ELFA artikelnr.
73-093-39 AF56 gassensor

(1) Operating Conditions

Table 1 : Operating Conditions of the AF-Series

Parameter	Ratings
Operating Temperature	-10℃～55℃
Strage Temperature	-30℃～85℃
Load Resistor R_L	Variable
Rated Sensor power consumption P_S	$P_S \leqq 15mW$
Rated Working Voltage of Curcuit V_C	DC or AC 5V (Max12V)
Rated Working Voltage of Heater	DC or AC 5V ± 0.2V

$$P_S = \frac{V_C^2 \cdot R_S}{(R_S+R_L)^2}$$

R_S : Sensor Resistance

(2) Specifications

(2-1)Sensitivity Characteristics

Table 2 : Sensitivity Characteristics of the AF56

Items	Ratings
Gas Sensitivity	$0.08 \leqq R_{GAS} / R_{AIR} \leqq 0.25$ R_{AIR} is Sensor resistance in the clean air without noise gases. R_{GAS} is Sensor resistance in the air containing 2000ppm isobutane. Temperature:25±2℃、Humidity:50±5%RH
Sensor Resistance (R_{GAS})	1.5 KΩ～6.0 KΩ It is Sensor Resistance in 2000ppm isobutane/air.
Power Consumption	690mW (MAX)

(2-2)Mechanical Durability

It displays excellent resistance against shock or vibration, since the gas-sensitive element is fixed on the ceramic board being sandwiched from the both sides by a pair of electrodes, and baked hard concomitantly with the formation of the external protection film.

Table 3 : Mechanical Durabikity of the AF-Series

Items	Test Conditions	Criterion
Vibration Test	Frequency : 10-500Hz Amplitude(10-50Hz) : 2mm Acceleration(50-500Hz) : 10G Reciprocal scanning time : 5min Test time 2 hours respective for X, Y and Z directions	It maintain the characteristics shown in Table 2.
Shock Proof Test	Acceleration : 200G Number of impacts : 5	

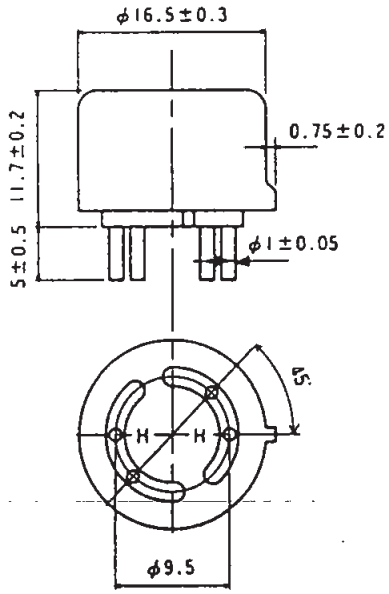
(2-3)Material

Table 4 : Material of the AF-Series

Name	Material
Sensing Element	Semiconducting oxide
Thick-file Heater	Platinum
Lead Wire	Platinum alloy
Case	Nylon 66
Pin	Nickel alloy
Flame Arrestor	Double 100-mesh stainless steel gauze (SUS 316)

(2-4)Appearance and Dimentions

Fig. 1 : Appearance and Dimentions of the AF-Series



(3) Characteristics

(3-1)Sensitivity

Fig. 2 is shows the typical sensitivity characteristics of the AF56 for Isobutane, Propane Methane, Hydrogen, Carbon-monoxide and Ethanol. The sensitivity denotes the ratio (R_{GAS}/R_{AIR}) of the sensor resistance obtained in the gas-containing air (R_{GAS}) to the sensor resistance obtained in the clean ari without noise gases (R_{AIR}) .

