SPECIFICATION

Product Name：Ultrasonic Oxygen Sensor

Sensor Item No.: Gasboard-7500E

Version: V1.5

Date: July 01, 2020

Revision

No.	Version	Content	Reviser	Date
1	V1.0	1. Increase reliable test; 2. Increase communication protocol; 3. Increase reference circuit;	Mei Yang	2018-1-29
2	V1.1	1. Specifications ,delete ”cubic sensor”; 2. Change package materials from “red pearl cotton” to “blister plate”;	Mei Yang	2018-2-9
3	V1.2	1. Specifications: O2 concentration:0-100%,add notes,”PSA” oxygen ventilator concentration accuracy 20.5%~95.6%”	Mei Yang	2019-1-26
4	V1.3	1. Delete the screw model and screw hole spacing in the product appearance dimension drawing;	Mei Yang	2019-4-30
5	V1.4	1. The font of the specification is modified to Song typeface, Arial; 2. Reference circuit diagram correction;	Mei Yang	2019-8-7
6	V1.5	1. Update Gasboard-7500E Pin Definition Picture	Una Zhan	2020-7-1

Ultrasonic Oxygen Sensor Module Gasboard-7500E

Applications

- ✧ Family and Medical Oxygen Concentrator/ Generator
- ✧ Measurement the Flow of Clean Gas
- ✧ Gas Detection in Binary Gas(include O2)

Description

The gasboard-7500E ultrasonic oxygen sensor is an economical and practical sensor for measuring oxygen flow and concentration in binary gases. Based on the mature gasboard-7500 ultrasonic oxygen sensor module, the product is optimized and upgraded to further strengthen EMC protection, which is used to replace and expand applications of original series in more occasions.

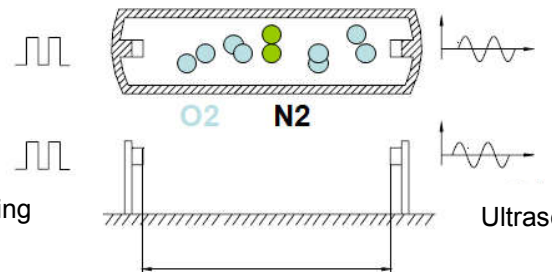
Features

- ✧ Measure both Concentration and Flow Rate of O2
- ✧ Full Scale Course Temperature Compensation
- ✧ Small size, Quick response, Stable, High Accuracy
- ✧ CMC, CE, EMC Certificated
- ✧ Meet the Medical and Other Special Requirements
- ✧ Long Lifespan, Self-calibration, Maintenance-free

Working Principle

Principle of ultrasonic flow detection: when ultrasonic wave is propagating in the fluid, it is affected by the fluid velocity and carries the flow velocity information. The flow velocity can be measured by detecting the received ultrasonic signal, so as to obtain the flow rate. Ultrasonic flow measurement has the characteristics of not impeding fluid flow.

Ultrasonic concentration detection theory: when the binary gas mixture composition has molecular weight difference, sound travel speed varies from different gas composition.



