



## Pressure sensor with built-in amplification and temperature compensation circuit

# PS-A PRESSURE SENSOR

(built-in amplification and temperature compensating circuit)

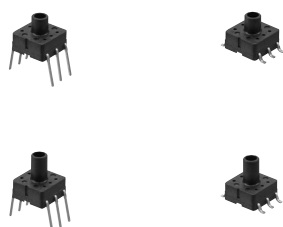
## FEATURES

1. Contains built-in amplification and temperature compensation circuit. Circuit design and adjustment of characteristics are not required by users.

2. High-level precision and high reliability realized. (Overall accuracy is  $\pm 1.25\%$  FS.)

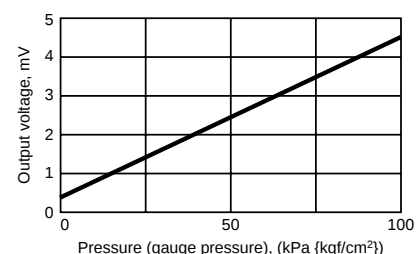
3. Compact pressure sensor unit that saves space.

Same size and footprint (7.0 mm (W) x 7.2 mm (D)) as previous PS pressure sensor.



### Example of pressure characteristics (ADP5140)

Drive voltage: 5V DC rated voltage;  
ambient temperature: 25°C 77°F



## TYPICAL APPLICATIONS

- Gas equipment: Microprocessor gas meter, gas leakage detector
- Industrial equipment: Absorption device, etc.

## ORDERING INFORMATION

Ex. ADP 5

| Part No.                      | Terminal profile                           | Rated pressure                                                                                                        | Pressure inlet hole length             |
|-------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| ADP5:<br>PS-A pressure sensor | 1: DIP terminal<br><br>2: SMD terminal<br> | 0: $\pm 100$ kPa<br>1: $-100$ kPa<br>2: 25 kPa<br>3: 50 kPa<br>4: 100 kPa<br>5: 200 kPa<br>6: 500 kPa<br>7: 1,000 kPa | 0: 3 mm .118 inch<br>1: 5 mm .197 inch |

## PRODUCT TYPES

| <div><div></div><div>Pressure</div></div> | Pressure inlet hole length | Part No. |                                                                                                  | Part No.                                                                                         |                                                                                                    |
|-------------------------------------------|----------------------------|----------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
|                                           |                            | 3mm      | 5mm                                                                                              | 3mm                                                                                              | 5mm                                                                                                |
|                                           |                            | Terminal | DIP terminal  | DIP terminal  | SMD terminal  |
| ±100kPa                                   |                            | ADP5100  | ADP5101                                                                                          | ADP5200                                                                                          | ADP5201                                                                                            |
| −100kPa                                   |                            | ADP5110  | ADP5111                                                                                          | ADP5210                                                                                          | ADP5211                                                                                            |
| 25kPa                                     |                            | ADP5120  | ADP5121                                                                                          | ADP5220                                                                                          | ADP5221                                                                                            |
| 50kPa                                     |                            | ADP5130  | ADP5131                                                                                          | ADP5230                                                                                          | ADP5231                                                                                            |
| 100kPa                                    |                            | ADP5140  | ADP5141                                                                                          | ADP5240                                                                                          | ADP5241                                                                                            |
| 200kPa                                    |                            | ADP5150  | ADP5151                                                                                          | ADP5250                                                                                          | ADP5251                                                                                            |
| 500kPa                                    |                            | ADP5160  | ADP5161                                                                                          | ADP5260                                                                                          | ADP5261                                                                                            |
| 1,000kPa                                  |                            | ADP5170  | ADP5171                                                                                          | ADP5270                                                                                          | ADP5271                                                                                            |

PS-A PRESSURE SENSOR  
AKCT1B64E '03.9

New

PS-A (ADP5)

