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(CATALYTIC TYPE GAS SENSOR)

Handling manual

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NAP-56A is a newly developed catalytic type gas sensor for all combustible gases, and its power consumption and pin position are the same as our conventional type NAP-55A, but gas sensitivity value of NAP-56A is around 15% larger than 55A. Furthermore, it is easier to handle because the material of strainer was changed to metal substance.

1. Features and usage of NAP-56A

1) Features
・Good stability
・Excellent repeatability and detection accuracy
・Good linearity against gas concentration
・Quick response
・Down sizing for design flexibility of gas alarm or detector

2) Usage
・Gas alarm or detector for general combustible gases
・Gas densitometer
・Driving module for gas leakage detector

2. Maximum ratings

・Supply voltage to sensor AC 3.3V (50 － 60Hz)
DC 3.3V
・Ambient temperature and humidity in operation
Temperature －40 ～ +80℃
Humidity less than 99%RH
(without dew condensation)
・Ambient temperature and humidity in storage
Temperature －40 ～ +80℃
Humidity less than 99%RH
(without dew condensation)

3. Ratings

・Supply voltage to sensor AC 2.5 ± 0.25V(50－60Hz)
DC 2.5 ± 0.25V
・Current(when 2.5V is supplied) AC 160 ～ 180mA(50－60Hz)
DC 160 ～ 180mA
・Ambient temperature and humidity in operation
Temperature －20 ～ +60℃
Humidity less than 95%RH
(without dew condensation)

・Ambient temperature and humidity in storage

Temperature	－30 ～ +70℃
Humidity	less than 99%RH (without dew condensation)

4. Detection range

It can measure/detect whole combustible gases less than 100%LEL, but excellent accuracy of linearity within +/-10% can be obtained when the gas concentration is to be less than 50%LEL.

5. Response time

From clean air to 10%LEL	T50 : less than 5sec. T90 : less than 10sec.
From gas to clean air	T50 : less than 10sec. T90 : less than 20sec.

(This time is dependent on ambient conditions.)