Ultrasound wave sending

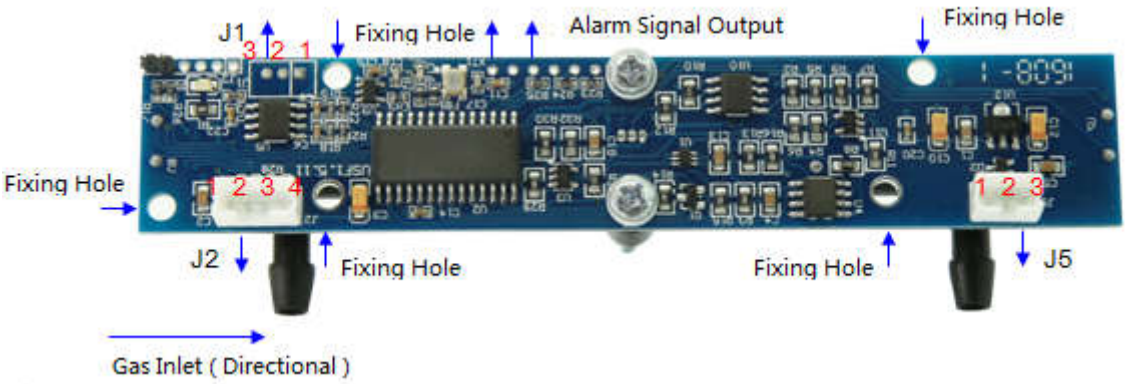
Ultrasound wave receiving

Specification

Ultrasonic Oxygen Sensor Specification	
Detect Principle	Ultrasonic Technology
Detection Range	O2 Concentration：0~100%① O2 Flow Rate：0~10L/min
Detection Accuracy	O2 Concentration：±1.8%FS @(10~45)℃ O2 Flow Rate：±0.2L/min@(10~45)℃
Resolution	O2 Concentration：0.1% O2 Flow Rate：0.1L/min
Response Time	1.5s
Work Condition	-10~50℃；0~95%RH（Non-condensing）
Storage Condition	-20~60℃；0~95%RH（Non-condensing ）
Work Voltage	DC 12V±0.5V, Ripple Wave <50mV
Average Work Current	＜50mA
Communication Interface	UART_TTL(5V)
Product Size	W120*H22*D13.6 mm
Life Span	≥5 Years

Remark① Oxygen concentration detection range for PSA oxygen concentrator is 20.5%~95.6%.

Pin Definition



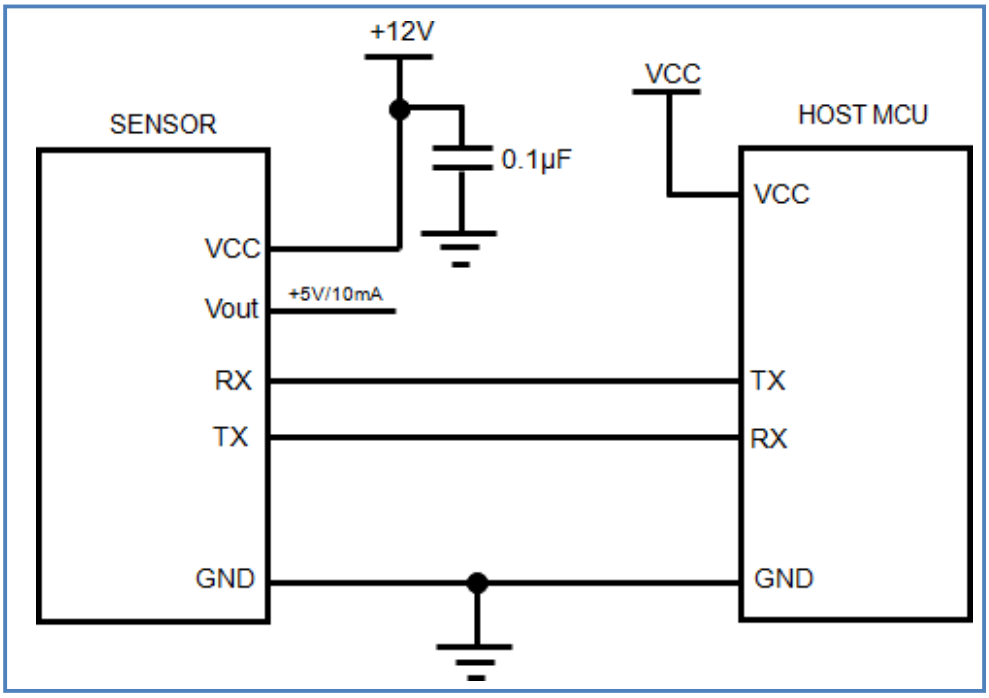
Drawing1 Gasboard-7500E Pin Definition

Pin Definition List

J1			J2		
NO	**Pin**	**Description**	**NO**	**Pin**	**Description**
1	Vout1	Customized Options	1	Vout	+5V/10mA, Power Supply Output
2	Vout2	Customized Options	2	Rx	UART-Rx Receiving (5V)
3	GND	Power Supply Output	3	Tx	UART-Rx Sending (5V)
			4	GND	Power Supply Output

