

ATO

Smoke Gas Sensor (Analog Type)

SN-*-SMK-*

Ver 2.0



Table of Contents

Chapter 1 Product Introduction.....	2
1.1 Product Overview.....	2
1.2 Functional Features.....	2
1.3 Main Parameters.....	3
1.4 System Block Diagram.....	5
1.5 Product Appearance.....	7
Chapter 2 Hardware Connection.....	8
2.1 Pre-Installation Check.....	8
2.2 Interface Description.....	8
2.3 Usage Instructions.....	9
2.4 Installation Location.....	11
2.5 Installation Precautions.....	11
Chapter 3 Wiring Instructions.....	12
Chapter 4 Meaning of Analog Parameters.....	13
4.1 Current Signal Output Conversion Calculation.....	13
4.2 Voltage Signal Output Conversion Calculation.....	13
Chapter 5 Troubleshooting Guide.....	14
Chapter 6 Precautions.....	14
Chapter 7 Warranty Information.....	15
Chapter 8 Disclaimer.....	15

Chapter 1 Product Introduction

1.1 Product Overview

The gas sensor developed by ATO is based on a semiconductor principle, featuring fast response speed, high sensitivity, and strong anti-interference capability. With our proprietary compensation algorithms and multiple standard gas calibration, this sensor also offers a long service life, high precision, excellent repeatability, and high stability. It is suitable for real-time monitoring of gas concentrations in scenarios such as homes, shopping malls, intelligent transportation, hotels, workshops, factories, large-scale farms, and enclosed public places. The device supports a wide DC voltage input of 10–30V, and provides analog output signals including 4–20mA, 0–5V, and 0–10V as options. It also offers an explosion-proof rating, allowing it to be deployed in harsh and complex gas detection environments.

1.2 Functional Features

- Adopts a semiconductor sensor for stable and durable performance.
- Measurement ranges: 0–2000ppm, 0–10000ppm; other ranges are also available upon request.
- High measurement accuracy: up to $\pm 5\%$ FS, with repeatability of up to 2%.
- Multiple analog output options: 4–20mA, 0–5V, 0–10V.
- Optional high-quality OLED display for direct reading of values on-site, with clear visibility even at night.
- Powered by a wide-range DC voltage of 10–30V, compatible with various on-site power supplies.
- Wall-mounted waterproof enclosure for easy installation; its high protection rating enables use in harsh field environments.