6. Gas sensitivity characteristics

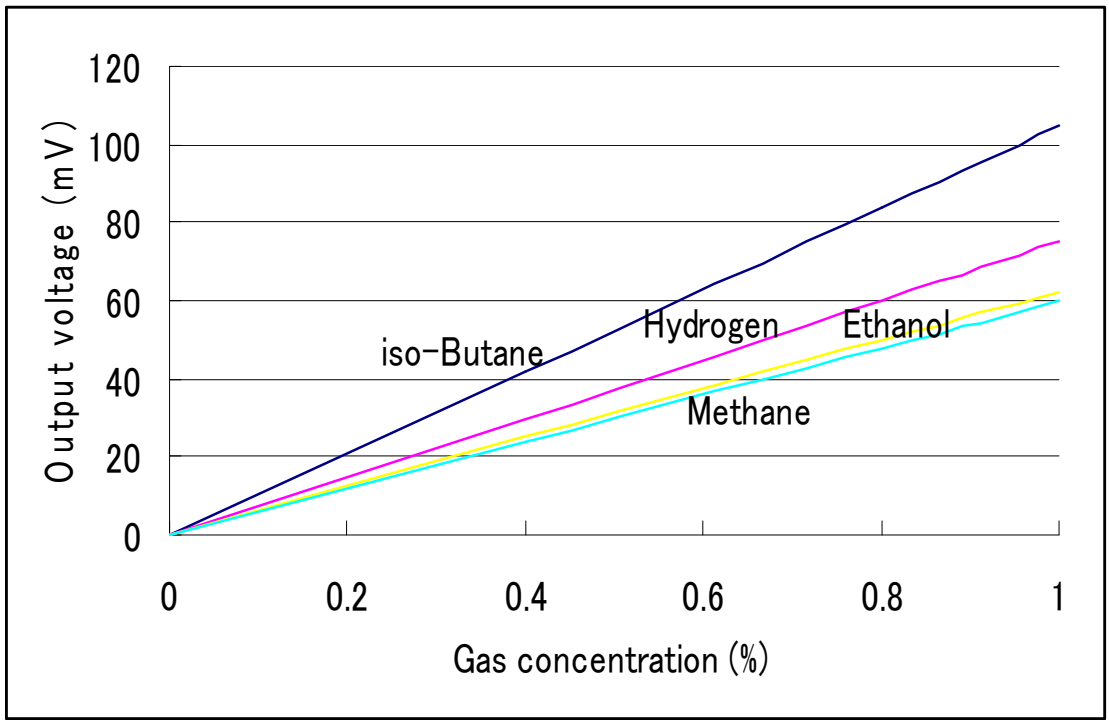


Fig. 1　Gas sensitivity characteristics

7. Supply voltage dependence

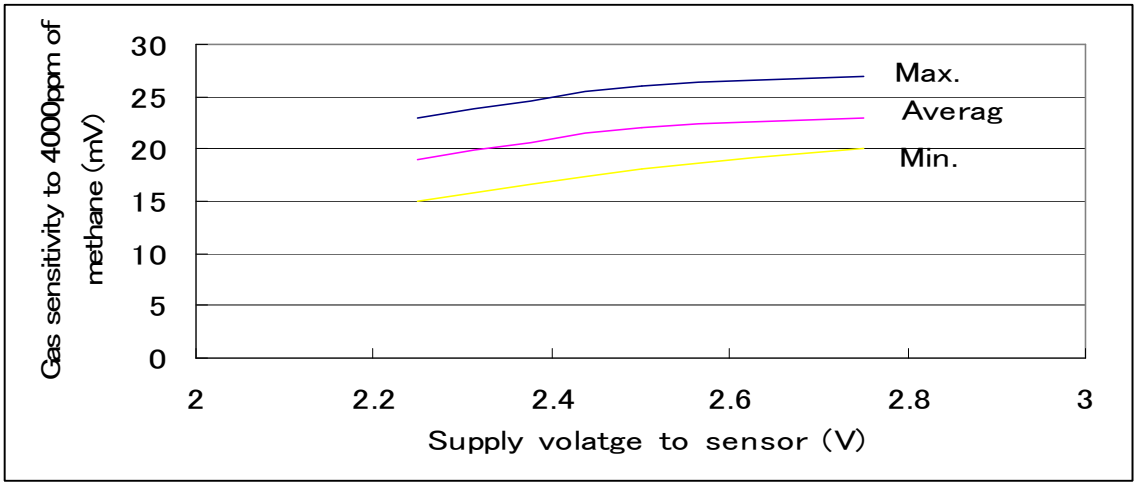


Fig.2　Supply voltage dependence of gas sensitivity

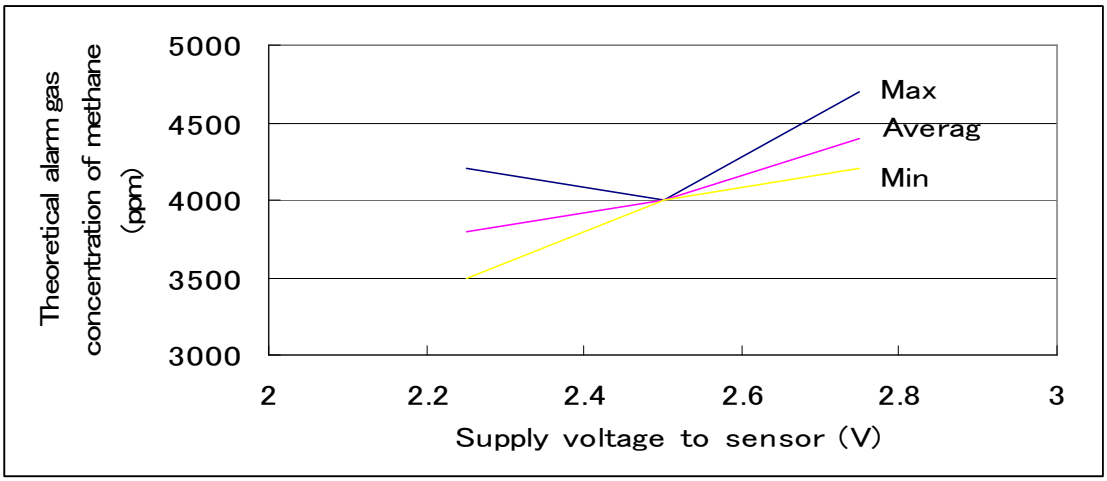


Fig.3　Supply voltage dependence of theoretical alarm gas concentration

8. Temperature dependence

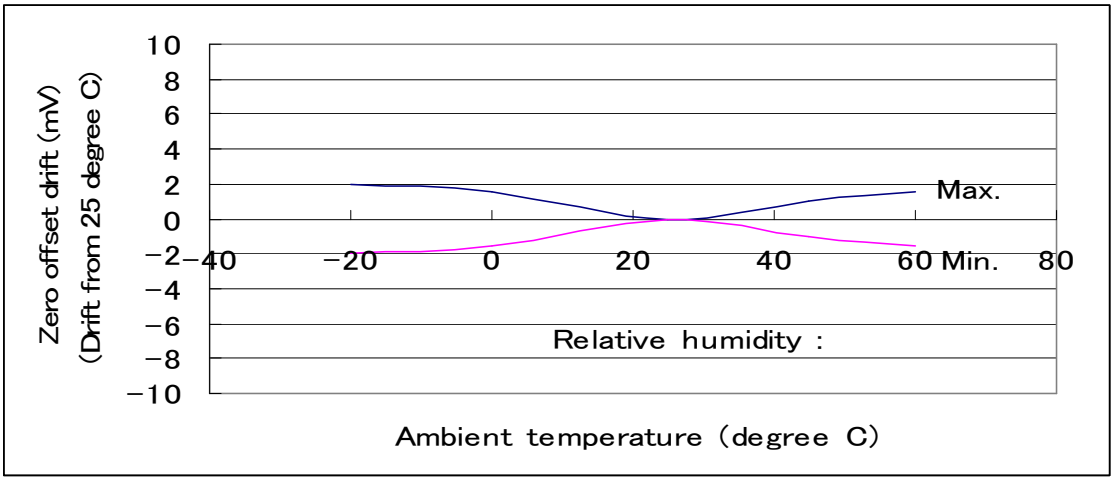


Fig.4　Temperature dependence of zero offset

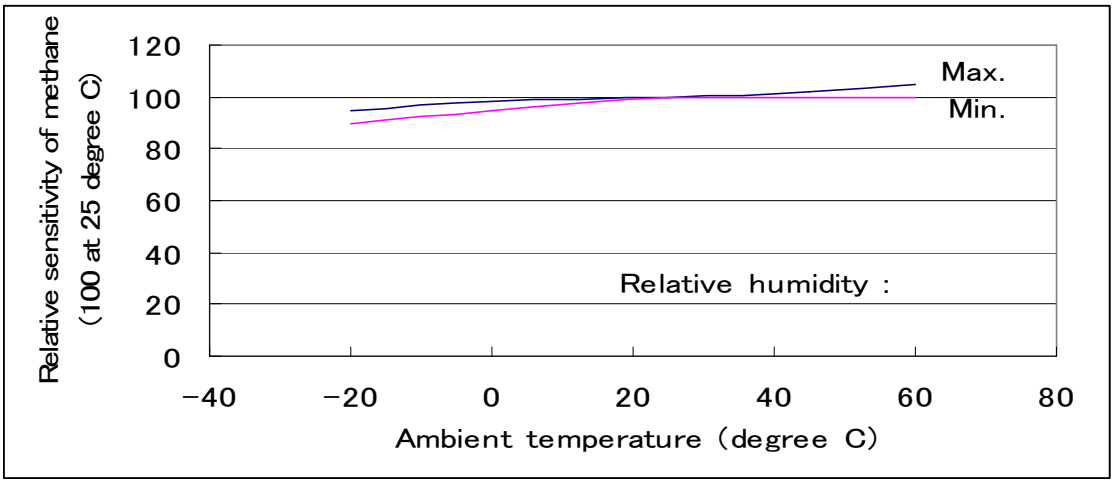


Fig 5　Temperature dependence of relative sensitivity of methane

9. Humidity dependence

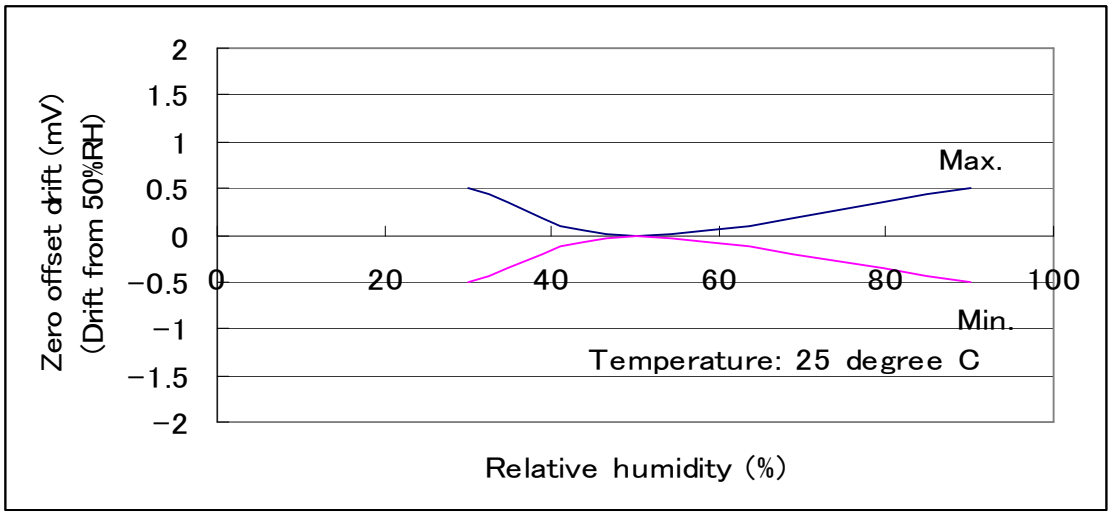


