	0x41	环氧异丙烷 C2H5OCL	66	0x42	三氯甲烷 CHCL3
67	0x43	四氯甲烷 CCL4	68	0x44	六氟化钨 WF6
69	0x45	四氯化锡 SNCL4	70	0x46	过氧化氢 H2O2

Table 2 Unit Code

Code	Unit	Description
1	%LEL	Lower explosive limit
2	ppm	Part Per Million
3	ppb	Part Per Billion
4	%VOL	Total volume percentage
5	umol/mo l	One part of a million
6	mg/m3	Gas Concentration
7	ug/m3	mass-to-volume ratio
8	°C	Temperature
9	%RH	Humidity
10	m/s	Speed
11	kpa	Atmospheric Pressure
12	lx	Luminance

Table 3 Detecting Gas Parameters

Detecting Gas	Range	Accuracy	Resolution
Oxygen	0-30%VOL	±3%FS	0.1%VOL
Carbon Monoxide	0-1000ppm	±10%FS	1ppm
Hydrogen Sulfide	0-100ppm	±10%FS	1ppm
Nitrogen Dioxide	0-20ppm	±5%FS	1ppm
Nitric Oxide	0-250ppm	±5%FS	1ppm
Sulfur Dioxide	0-20ppm	±3%FS	1ppm
Ammonia	0-100ppm	±10%FS	1ppm
Hydrogen Fluoride	0-10ppm	±3%FS	1ppm
Ozone	0-20ppm	±12%FS	1ppm
Hydrogen Cyanide	0-50ppm	±5%FS	1ppm
Formaldehyde	0-10ppm	±5%FS	0.1ppm
Benzene	0-100ppm	±10%FS	1ppm
Chlorine	0-50ppm	±10%FS	1ppm
Methane	0-100%LEL	±3%FS	1%LEL

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Hydrogen	0-1000ppm	±3%FS	1ppm
Carbon Dioxide	0-5%VOL	50ppm±5%FS	0.01%VOL

Note: Specific parameters not displayed

Table 4 About Alarm

main status	position status	status description
Bit15 = 0 Preheating Output the lower 15 bits as complete words	Bit14 – 0 Output as preheating time countdown	time=*0.1s
Bit15 = 1 preheating complete Output the lower 15 bits bit by bit	Bit14	idle
	Bit13	idle
	Bit12	idle
	Bit11	idle
	Bit10	idle
	Bit9	idle
	Bit8	idle
	Bit7	idle
	Bit6	High concentration protection
	Bit5	Sensor lost or damaged
	Bit4	overrange
	Bit3	TWA ALARM
	Bit2	STEL ALARM
	Bit1	high alarm
	(LSB)Bit0	Low alarm

Table 5 State Definitions

Value	Description
0x0000	Module busy, preheating or executing commands
0x0001	Module idle or command executed successfully
0x0002	Execution failure
0x0003	unsupported command
0x0004	invalid parameter
0x0005	execution timeout

0x0100	steps to execute a command 0
0x0101	steps to execute a command1
0x0102	steps to execute a command 2
0x0103	steps to execute a command 3

Table 6 Command Parameters

Value	Description
0x1000	Calibrate 0 point at multiple concentrations, parameter values do not matter
0x1001	Calibrate 1 point at multiple concentrations, parameter is the calibration concentration
0x1002	Calibrate 2 point at multiple concentrations, parameter is the calibration concentration
0x1003	Calibrate 3 point at multiple concentrations, parameter is the calibration concentration
0x1004	Calibrate 4 point at multiple concentrations, parameter is the calibration concentration
0x1005	Calibrate 5 point at multiple concentrations, parameter is the calibration concentration