

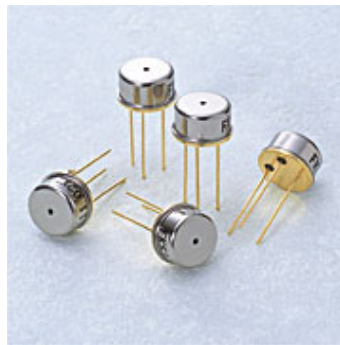
# Ultra-sensitive air pressure sensor FKS-111

## Operating principle

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The ultra-sensitive air pressure sensor captures the adiabatic compression and temperature change of air. For example, into a cylinder made of walls (adiabatic wall) impervious to heat, to sealing the gas. And, by moving the piston, the gas will be compressed or distended. At this time, the compression, is giving work from the outside to a gas. The internal energy is increased and the temperature of the gas will rise. In the distension, the gas is work to the outside. Its internal energy of the gas is reduced, the temperature of the gas will go down.

For example, in the opening and closing of the door of the sealed room, it happen temperature changes due to adiabatic compression or adiabatic distension. This temperature change will be detected as a change in pressure.



## Feature

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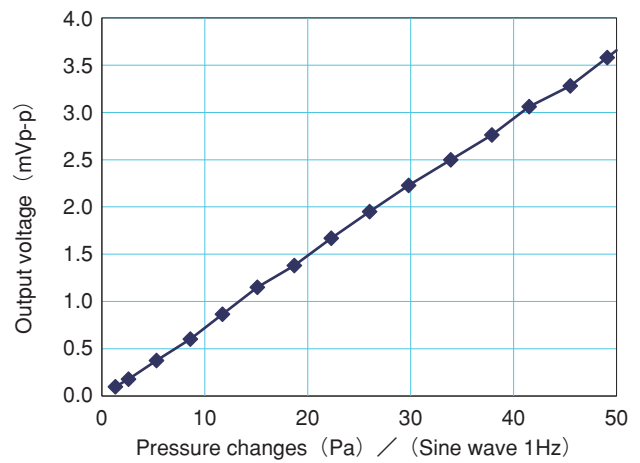
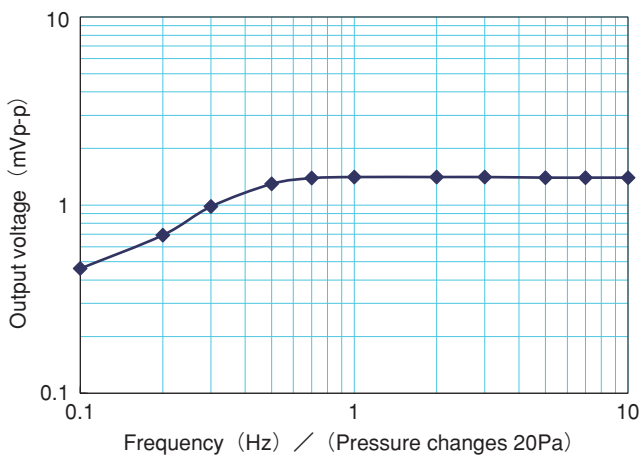
- Ultra-sensitive air pressure sensor, it can capture generally a very small pressure changes in the air or gas, which has not been able to detect with high sensitivity. Also, in the same sensor, it can capture the large pressure changes of 100 kPa.
- Compared to conventional diaphragm type, it is a high sensitivity at low prices. Since the sensing element is a ceramic, it does not break even in excessive pressure.
- Has a FET built-in to sensor, for impedance transformation. Therefore, the outputs signal can be taken out by the voltage outputs.

## Applications

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- The ultra-sensitive air pressure sensor can be used as a transformation sensor of ultra-low pressure (1 Pa).
- It can be used as an opening and closing timing sensor of the doors and windows of the sealed room.
- It cans also response as a sensitive pressure change sensor.
- Home equipments, security equipments, can also be used as an industrial equipments and other air switch.