Fig.6　Humidity dependence of zero offset

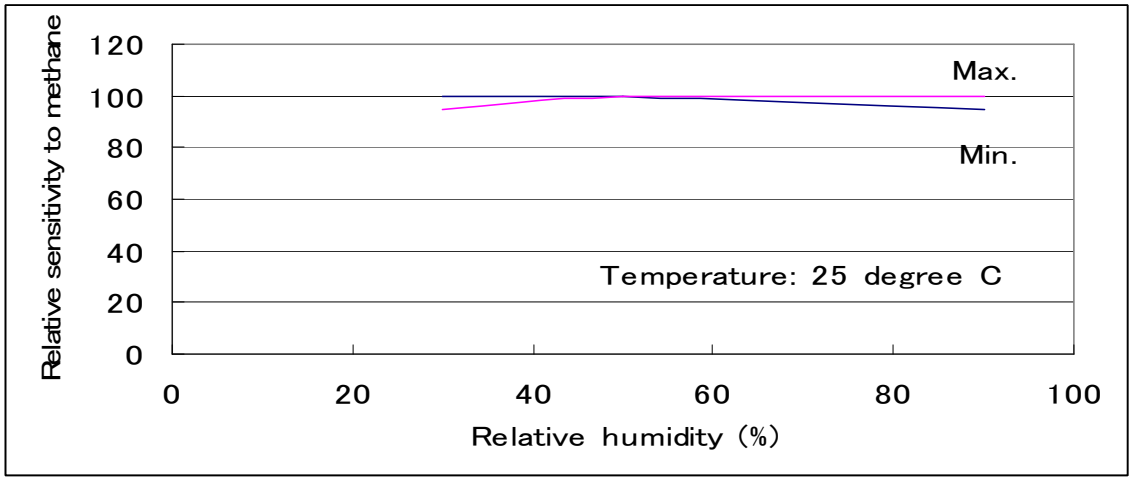


Fig.7　Humidity dependence of relative sensitivity of methane

10. 経時特性

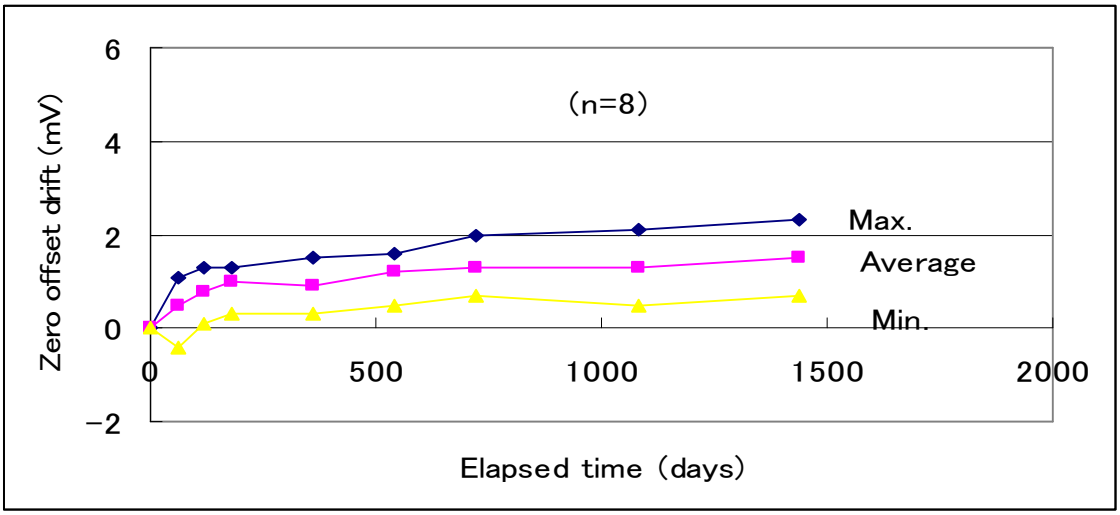


Fig.8　Long term stability of zero offset

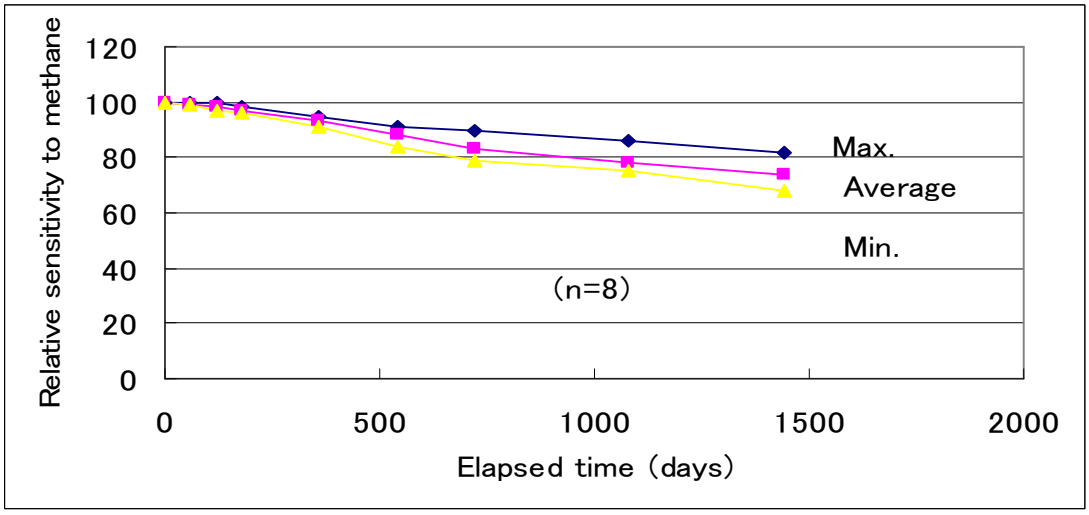


Fig.9　Long term stability of relative sensitivity of methane

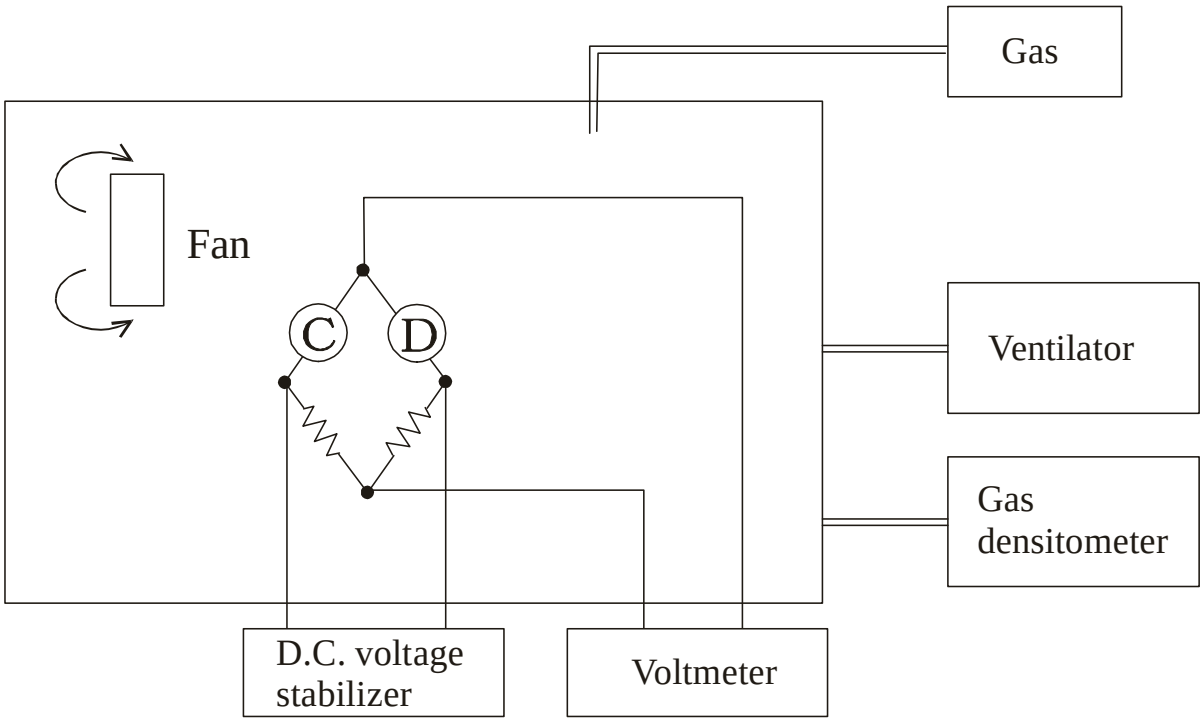
11. Actual gas sensitivity in normal temperature

Actual gas sensitivity in normal temperature are as below.

・Zero offset in clean air　　: +/-35mV
・Gas sensitivity to 3000ppm of methane : 15 – 23mV

12. Evaluation method of sensor

(1)Test equipmen
Outline of test equipment is shown as below.