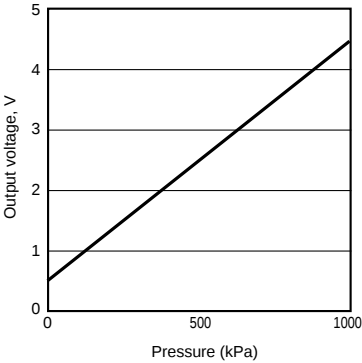
SPECIFICATIONS

| Type                           |           | Specifications             |           |    |    |     |     |     |       | Remarks          |
|--------------------------------|-----------|----------------------------|-----------|----|----|-----|-----|-----|-------|------------------|
| Type of pressure               |           | Gauge pressure             |           |    |    |     |     |     |       |                  |
| Pressure medium                |           | Air                        |           |    |    |     |     |     |       | Note*1           |
| Rated pressure                 | Unit: kPa | ±100                       | −100      | 25 | 50 | 100 | 200 | 500 | 1,000 |                  |
| Drive voltage                  |           | 5±0.25V DC                 |           |    |    |     |     |     |       |                  |
| Temperature compensation range |           | 0 to 50°C                  |           |    |    |     |     |     |       |                  |
| Offset voltage                 |           | 2.5±0.05                   | 0.5±0.05V |    |    |     |     |     |       | Note*2           |
| Rated output voltage           |           | 4.5±0.05<br>(when +100kPa) | 4.5±0.05V |    |    |     |     |     |       | Note*2           |
| Overall accuracy               |           | ±1.25%FS                   |           |    |    |     |     |     |       | Note*2<br>Note*3 |
| Current consumption            |           | Max. 10mA                  |           |    |    |     |     |     |       |                  |
| Output impedance               |           | Approx. 50Ω                |           |    |    |     |     |     |       |                  |
| Source current                 |           | Max. 0.2mA                 |           |    |    |     |     |     |       |                  |
| Sink current                   |           | Max. 2mA                   |           |    |    |     |     |     |       |                  |

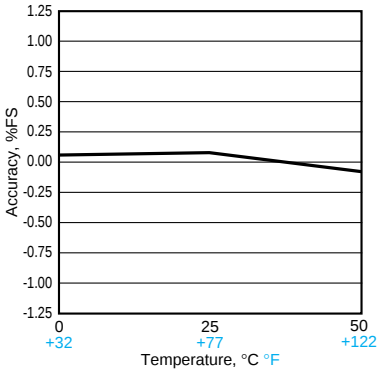
Notes) 1. Please consult us for pressure media other than air.  
2. Indicates output when drive voltage is 5 V. Although output fluctuates due to fluctuations in the drive voltage, this is not included.  
3. Overall accuracy indicates the accuracy of the offset voltage and rated output voltage at temperatures between 0 and 50°C. (FS=4V)  
4. Where no particular temperature is indicated, the specification is for use at 25°C

DATA

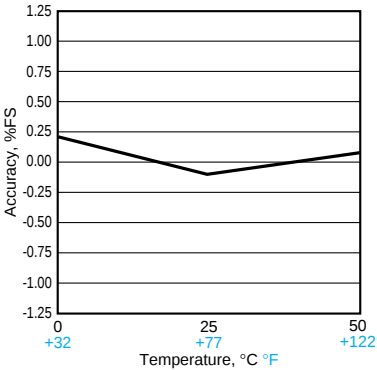
1-(1) Output voltage  
ADP5170  
Drive voltage: 5V DC;  
temperature: 25°C 77°F  
Applied pressure: 0 to +1,000kPa



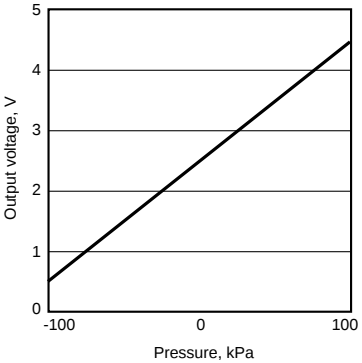
1-(2) Overall accuracy (Offset voltage)  
ADP5170  
Drive voltage: 5V DC;  
temperature: 0 to 50°C 32 to 122°F  
Applied pressure: 0kPa