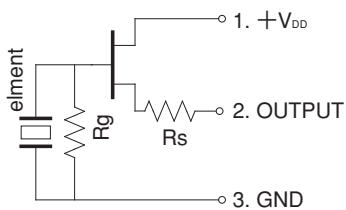
## Typical Characteristics



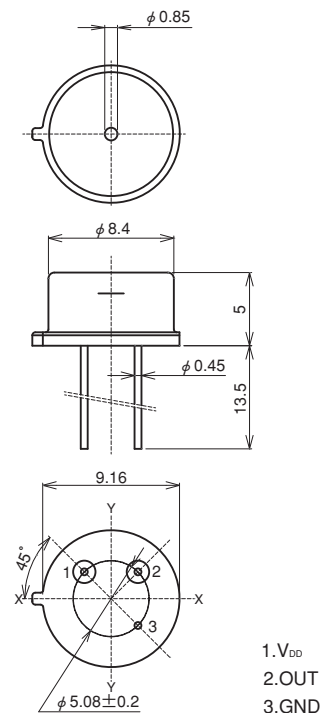
## Standard specifications

Parameter	Specifications
Power-supply voltage	1.7 ~ 15 V
Source voltage	0.3 ~ 1.7 V
Minimum detection air pressure	1 Pa
Operating temperature	-20 ~ 80 °C
Operating humidity	max. 70 %RH
Storage temperature	-40 ~ 85 °C

## Equivalent circuit



## Outside dimensions



## Output voltage direction

- Standard specification will be the output of the positive voltage by the change in pressurization. → Model : FKS-111
  - If there is a request, it can also output the positive voltage at the change of reduced-pressure. → Model : FKS-111M
- ※ This air pressure sensor, in case of detecting a small change in pressure, it is recommended to use the option of the resin cap.

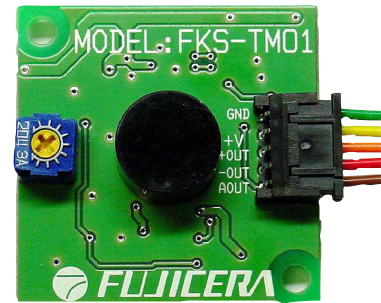
# Ultra-sensitive air pressure sensor FKS-111

## Learning modules for Ultra-sensitive air pressure sensor FKS-TM01

This is a Learning module FKS-TM01 for the Ultra-sensitive air pressure sensor FKS-111.

In order to understand the operating characteristics of the Ultra-high-sensitivity air pressure sensor FKS-111 to detect the minute pressure changes, we have provided a Learning module as a teaching tool.

About the actual operation of the Ultra-sensitive air pressure sensor FKS-111, it is ideal for those who want to try in an experiment or the like.



### ■ Specifications of Learning module FKS-TM01

Brown lead (AOUT)	Analog output (0 ~2.7 Volts)
Red lead (-OUT)	Comparator output (-) Decompression change (After the comparator works, open-drain turned on for 1 sec. Max. 100 mA)
Orange lead (+OUT)	Comparator output (+) Pressurization change
Yellow lead (+V)	Power-supply voltage (+) 2.9 ~15.0 Volts
Green lead (ND)	GND
Consumption current	Standby time 100 $\mu$ A
Gain	Adjustable by a variable resistor (Adjustable range 400~5200 times at 2 Hz)
Dimensions & weight	35×35×11 mm 8 grams

- This module FKS-TM01 is, there is an analog output to amplify the sensor signal of the air-pressure sensor FKS-111 which has detected a subtle change in pressure. It also features a comparator output that can check the operation by connecting LED and the like.
- Analog output, in the time of not operation is output about 1.35 V (see FIG 1). In operation time, the voltage corresponding to the sensor signal at the center 1.35 V will change. Therefore, easy sensor signal by simply connecting to the oscilloscope can be confirmed.
- Comparator output, analog output voltage 1.6 V or more, or at 1.1 V or less, the ground terminal and the comparator output at the inside of the module will be short-circuited. By connecting the LED and buzzer, other control equipment, it can be the ON-OFF operation.  
(However, the time that is short-circuited is 1 second.)

**Note :** For example, it opened the door of the room of the volume of 36 cubic meters (3 m × 4 m × 3 m), there is a pressure change of about 30 Pa. At the amplification factor minimum of this module, it output voltage of about 0.8 Vp-p is obtained.

