Model No.	**XRAB214010**
Product name	**R290 gas sensor-Relay type**
Spec. No.	**1549900000002**
Issued on	**December 26,2024**

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SANHUA

SPECIFICATIONS 1.0 edition

Product name: R290 gas sensor-Relay type
Model No.: XRAB214010

1. Contents

Revision history

Ver.	Data	Contents	Created by
1.0	December 26,2024	V1.0	Pengfei Yu

SPECIFICATIONS 1.0 edition

Product name: R290 gas sensor-Relay type
Model No.: XRAB214010

2. Scope

This specification applies to the sensor detecting R290 refrigerant gas. This sensor is designed to comply to IEC60335-2-40Ed7.0 and UL60335-2-40Ed4.0.

The intelligent R290 gas sensor uses the non-dispersive infrared (NDIR) principle to detect refrigerants Measurement, with good selectivity, no oxygen dependence; The sensor is to mature for infrared absorption Gas detection sensors are produced in close combination with micro-machining and sophisticated circuit design Compact high-performance module. Easy to use, excellent performance.

3. Technical parameters

Item	Specification	Remark
Detection accuracy	±2.5%LFL [1] ±5.0%LFL [2]	1: -20~60℃,0-95%RH 2: Other environment
Detection range	0~50%LFL	0~100%LFL Display range
Supply voltage	5~25VDC	V_{ripple}⩽50mV
Average current	≤30mA@12VDC	Ipk⩽100mA@12VDC
Output signal	RS-485 Baud rate: 38400bps	
Response time	≤15s	According to IEC60335-2-40
Warm-up time	15s	
Operation temperature	-40~80℃	
Storage temperature	-40~60℃	
Operation humidity	0~100%RH	No condensation
Storage humidity	0~100%RH	No condensation
Ingress protection	IP54	
Wight	45g	No cables
Life span	> 15 years	

4. External view

Item	Specification
Appearance	
Size (L*W*H)	63.1*54.1*25.5mm
Weight	45g (No cables)

SPECIFICATIONS 1.0 edition

Product name: R290 gas sensor-Relay type
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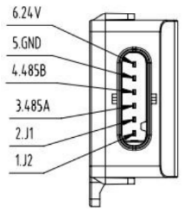
5. Connector pin specifications

Table **3:** Connector pin specifications

No.	Function	Description	Appearance
1	J2	Relay pin 2	
2	J1	Relay pin 1	
3	RS485-A	Mod Bus A	
4	RS485-B	Mod Bus B	
5	GND	Connect to Ground	
6	24V	Input Voltage	

6. Gas alarm and relay specification

1. When the gas sensor detects gas concentration more than 10%LFL(=2100ppm), the sensor releases gas alarm signal.
2. Gas alarm signal is released, when the gas concentration decreases.
3. Relay status description

Table 4: Relay status description

Status	definition	Description
Open	Warm-up /alarm/ fault	15s preheating period during power-on; Leak alarm; Internal communication errors;
Close	Normal operation/life limit	Life information does not affect the relay

