

# GZP6188A Series

## Barometric Pressure Sensor

Analog Output

Datasheet

Version: V1.3

Issued Date:2024.05.28

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**Document Revision History**

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Revision	Description	Date
V1.0	Initial version	2022.05.13
V1.1	Modify the recommended size of the mounting holes	2022.09.01
V1.2	Template modification	2023.02.07
V1.3	Increase product series	2024.05.28

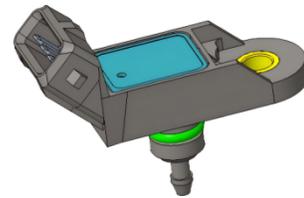
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## 1. Product Description

GZP6188 series products are the finished sensor products that measure the absolute pressure in the engine compartment launched by Sencoch for the automobile market. The product uses an automotive-grade signal conditioning chip to calibrate and compensate for the MEMS core output, which can convert the pressure signal from 20kPa to 115kPa into an analog output signal of 0.4V to 4.65V (range and output can be customized), with fast response speed, high reliability and stability. Good performance, it is a cost-effective sensor product.

### 1.1 Features

- Pressure range: 20~115kPa
- High accuracy, fast response
- Working temperature range -40°C to 130°C
- Overvoltage and reverse polarity protection
- Proportional analog voltage output with clamp set (customizable)
- Extensive automotive applications with affordable cost



### 1.2 Application Areas

The product is installed in the engine compartment, monitors the atmospheric pressure of the vehicle's environment in real time, and provides this information to the engine control unit (ECU) to ensure that the engine can achieve optimal fuel injection, ignition and emission control under various altitude and weather conditions.

## 2. Function Description

This product is manufactured using advanced microelectromechanical principles. Its core technologies are a silicon piezoresistive effect- based MEMS pressure sensor chip and a high-performance signal conditioning ASIC chip. The silicon micro-piezoresistive MEMS pressure sensor chip outputs a voltage signal proportional to the measured pressure through a Wheatstone bridge composed of four strain-sensitive resistors. This signal is amplified, temperature-compensated, and linearized by the ASIC chip to obtain an output voltage that is proportional to the applied pressure. Linearization of the transfer function and temperature compensation are implemented by digital processing circuitry in the ASIC. Through polynomial compensation algorithms and multi-point pressure calibration technology at multiple temperatures, high-precision pressure measurement is achieved across the entire operating temperature range. The transfer function of the pressure sensor is created by the following parameters:

- Minimum and maximum rated pressure
- Voltage values at minimum and maximum rated pressure
- Clamping voltage

All parameters required for the complete calibration algorithm (such as offset, gain, temperature coefficients of offset and gain, and linearization parameters) are determined and stored in the E<sup>2</sup>PROM inside the ASIC after calibration.

### 2.1 Electrical Connections

The recommended female electrical connector for this product is AMP C-282686.

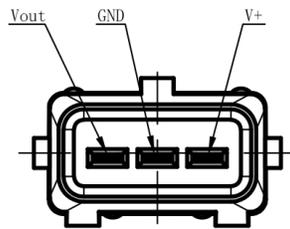


Fig.1 Pin diagram

The above connector is for Delphi interface. For other connector types and sizes, please consult Sencoch.

Tab.1 Pin Correspondence

Serial Number	Describe	Remark
1	VCC	Power input positive terminal 5±0.25VDC
2	Vout	Product output voltage signal
3	GND	Negative power input

### 2.2 Block Diagram

The sensor functional block diagram is shown in Figure 2.