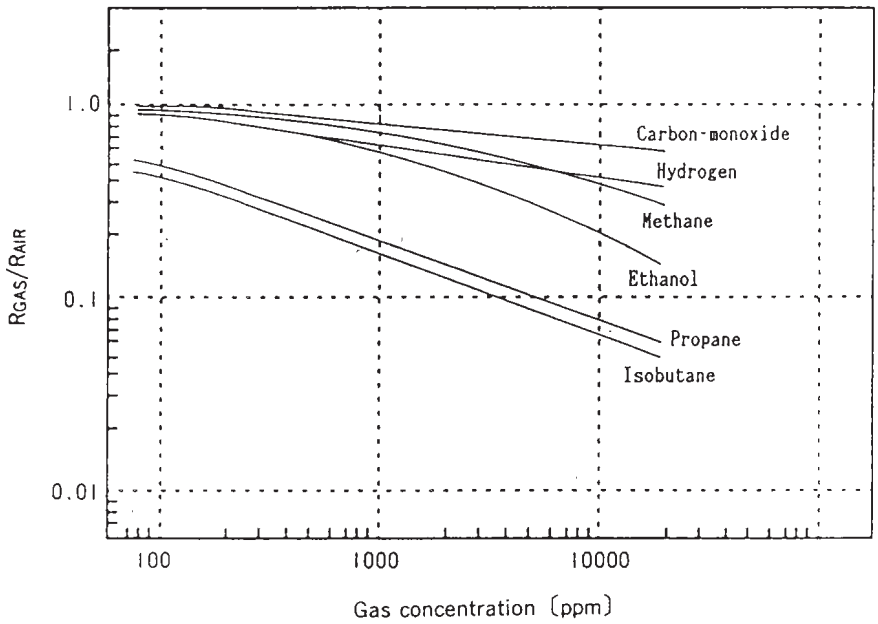


Fig. 2 : Sensitivity Characteristics of the AF56
R_{AIR} is Sensor resistance in the clean air.
R_{GAS} is Sensor resistance in various concentrations of gases.
The measurments have done after operating more than 48 hours.

(3-2)Initial Stabilization Time

Fig.3 shows typical change in resistance of the AF56 observed from the time point immediately after current supply, where this AF56 corresponds to the sensor kept standing for a month(30 days) at normal temperature and under normal humidity without current supply.

The intial stabilization time largely depends on the atmosphere and the storage period. In general, the longer the storage time, the longer the initial stabilization time.

In the AF56, the initial stabilization time will be less than 2 minutes.

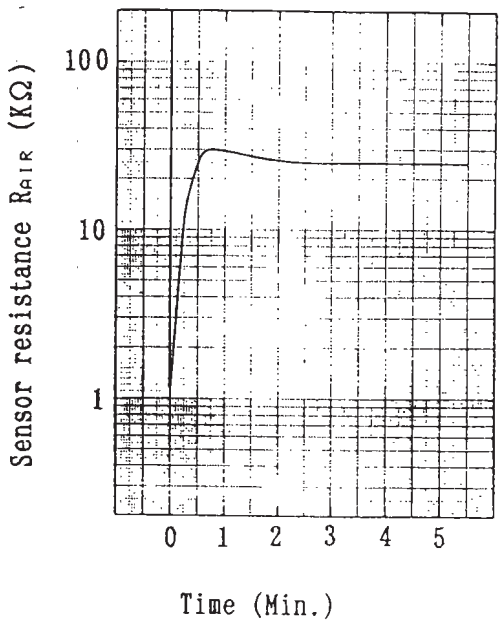


Fig. 3 : Initial Action of the AF56 stored for 30 days without Current Supply.
R_{Air} is Sensor resistance in the air.

(4) Basic Test Circuit

The pin allocation of the AF-Series is shown in Fig. 5, where pins No.1 and No.3 are connected to the heater section, and pins No.2 and No.4 to the sensor section.

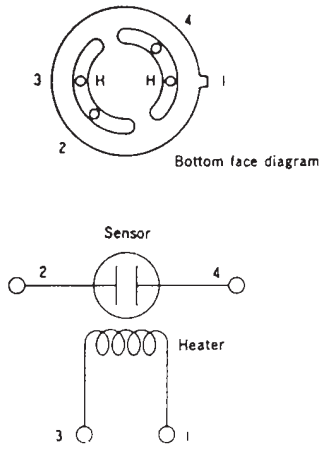
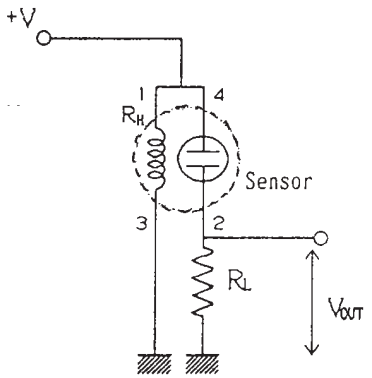


Fig. 5 : Pin Allocation

The basic test circuit for use with AF-Series is shown in Fig. 6. The circuit voltage and the heater voltage are applied in the basic test circuit shown below. The AF-Series is designed to operated with a stabilized 5V. And then any heater voltage value higher or lower than 5V will adverserly affect the sensitivity characteristics.



Vc :Circuit voltage

RL :Load resistance

VOUT:Output voltage

Fig. 6 : Basic Test Circuit

In this test circuit, the sensor resistance (R_S) is calculated from output voltage(V_{OUT}) by the following formula.

$$R_S = \frac{V_C - V_{OUT}}{V_{OUT}} \cdot R_L$$

The sensitivity denotes the ratio (R_{GAS}/R_{AIR}) of the sensor resistance obtained in the gas-containing air (R_{GAS}) to the sensor resistance obtained in the clean ari without noise gases (R_{AIR}) .