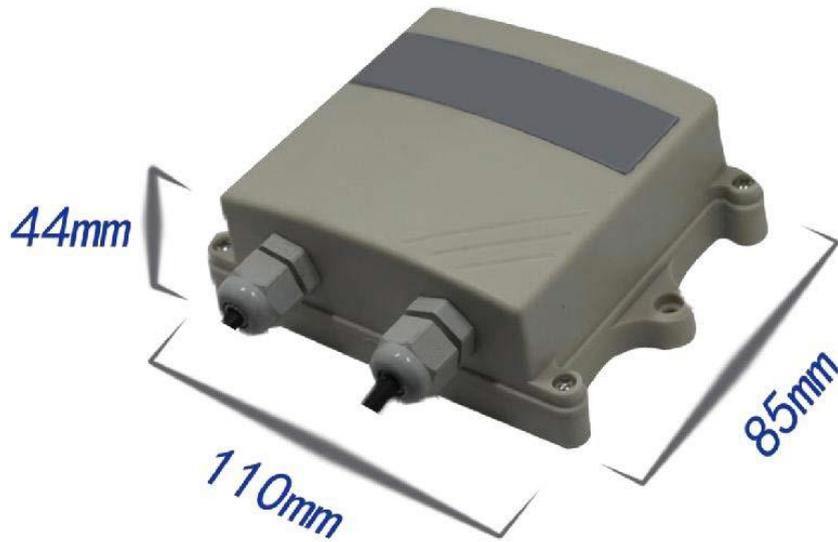
1.3 Main Parameters

Power Supply	10~30V DC
Output Signal	4~20mA / 0~5V / 0~10V
Power Consumption	0.9W
Operating Temperature	-20~50°C
Operating Humidity	15~90%RH No Condensation
Pressure Range	90~110KPa
Stability	≤2% Signal Value/Month
Smoke Zero Drift (-20~40°C)	±3%FS
Repeatability	≤2%
Service Life	≥12 Months
Measurement Range	0~2000ppm, 0~10000ppm
Accuracy	±5%FS (at C3H8,2000ppm, 25°C, 50%RH)
Resolution	1ppm
Response Time	≤35S
Preheating Time	≥24H

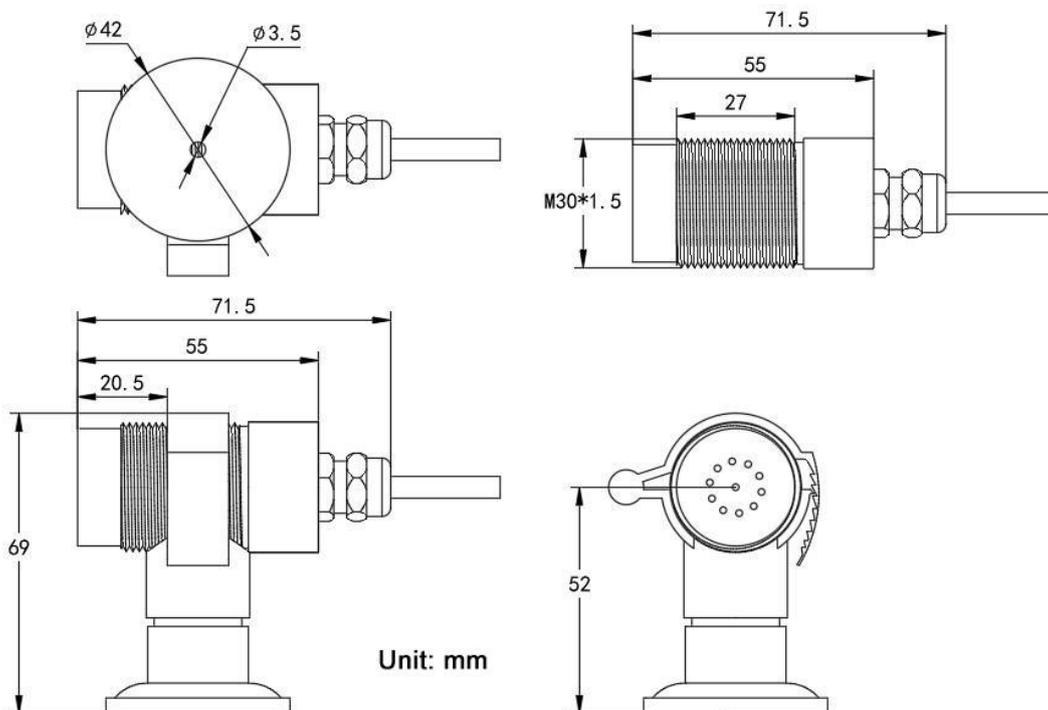
All specifications above are tested under the following ambient conditions:
Temperature 20°C, relative humidity 50%RH, 1 atmosphere, and the concentration of the measured gas does not exceed the measuring range of the sensor.

The above performance data is obtained under the test conditions using our test system and software. For continuous product improvement, we reserve the right to modify design specifications and performance without prior notice.

