AOX4000 manual

Fluorescent Oxygen Sensor

- High precision, with temperature compensation
- No Drift, Low Power Consumption
- long life
- Quick response
- calibrated
- Digital output oxygen partial pressure, atmospheric pressure
- Lead-free, RoHS compliant

Product description

AOX4000 is an oxygen sensor that measures the partial pressure of oxygen in the environment based on the principle of fluorescence quenching. The sensor has a built-in air pressure sensor, which can directly output the values of ambient air pressure, oxygen partial pressure and oxygen concentration, which is convenient for users to read data intuitively. Compared with electrochemical sensors, AOX4000 uses non-depleting oxygen-sensitive materials, so it has a longer life. Due to the temperature compensation function, no additional compensation system is required. AOX4000 is very stable and environmentally friendly, does not contain lead or any other harmful substances, and is almost free from cross-interference from other gases.

Application range

AOX4000 has a wide range of application scenarios, and is suitable for scenarios such as oxygen generators, incubators, oxygen concentrators, inert gas treatment rooms (glove boxes), exhaust gas measurement systems, inert gas monitoring systems, and portable oxygen measurement equipment.

Figure 1. AOX4000 physical picture

1. Working principle

AOX4000 is an all-solid-state optical oxygen sensor, which is mainly based on the principle of quenching effect of oxygen molecules on fluorescent substances. When the incident light of a specific wavelength irradiates the fluorescent substance, the fluorescent substance emits fluorescence. Due to the existence of molecular oxygen, the fluorescence intensity and fluorescence lifetime of the fluorescent substance change, and molecular oxygen can completely reversibly change the fluorescence intensity and lifetime. By testing different oxygen Oxygen concentration can be calculated from the change in fluorescence intensity or fluorescence lifetime under concentration. The working principle is shown in Figure 2 .

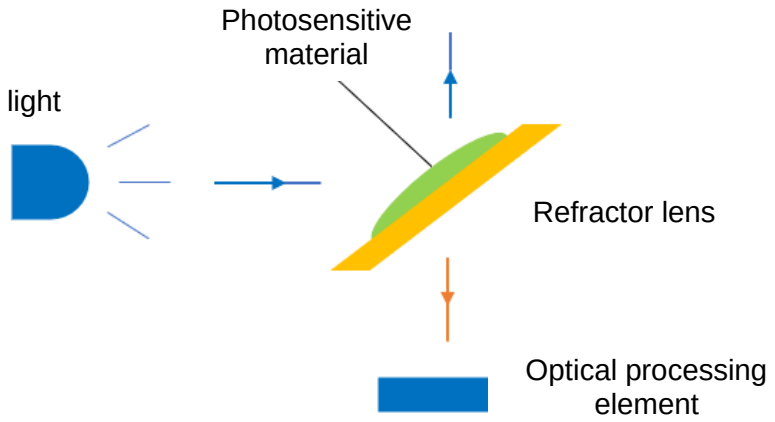

Figure 2. Sensor working principle diagram

2. Technical indicators

Table 1. Specifications

Parameter	Index	
Operating Voltage	4.75~5.25V	
Working current	Average 7.5mA; Peak 32mA	
Measuring range	oxygen concentration	0~25%
	partial pressure of oxygen	0~300mbar
	atmospheric pressure	500~1200mbar
Precision	partial pressure of oxygen	＜2%FS
	atmospheric pressure	±5mbar
Working environment	-30℃~60℃; 0~95%RH	
Storage environment	-30℃~60℃; 0~95%RH	
Life	>6 years	

3. Interface definition and communication protocol

3. 1 AOX4000 pin assignment

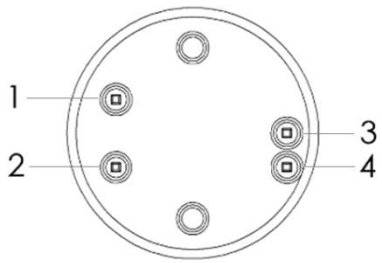

Figure 3. A OX400 0 pin diagram

Table 2. Pin Definitions

pin	definition
1	+5V
2	GND
3	UART TX
4	UART RX

3. 2 UART communication protocol

3.2.1 Serial communication parameters

Table 3. Serial communication parameters

data field	parameter
baud rate	9600
data bit	8 bits
stop bit	1 bit
Check Digit	none

3.2.2 Serial port protocol format

Serial communication uses ASCII characters, and the command set is shown in Table 4.

Table 4. Command Set

describe	character	corresponding to hexadecimal
Order	" M ", " O ", " % ", " T ", " P ", " A ", " # ", " e "	0x4D , 0x4F , 0x25 , 0x54 , 0x50 , 0x41 , 0x23 , 0x65
parameter	" 0 " ~ " 9 "	0x30~0x39
delimiter	" "	0x20
terminator _	"\r\n"	0x0D 0x0A

There are two working modes available for the sensor, active reporting mode and polling mode. Mode switching instructions are shown in Table 5 .