(Remarks)

1) Test chamber
- Material of test chamber is to be like as metal or glass which does not exhale and adsorb gases.
- Volume of test chamber is to be 1 litter per 1pc. of sensor.

2) Circumstance
- Clean air is to be available. Dirty air in a factory which contains combustible gases or organic solvent vapor is not to be supplied to test chamber.

3) Gas densitometer
- IR gas densitometer is suitable.

4) Agitation in test chamber
- Air agitation in test chamber is to be noticed in order not to flow air to sensor directly. Air velocity is to be less than 0.5m/sec.

5) Power supply

・ Sensor is available by AC power and DC power, but DC power supply is to be recommended for more accurate measurement.

6) Digital volt meter

・ Since the impedance of sensor is fairly low, general digital volt meter having over 100kohm as input impedance is recommended.

7) Ventilation

・ Ventilator with ventilation ability of over 10 times per minute of the volume of test chamber is to be necessary for the next measurement.

8) Installation position of sensor in test chamber

・ When the sensor is installed in test chamber, it should be noticed that every sensor is to be in constant position because output signal is changed in case that position of sensor is changed. If the rough evaluation is enough, such notice is not needed.

(2) Adjustment of gas concentration

Adjustment of gas concentration is to be conducted by volume method or by using IR gas densitometer. In case of volume method, gas volume of injection to chamber is obtained from the calculation formula described as below.

$$V(m\lambda) = Vi \cdot C \cdot 10^{-6} \frac{273 + Tr}{273 + Tc}$$

V ; Gas volume to be injected
Vi ; Inner volume of test chamber（$m\lambda$）

C ; Target gas concentration（ppm）

Tc ; Temperature in test chamber（℃）
Tr ; Room temperature（℃）

(3) Evaluation method

1) Preliminary aging

・ Before evaluation of sensor, preliminary aging at rated voltage for over 1 hr. is to be necessary.

