GZP6181A

Pressure Transducer

Analog output

Datasheet

Version: V1.1

Issued Date: 2023.02.09

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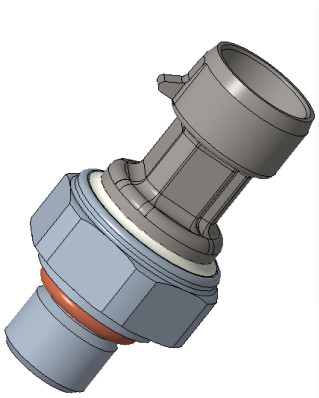
Document Revision History

Revision	Description	Date
V1.0	Initial version	2022.10.20
V1.1	Template Edit	2023.02.09
V1.2	Format adjustment	2024.05.28

The company reserves the right to modify the specifications contained herein without prior notice.

1. Product Description

The GZP6181 is a pressure sensor product developed by Sencoch for the automotive market and industrial control applications.



The product packaging adopt metal diaphragm isolation technology. The measured pressure work on the stainless steel diaphragm and then transfer to MEMS chip by internal sealed silicone oil, where the signal is processed by an automotive-grade signal conditioning chip(ASIC).

The ASIC performs calibration and compensation for raw signal and convert pressure signals into standard analog output signals (range and output is customizable).

The GZP6181 pressure transducer has the advantages of fast response, high reliability and good stability, and is a high cost-effective sensor product.

1.1 Product Features

- High accuracy pressure transducer

  The accuracy over the entire service life at room temperature is better than ±1%FS.

  The full-life accuracy of high and low temperature performance exceeds ±3%FS
- Temperature range: -40°C to 125°C
- Customizable for wide range up to 5Mpa
- Electrical strength: AC 1500V (1 minute) / 1800V (1 second), leakage current ≤0.75mA
- Exceptional overvoltage protection against reverse polarity, supporting 18V overvoltage and-14V reverse polarity
- Proportional/Fixed analog voltage output (customizable)
- Output Clamping (Customizable)

1.2. Application Fields

- Hydrogen energy

The laser welding process of this pressure sensor ensures hydrogen ion permeability, making it applicable to the production, storage, and transportation of hydrogen energy, enabling real-time monitoring of hydrogen pressure to ensure stable and safe operation

- Air conditioning system ：

The system monitors and measures the pressure in the air conditioning ducts, feeding the signal back to the ECU. Based on this voltage reading, the ECU promptly adjusts the cooling fan's speed to prevent compressor damage.

- Coolant system：

This sensor is designed for temperature control systems in data centers, energy storage, and battery management. It measures coolant pressure in water-cooled systems to evaluate their heat dissipation performance.

2. Function Description

This product is developed using advanced microelectromechanical systems (MEMS) technology, with its key technology based on high-temperature resistant MEMS pressure sensor chips and high-performance analog integrated circuit (ASIC) chips for signal conditioning. It adapt mature and reliable oil-filled isolation technology for packaging. The MEMS pressure sensor chip generates 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 produce an output voltage that follows a predefined relationship with applied pressure. The linearization of the transfer function and temperature compensation are implemented by the ASIC's digital processing circuitry. Through polynomial compensation algorithms and multi-point pressure calibration techniques across various temperatures, the system achieves high-precision pressure measurement throughout its full operating temperature range. The transfer function of the pressure sensor is defined by the following parameters:

- minimum and maximum rated pressure
- voltage values at minimum and maximum rated pressures
- clamp voltage

All parameters required by the complete calibration algorithm (including offset, gain, temperature coefficients of offset and gain, and linearization parameters) are determined and stored in the E^2PROM inside the ASIC after calibration.

2.1 Electrical Connection

The recommended electrical connector type for this product is PACKARD #12065287.

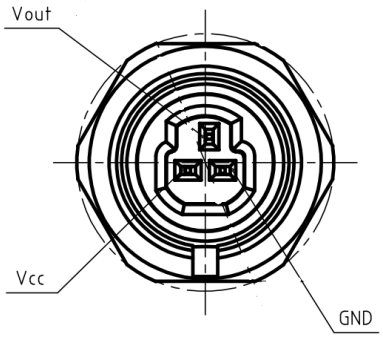


Fig. 1. PIN wire Schematic diagram

Table 1. Pin Definition

PIN Number	Definition	Description
1	VCC	Positive power input: 5±0.25VDC
2	Vout	Output voltage signal
3	GND	Negative power input

Table 1

2.2 Block Diagram

The functional block diagram of the sensor is shown in Figure 2.

