## (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 Ps | Ps≦15mW |
| Rated Working Voltage of Curcuit Vc | DC or AC 5V (Max12V) |
| Rated Working Voltage of Heater | DC or AC 5V ± 0.2V |

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

Rs : Sensor Resistance

## (2) Specifications

### (2-1)Sensitivity Characteristics

Table 2 : Sensitivity Characteristics of the AF30

| Items | Ratings |
|---|---|
| Gas Sensitivity | $0.20 \leqq R_{GAS}/R_{AIR} \leqq 0.40$ |
| Sensor Resistance | $10K\Omega \leqq R_{AIR} \leqq 50K\Omega$<br>$R_{AIR}$ is Sensor resistance in the clean air without noise gases.<br>$R_{GAS}$ is Sensor resistance in the air containing 10ppm hydrogen.<br>Temperature:25±2℃、Humidity:50±5%RH |
| Power Consumption | 535mW (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<br>Amplitude(10-50Hz) : 2mm<br>Acceleration(50-500Hz) : 10G<br>Reciprocal scanning time : 5min<br>Test time 2 hours respective for X, Y and Z directions | It maintain the characteristics shown in Table 2. |
| Shock Proof Test | Acceleration : 200G<br>Number of impacts : 5 | |

## (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) : 10 KΩ±1%

### (5-3)Test Gas

Hydrogen : 10 ppm

## 【NOTES】

- Used the AF30 on the continuous operation, because if the AF30 is used after it is straged for a long peirod, it will takes about a hour untill its characteristics are stabilized.
- 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.
- If it is to be used or stored in a special environment or gas, consult us.

## (4) Basic Test Circuit

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

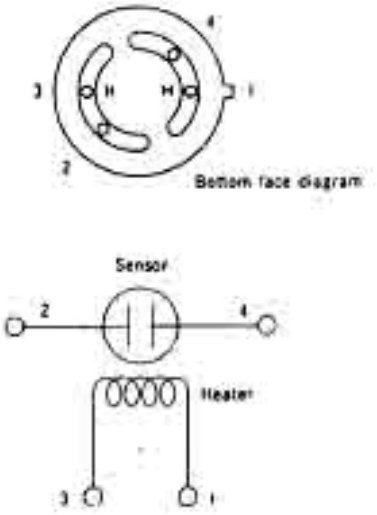
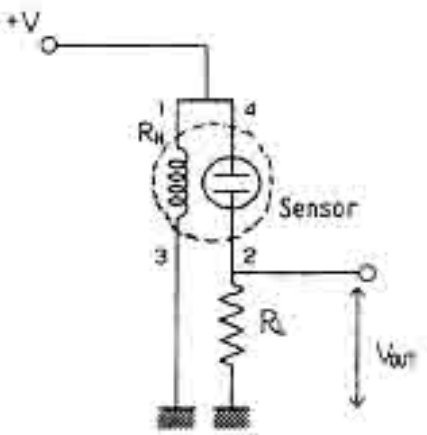



Fig. 4 : Pin Allocation

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




$V_C$ :Circuit voltage

$R_L$ :Load resistance

$V_{OUT}$:Output voltage

Fig. 5 : 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) Characteristics

### (3-1)Sensitivity

Fig. 2 is shows the typical sensitivity characteristics of the AF30 for Isobutane, Propane the several gases. 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 air without noise gases ($R_{AIR}$).

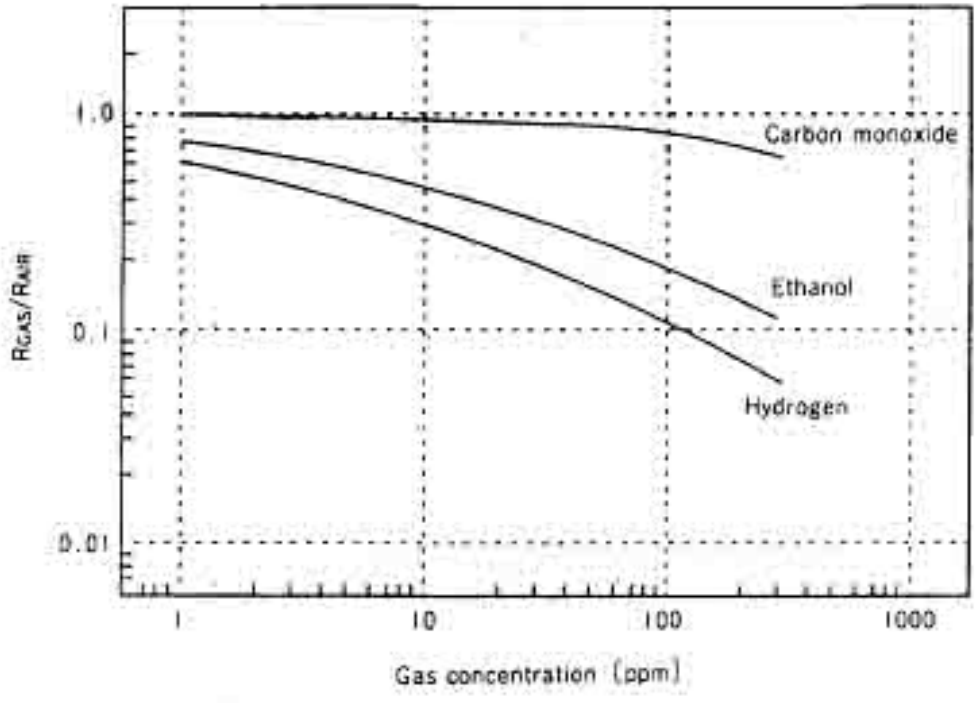



Fig. 2 : Sensitivity Characteristics
$R_{AIR}$ is Sensor resistance in the clean air.
$R_{GAS}$ is Sensor resistance in various concentrations of gases.
The measurments have done after operating more than 48 hours.

### (3-2)Initial Stabilization Time

Fig. 3 shows typical change in resistance of the AF30 observed from the time point immediately after current supply, where this AF30 corresponds to the sensor kept standing for a year 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 AF30, the initial stabilization time will be less than 1 hour.

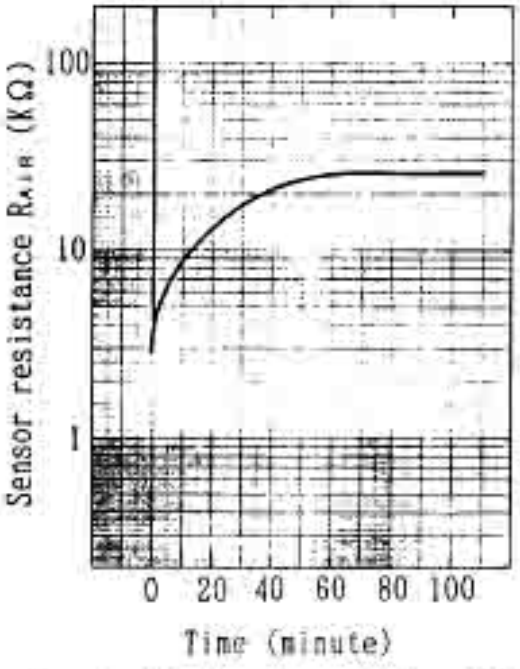



Fig. 3 : Initial action of the AF30 stored for a year without current supply.
$R_{AIR}$ is Sensor resistance in the air.

(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