Infrared Refrigerant Sensor Module

(**Model: ZRT510**)

User's Manual Version 1.0

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Zhengzhou Winsen Electronics Technology Co., Ltd

ISO9001 Certificated Company

Statement

Thanks for purchasing our product. In order to let customers use it better and reduce the faults caused by misuse, please read the manual carefully and operate it correctly in accordance with the instructions. If users disobey the terms or remove, disassemble, change the components inside of the sensor, we shall not be responsible for the loss.

The specific such as color, appearance, sizes &etc., please in kind prevail.

We are devoting ourselves to products development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on optimized using way are welcome.

Please keep the manual properly, in order to get help if you have questions during the usage in the future.

Zhengzhou Winsen Electronics Technology CO., LTD.

ZRT510 Refrigerant Sensor Module

Profile

ZRT510 refrigerant sensor module is a smart infrared type sensor module, using non-dispersive infrared (NDIR) principle to detect the existence of refrigerant, with good selectivity and non-oxygen dependent. It is a compact high performance sensor module made by combining mature infrared gas detection technology with micro machining and sophisticated circuit design. It is easy to use with excellent performance.

Main Features

*High sensitivity, high resolution, fast response
*UART communication
*Temperate compensation, excellent linear output, good stability, long lifespan
*Self-heating function, anti-water vapor interference, anti-poisoning, direct replacement for catalytic sensors

Main applications

*HVAC *Industrial process and safety monitoring

Main parameters

Table1.

Model No.	ZRT510
Detection Gas	R290
Working voltage	5±0. 1 V DC, ripple<50mV
Average current	< 60mA (without opening the heating function)
Peak current	< 300mA
Interface mode	XHQ-4
Communication mode	RS485
Data update	1s
Preheat time	＜ 30s
Response Time	Under 25% LFL environment, the time reaching alarm point (7% LFL) is less than 10 seconds
Working T&H	-40~80 ℃,0~100% RH
Storage T&H	-40~60 ℃,0~100% RH
Sizes	75.4*57*21.5 mm (without connecting cable)
Weight	32.5g (without connecting cable)
Lifespan	＞ 15 years
Certification	IEC 60335-2-40 : 2022

Resolution

Table2.

Detection Gas	Detection Range	Resolution	Accuracy
R290	0~100% LFL	1% LFL	1.±3%LFL(-20-60℃, 0-95%RH) 2. ±5%LFL(Others)