7. Handling notes

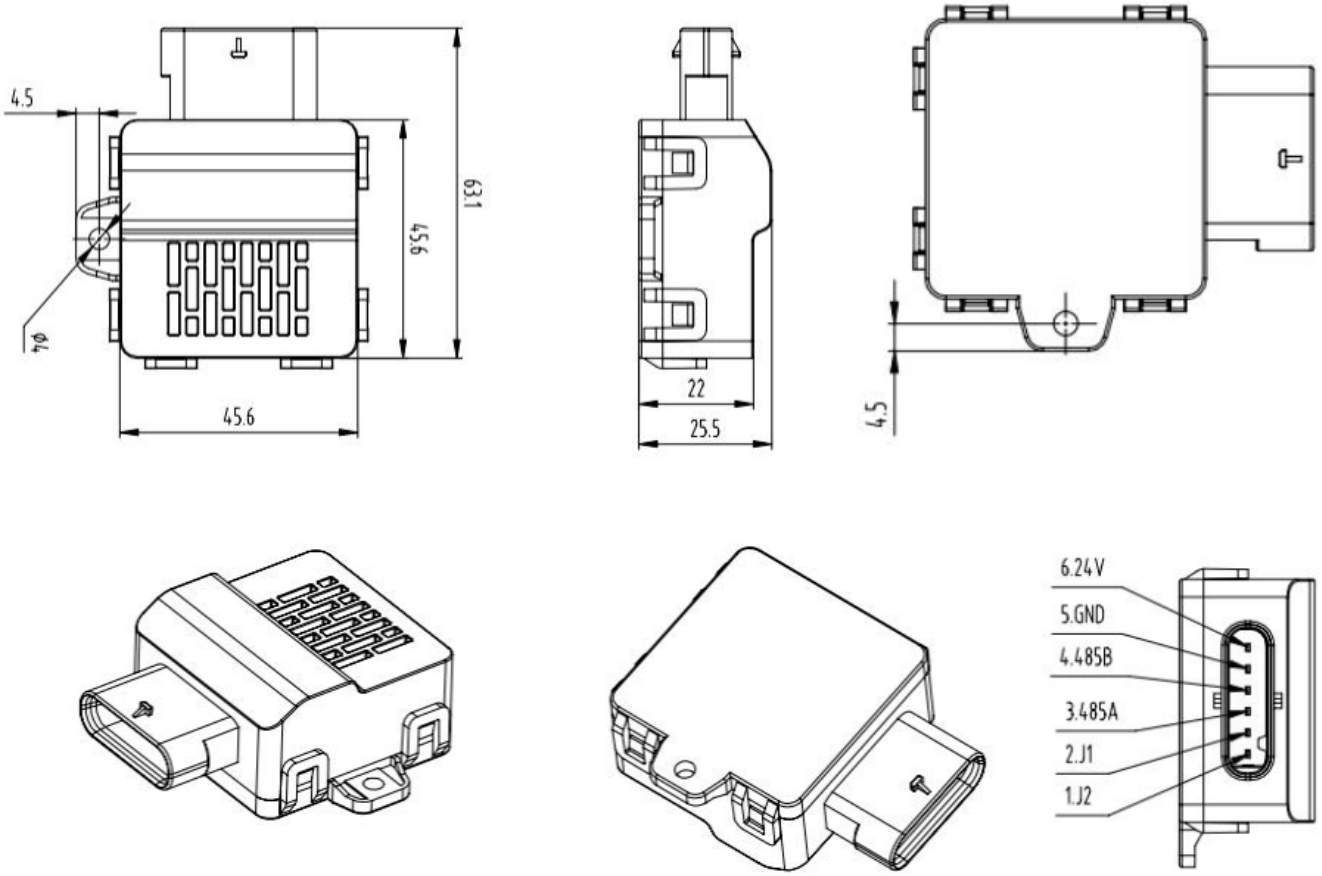
1. The module should be used to ensure that the voltage is in the set range, and the power supply is stable, if the voltage is too high, it may cause damage to the module, such as over voltage
Low, the module may not work properly;
2. To avoid long-term module in high temperature and humidity environment, strong electromagnetic environment, dust is too large environment;
3. vibration, drop, may make the measurement accuracy of the module deteriorate, should avoid the module to withstand excessive impact or vibration;
4. Do not install the module in a strong air convection environment.

8. Design life

Design life of the gas sensor is 15 years.

