ATO

Oxygen Transmitter (Analog Type)

Chapter 1 Product Overview

1.1 Product Overview

The oxygen sensor uses a professional oxygen concentration sensor probe as its core detection component. It features a wide measurement range, high accuracy, good linearity, versatility, ease of use, easy installation, long transmission distance, and reasonable price.

1.2 Functional Features

This product employs a high-sensitivity gas detection probe, ensuring stable signals and high accuracy. It offers a wide measurement range, good linearity, ease of use, convenient installation, and long transmission distances.

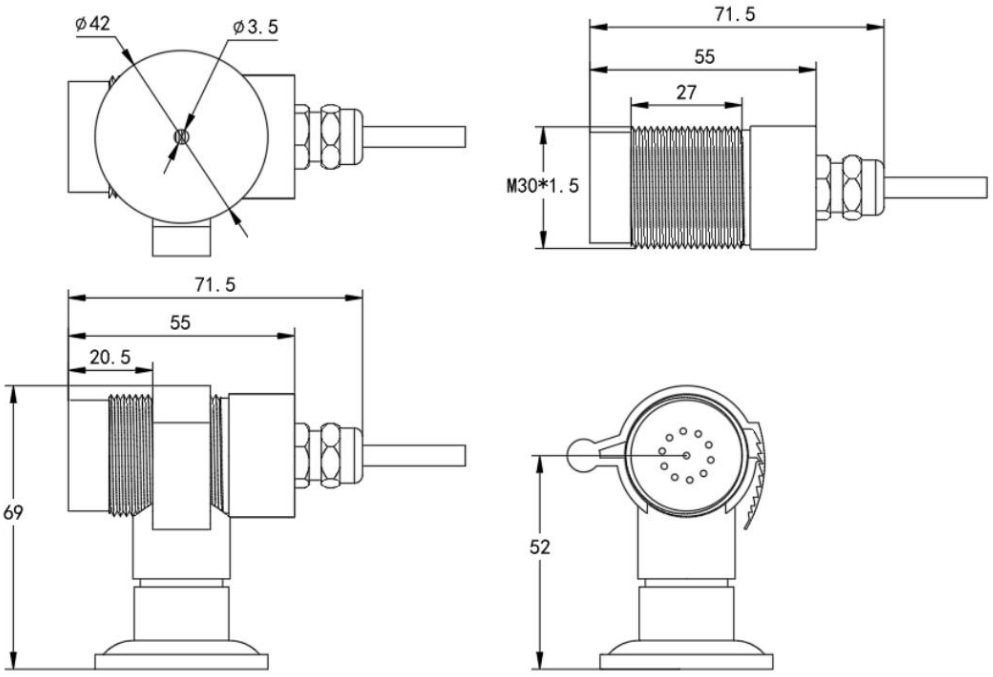
1.3 Main Parameters

Power supply	10 – 30 V DC
Output signal	(For devices with 0 – 10 V output, only 24 V power supply can be used)
Power consumption	4 – 20 mA, 0 – 5 V, 0 – 10 V
Operating temperature	0.25 W
Operating humidity	-20~50° C
Pressure range	5~95% RH (no condensation)
Stability	90~110 kPa
Response time	≤5% signal value/year
Warm-up time	≤10 s
Zero drift (-20 to 40° C)	≥5 min
Repeatability	±0.3% VOL
Service life	≤1%
Range	≥24 months
Accuracy	0~25% VOL
Resolution	±3% FS

All of the above specifications and parameters were measured under the following environmental conditions: temperature 20° C, relative humidity 50% RH, 1 atmosphere, and a maximum gas concentration not exceeding the sensor range.