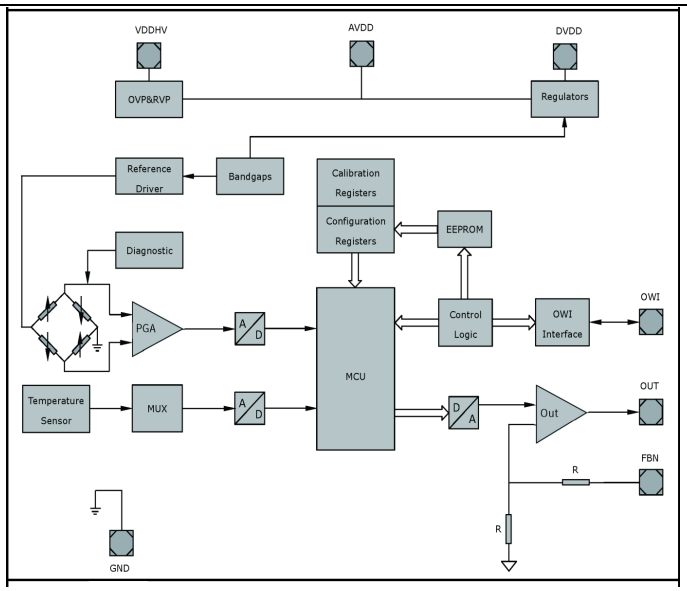


Fig. 2 Sensor Block Diagram

2.3 Pressure Function

Curve equation(Taking 0.1~1.1mPa as example): Vout = (0.02 + 0.8P) * Vin

Where: Vin is the supply voltage, in volts (V).

P is the input absolute pressure, in MPaA.

Vout is the output voltage, in volts (V).

The linear equation is shown in Figure 3:

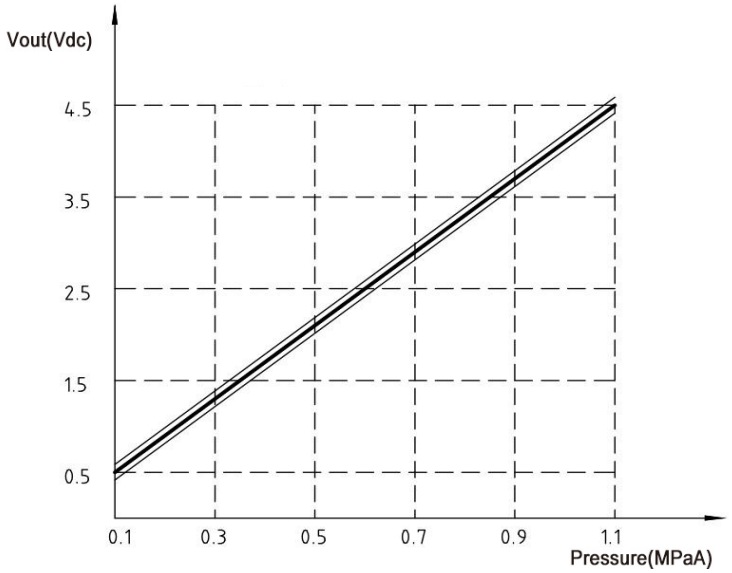


Fig.3 Voltage output curve

2.4 Accuracy

The accuracy of the GZP6181A coolant pressure sensor is affected by power supply voltage, input pressure, ambient temperature, and aging effects. The value calculated using the transfer function is the sensor's specified value and theoretical value. The sensor's error equals the difference between the actual output voltage value at the specified input pressure and the specified output voltage value.

2.4.1 Overall Accuracy

The overall precision considers the different error sources in the measurement pressure range and working temperature range, which mainly include:

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

Temperature: Output deviation at different temperatures within the specified range.

Aging: parameter drift over time.