Table 5. Working Mode Switching Instructions

Order	describe	parameter	answer
" M "	output mode	0: active reporting mode 1: polling mode	"M xx\r\n" Where xx is the parameter of the command

3.2.3 Active reporting mode (M0)

And the data is actively reported every time the data is measured (about 3 seconds), including the data of oxygen partial pressure , temperature, pressure, and oxygen concentration. The format is as follows:

" O xxxx.x T yxx.x P xxxx % xxx.xx e xxxx \r\n "

Its equivalent description block combination is:

"<command><delimiter><parameter><delimiter><command><delimiter><parameter><delimiter>

<command><delimiter><parameter><delimiter><command><delimiter><parameter><delimiter>

<command><delimiter><parameter><terminator>"

3.2.4 polling mode (M1)

In polling mode, host requests are constructed from description block combinations, a typical arrangement is shown in Table 6.

<command><terminator>

<command><delimiter><parameter><terminator>

Sensor replies use the following format:

<command><delimiter><parameter><terminator>

NOTE: All commands are case sensitive.

Table 6. Polling Mode Command Set (M1)

Order	describe	parameter	answer
" O "	Query the current partial pressure of oxygen	N/A	"O xxxx.x \r\n" where xxxx.x is the ppO2 value (unit: mbar)
" % "	Query the current oxygen concentration value	N/A	"% xxx.xx \r\n" Where xxx.xx is the volume concentration of O_2, O_2%
" T "	Query the internal temperature value of the sensor	N/A	"T yxx.x \r\n" where y is the symbol "-" or "+", xx.x is the temperature (unit: ℃)
" P "	Query the current ambient air pressure	N/A	"P xxxx \r\n" Where xxxx is the current pressure value (unit: mbar)
" e "	reserve	N/A	reserve
" A "	Query for all values (see above: O, %, T, P and e)	N/A	Refer to the active report mode (M0) output: " O xxxx.x T yxx.x P xxxx % xxx.xx e xxxx \r\n "

Routine 1 :
Request (query current partial pressure of oxygen):

" O\r\n " corresponds to hexadecimal: " 0x4F 0x0D 0x0A "

Reply (take 210.3mbar as an example):

" O 210.3\r\n " corresponds to hexadecimal: " 0x4F 0x20 0x30 0x32 0x31 0x30 0x2E 0x33 0x0D 0x0A "

Routine 2 :
Request (set to active reporting mode):
" M 0\r\n " corresponds to hexadecimal: " 0x4D 0x20 0x30 0x0D 0x0A "
Reply (already in active reporting mode):
" M 00\r\n " corresponds to hexadecimal: " 0x4D 0x20 0x30 0x30 0x0D 0x0A "

3.2.5 Misidentification

When the request is not successful, an error code will appear in the response format, as shown in Table 7.

Table 7. Error Identification

reply	describe	Possible Causes	measure
" E 00\r\n "	serial receiver overflow	<terminator> not received before overflow	• Check serial port settings • Verify that the command terminated properly
" E 0 1 \r\n "	invalid command	Received unrecognized <command>	• Check if the command is valid • Check that the command is capitalized, eg replace " m " with " M "
" E 0 2 \r\n "	invalid frame	bad <delimiter>	• Check to use the correct delimiter
" E 0 3 \r\n "	invalid parameter	<parameter> is not allowed, or <parameter> is not within limits	• Check parameter is no longer 6 characters • Check that parameters are within limits • Check parameters available for command

4. physical dimension

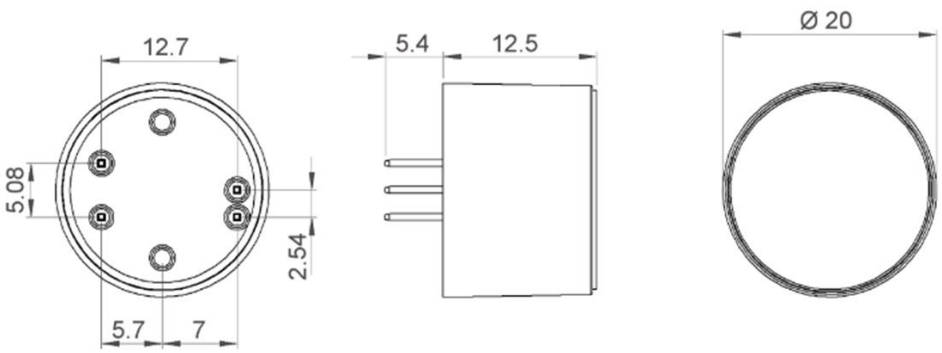

Figure 4. Appearance dimension drawing (unit: mm , general tolerance: ISO2768-mK)

5. Packing

AOX4000 is packaged in blister trays, and each blister tray packs 50 sensors, as shown in Figure 5 .