Dimensions: 110×85×44mm



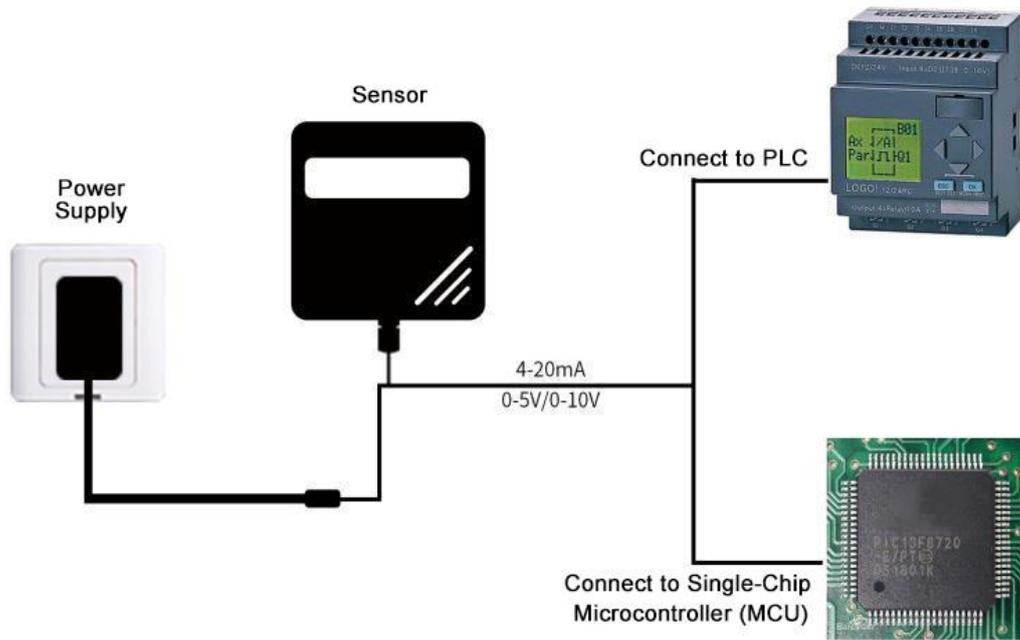
Extension Probe Dimensions:



1.4 System Block Diagram

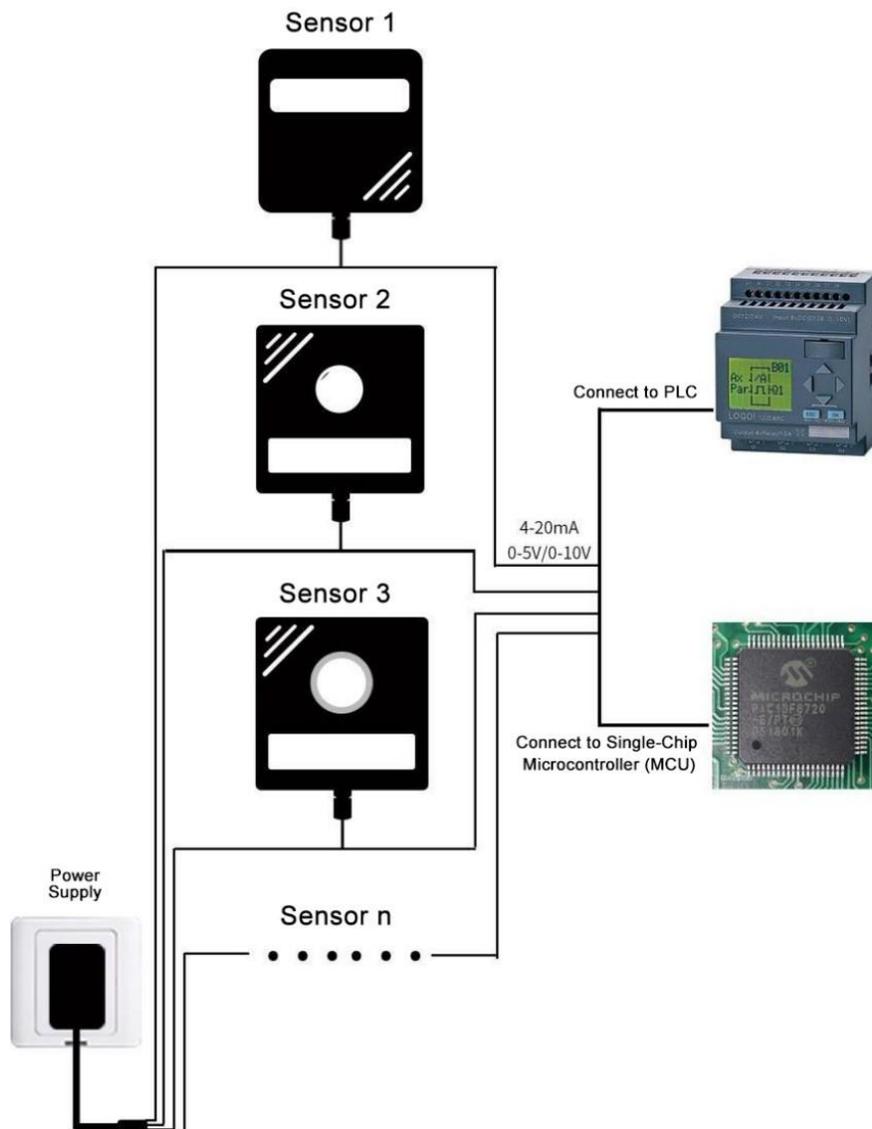
When the system needs to connect an analog version of the sensor, you only need to supply power to the device, connect the analog output line to the DI interface of a single-chip microcomputer or PLC, and then write the corresponding acquisition program according to the conversion relationship described later in this document.