Dimensions

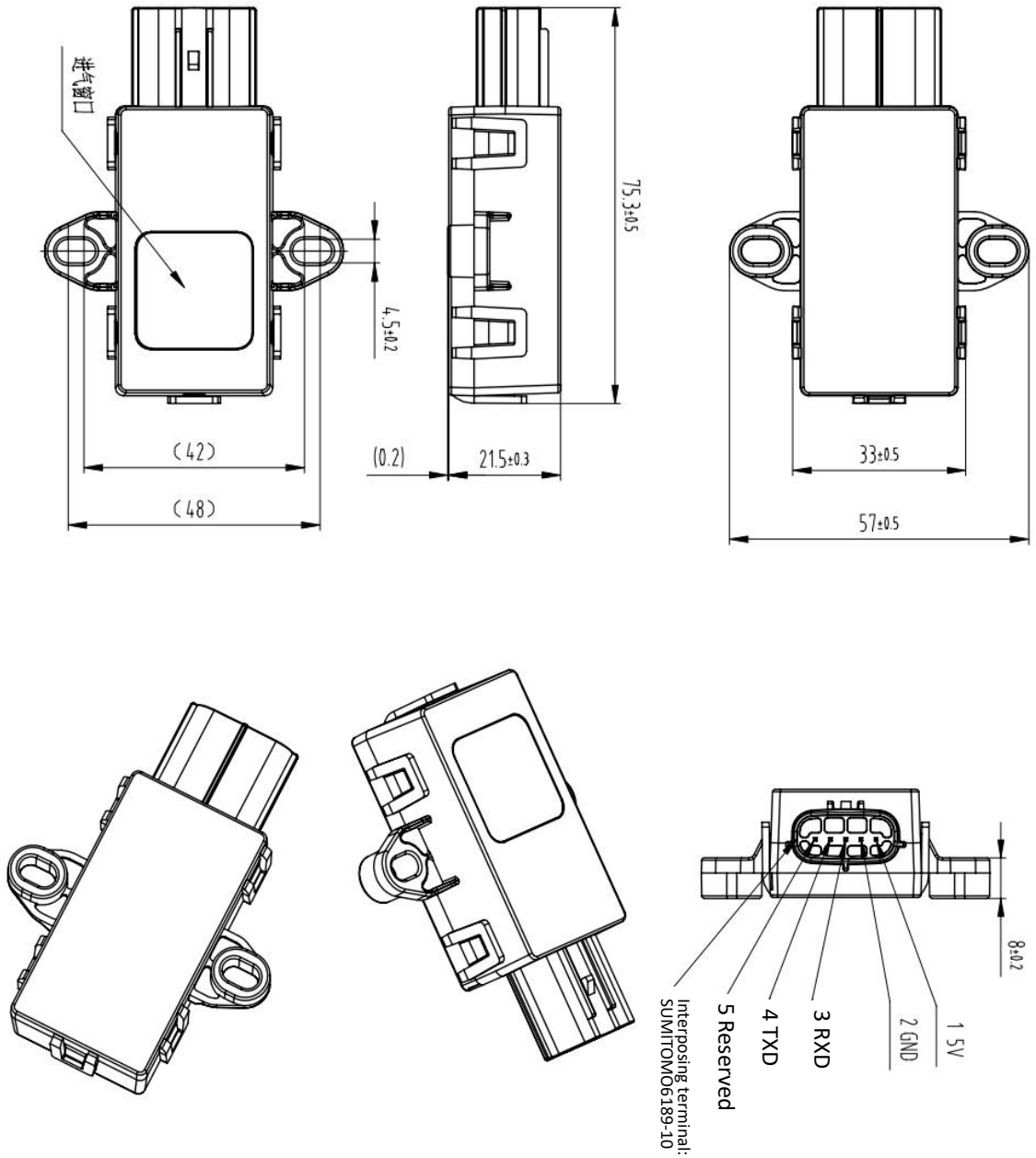

Fig1.sensor module size

Pin Definition:

Table3.

Pin	Pin Definition
Pin 1	VCC
Pin 2	GND
Pin 3	RXD
Pin 4	TXD
Pin 5	Reserved

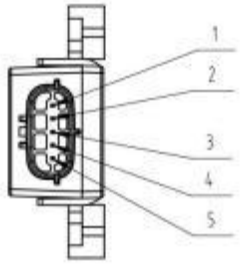

Fig2. Sensor Module Pins

Communication protocol:

ZRT510 module is UART communication, communication protocol and data format are as follows:

1、 Communication settings:

Table4. Communication settings

Physical Layer	RS485
Software Protocol Type	Modbus RTU
Data Byte Order	High byte first
CRC byte order	Low byte first
Data frame	Start bit: 1 bit Data bit: 8 bits Stop bit: 1 bit No parity
Baud rate	9600bps
Modbus address	0x01 (default)
Supported Function Codes	0x03 (Read multiple holding registers) 0x06 (write single register)
Supported Exception Codes	0x01 (Illegal function) 0x02 (illegal address) 0x03 (Illegal data value) 0x04 (server-side device fault)

2、 Register definition:

Table5. Register Definition Table

Access Type	Name	Register Address	No. of Registers	Data Type	Description
Read	Register Specification Version	0x0100	1	[uint8, uint8]	Protocol specification version, the high byte is the major version number and the low byte is the minor version