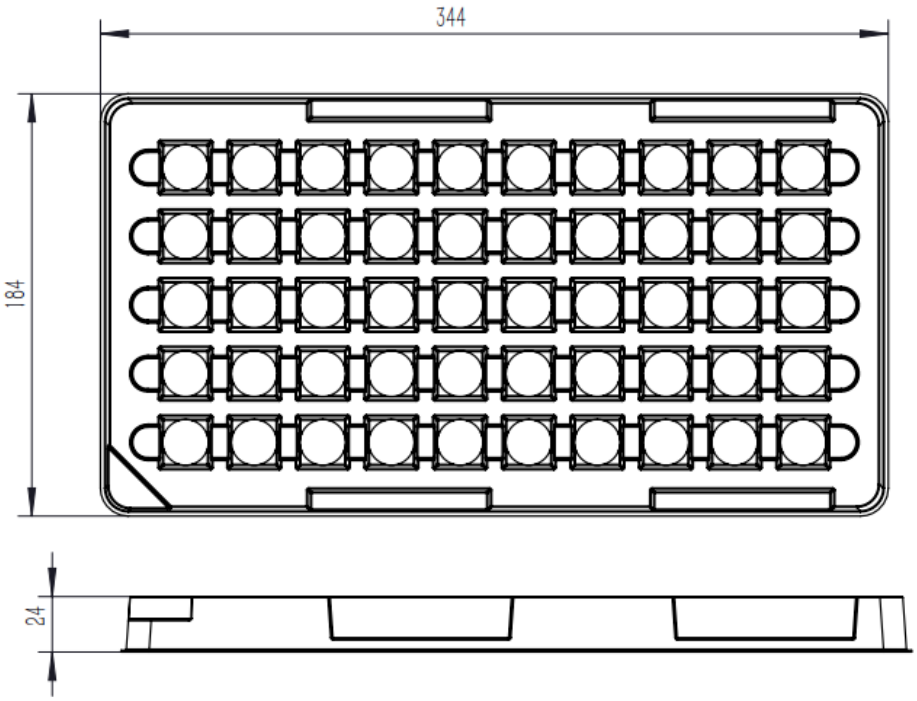

Figure 5. Dimensional drawing of blister tray (unit: mm , general tolerance: ISO2768-mK)

6. Precautions

6. 1 clean

If necessary, clean the sensor housing surface with a cloth dampened with clean water.

6. 2 disassemble

Users must not disassemble the sensor to prevent irreversible damage.

6. 3 calibration

Before the sensor leaves the factory, the data has been tested and the data consistency is good. Please do not use third-party testing instruments or data as a comparison standard. If the user wants the measurement data to be consistent with the third-party testing equipment, data fitting and calibration can be performed according to the actual measurement results.

6. 4 use environment

This sensor is suitable for ordinary indoor environments. If the user equipment is used in the following environments, the sensor may cause data consistency to decline due to excessive dust, oil, and water ingress.

a) Excessive dust concentration
b) Fume environment
c) High water mist environment

6. 5 welding requirements

It is forbidden to directly solder the pins, because soldering will cause the oxygen-sensitive film to deactivate, resulting in product performance problems.

WARNINGS AND PERSONAL INJURY

Do not use this product in safety protection devices or emergency stop equipment, and in any other application where failure of the product may cause personal injury, unless there is a specific purpose or authorization for use. Refer to the product data sheet and instruction manual before installing, handling, using or maintaining this product. Failure to follow recommendations could result in death or serious personal injury. The company will not be responsible for all compensation for personal injury and death arising therefrom, and exempt any claims that may arise from the company's managers and employees, affiliated agents, distributors, etc., including: various costs, claims fees, attorney fees, etc.

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Guangzhou Aosong Electronics Co., Ltd. provides the direct purchasers of its products with the quality assurance in the following table (calculated from the date of delivery), and indicates the technical specifications in the Aosong Electronics product manual. If the product is proven to be defective within the warranty period, the company will provide free repair or replacement services.

Warranty Description

Product category	Warranty period
AOX4000 fluorescent oxygen sensor	12 months

The company is only responsible for the products that are defective due to the application in the occasions that meet the technical conditions of the product. The company does not make any guarantees for product applications in special scenarios that are not recommended. The company also does not make any commitment to the reliability of the product applied to other non-company supporting products or circuits.

This manual is subject to change without notice.

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