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Winsen US1010 Ultrasonic Oxygen Sensor User Manual

Contents

Winsen US1010 Ultrasonic Oxygen Sensor

Product Information

Specifications

- **Model:** US1010 Ultrasonic Oxygen Sensor
- **Detection Method:** Ultrasound
- **Detection Gas:** O2
- **Measuring Range – Concentration:** 20.5% – 95.6%
- **Measurement Accuracy:** Can be customized according to customer requirements, the fastest 0.1s
- **Measuring Range – Flow:** 0-10L/min
- **Working Voltage:** 4.5-13.2V
- **Average Current:** 30mA
- **Working Environment:** 0-55°C, 0-95%RH (no condensation)
- **Storage Environment:** -30-65°C, 0-95%RH (no condensation)
- **Output Signal:** UART (3.3V)
- **Dimensions:** Standard version: 78.2mm x 30mm x 20mm (L x W x H), Long screw version: 78.2mm x 30mm x 30.4mm (L x W x H)
- **Weight:** 20g
- **Lifespan:** 5 years

Product Usage Instructions

Detection Principle
The US1010 ultrasonic oxygen sensor detects oxygen concentration and flow by measuring the propagation time of ultrasonic waves in gas.

Main Features

- Good consistency
- Real-time response
- High precision
- Good stability
- Long lifespan
- Calibration-free
- LED indicator light

How to Use

1. Connect the sensor to the appropriate power source following the pin sequence and terminal description.
2. Ensure proper airflow through the sensor.
3. Monitor the LED indicator for normal operation.
4. Calibrate or customize measurement accuracy as needed.

Frequently Asked Questions (FAQ)

Q: What is the lifespan of the US1010 Ultrasonic Oxygen Sensor?
A: The sensor has a lifespan of 5 years under normal operating conditions.

Q: How can I know if the sensor is working properly?
A: The LED indicator will blink once every 5 seconds when the sensor is powered and working normally. Any other LED behavior indicates an abnormality.

Q: Can the measurement accuracy be customized?
A: Yes, the measurement accuracy can be customized according to customer requirements.

Statement

US1010 Ultrasonic Oxygen Sensor

Profile
The US1010 ultrasonic oxygen sensor is mainly used in the detection of oxygen concentration and flow in oxygen concentrators and related products. It uses ultrasonic sensors to detect the propagation speed of ultrasonic waves in gas, and uses temperature compensation to accurately calculate oxygen concentration and flow.

Main Features

- Good consistency
- Real-time response
- High precision
- Good stability
- long lifespan
- Calibration-free
- LED indicator light

Applications

- Household oxygen generator
- Medical oxygen concentrator

Detection principle

The propagation time of ultrasonic waves in a binary gas mixture changes with the concentration and flow of the two gases. According to this law, the gas concentration and flow velocity can be calculated at the same time without affecting the normal flow of the gas.

Technical Specifications

Model No.	US1010	
Detection method	ultrasound	
Detection gas	O2	
Concentration	Measuring range	20.5% 95.6%
	Measurement accuracy	± 1.5%FS @(5 45)°C
	Resolution	0.1%
	Response time	≤1.5s T90 Can be customized according to customer requirements, the fastest ≤0.1s
Flow	Measuring range	0 10L/min
	Measurement accuracy	±0.2L/min@(5 45)°C
	Resolution	0.1L/min
	Response time	≤1.5s T90 Can be customized according to customer requirements, the fastest ≤0.1s
Working voltage	4.5 13.2V	
Average current	≤30mA	
Working environment	0 55°C 0 95%RH no condensation	
Storage environment	-30 65°C 0 95%RH no condensation	
Output signal	UART(3.3V)	
Dimensions	Standard version: 78.2mm*30mm*20mm(L*W*H) Long screw version: 78.2mm*30mm*30.4mm(L*W*H)	
Weight	20g	
Lifespan	≥5 years	