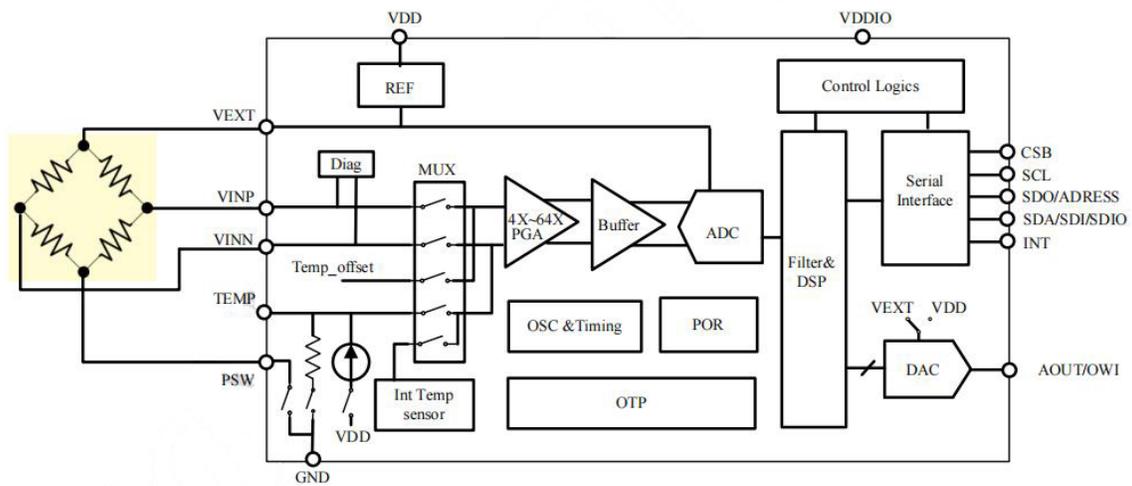


Fig.2 Sensor Functional Block Diagram

### 2.3 Pressure Function

P indicate the input pressure (the difference between inlet pressure and atmospheric pressure), in kPa. Vout is the output voltage, in volts (V).

The curve formula:  $V_{out} = (0.008947 * P - 0.098947) * V_{cc}$  and linear equation is shown in Figure 3:

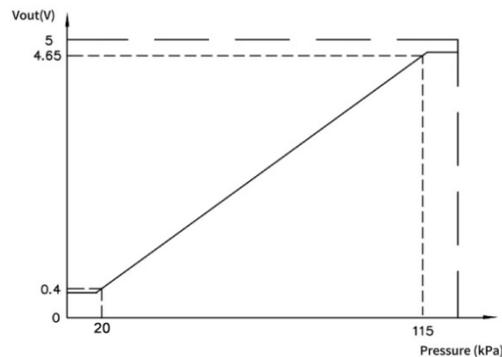


Fig.3 Voltage output curve

### 2.4 Accuracy

The accuracy of the GZP6188A pressure sensor is affected by the supply voltage, input pressure, ambient temperature, and aging effects. The value calculated using the transfer function is the sensor's specified value, which is also its theoretical value. The sensor's error is equal to the difference between the actual output voltage value and the specified output voltage value at the specified input pressure.

#### 2.4.1 Overall Accuracy

The overall accuracy takes into account different error sources within the measurement pressure range and operating temperature range. These error sources mainly include:

**Pressure:** The output deviation between the actual output voltage and the specified output voltage within the specified pressure range.

**Temperature:** Output deviation at different temperatures within the temperature range.

**Aging:** The drift of parameters over time.

The overall accuracy is represented by an error band, which consists of three-line segments. The data is shown in Figure 4 as shown.

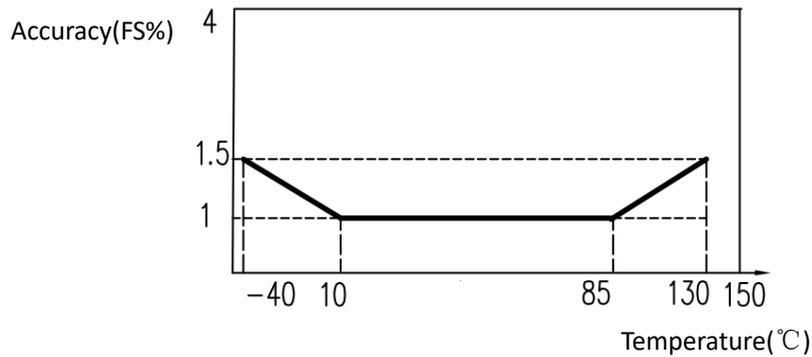


Fig.4 Relationship between overall accuracy and temperature

### 3. Technical Specifications

The following sensor specifications were measured at a power supply of (5±0.25) V DC and a temperature of 25°C.

### 3.1 Maximum Rated Parameters

The maximum rated parameters of the sensor are shown in Table 3.

Tab.3 The maximum rated parameters

Attribute	Minimum	Typical	Maximum	Unit	Remark
Maximum voltage			18	V	1h@70°C
Reverse voltage			-14	V	
Overload pressure			500	kPaA	60s
ESD protection			±4	KV	

### 3.2 Performance Indicators

The sensor performance indicators are shown in Table 4.

Tab.4 Sensor performance indicators

Attribute	Values	Unit
Pressure range	20 ~ 115 (customizable range)	kPa A
Output signal	0.4 ~ 4.5 (Customizable range)	V
Protection level	IP6K9K	
Response time	≤ 2	MS
Insulation resistance	≥10MΩ/500VDC	MΩ
Operating temperature	-40 ~ 130	°C
Storage temperature	-40 ~ 140	°C

## 4. Structure and Specification

The sensor's external dimensions (unit: mm, unless tolerances are specified, in accordance with

GB/T1804-V) and electrical definition are shown in Figure 5.