2) Measurement

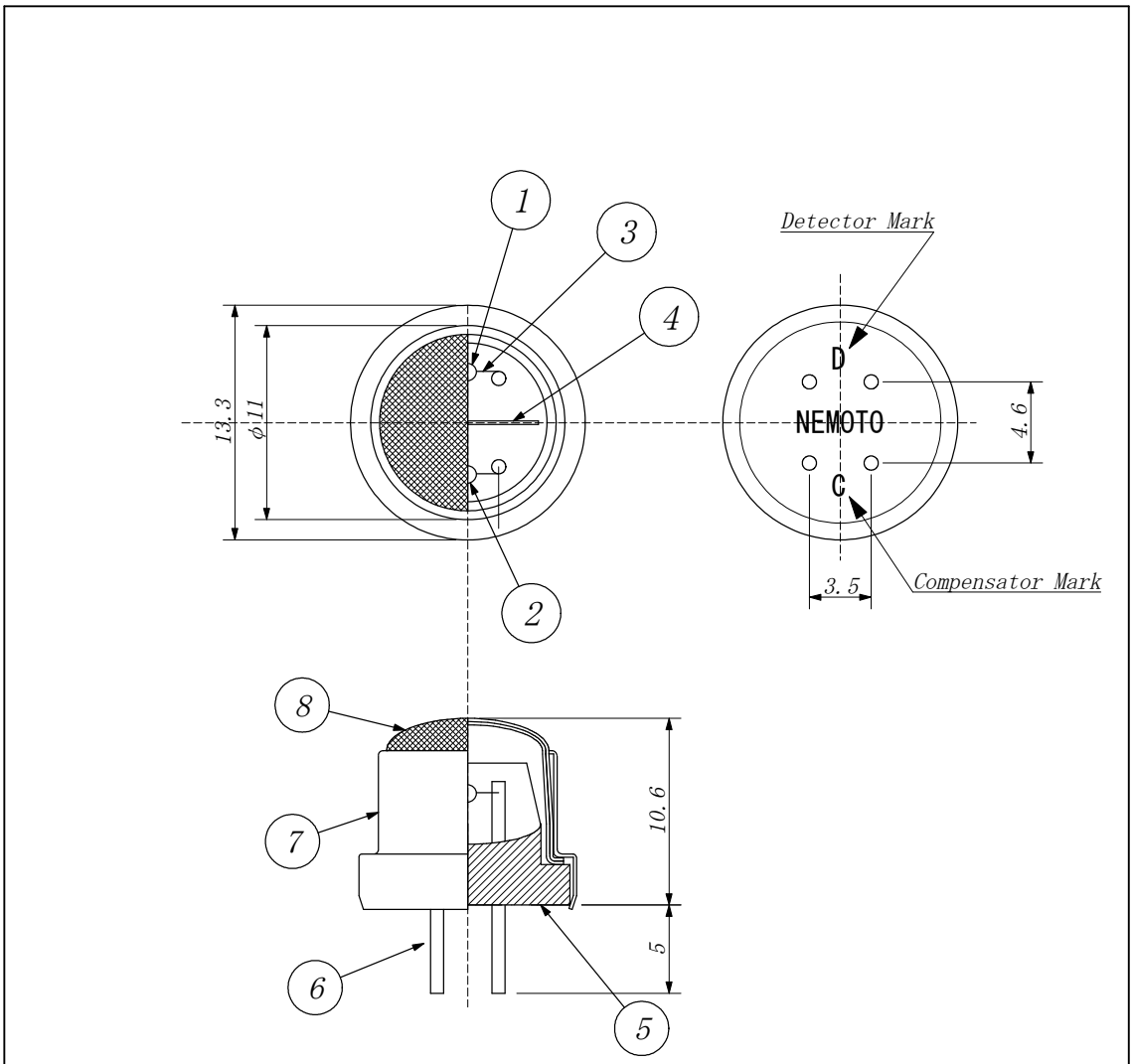
・ At first, output voltage in clean air is to be measured. It should be confirmed that output voltage has to be stable, not fluctuated.
・ Output voltage is to be measured after the designated volume of gas is injected into a test chamber.

・ After measurement, air in test chamber is to be exhaled compulsory.

(4) Notice on handling

・ Sensor is to be gently handled without drop or shock.
・ Handling is to be avoided in a location which corrosive gases and poisoned gases exist.
・ Sensor is not to be dipped in water.

13. Figure of sensor



No	Parts	Materials	Remarks
8	Mesh	SUS316#100	Duoble
7	Strainer	Brass with Ni coating	t=0.2
6	Pin	Ni	φ0.8
5	Base mount	Phenol	—
4	Separator	SUS304	t=0.2
3	Coil	Pt	φ0.03
2	Compensator	—	—
1	Detector	—	—