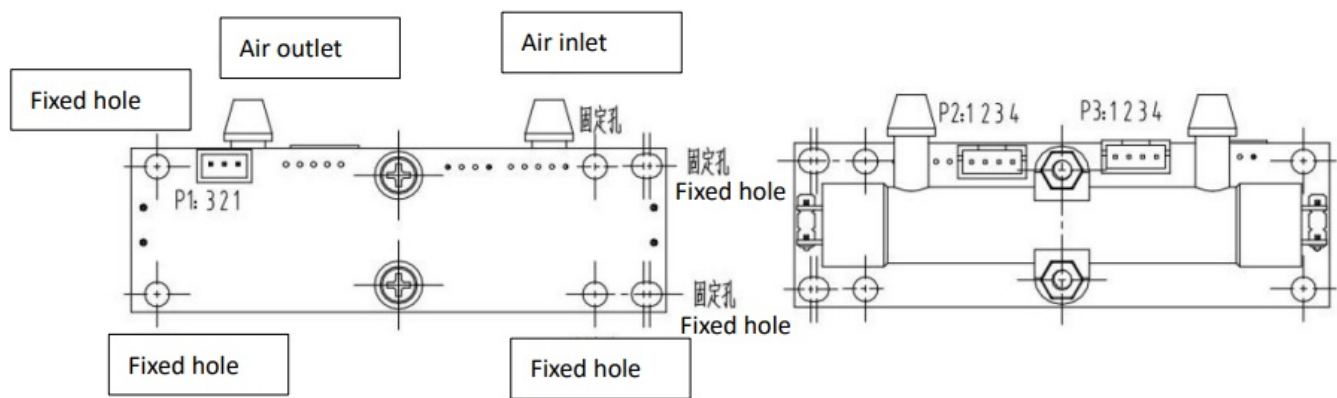**Table 1 – Technical Specifications**

Pin sequence

Figure 1 - Pin sequence

Terminal description: P1 model is PH2.0-3P (interval 2.0mm ,no snap joint), P2 models are PH2.0-4P (internal 2.0mm, with snap joint), P3 models are PH2.0-4P (interval 2.0mm, no snap joint).

Pin definition:

Table 2 – Pin Definition

| Pin name	Pin description
P1-1	VCC(4.5 13.2V)
P1-2	NC (hang in air)
P1-3	GND
P2-1	GND
P2-2	UART(TXD) Serial port sending (3.3V)
P2-3	UART(RXD) Serial port receiving (3.3V-5V)
P2-4	VCC(4.5~13.2V)
P3-1	GND
P3-2	UART(TXD) Serial port sending (3.3V)
P3-3	UART(RXD) Serial port receiving (3.3V 5V)
P3-4	VCC (4.5~13.2V)

LED status description:
When the LED blinks once every 5 seconds, the sensor is powered and working normally; When the LED blinks too fast, too slow or does not blink, the sensor is abnormal;

Communication Description

Hardware connection
Connect the VCC-RXD-TXD-GND of the sensor to the VCC-TXD-RXD-GND of the customer's board respectively, as shown in the figure below (the user side needs to use TTL level, if it is RS232 level, it must be converted). A typical interface circuit is as follows:

US1010   Client device
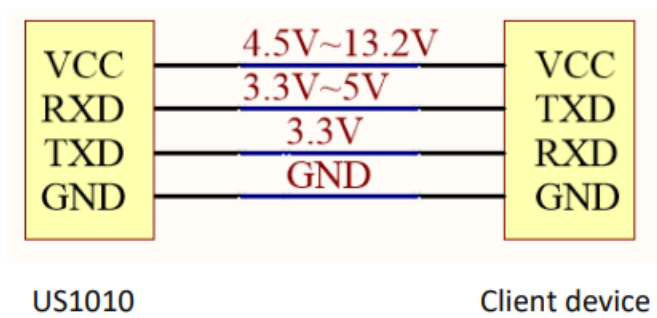
Serial parameters

Table 3 – Serial port configuration

name	description
Baud rate	9600
Data byte	8
Stop byte	1
Parity	None

Protocol Description

start byte	length	Command	data	checksum
Head	Length	Command	Data	Checksum
1Byte	1Byte	1Byte	nByte	1Byte

Data Instruction

Note: 1. The data are all hexadecimal data, 1Byte refers to single-byte unsigned number (0-255), nByte refers to n-byte unsigned number;

The high byte of double-byte data comes first, and the low byte follows.

Data name	Illustrate
Start byte	The upper computer send is fixed at 0x11, and the sensor module response is fixed at 0x16
Length	= command length (1) + data length (n) (note: data length n can be 0)
Command	The sensor executes the command, 0x01 is to read the oxygen data measured by the sensor, and the rest are reserved.

Data	The data sent by the host or the sensor, the length is n bytes, or there is no data (n=0)
Checksum	=(0xFF- Head + Length + Command + Data))+1 (Note: checksum = all values except the checksum are accumulated and inverted + 1)

Example

	start byte	length	command	check value
host sends	11	01	01	ED

	start byte	length	command	data (D1)	data (D2)	data (D3)	data (D4)	data (D5)	data (D6)	data (D7)	data (D8)	check sum
sensor send	16	09	01	03	A7	00	0C	01	1B	00	00	0E

Note: The sensor has two data output modes. In the question & answer mode, it is recommended that the host send the interval not less than 0.5S, and the active upload mode of the sensor is to send a set of data every 1S.

