

# Datasheet AO-03

## Oxygen sensor

- Linear output from 0 to 30%
- No external power supply
- Fast response
- Accurate and reliable
- Small and light

## Summary

AO-03 is an electrochemical sensor for oxygen concentration measurement. The sensor adopts molded body design and provides a quick, accurate and reliable response. It is small, portable, easy to be installed and replaced, and much more cost-effective than other sensors of the same type in the market.

## Application

AO-03 oxygen sensor is widely used in air monitoring in coal mine, steel and petrochemical industry, and other fields, for instance, oxygen alarm in mine area, air quality detector and commercial air purifier.



Figure 1. AO-03 oxygen sensor

# 1. Sensor specification

Table 1. Technical indicators of AO-03

<b>MEASUREMENT<sup>1</sup></b>	
Operating principle	Electrochemical
Output signal	0.1 ± 0.03 mA in Air
Measurement range	Linear output from 0 to 30% O <sub>2</sub> , Nonlinear output from 30 to 100% O <sub>2</sub>
Response time (T <sub>90</sub> )	< 15 s
<b>ELECTRICAL</b>	
Recommended load resistor	45 Ω
<b>MECHANICAL</b>	
Housing material	ABS
Weight	15 g (nominal)
<b>ENVIRONMENTAL</b>	
Operating temperature range	0 ~ 50 °C
Operating pressure range	Atmospheric ± 20%
Operating humidity range (non-condensing)	0 ~ 99% RH (non-condensing)
<b>OTHER INDICATORS</b>	
Long-term output drift <sup>2</sup> (Signal loss/year)	< 2%
Expected life time	2 years in Air
Shelf life	12 months from date of dispatch

<sup>1</sup> The parameters with no annotated condition in the above table are obtained under the recommended circuit, 20°C, 50% RH, and 1013 mBar. Technical indicators outline the performance of sensors provided within the first three months after delivery.

<sup>2</sup> Output signal may drift below the lower limit over time.

## 2. Dimension

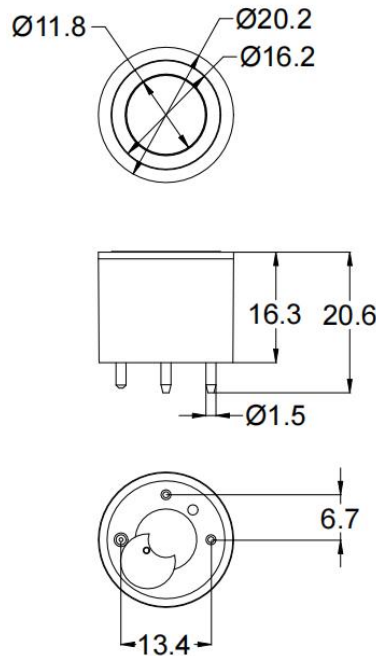


Figure 2. AO-03 outline dimension. All tolerances are  $\pm 0.1$  mm except tolerance of pins ( $\pm 0.05$  mm)

## 3. Installation and use

### 3.1 Storage and use

AO-03 oxygen sensor has to be kept away from high concentrations of organic solvent vapors during storage, installation and operation.

Welding is prohibited, because welding may cause defects, such as pin corrosion, skew, poor electrical contact and electrolyte leakage.

Before installing the AO-03 on a printed circuit board (PCB), the PCB should be cleaned with a degreasing agent to prevent the contamination on gas-permeable membrane. For example, rosin from volatilizing and condensing can block the gas-permeable membrane in the AO-03. Do not use organic solvents on the AO-03 housing, as solvents may cause cracking of plastics.

### 3.2 Acid gases

Acid gases such as  $\text{CO}_2$  and  $\text{SO}_2$  will be absorbed by the electrolyte and tend to increase the flux of oxygen to the electrode. This gives an increased oxygen signal of approximately 0.3% of signal per 1%  $\text{CO}_2$ . AO-03 oxygen sensors are not suitable for continuous operation in concentrations of  $\text{CO}_2$  above 25%.