Product Dimensions：

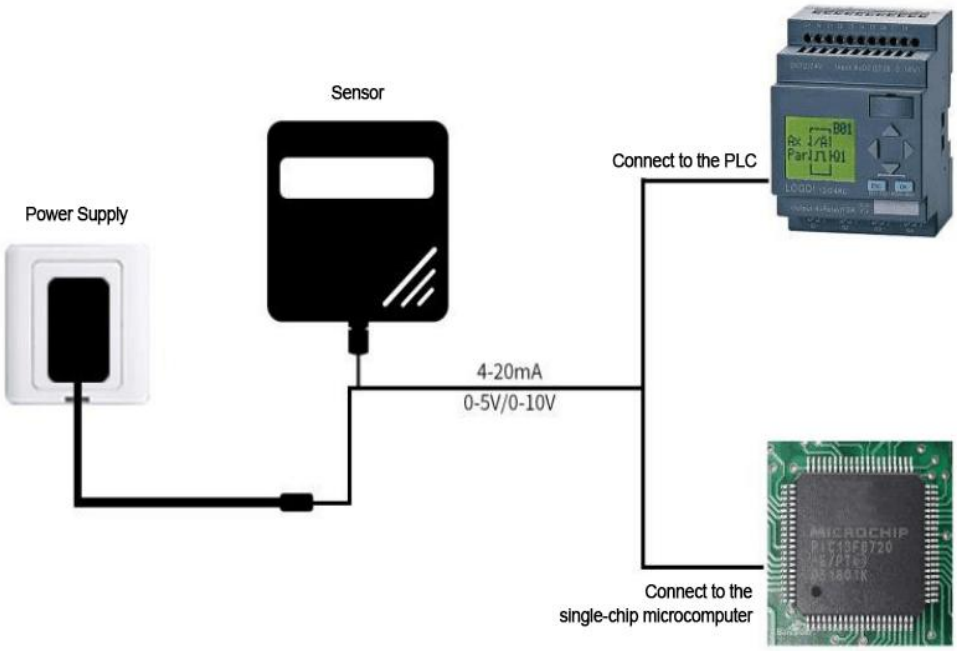
Extension Probe Dimensions (Unit:mm)：



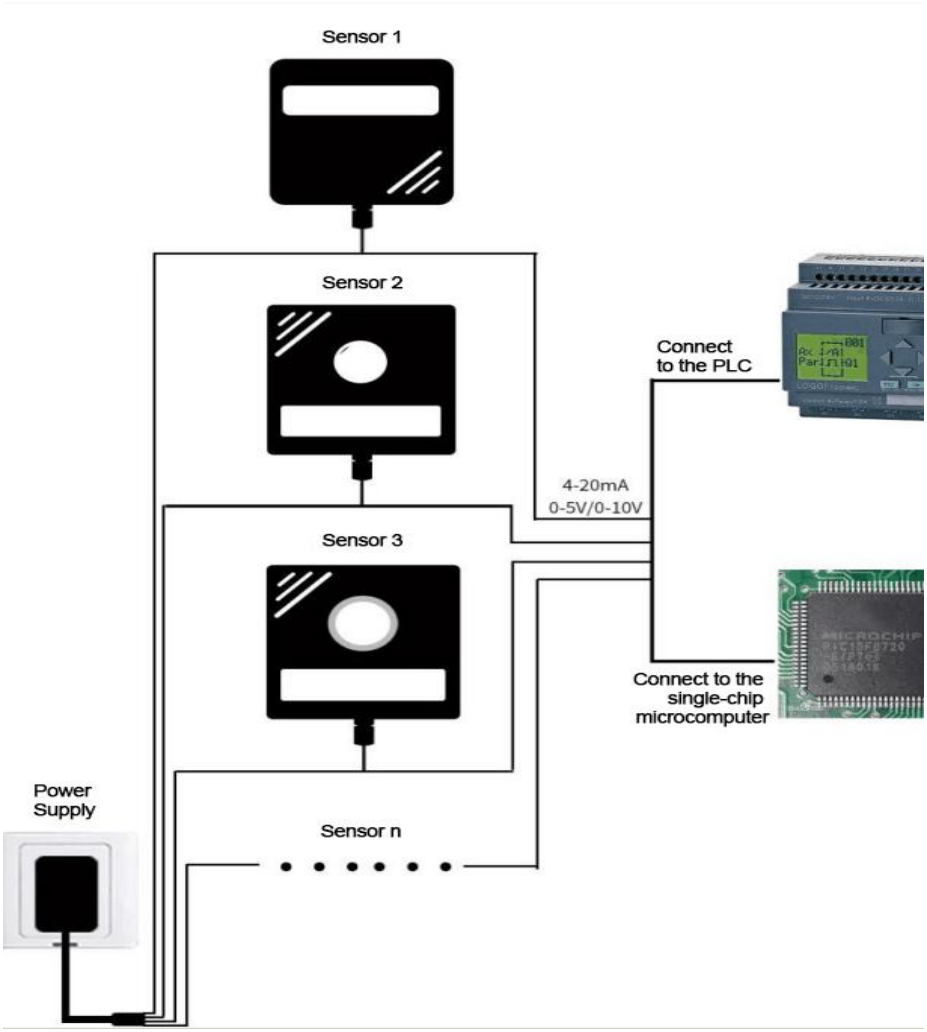
1.4 System Framework Diagram

When the system needs to connect to an analog sensor, you only need to power the device and connect the analog output line to the DI interface of the microcontroller or PLC. Then, write the corresponding acquisition program according to the conversion relationship described later.