J5			Alarm output		
NO	**Pin**	**Description**	**NO**	**Pin**	**Description**
1	Vcc	12VDC， External Power Supply Input Pin	1	Alarm Output	Customize Options
2	NC	No Definition			
3	GND	Power Supply Input			

Application Scenarios： UART TTL 5 V Output



Drawing 2 UART Communication Connection Circuit

Communication Protocol

UART Communication Protocol

1. Protocol Overview

1） Baud Rate：9600, Data Bits: 8, Stop Bits: 1, Parity: No, Flow Control: No

2） The protocol data are hexadecimal data. For example “46” is [70] in decimal；

3） [xx] is single byte data(unsigned，0-255)；In double byte, the high byte is in front of low byte；

2. Serial Communication Protocol Format

PC Send Format

Start Symbol	Length	Order No	Data 1	……	Data n	Check Sum
HEAD	LEN	CMD	DATA1	……	DATAn	CS
11H	XXH	XXH	XXH	……	XXH	XXH

Protocol Format Description

Protocol Format	Description
Start Symbol	PC sending is fixed to [11H]，module response is fixed to[16H]
Length	Length of frame byte，=data length+1（include CMD+DATA）
Order No	Directive number
Data	Read or written data, the length is variable
Check Sum	The sum of data accumulation，=256-(HEAD+LEN+CMD+DATA)

3. Serial Protocol Order Number List

No	Function Name	Order No
1	Read the measurement result of O2	0x01
2	Read the software version number	0x1E
3	Inquiry instrument serial number	0x1F

4. Detailed Description

4.1 Read the Measurement Result of O2

Send：11 01 01 ED

Response：16 09 01 DF1-DF8 [CS]

Function：Read the measurement result of O2

Description：O2 Concentration = （DF1*256+ DF2）/10 （Vol %）

O2 Flow Value = （DF3*256 + DF4）/10 （L/min）

O2 Temperature Value = （DF5*256 + DF6）/10 （℃）

Notice：DF7-DF8 reserve

Response Example：

Response：16 09 01 00 CD 00 00 00 C2 00 1E 33

Instruction ：

Hexadecimal Convert into Decimal： CD is 205；C2 is194

O2 Concentration =0*256 + 205=205 (20.5%)

O2 Flow Value=0*256+0=0 (L/min)

O2 Temperature Value=0*256+194=194 (19.4℃)

4.2 Read the Software Version Number

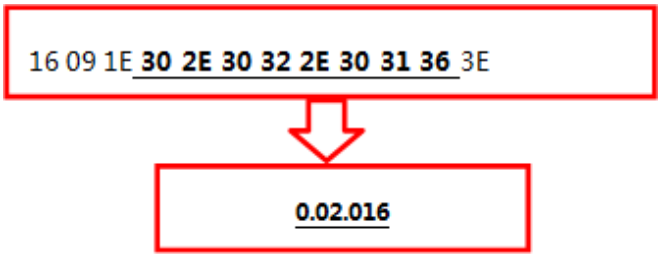
Send ： 11 01 1E D0

Response ： 16 09 1E DF1-DF8 [CS]

Function ： Read the software version number

Instruction ： DF1-DF8 refers to the ASCII code of particular version number

For Example： When module version number is 0.02.611, response data:



Hexadecimal Convert into ASCII Code:

4.3 Inquiry Instrument Serial Number

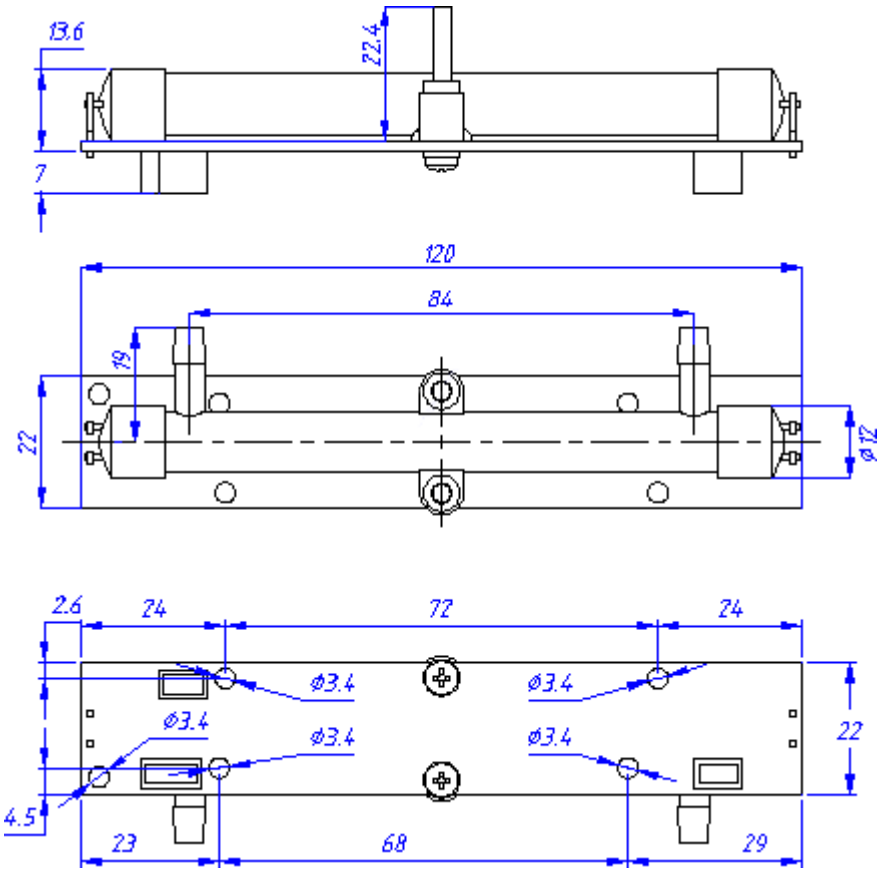
Send ： 11 01 1F CF

Response ： 16 0B 1F（SN1）（SN2）（SN3）（SN4）（SN5）[CS]

Function ： ：Read version number for module firmware

Explanation ： Instrument serial number of output software. SNn range is 0~9999，5 integer type constitute 20 serial number