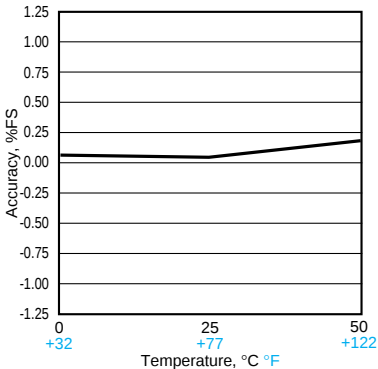
1-(3) Overall accuracy (Rated output voltage)  
ADP5170  
Drive voltage: 5V DC;  
temperature: 0 to 50°C 32 to 122°F  
Applied pressure: +1,000kPa



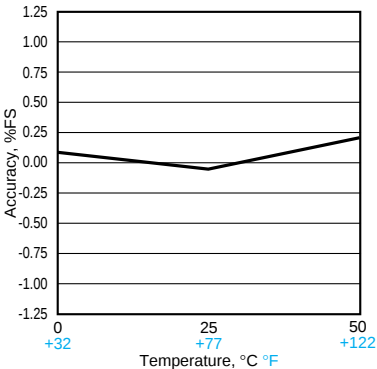
2-(1) Output voltage  
ADP5100  
Drive voltage: 5V DC;  
temperature: 25°C 77°F  
Applied pressure: −100 to +100kPa



2-(2) Overall accuracy (Offset voltage)  
ADP5100  
Drive voltage: 5V DC;  
temperature: 0 to 50°C 32 to 122°F  
Applied pressure: 0kPa



2-(3) Overall accuracy (Rated output voltage)  
ADP5100  
Drive voltage: 5V DC;  
temperature: 0 to 50°C 32 to 122°F  
Applied pressure: +100kPa



## 3. Evaluation test

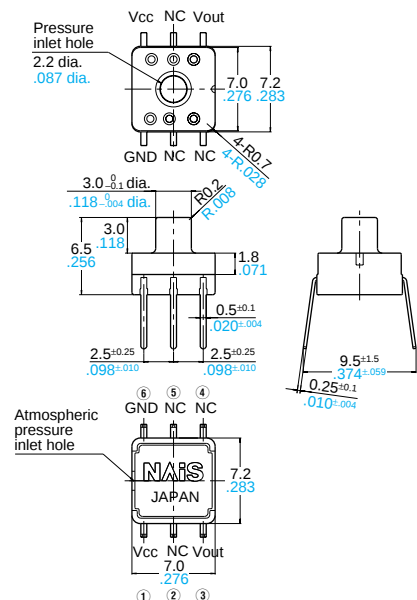
| Tested item                   |                                          | Tested condition                                                                                                                              | Result |
|-------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Environmental characteristics | Storage at high temperature              | Temperature: Left in a 85°C <b>185°F</b> constant temperature bath<br>Time: 100 hrs.                                                          | Passed |
|                               | Storage at low temperature               | Temperature: Left in a -20°C <b>-4°F</b> constant temperature bath<br>Time: 100 hrs.                                                          | Passed |
|                               | Humidity                                 | Temperature/humidity: Left at 40°C <b>104°F</b> , 90% RH<br>Time: 100 hrs.                                                                    | Passed |
|                               | Temperature cycle                        | Temperature: -20°C to 85°C <b>-4°F to 185°F</b><br>1 cycle: 30 min.<br>Times of cycle: 100                                                    | Passed |
| Endurance characteristics     | High temperature/high humidity operation | Temperature/humidity: 40°C <b>104°F</b> , 90% RH<br>Operation times: 10 <sup>6</sup> , rated voltage applied                                  | Passed |
| Mechanical characteristics    | Vibration resistance                     | Double amplitude: 1.5 mm <b>.059 inch</b><br>Vibration: 10 to 55 Hz<br>Applied vibration direction: X, Y, Z 3 directions<br>Times: 2 hrs each | Passed |
|                               | Dropping resistance                      | Dropping height: 75 cm <b>29.528 inch</b><br>Times: 2 times                                                                                   | Passed |
|                               | Terminal strength                        | Pulling strength: 9.8 N {1 kgf}, 10 sec.<br>Bending strength: 4.9 N {0.5 kgf}, left and right 90° 1 time                                      | Passed |
| Soldering Resistance          | Soldered in DIP soldering bath           | Temperature: 230°C <b>446°F</b><br>Time: 5 sec.                                                                                               | Passed |
|                               | Temperature (DIP)                        | Temperature: 260°C <b>500°F</b><br>Time: 10 sec.                                                                                              | Passed |

Note: For details other than listed above, please consult us.