The overall accuracy is expressed by the error band, which is composed of three line segments. The data are shown in Figure 4 and Table 2.

Temperature (°C)	**Accuracy (FFS)**
-40	±3%
0	±1%
60	±1%
125	±3%

Table 2 Overall Accuracy

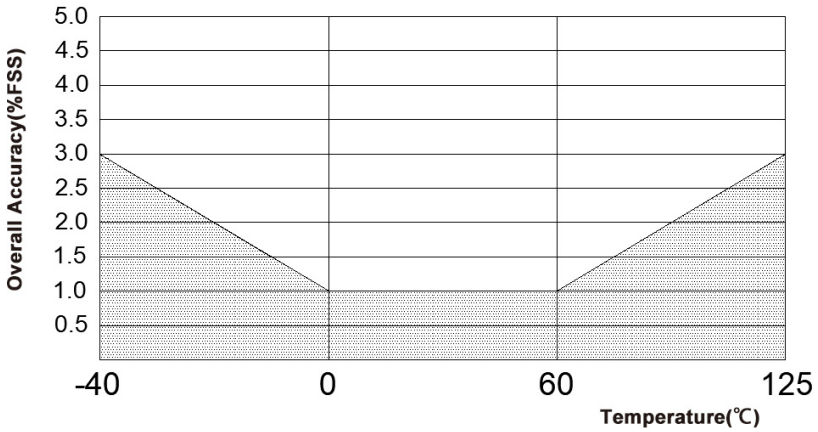


Fig. 4 Relationship between overall accuracy and temperature

3. Technical Indicators

The following sensor parameters were measured under the power supply (5±0.25) V DC and temperature of 25°C.

3.1 Maximum Rated Parameters

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

Parameter	Min.	Typ.	Max.	Unit	Remarks
Maximum voltage			18	V	70°C，1h
Maximum reverse voltage			-14	V	
Overload pressure			2	MPa	60s
Bursting pressure			5	MPa	3s

Table 3

3.2 Performance Indicators

The performance indicators of the sensors are shown in Table 4.

Subject	Value	Unit
Pressure Range	0.1-1.1 (customizable within 5MPa)	MPaA
Output Signal	0.5 to 4.5 (output customizable)	V
Protection Level	IP67	/
Response Time	≤1	ms
Pressure Cycle	1	Million
Insulation Resistance	≥100MΩ/500VDC	MΩ
Working Temperature	-40～125	°C
Storage Temperature	-40～130	°C

Table 4

3.3 Electrical Characteristics

The electrical characteristics of the sensor are shown in Table 5.

Parameter	Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	4.75	5	5.25	V	
Working Current			10	mA	
Output Current Load			5	mA	
Short Circuit Current Limit	15	20	25	mA	
Output Load (Pull Down)		47		KΩ	
Output Load (Pull Up)		100		KΩ	

Table 5

4. Recommended Assembly Interface

Refer to Figure 5 for recommended sensor matching installation interface

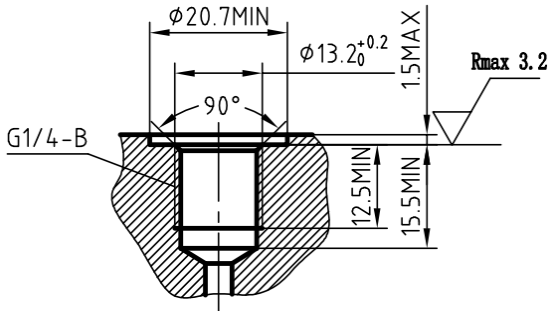


Fig. 5

5. Structure Specification(Unit: mm)

Refer to Figure 6 and Figure 7 for the sensor's external dimensions (unspecified tolerances shall comply with GB/T1804-V).