Dimension

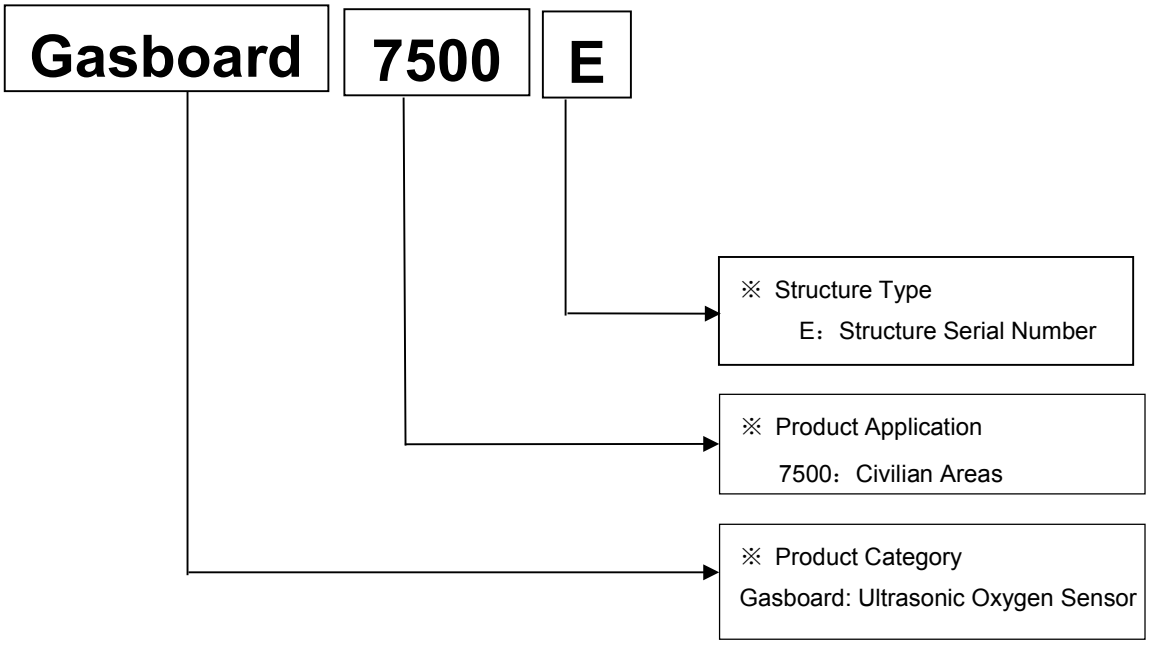


Drawing 3（Unit:mm, Tolerance:±0.2mm）

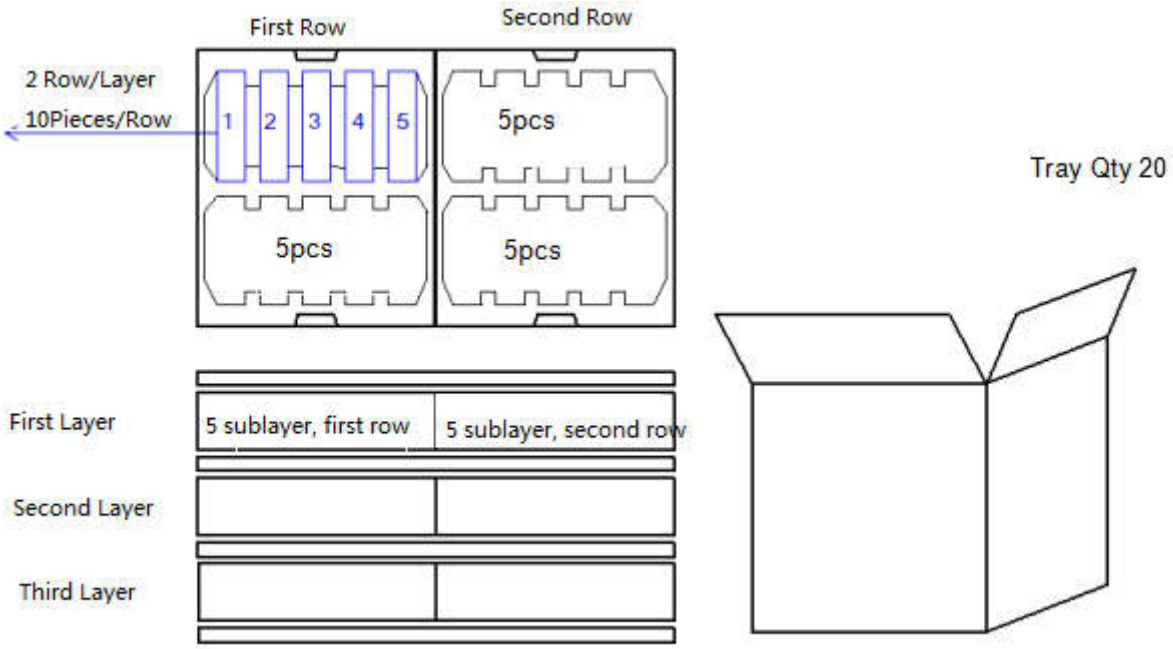
Reliability Testing

Item	Requirement	Criterion	Sample (n) Failed (c)
Flow Performance	Indoor temperature requirement：25±2℃，humidity（50±10）%RH，after the sensor connect with serial port and power on， switch over the flow in 3L/min、5L/min、8L/min respectively to make measurement of oxygen concentration and accuracy.	Make new tests in different oxygen flow，all can meet deviation criterion.	n=70 c=0
Low Temperature Storage	Storing the sensor for 96H with no power under -20℃±2℃ environment condition, then test the measuring deviation under normal temperature condition.	After staying under normal temperature condition for 2 hours, the test all can meet deviation criterion.	
Low Temperature Operation	Indoor temperature requirement：-10±2℃，test the measuring deviation of sensor under normal temperature condition after operating for 96H with electricity.	After staying under normal temperature condition for 2 hours, the test all can meet deviation criterion.	
High temperature Storage	Storing the sensor for 96H with no power under 60℃±2℃ environment condition, then test the measuring deviation under normal temperature condition.	After staying under normal temperature condition for 2 hours, the test all can meet deviation criterion.	
High Temperature Operation	Indoor temperature requirement：50±2℃，test the measuring deviation of sensor under normal temperature condition after operating for 96H with electricity.	After staying under normal temperature condition for 2 hours, the test all can meet deviation criterion.	n=0 c=0
High-low Temperature Shock	Keep the sensor under -20℃ for 60 mins，then switch it to 60℃ in 10s and stay for another 60 mins, this is one cycle. Totally 10 cycles with the sensor power off.	After staying under normal temperature condition for 2hours，the sensor accuracy should meet the specification standard.	
High Temp &Humidity	Keep the sensor under high temp & humidity (40±2℃，95%RH)，after working under rated voltage for 500H，test the measuring deviation under normal temperature condition.	After staying under normal temperature condition for 2hours，the sensor accuracy should meet the specification standard.	
Salt Spray Test	Standard :GB/T2423.17，place the sensor in the salt fog box under 35℃ and spray it with Nacl solution (concentration is 5%) for 24 hours, then flushing it with distilled water and drying it with airflow.	Keep the sensor under standard environment more than 1h and less than 2h, it should no appearance defect, no corrosion.	n=2 c=0