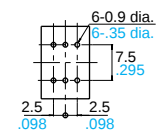
## DIMENSIONS

## 1. DIP terminal (Pressure inlet hole: 3mm) ADP51\*0

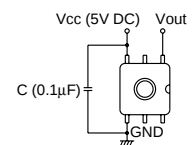
mm inch

General tolerance:  $\pm 0.3$   **$\pm 0.012$** 

Recommended PC board pattern (TOP VIEW 2:1)



Terminal connection diagram



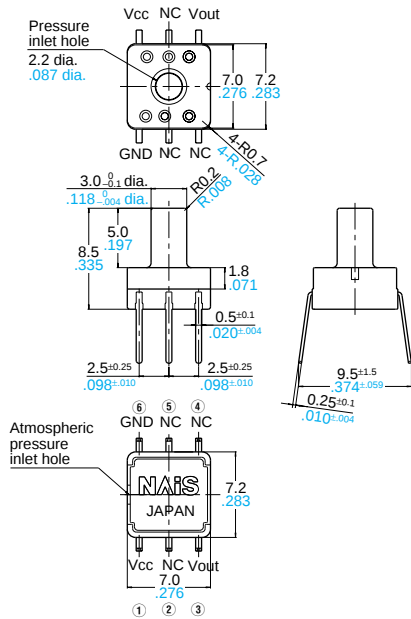
| Terminal No. | Name                   |
|--------------|------------------------|
| 1            | Vcc (Power supply [+]) |
| 2            | NC (No connection)     |
| 3            | Vout (Output)          |
| 4            | NC (No connection)     |
| 5            | NC (No connection)     |
| 6            | GND (Ground)           |

PS-A (ADP5)

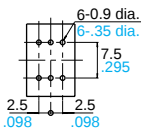
2. DIP terminal (Pressure inlet hole: 5mm) ADP51\*1

mm inch

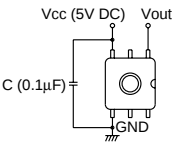
General tolerance: ±0.3 ±.012



Recommended PC board pattern (TOP VIEW 2:1)

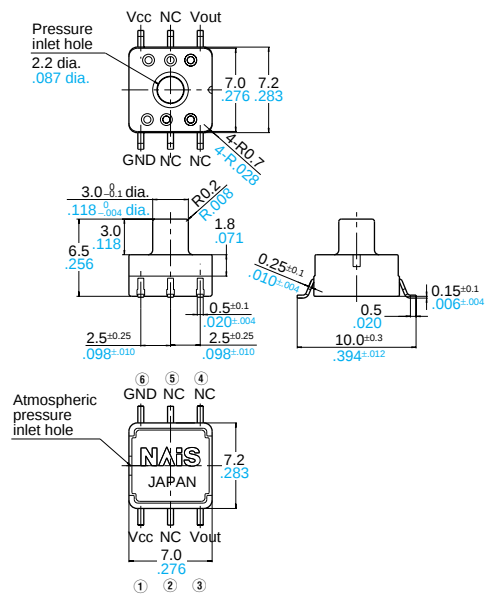


Terminal connection diagram

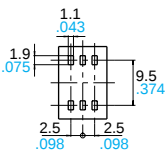


| Terminal No. | Name                   |
|--------------|------------------------|
| 1            | Vcc (Power supply [+]) |
| 2            | NC (No connection)     |
| 3            | Vout (Output)          |
| 4            | NC (No connection)     |
| 5            | NC (No connection)     |
| 6            | GND (Ground)           |

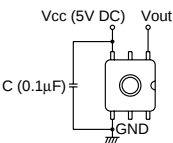
3. SMD terminal (Pressure inlet hole: 3mm) ADP52\*0



Recommended PC board pattern (TOP VIEW 2:1)