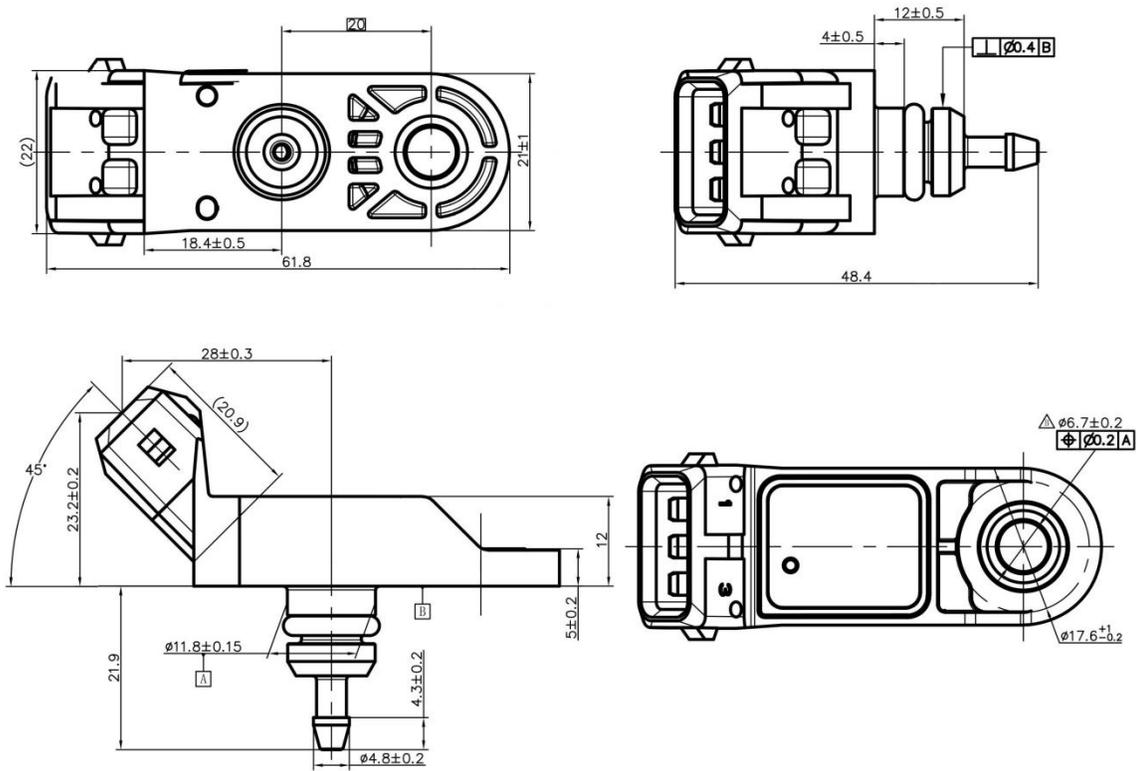


Fig.5 GZP6188A

## 5. Order Guide

### GZP 6188 A - A064 E020 B02

Tab.5 Order Guide

GZP	Sencoch
6188 A	Product Categories
A064	Pressure Range A064: 20~115kPa
E020	Power Supply and Output E020: 5V/0.4~4.65V.
B0 2	Packaging Method B02: Tray

## 6. Installation Instructions

- 1) Do not immerse the sensor in liquid lubricants.
- 2) Do not touch rubber seals with bare hands; avoid contaminating rubber seals during assembly.
- 3) Do not use hammers, rods, or similar tools to strike the sensor during installation.
- 4) The sensor is for one-time installation only; sensors that have been installed must not be reused.
- 5) Allowable angular deviation in the vertical direction:
  - Under normal conditions:  $a = b \leq 90^\circ$
  - When the sensor is exposed to liquid fuel (any type):  $a = b \leq 40^\circ$

## 7. Precautions for use

- 1) The sensor should only be unpacked before it is installed on the engine.
- 2) This sensor is designed for measuring fuel tank pressure in internal combustion engines that use gasoline or diesel fuel. It is not permitted for use in other applications. Please confirm with our company in advance if you require its use in other applications.
- 3) The pressure gauge port is used to measure atmospheric pressure. It is necessary to prevent the pressure gauge port from being blocked during installation (painting) and use.
- 4) Pressure sensors in standard packaging can be transported using ordinary conveyor systems. Please note: Protect the product from moisture, impact, sun damage, and pressure during transportation.
- 5) Please feel free to contact Sencoch for any question.

### ■ Please confirm under actual usage conditions

Since this specification is for a single product, please verify the performance and quality under actual use to improve reliability.