### 3.3 Operating requirements

- Direct welding of the tube pin is prohibited.
- It is required to warm up AO-03 for at least 2 hours before the first time use of AO-03. Once the working electrode is disconnected to the counter electrode, warm up for at least 2 hours is also required.
- Corrosive gases can damage the AO-03, so use AO-03 under corrosive gases must be avoided.
- The calibration of the AO-03 shall be conducted in clean air (calibration at 20.9% oxygen concentration is suggested).
- Avoid violent shaking or impact on AO-03.
- Avoid bending and breaking the pins of AO-03.
- Avoid long-term use of AO-03 in anaerobic environments.
- Avoid long-term use of AO-03 in high humidity conditions.
- Do not open the housing of AO-03.

### 3.4 Recommended circuit

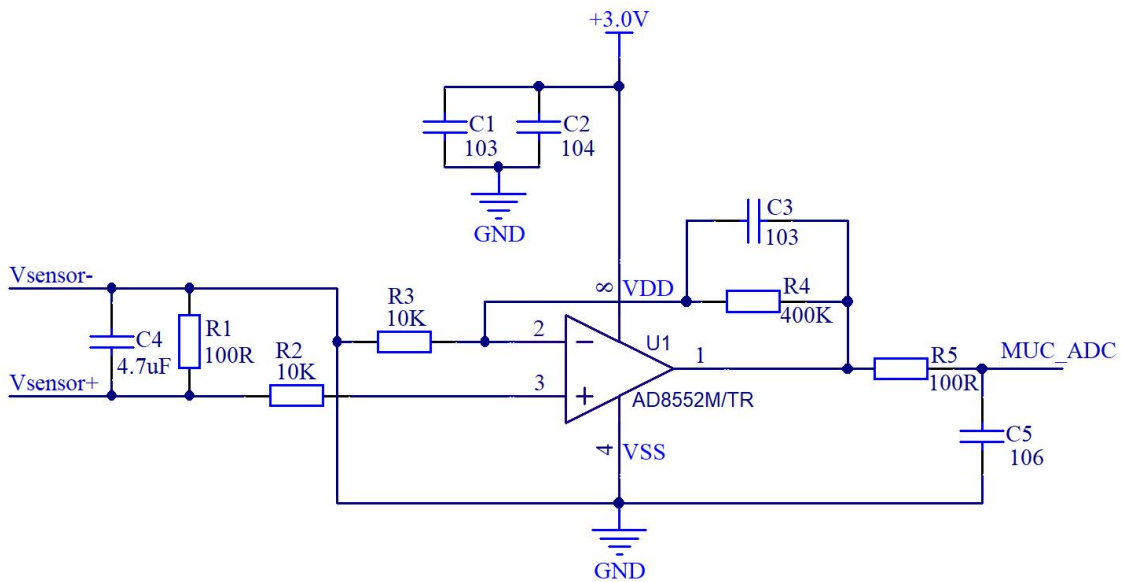


Figure 3. AO-03 recommended application circuit diagram

- Short-circuit the positive and negative pins (Vsensor+ and Vsensor-), read the amplified ADC value (MUC\_ADC), and record it as A<sub>0</sub>.
- Place the AO-03 in the air, read the amplified ADC value, record it as A<sub>1</sub>.
- Place the AO-03 in the environment to be tested, read the amplified ADC value, and record it as A<sub>x</sub>.
- The formula for calculating the oxygen concentration in the environment for measurement is:

$$\text{Oxygen Concentration} = \frac{(A_x - A_0) * 20.9}{(A_1 - A_0)} * 100\%$$

### 3.5 Pin definition

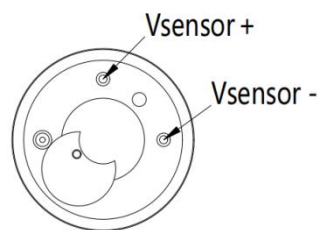


Figure 4. AO-03 pin definition diagram

## Warning and personal injury

Do not apply this product to safety protection devices or emergency stop equipment, and any other applications that may cause personal injury due to the product's failure. Do not use this product unless there is a special purpose or use authorization. Refer to the product data sheet and application guide before installing, handling, using or maintaining the product. Failure to follow this recommendation may result in death and serious personal injury.

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Description of warranty period

Product category	Shelf life
AO-03 oxygen sensor	12 months

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