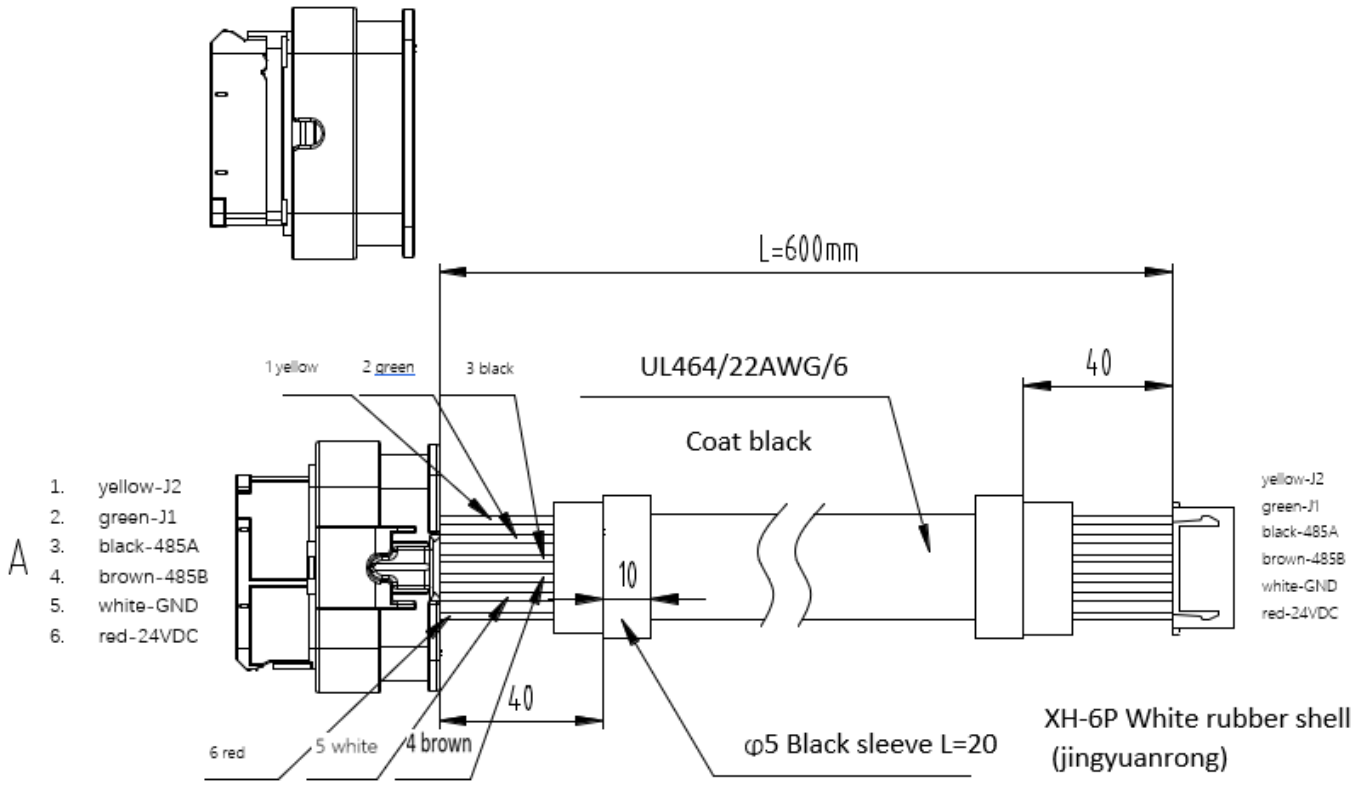
9. Sensor size

9.1 Gas Sensor size

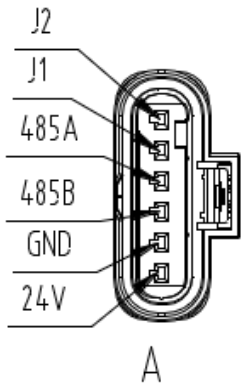


9.2 Cabler size

Jingyuanrong DJK7066K-1.5-21 （Side of joint）



Jingyuanrong DJK7066K-1.5-21 (joint front)



10. Mod Bus Specification

R290 Gas Sensor indicates RS485 communication.

10.1 Modbus Settings

Table 5: Modbus Settings

Physical Layer	RS485
Bus type	Modbus RTU
Data Order	High Byte, Low Byte (Big Endian)
CRC Order	Low Byte, High Byte (Little Endian)
Frame	1 Start bit 8 Data bits 1 Stop bits No Parity
Baud rate	38400bps
Modbus address	0x01（default）
Supported function codes	0x03（Read holding registers） 0x06（Write single register）
Supported exception codes	0x01（Illegal Function） 0x02（Illegal Address） 0x03（Illegal Data Value） 0x04（Server Device Failure）

10.2 Register definition

Table 6: Register definition

Access type	Name	Register Address	Number of registers	Data Type	Description
Special registers (2)					
W	Working state A	0x0001	1	uint16	Refer to《5》Table 3: Connector pin specifications
W	Information B	0x0002	1	uint16	Refer to《6》Table 4: Relay status description
Reserved registers (17)					
R	Register Version	0x0100	1	[uint8, uint8]	The high byte is the major version number, and the low byte is the minor version number.
W	Equipment Reset	0x0101	1	bool	When the register is written to 1, the sensor resets.
Data Query					