Single Connection



When the system needs to connect multiple analog version sensors, each sensor must be connected to a separate DI interface of a single-chip microcomputer acquisition module or PLC, and the corresponding acquisition program should be written according to the conversion relationship described later in this document.

Multi-Sensor Connection



1.5 Product Appearance



Chapter 2 Hardware Connection

2.1 Pre-Installation Check

Equipment List:

- 1× Smoke Sensor Device
- 2× Self-tapping Screws, 2× Expansion Plugs
- Product Certificate, Warranty Card, Wiring Instructions, etc.
- Extension Probe Bracket (including 1 set of expansion screws, included only with extension models)

2.2 Interface Description

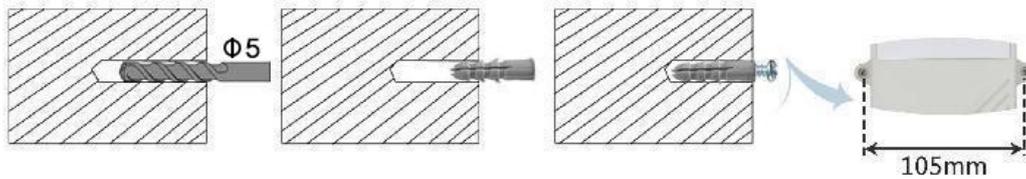
Wide-voltage DC power input: 10–30V. Devices with 0–10V output must be powered by 24V only.

2.2.1 Sensor Wiring Method

	Wire Color	Description
Power Supply	Brown	Power Positive
	Black	Power Negative
Output	Blue	Smoke Signal Positive
	Green	Smoke Signal Negative

2.3 Usage Instructions

- Main steps for installation:



▲ Drill a hole

▲ Insert the expansion plug into the hole

▲ Drive the self-tapping screw into the expansion plug



- Installation steps for extension probe

1. Threaded installation:



Thread Size: M30×1.5

2. Bracket Installation:



2.4 Installation Location

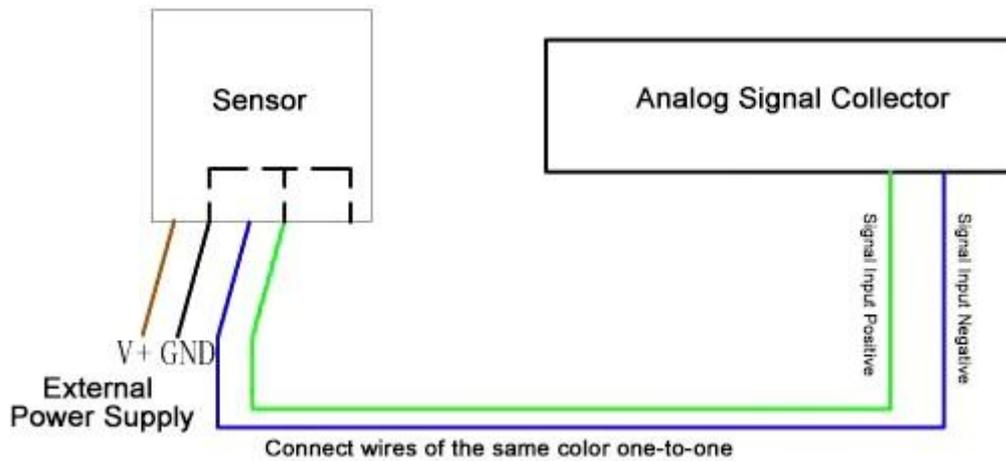
The device should be installed in a location free from impact, vibration, and strong electromagnetic interference, and where it is easy to access for maintenance. The clear distance between the installation site and surrounding process pipelines or equipment shall not be less than 0.5 meters.

2.5 Installation Precautions

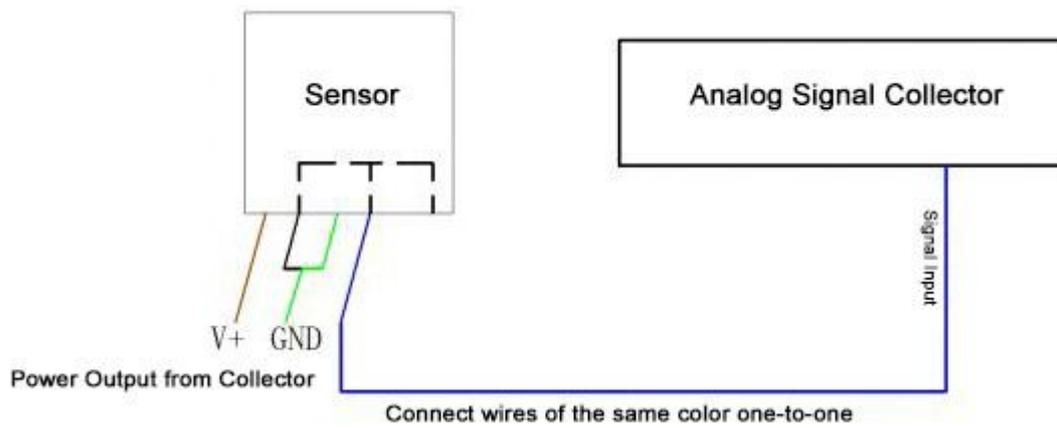
To ensure proper operation of the device and prevent equipment failures, do not install it in the following locations:

- Areas directly exposed to steam or oil fumes
- Air supply openings, ventilation fans, doorways, or other places with high air flow
- Humid areas with water vapor or dripping water (relative humidity $\geq 95\%$ RH, or where condensation may occur)
- Areas outside the device's operating temperature range
- Locations with strong electromagnetic fields

Chapter 3 Wiring Instructions



4-Wire System Wiring Diagram



3-Wire System Wiring Diagram

Chapter 4 Meaning of Analog Parameters

4.1 Current Signal Output Conversion Calculation

For example, with a range of 0~10000 ppm and a 4–20 mA output, when the output signal is 12 mA, calculate the current smoke concentration:

The smoke range span is 10000 ppm, represented by a 16 mA current signal.
 $10000 \text{ ppm} \div 16 \text{ mA} = 625 \text{ ppm/mA}$, meaning 1 mA of current represents a smoke concentration change of 625 ppm.

Measured current:
 $12 \text{ mA} - 4 \text{ mA} = 8 \text{ mA}$

Concentration:
 $8 \text{ mA} \times 625 \text{ ppm/mA} = 5000 \text{ ppm}$

Thus, the current smoke concentration is 5000 ppm.