(3-3)Dependence on Temperature and Humidity

Genelally sensor resistance is influenced by temperature and humidity. Fig. 4 is shows the typical dependence of the AF56 on temperature and humidity. The AF56, similar as the conventional gas sensor, is not totally free from influence by temperature and humidity. But the dependence of the AF56 on temperature and humidity is very small in comparison with conventional gas sensors.

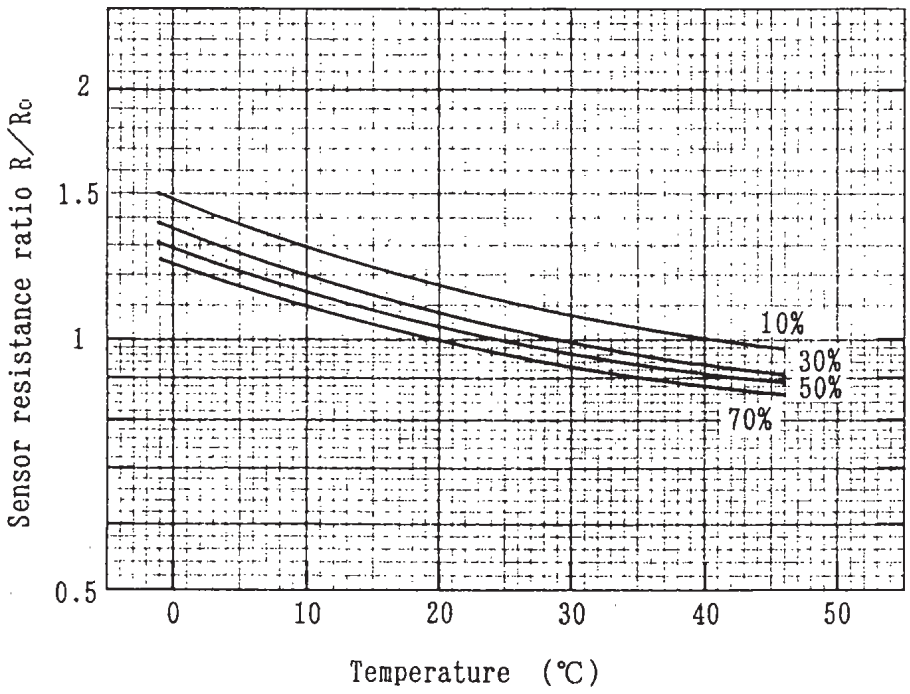


Fig. 4 : Dependence of the AF56 on Temperature and Humidity

Ro is Sensor resistance in the air containing 2000ppm isobutane at 25℃ 50%RH.
R is Sensor resistance in the air containing 2000ppm isobutane at different temperature and relative humidity.

(5) Standard Test Conditions

(5-1)Atomospheric Conditions

Clean air with 25±2℃ and R.H. 50±5%
(without noise gases such as organic solvent vapor, exhaust gas and smell)

(5-2)Circuit Conditions

V_C (Circuit voltage) : 5 ±0.05 V
V_H (Heater voltage) : 5 ±0.05 V
R_L (Load resistance) : 5 KΩ±1%

(5-3)Test Gas

Isobutane : 2000 ppm

(6) Setting of the Alarm Point

The AF56 has small sensitivity to noise gases such as alcohol, cigarette smoke, cooking fumes. And also the AF56 has small dependence on temperature and humidity as compared with the conventional gas sensors. But the AF 56 is not totally free from influence by those factors. Therefore the proper alarm point for the gas detector should be determined after considering the those influence.
Setting the actual alarm point, we recommend that you calibrate the detector for 2000ppm ~ 3000ppm of LP-Gas concentration.

【NOTES】

- Measure the gas sensor characteristics after operating more than 24 hours to fully stabilize the sensor.
- Sensor characteristics must be measured in clean air without noise gases.
- If the sensor is used after it is left for a long time under high humidity without current supply, it will takes some time untill its characteristics are stabilized. In general, the longer it is left under high humidity, the longer it will take to stabilize.
- The temperature of the sensor case, heated by the built-in heater, will be 30℃ to 40℃ higher than the ambient temperature during operation.
- The sensors display excellent resistance against shock and vibration, but do not apply excessive shock and vibration to it.
- Do not bend the pins.
- Do not apply any forcible strength to the mesh.
- Solder by hand. Before using other methods of soldering, consult us.
- If it is to be used or stored in a special environment or gas, consult us.
- If accurate performance is required, such as in industrial applications, check the operation periodically.
- It is recommended to replace the AF 56 with a new one every 5 years.