R	Operation Mode	0x0110	1	enum	The mode of operation of the device, with no measurements available during startup. 0: Start. 1: Being measured.
R	Leak Signal	0x0111	1	bool	This is the sign that opens when the concentration exceeds the alarm threshold. By default, the leak signal remains for 5 minutes after the concentration again falls below the leak signal threshold. 0: No leak is detected. 1: The leak is detected actively or during the duration after the leak detection.
R	Error Code	0x0112	1	uint16	Refer to《10.5》Table 9: Fault definition
R	Gas Concentration	0x0113	1	int16	The last measured gas concentration is measured in %LFL multiplied by 10 (e.g. 251 means 25.1%LFL). Resolution: 0.1%LFL; Range: 0-100%LFL.
R	Sensor Temperature	0x0114	1	int16	The last measured temperature is measured in ° C multiplied by 10 (for example, 210 means 21.0 ° C). Resolution: 0.1℃; Range: -40-85℃.
R	Sensor Humidity	0x0115	1	int16	The last measured humidity is measured in %RH multiplied by 10 (for example, 305 means 30.5%RH). Resolution: 0.1%RH; Range: 0-100%RH.
Settings					
W/R	Device Address	0x0120	1	uint8	Slave address of the Modbus interface. A device reset or power cycle is required to apply a change of this value. Range: 1–247 (as per Modbus specification) Default: 1
R	Leakage Signal Threshold	0x0124	1	uint16	The gas concentration level that triggers the leak signal. Resolution: 0.1%LFL (e.g. 251 means 25.1%LFL)
R	Life warning signal threshold	0x0126	1	uint16	Life indicator that triggers the life warning signal (unit: day). Resolution: 1 day; Range: 0 to 65535 days.

R	Life alarm signal threshold	0x0127	1	uint16	The value of the life meter that triggers the life alarm signal, in days. Resolution: 1 day; Range: 0 to 65535 days.
Device Information					
R	Device marker	0x0140	1	String [20]	Read the device tag. To be set, there is no default value. The representation is a 0 filled string, terminated without 0.
R	Firmware Version	0x014A	1	uint8[2]	Firmware version. Format: High byte: major version; Low byte: minor version.
R	Gas type	0x014C	1	enum	Gas type for sensor module configuration. 0: default value
R	Life counter (days)	0x014E	1	uint16	Service life of the device, in days. The device stores the timing value every 12 hours. Resolution: 1 day; Range: 0 to 65535 days.
R	Life counter (hours)	0x014F	1	uint16	The service life value of the device is supplemented by the number of hours, which together with the integer bits form the life value. The unit is hour. Resolution: 1 hour (for example, 12 means 12 hours, if the life days are 100, the total life is 100 days and 12 hours); Range: 0-23 hours. This value is updated every 1 hour.

10.3 Working status description

Table 7: Working status description

Status value	Definition	Description
0	normal	Normal working
1	alarm	Gas concentration exceeding threshold (10%LFL)
2	other	Warm up / fault / life warning

10.4 Information definition

Table 8: Information definition

Bits (0-15 from right to left)		Definition	Description
Bit0		Internal communication error (fault)	Sensor communication is abnormal, and the gas concentration is invalid
Bit2		Warm up	Power on and warm up for 15 seconds
Bit5		Over life alarm （reminder）	Life span is more than 15 years
Bit6		End-of-life warning (reminder)	Life expectancy is close to 15 years

10.5 Fault definition

Table 9: Fault definition

Bits (0-15 from right to left)	Fault Type	Description
0	Internal Error	Errors that make measurement data unusable, such as internal communication errors.
1	Value out of limit	The sensor detects a temperature, relative humidity, or gas concentration that exceeds specified levels.
2	-	-
3	-	-
4	-	-
5	Exceed life limit alarm	The service life limit has been reached.
6	Near life limit warning	The service life warning threshold has been reached

10.6 Data format

Table 10: Basic format

Device address	Function code	Data	CRC Check
1 byte	1 byte	N byte	2 bytes

Table 11: Function code 03- Read hold register request format

Device address	Function code	Start register address high byte	Start register address low bytes	Read register number high bytes	Read register number low bytes	CRC check
1 byte	03	1 byte	1byte	1 byte	1 byte	2 bytes

Table 12: Function code 03- Read keeps the register in the correct reply format

Device address	Function code	Return data byte	Register 1 Data high byte	Register 1 Data low byte	.....	CRC check
1 byte	03	1 byte	1byte	1 byte	.....	2 bytes

Table 13: Function Code 06- Write hold register request format

Device address	Function code	Register address high byte	Register address low byte	Write value high byte	Write value low byte	CRC check
1 byte	06	1 byte	1 byte	1 byte	1 byte	1 bytes

If the write hold register is set successfully, the original data packet is returned.

Table 14: Request frame error response format

Device address	Function code	Abnormal code value	CRC check
1 字节	Request frame function code +0x80	1 byte	2 bytes

Note: CRC check calculation: CRC-16/MODBUS x16+x15+x2+x1