

# Pre-calibrated AG-4 module equipped with the Alphasense A series

----- *Pre-calibrated module Instruction Manual*

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## Product Description

The AG-4-GSB-MA4S(D) is an embedded type module equipped with the Alphasense A series electrochemical Sensor, capable of detecting various toxic gases such as CO, H<sub>2</sub>S, and NO<sub>2</sub> in diverse environments. The module has been pre-calibrated before leaving the factory and has good stability and selectivity. It includes a built-in temperature sensor for data correction via software algorithms to minimize environmental impact on measurement accuracy. It utilizes digital communication through a UART bus output for gas concentration readings, which allows users to easily and quickly integrate the module into various systems. The module is suitable for both indoor and outdoor air quality monitoring, as well as gas detection in industrial applications.

The module features an automatic short-circuiting of PINs when power is off with zero bias. For zero-bias sensors, the module operates stably after being powered on for 30 minutes. For sensors with bias, it is recommended to power on the module for more than 24 hours before use.

## Technical Specification

Item	Specification
Model Number	AG-4-GSB-MA4S(D)
Target Gases	Toxic gases (CO, H <sub>2</sub> S, NO <sub>2</sub> , etc.)
Sensing Principle	Catalytic
Detection Range	See corresponding sensor spec
Resolution	See corresponding sensor spec
Measurement Error	< ±5% FS
Operating Voltage	3.2 – 5.5V DC
Operating Current	≤ 500uA@5V
Output Signal	UART (+3.0V TTL)
Temperature Range	-20 - 55°C
Humidity Range	0% -90%RH
Pressure Range	1 ± 0.1 atm
Storage Temperature	10 - 40°C
Size	L*W*H=41mm*27mm*26mm
Expected Life	See corresponding sensor spec

## Corresponding Sensor Maximum Concentration (ppm)

Gas	Sensor Type A	Maximum Concentration (ppm)
Carbon Monoxide	CO-AF	5,000
	CO-AE	10,000
	CO-AX	2,000
Hydrogen Sulfide	H2S-A1	100
	H2S-AH	50
	H2S-AE	2,000
Sulfur Dioxide	SO2-AF	50
	SO2-AE	2,000
Nitrogen Dioxide	NO2-A1	20
	NO2-AE	200
Chlorine	CL2-A1	20
Nitric Oxide*	NO-A1	250
	NO-AE	5,000
Phosphine	PH3-A1	10
Ethylene Oxide*	ETO-A1	100
Hydrogen Cyanide	HCN-A1	100
Hydrogen Chloride	HCL-A1	20

**Note:** Biased sensors require at least 12 hours to stabilise after first powered on. Specify required full scale gas concentration. Do not exceed maximum gas concentration shown in table.

## Product Appearance and Dimensions



## Pin Configuration

The module reserves a 3P + 4P pin header with a pitch of 2.54 mm as the electrical interface. Pin descriptions are as follows:

Pin Number	Name	Functional Description
1	VIN	Power supply, 3.2 - 5V DC
2	GND	Signal ground
3	RXD	Serial port input, Connected to the host TXD
4	TXD	Serial port output, Connected to the host RXD
5	VOT	Module onboard 3.0V reference power output (maximum output capacity 50mA)
6	FAT	Fault signal output pin (reserved)
7	ALM	Alarm signal output pin (reserved)

**Note:**

- 1) After being powered-on, the module needs approximate 30 seconds to warm up. Once the process is complete, the module enters into normal monitoring state.
- 2) After being powered-on, the module's serial port outputs a frame of data containing status and concentration values every 1 second.

## Communication Protocol and Description

1. Serial communication adopts module active upload data mode, data upload interval 1 second.
2. UART serial port:  
Baud rate: 4800, data bits: 8bit, stop bits: 1bits, parity bit: no parity
3. The data frame is 5 bytes and has the following data format:

Frame Header	Status	Conc. high byte	Conc. low byte	Checksum
0xAA	State	D(H)	D(L)	Sum

Checksum Sum = 0xAA + State + D(H) + D(L)

The module state byte is defined as follows:

Operating properly	Module Circuit Fault	Power On to Warm Up
0x80	0x81	0x82

**Note:** Concentration values are all 0 during the module warm-up period;  
Concentration range: 0-100; When the concentration value is 0xffff, it indicates an over-range condition.

**Example:**

Module upload: 0xAA 0x80 0x01 0xF4 1F

Indicates that the module is in normal monitoring state and the current gas concentration is 500ppm.

4. The above communication protocols are only for module testing, and can also be customized according to customer requirements.

## Application Notes

1. The module is not protected against reverse polarity or ESD (Electrostatic Discharge). Users should ensure correct power connection and implement appropriate ESD protection measures when using the module.
2. Exceeding the module power supply voltage range may cause damage to the module or the module may fail to operate properly.
3. Please follow precautions specific to the sensor when using the module.