					number.
Write	Device Reset	0x0101	1	bool	The sensor will be reset by writing 1 to the register.
Data Search					
Read	Operation mode	0x0110	1	enum	Operation mode of the device, no measurement values are available during startup. 0: start-up; 1: measurement in progress.
Read	Leak signal	0x0111	1	bool	Flag that turns on when the concentration exceeds the alarm threshold. By default, the leak signal remains on for 5 minutes after the concentration falls below the leak signal threshold again. 0: No leak detected; 1: Leak is actively detected or for the duration after the leak detection.
Read	Error Code	0x0112	1	uint16	Refer to <6> Fault Definition Table
Read	Gas concentration LFL	0x0113	1	int16	The last measured gas concentration in %LFL multiplied by 10 (e.g. 251 means 25.1%LFL). Resolution: 0.1% LFL; Range: 0-100% LFL.
Read	Sensor Module Temperature	0x0114	1	int16	Last measured temperature in °C multiplied by 10 (e.g. 210 means 21.0 °C). Resolution: 0.1 °C; Range: -40 to 85°C.
Read	Sensor Module Humidity	0x0115	1	int16	Last measured humidity in %RH multiplied by 10 (e.g. 305 means 30.5%RH). Resolution: 0.1%RH; Range: 0-100%RH.
Setting					
Read / Write	Device Address	0x0120	1	uint8	Slave address of the Modbus interface Range: 1 - 247; Default value: 1 A soft reset or power reapplication is required to apply a change to this value.
Read	Leak signal trigger threshold	0x0124	1	uint16	The gas concentration level that triggers the leak signal. Resolution: 0.1% LFL (e.g. 251 means 25.1% LFL)
Read	Lifetime warning	0x0126	1	uint16	The life count value of the trigger life

	signal trigger threshold				warning signal in days. Resolution: 1 day; Range: 0-65535 days.
Read	Life Alarm Signal Trigger Threshold	0x0127	1	uint16	The life count value of the trigger life alarm signal in days. Resolution: 1 day; Range: 0-65535 days.
Device Information					
Read	Device Marking	0x0140	1	string[20]	Reads the device tag. To be set, no default value. Indicates that the string is filled with 0 and terminated without 0.
Read	Firmware Version	0x014A	1	uint8[2]	Firmware version. Format: High byte: major version; Low byte: minor version.
Read	Gas Type	0x014C	1	enum	The type of gas for which the sensor module is configured.
Read	Life counter (days)	0x014E	1	uint16	The service life of the device in days. Resolution: 1 day; Range: 0-65535 days. Device stores timing values every 12 hours.
Read	Life counter (hours)	0x014F	1	uint16	The value of the service life of the device is supplemented by the number of hours, which together with the integer digits form the life value. The unit is hours. Resolution: 1 hour (for example: 12 means 12 hours, if the number of life days is 100, the total life is: 100 days and 12 hours); Range: 0-23 hours. This value is updated every 1 hour.

3、 Fault definition

Table6. Fault Definition Table

Bit(0-15 from right to left)	Fault	Description
0	Internal errors	Errors that cause measurement data to be unavailable, such as internal communication errors.
1	Value exceeds limit	The sensor detects a temperature, relative humidity or gas concentration that exceeds the specified limits.
2	-	-

3	Self-test failed	Internal check for errors caused by incorrect operation, invalid settings, etc.
4	Sensor module failure	Unable to recover from an error that requires replacement of the sensor module.
5	Exceed life limit alarm	The service life limit has been reached.
6	Approaching life limit warning	The lifetime warning threshold has been reached.

4、 Data sending and receiving format:

Table7. Basic Format

Device Address	Function Code	Data	CRC Checksum
1 byte	1 byte	N byte	2 byte

Table8. Function Code 03 - Read Holding Register Request Format

Device Address	Function Code	Start register address high byte	Start register address low byte	Read the high byte of the number of registers	Read the low byte of the number of registers	CRC Checksum
1 byte	03	1 byte	1 byte	1 byte	1 byte	2 byte

Table9. Function Code 03 - Read Holding Register Correct Answer Format

Device Address	Function Code	Return the number of data bytes	Register 1 data high byte	Register 1 data low byte	……	CRC Checksum
1 byte	03	1 byte	1 byte	1 byte	……	2 byte

Table10. Function Code 06 - Write Single Holding Register Request Format

Device Address	Function Code	Register address high byte	Register address low byte	Write value high byte	Write value low byte	CRC Checksum
1 byte	06	1 byte	1 byte	1 byte	1 byte	2 byte

Table11. Request frame error response format

Device Address	Function Code	Exception code values	CRC Checksum
1 byte	Request frame function code +0x80	1 byte	2 byte

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

Notes:

- Please use the sensor module within requested and stable voltage. It may be damaged if the voltage is too high or not work properly if the voltage is too low.
- Please do not use the product in high T&H, strong electromagnetic or dusty environment for long time.
- Please do not impact or vibrate the module seriously.
- Please do not install the module in the severe convection environment.

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