Single Connection



When the system needs to connect to multiple analog version sensors, each sensor must be connected to a different analog input port of the microcontroller or the DI interface of the PLC. Then, the corresponding acquisition program can be written according to the conversion relationship described later.



Chapter 2 Hardware Connection

2.1 Pre-installation Check

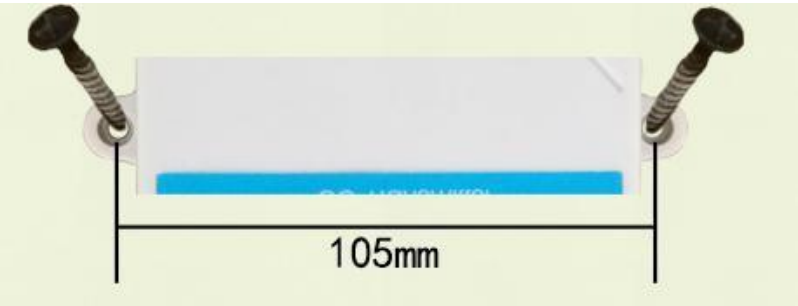
Equipment List:

- 1 oxygen transmitter device
- 2 self-tapping screws, 2 expansion plugs
- Certificate of Conformity

2.2 Sensor Wiring

	Line color	Description
Power	Brown	Power supply positive (10~30V DC)
	Black	Power supply negative
Output	Blue	Transmitter signal positive
	Green	Transmitter signal negative

2.3 Installation Method



Wall-mounted installation, with mounting holes located in the middle of both sides of the device. The hole diameter is less than 4 mm, with a hole spacing of 105 mm. 3 mm self-tapping screws can be used for installation.

Installation steps for the external probe:

Threaded installation:

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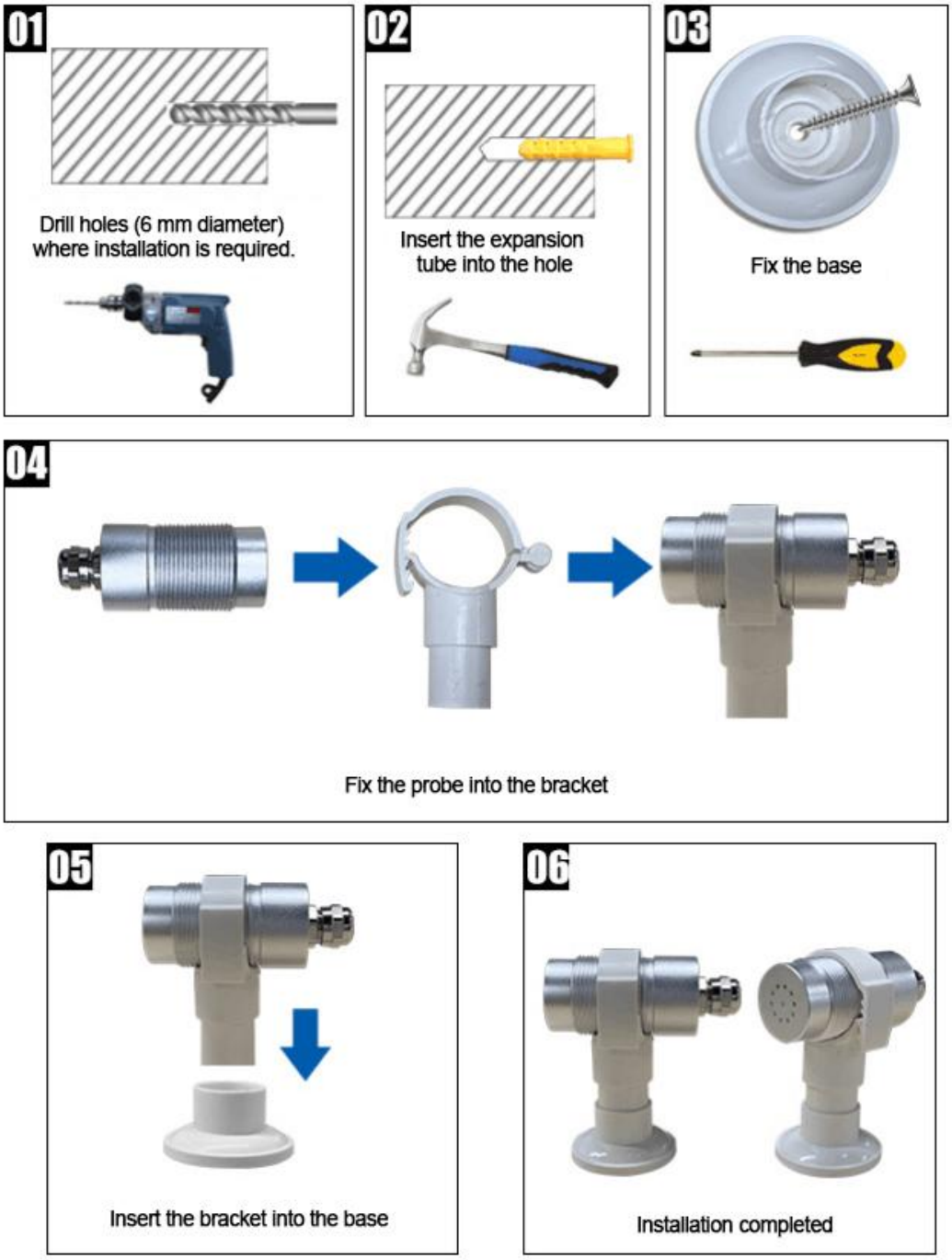
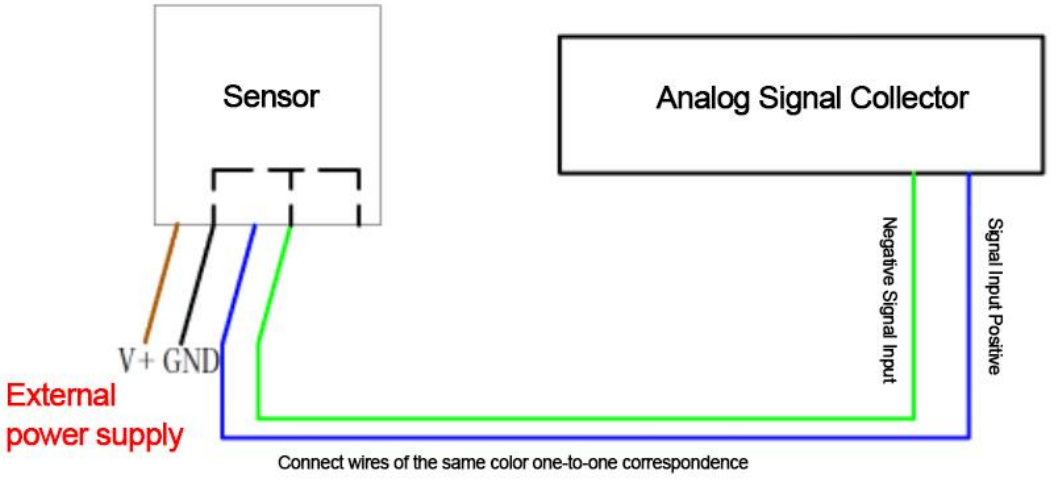
Bracket Installation:

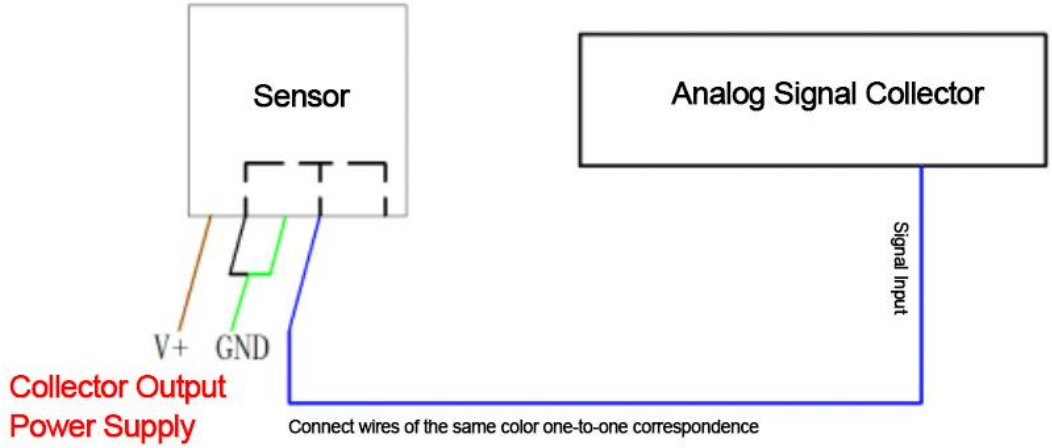


Chapter 3 Wiring Instructions

Analog sensors are easy to wire; simply connect the wires to the designated ports on the device. The device comes standard with two independent analog outputs. It supports both three-wire and four-wire systems.



Schematic diagram of four-wire connection method



Schematic diagram of the three-wire connection method

Chapter 4 Meaning of Analog Parameters

4.1 Current Signal Output Conversion Calculation

For example, with a range of 0 – 25% VOL and a 4 – 20 mA output, calculate the current oxygen concentration value when the output signal is 12 mA. The span of this oxygen range is 25% VOL, expressed as a 16 mA current signal. 25% VOL/16 mA = 1.5625% VOL/mA, meaning that 1 mA of current represents a 1.5625% VOL change in oxygen concentration. The measured value is 12 mA - 4 mA = 8 mA, 8 mA × 1.5625% VOL/mA = 12.5% VOL, so the current oxygen concentration is 12.5% VOL

4.2 Voltage-type Signal Output Conversion Calculation

For example, with a range of 0 – 25% VOL and a 0 – 10 V output, when the output signal is 5 V, calculate the current oxygen concentration value.

The voltage span for this oxygen range is 25% VOL, expressed as a 10 V voltage signal, 25% VOL/10 V = 2.5% VOL/V, meaning that a voltage of 1 V represents a change in oxygen concentration of 2.5% VOL. The measured value is 10 V – 0 V = 10 V, The span of this oxygen range is 25% VOL, expressed as a 10V voltage signal. 25% VOL/10V = 2.5% VOL/V, meaning that a voltage of 1V represents a change in oxygen concentration of 2.5% VOL. The measured value is 5V - 0V = 5V, 5V × 2.5% VOL/V = 12.5% VOL, so the current oxygen concentration is 12.5% VOL.

4.3 Conversion Relationship Between Oxygen Measurement Units VOL, ppm, and mg/m³

The conversion formula is based on 25° C and 1 atmosphere: X ppm = (Y mg/m³)(24.45)/(molecular weight) or Y mg/m³ = (X ppm)(molecular weight)/24.45.

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Applicable only to oxygen (O_2) calculations:

1% VOL = 10,000 ppm 1 ppm = 1.31 mg/m³

Chapter 5 Precautions

1) Do not use this device in systems involving personal safety.

2) Do not install the device in environments with strong convection currents.

3) Avoid exposing the device to organic solvents (including silicone and other adhesives), paints, chemicals, oils, and high-concentration gases.

4) The device should not be used for extended periods in environments containing corrosive gases, as these gases can damage the sensor;

7) Although this product has high reliability, we recommend testing the device's response to the target gas before use to ensure suitability for on-site application.

8) When testing the device's response to the target gas, it is recommended to use a corresponding gas standard substance with a concentration not exceeding the device's measurement range. The company shall not be liable for any abnormal measurement values resulting from testing using non-recommended methods.

9) The equipment should not be used for extended periods in environments where oxygen content is less than 10% VOL. Our company shall not be liable for any abnormal measurement values caused by use in low-oxygen environments.

Warning:

To ensure normal use, users must strictly follow this manual when using the equipment. Improper use will not be covered under warranty. Although our products have high reliability, we recommend checking the equipment's response to the target gas before use to ensure safe on-site operation.

When testing the device's response to the target gas, we recommend using a corresponding gas standard substance with a concentration not exceeding the device's measurement range. Our company shall not be liable for any abnormal measurement values caused by testing using non-recommended methods.