Function

Read O2 concentration

Data analysis

- D1 and D2 are concentration values, O2 concentration value = (D1*256 + D2)/10 (Vol %)
- D3 and D4 are flow values, O2 flow value = (D3*256 + D4)/10 (L/min)
- D5 and D6 are temperature values, O2 temperature value = (D5*256 + D6)/10 (°C)
- (Note: The temperature returned by the sensor is the temperature of the gas in the sensor chamber) D7 and D8 are reserved data

Example calculation results:
Each value is hexadecimal data, it should be converted to decimal number when calculating

- D1=0x03=3, D2=0xA7=167, O2 concentration value=(3*256+167)/10=93.5%
- D3=0x00=0, D4=0x0C=12, O2 flow value=(0*256+12)/10=1.2L/min
- D5=0x01=1, D6=0x1B=27, O2 temperature value=(1*256+27)/10=28.3°C

Notes

- When the sensor is installed and used, it is forbidden to touch the pins of the transducers at both ends of the sensor;

- Do not disassemble the sensor gas pipeline fixing screws at will;
- The air inlet and outlet holes of the sensor must not be blocked or polluted, and liquids and debris are prohibited from entering the sensor gas pipeline;
- The sensor should not be subject to excessive impact or vibration;
- Do not use if the shell is damaged or deformed;
- Do not continue to use the sensor if the LED indicator is not blinking periodically

Product Size
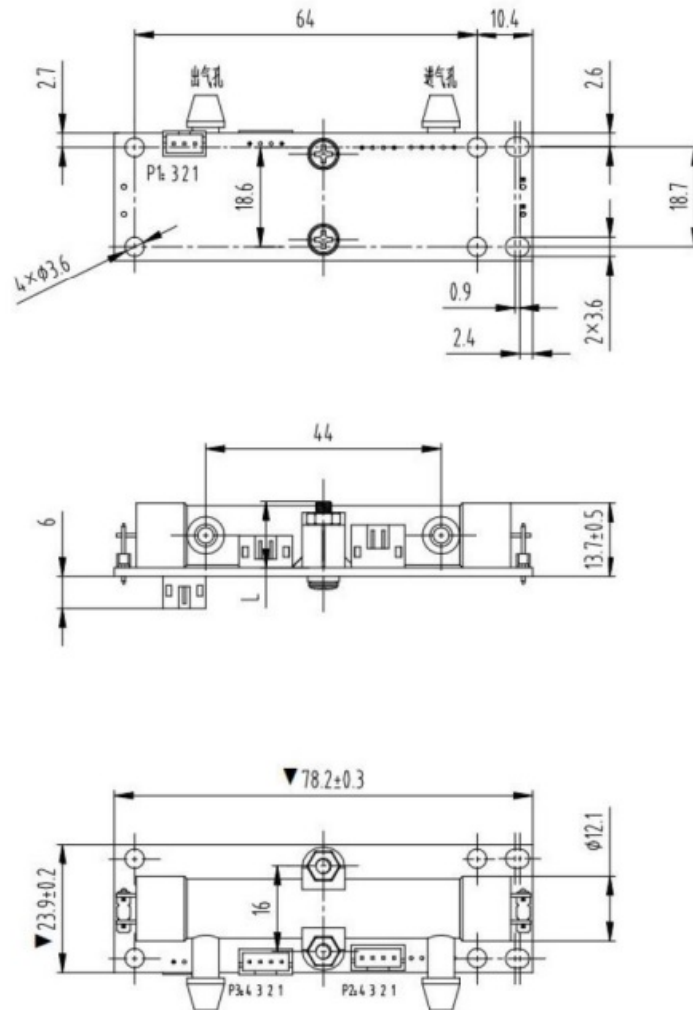
- Unmarked tolerance is ±0.3mm
- Standard version: L =12.4±0.5mm
- Long screw version: L=22.8±0.5mm

Documents / Resources

Winsen Ultrasonic Oxygen Sensor （Model：US1010) User's Manual Zhengzhou Winsen Electronic Technology Co., Ltd ISO9001 Certificated Company Leading gas sensing solutions supplier in China!	**[Winsen US1010 Ultrasonic Oxygen Sensor](#)** [pdf] User Manual US1010 Ultrasonic Oxygen Sensor, US1010, Ultrasonic Oxygen Sensor, Oxygen Sensor, Sensor

References

- **Winsen Gas Sensor_CO2 Sensor_Air Quality Sensor_Dust Sensor_CO Sensor-Winsen Electronics**
- **Winsen Gas Sensor_CO2 Sensor_Air Quality Sensor_Dust Sensor_CO Sensor-Winsen Electronics**
- **Professional gas sensor factory-accurate gas detection solutions**
- **Professional gas sensor factory-accurate gas detection solutions**
- **User Manual**