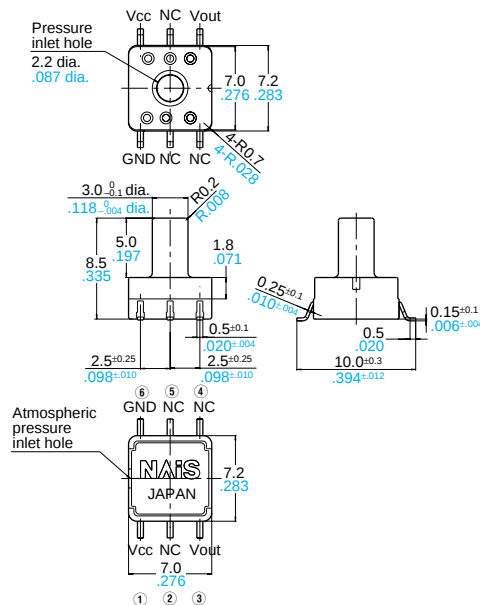


Terminal connection diagram

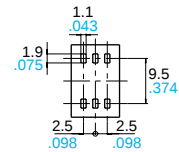


| Terminal No. | Name                   |
|--------------|------------------------|
| 1            | Vcc (Power supply [+]) |
| 2            | NC (No connection)     |
| 3            | Vout (Output)          |
| 4            | NC (No connection)     |
| 5            | NC (No connection)     |
| 6            | GND (Ground)           |

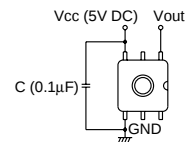
## 4. SMD terminal (Pressure inlet hole: 5mm) ADP52\*1



Recommended PC board pattern (TOP VIEW 2:1)



Terminal connection diagram



| Terminal No. | Name                   |
|--------------|------------------------|
| 1            | Vcc (Power supply [+]) |
| 2            | NC (No connection)     |
| 3            | Vout (Output)          |
| 4            | NC (No connection)     |
| 5            | NC (No connection)     |
| 6            | GND (Ground)           |

## NOTES

## 1. Mounting

Use lands on the printed-circuit boards to which the sensor can be securely fixed.

## 2. Soldering

Due to its small size, the thermal capacity of the pressure sensor DIP type is low. Therefore, take steps to minimize the effects of external heat.

Damage and changes to characteristics may occur due to heat deformation.

Use a non-corrosive resin type of flux.

Since the pressure sensor DIP type is exposed to the atmosphere, do not allow flux to enter inside.

## 1) Manual soldering

- Set the soldering tip from 260 to 300°C (30W), and solder for no more than 5 seconds.

- Please note that output may change if the pressure is applied on the terminals when the soldering.

- Thoroughly clean the soldering iron.

## 2) DIP soldering (DIP terminal type)

- Please keep the DIP solder bath temperature no higher than 260°C. When soldering, heat should be applied no longer than five seconds.

- When mounting onto a PCB of low thermal capacity, please avoid DIP soldering as this may cause heat deformity.

## 3) Reflow soldering (SMD terminal type)

- The recommended reflow temperature profile conditions are given below.

- We recommend the screen solder printing method as the method for cream solder printing.

- Please refer to the recommended PCB specification diagram for the PCB foot pattern.

- Self alignment may not always work as expected; therefore, please carefully adjust the position of the terminals and pattern.

- The profile temperature is the value measured on the PCB near the terminals.

- When doing reflow soldering on the back of the PC board after performing sensor reflow, please fix the sensor with adhesive and so on.

## 4) Solder reworking

- Finish reworking in one operation.

- For reworking of the solder bridge, use a soldering iron with a flat tip. Please do not add more flux when reworking.

- Please use a soldering iron that is below the temperature given in the specifications in order to maintain the correct temperature at the tip of the soldering iron.

5) Too much force on the terminals will cause deformation and loss in effectiveness of the solder. Therefore, please avoid dropping and careless handling of the product.

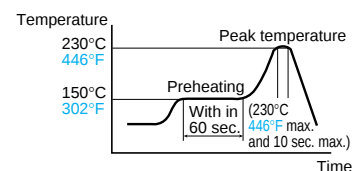
6) Please control warping of the PCB within 0.05 mm of the sensor width.

7) When cut folding the PCB after mounting the sensor, take measures to prevent stress to the soldered parts.