Vibration Test	Bare sensor should bear the specified vibration test in X/Y/Z direction, frequency range 10~55~10Hz/min，amplitude 1.5mm，scan circulation 2 hours.	No appearance defect after vibration test, the sensor can meet basic performance test standard.	n=4 c=0
Package Drop Test	Drop height：setting the height as specified weight according to standard GB/T 4857.18. Making the drop test according to the GB/T4857.5 standard。Test sequence is one corner, three edges, six sides.	No appearance defect after drop test，no components fall off, the sensor should work normally.	n=1 ctn c=0

Product Code Instruction



Packing Information



Qty/Layer	Small Tray Qty	Big Tray Qty	Sensor per Carton	Carton Dimension	Packing Material
20 pcs	5 layers	3 layers	300pcs	W395 * L320 * H470mm	Anti-static Plastic Tray

User Attention

Please confirm before starting to test:

(1)Sample gas needs to be pretreated to make sure that the sensor entrance is clean, no water and no oil.

(2)Connect the sensor vent pipe with outside air to ensure the safety of emissions and ensure no blocking phenomenon.

(3) Do not smoke or use open flame near the sensor.

(4) The integrity of the pipeline must be ensured in use to avoid gas leakage caused by pipeline rupture. When the leaked gas contains poisonous and explosive gases, it may cause serious accidents.

(5) When exhausting, please connect the exhaust pipe to the outdoor atmospheric environment, do not make it diffuse in the sampling device or indoor. Do not allow moisture to enter the sensor, or it may cause electric shock or short circuit in the instrument.

(6) The inlet pressure of the sensor must be within the specified range to avoid the loss or leakage of the pipeline due to excessive pressure.

(7) Non-professionals or without the permission of the manufacturer, do not disassemble the sensor, otherwise the sensor damage are not under the warranty or repair services.

(8) Please read the instructions carefully before using the sensor to avoid personal injury or damage to the sensor.

Consultancy & After-sales service

Contact Number：86-27-8162 8827

Address：Fenghuang No.3 Road, Fenghuang Industrial Park, Eastlake Hi-tech Development Zone, Wuhan, China

Postal Code：430205

Fax：86-27-8740 1159

Website：http://www.gassensor.com.cn

E-mail：info@gassensor.com.cn