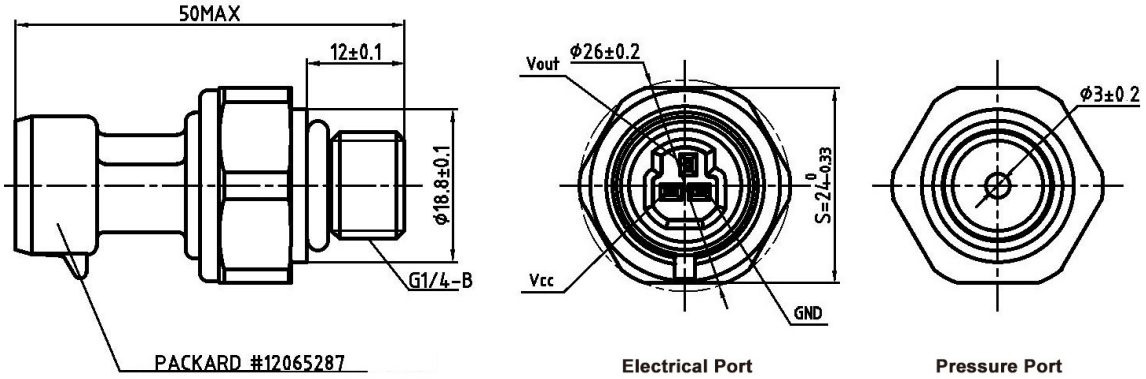


Fig. 6

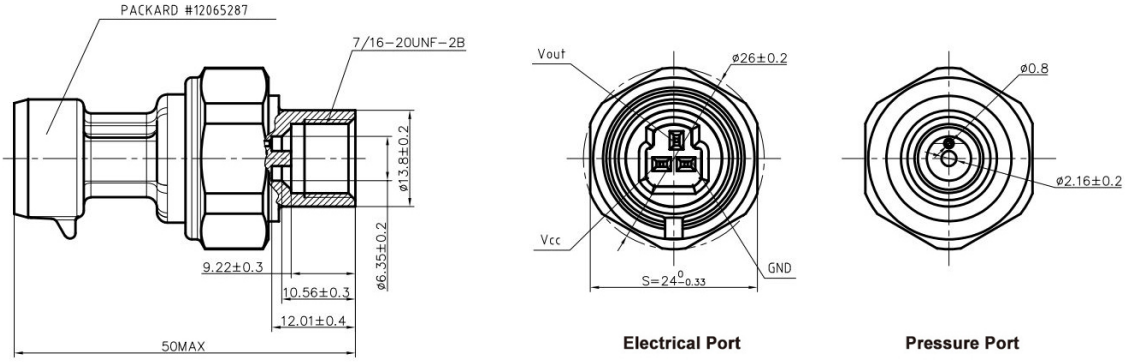


Fig. 7

6. Order Guide

GZP 6181-A-HV02-S-00-A032 K001 B02 WX

GZP	Sencoch
6181	Product Category
A	Output type A: Analog output
HV02	HV00: Air Condition/Coolant application HV02: Hydrogen Energy application
S	S: Stainless Steel
00	00: G1/4 S=24 Packard 01: 7/16UNF S=24 Packard
A032	Pressure range A032:0.1~1.1MPa
K001	Power Supply and Output K001: 5V input, 0.5~4.5V output
B02	Packaging method B02: Plastic Tray
WX	Company interior code

*For more customized ranges and special parameter part numbers, please consult Sencoch.

7. Usage Notes

1) The sensor can only be unpacked before installation.

2) The sensor lacks anti-freezing capability when tested in water.

3) The normally packaged pressure sensors can be transported using standard handling equipment. Note: During transportation, protect the product from moisture, impact, sun exposure, and pressure.

4) Confirm under actual usage conditions

As this specification is a standalone product, to ensure reliability in practical use, verify its performance and quality under real-world conditions.

Safety Precautions

This product is made of semiconductor components for general electronic equipment (communication equipment, measuring equipment, working machinery, etc.). Products using these semiconductor components may malfunction and fail due to external interference and surges, so please confirm the performance and quality under actual use. To be on the safe side, please perform safety design on the device (setting of protection circuits such as fuses and circuit breakers, multiple devices, etc.) so that life, body, property, etc. will not be harmed in the event of a malfunction. To prevent injuries and accidents, please be sure to comply with the following matters:

·The driving current and voltage should be used below the rated values.

Please wire according to the electrical definition . In particular, reverse connection of the power supply may cause accidents due to circuit damage such as heat, smoke, and fire, so please be careful.

·Be careful when fixing the product and connecting the pressure inlet .

Warranty and Disclaimer

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