4.2 Voltage Signal Output Conversion Calculation

For example, with a range of 0~10000 ppm and a 0–10 V output, when the output signal is 5 V, calculate the current smoke concentration:

The smoke range span is 10000 ppm, represented by a 10 V voltage signal.
 $10000 \text{ ppm} \div 10 \text{ V} = 1000 \text{ ppm/V}$, meaning 1 V of voltage represents a smoke concentration change of 1000 ppm.

Measured voltage:
 $5 \text{ V} - 0 \text{ V} = 5 \text{ V}$

Concentration:
 $5 \text{ V} \times 1000 \text{ ppm/V} = 5000 \text{ ppm}$

Thus, the current smoke concentration is 5000 ppm.

Chapter 5 Troubleshooting Guide

No Output or Incorrect Output

Possible Causes:

1. Incorrect range configuration leading to calculation errors in the PLC.
2. Incorrect wiring method or reversed wire connections.
3. Incorrect power supply voltage (devices with 0–10 V output must use 24 V powersupply).
4. Excessive distance between the sensor and collector, causing signal interference.
5. Damage to the PLC acquisition module.
6. Damage to the device itself.

Chapter 6 Precautions

1. Do not use this device in systems related to personal safety.
2. Do not install the device in an environment with strong convective air.
3. The device must avoid contact with organic solvents (including silica gel and other adhesives), paints, chemicals, oils, and high-concentration gases.
4. Do not use the device for long periods in environments containing corrosive gases, as these will damage the sensor.
5. Do not leave the device in high-concentration organic gases for extended periods, as this will cause sensor zero drift and slow recovery.
6. Do not store or use the device in high-concentration alkaline gases for long periods.
7. Although this product has high reliability, we recommend verifying the device's response to the target gas before use to ensure suitability for on-site application. This product is a smoke transmitter based on gas detection principles, designed to detect smoke from combustion. It cannot be used to detect non-combustion smoke such as water vapor or particulates, and will be interfered with by combustible gases like methane.
8. Do not use the device in environments where oxygen content is less than 10% VOL. The company will not be responsible for measurement abnormalities caused by low-oxygen conditions.
9. Do not perform pure gas testing on the device, and never use a lighter to smoke-test it. This will cause premature failure due to exposure to excessively high gas concentrations.

Chapter 7 Warranty Information

This product comes with a 12-month warranty from the date of purchase (valid purchase proof required). Under normal use and maintenance during the warranty period, if the device fails due to material or manufacturing defects, we will provide freerepair or replacement parts after our inspection and confirmation. After the warranty expires, we will continue to offer lifetime paid repair services.

Exclusions from Warranty Coverage:

- The warranty does not apply if the device is damaged due to any of the following: Incorrect installation or operation by the user.
- Disassembly, repair, modification, or replacement of components by non-authorized personnel or the user.
- Negligent use, or damage caused by water or other substances entering the device.
- Malfunction or damage caused by accidents or natural disasters.
- Failure resulting from operating the device outside the specified working parameters.

Chapter 8 Disclaimer

The performance data presented above was obtained under test conditions using our company's test systems and software. We reserve the right to modify product design features and specifications at any time for continuous improvement, without prior notice. We shall not be liable for any loss, injury, or damage arising from such changes. We also disclaim any responsibility for indirect loss, injury, or damage resulting from the use of this document, including any omissions or errors in the information contained herein. This document does not constitute a sales offer, and the data provided is for reference only and should not be construed as a guarantee. Any use of the provided data must be evaluated and confirmed by the user. All specifications outlined are subject to change without notice.

Warning:

To ensure proper operation, users must strictly follow this manual when using the device. Any non-compliant use will not be covered by the warranty. While our products are highly reliable, we recommend verifying the device's response to the target gas before use to ensure suitability for on-site application.