8) The sensor terminals are designed to be exposed, so contact of the terminals with metal shards and the like will cause output errors. Therefore, please be careful and prevent things such as metal shards and hands from contacting the terminals.

9) To prevent degradation of the PCB insulation after soldering, please be careful not to get chemicals on the sensor when coating.

10) Please consult us regarding the use of lead-free solder.



## 3. Connections

1) Please perform connections correctly in accordance with the terminal connection diagram. In particular, be careful not to reverse wire the power supply as this will cause damage or degrade to the product.

2) Do not connect terminals that are not used. This can cause malfunction of the sensor.

# PS-A (ADP5)

## 4. Cleaning

- 1) Since the pressure sensor chip is exposed to the atmosphere, do not allow cleaning fluid to enter inside.
- 2) Avoid ultrasonic cleaning since this may cause breaks or disconnections in the wiring.

## 5. Environment

- 1) Please avoid using or storing the pressure sensor chip in a place exposed to corrosive gases (such as the gases given off by organic solvents, sulfurous acid gas, hydrogen sulfides, etc.) which will adversely affect the performance of the pressure sensor chip.
- 2) To ensure resistance to power supply superimposed noise, you must provide a capacitor at the power supply input terminal of the sensor in order to stabilize the power supply voltage. We recommend to provide 0.1  $\mu$ F and 1,000 pF capacitor in parallel. Please confirm the noise resistance with the actual equipment and choose adequate capacitor.
- 3) Since the internal circuitry may be destroyed if an external surge voltages is supplied, provide an element which will absorb the surges.
- 4) Malfunctioning may occur if the product is in the vicinity of electrical noise such as that from static electricity, lightning, a broadcasting station, an amateur radio, or a mobile phone.

- 5) Since this pressure sensor chip does not have a water-proof construction, please do not use the sensor in a location where it may be sprayed with water, etc.
- 6) Avoid using the pressure sensors chip in an environment where condensation may form.

Furthermore, its output may fluctuate if any moisture adhering to it freezes.

- 7) The pressure sensor chip is constructed in such a way that its output will fluctuate when it is exposed to light. Especially when pressure is to be applied by means of a transparent tube, take steps to prevent the pressure sensor chip from being exposed to light.

- 8) Avoid using the pressure sensor chip where it will be susceptible to ultrasonic or other high-frequency vibration.

## 6. Quality check under actual loading conditions

To assure reliability, check the sensor under actual loading conditions. Avoid any situation that may adversely affect its performance.

## 7. Other handling precautions

- 1) That using the wrong pressure range or mounting method may result in accidents.
- 2) The only direct pressure medium you can use is dry air. The use of other media, in particular, corrosive gases (organic solvent based gases, sulfurous acid based gases, and hydrogen sulfide based

gases, etc.) and media that contains moisture or foreign substances will cause malfunction and damage. Please do not use them.

- 3) The pressure sensor chip is positioned inside the pressure inlet. Never poke wires or other foreign matter through the pressure inlet since they may damage the chip or block the inlet. Avoid use when the atmospheric pressure inlet is blocked.

- 4) Use an operating pressure which is within the rated pressure range. Using a pressure beyond this range may cause damage.

- 5) Since static charge can damage the pressure sensor chip, bear in mind the following handling precautions.

- When storing the pressure sensor chips, use a conductive material to short the pins or wrap the entire chip in aluminum foil. Plastic containers should not be used to store or transport the chips since they readily become charged.

- When using the pressure sensor chips, all the charged articles on the bench surface and the work personnel should be grounded so that any ambient static will be safely discharged.

- 6) Based on the pressure involved, give due consideration to the securing of the pressure sensor DIP type and to the securing and selection of the inlet tube. Consult us if you have any queries.

## Internet Homepage

- ◆ North America : <http://www.aromat.com/>
- ◆ Europe : <http://www.mew-europe.com/>

- ◆ Asia & others : <http://www.nais-e.com/>
- (Japanese) : <http://www.mac-j.co.jp/>
- (Chinese) : <http://www.cmew.com.cn/>

These materials are printed on ECF pulp.  
These materials are printed with earth-friendly vegetable-based (soybean oil) ink.



Please contact .....

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