(Pressure change and the output voltage, the size of the room and will vary depending on the opening and closing of the door.)

## Learning modules for Ultra-sensitive air pressure sensor FKS-TM01

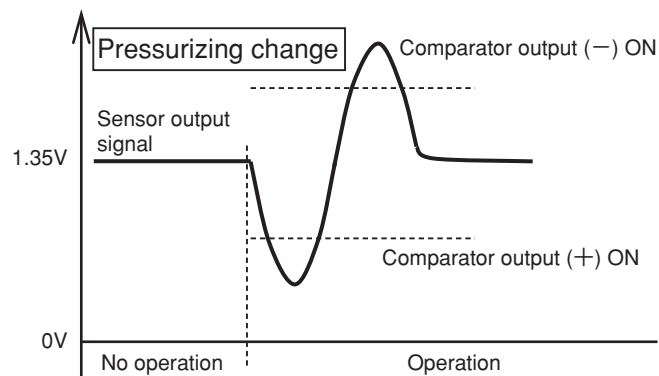
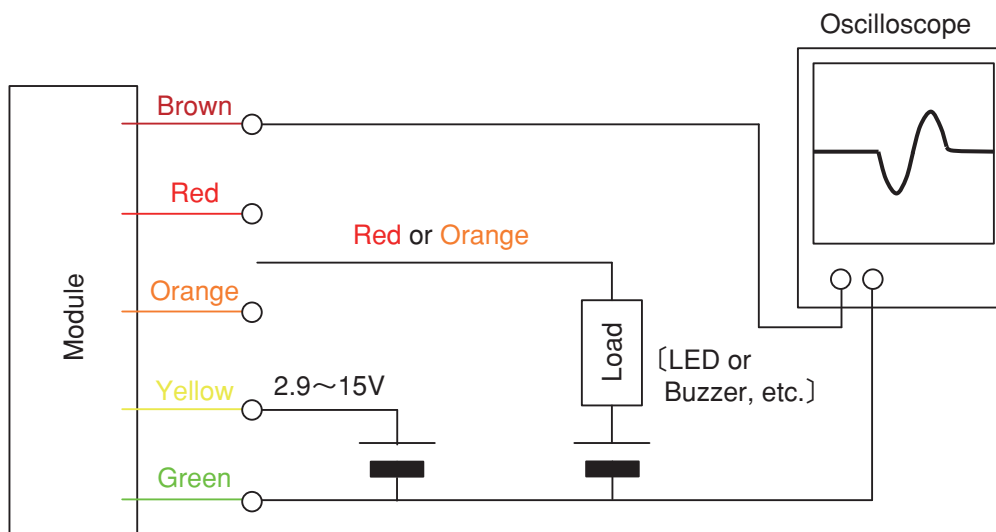
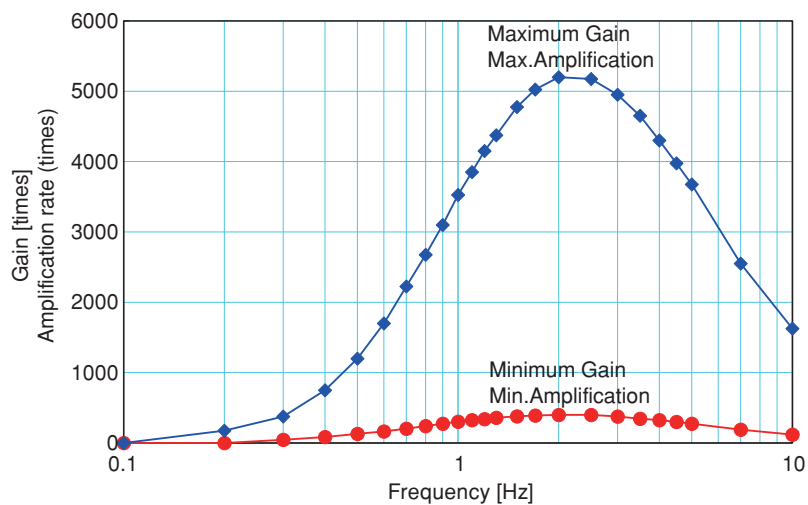


FIG 1 Analog output voltage (for example)



Wiring connection (for example)

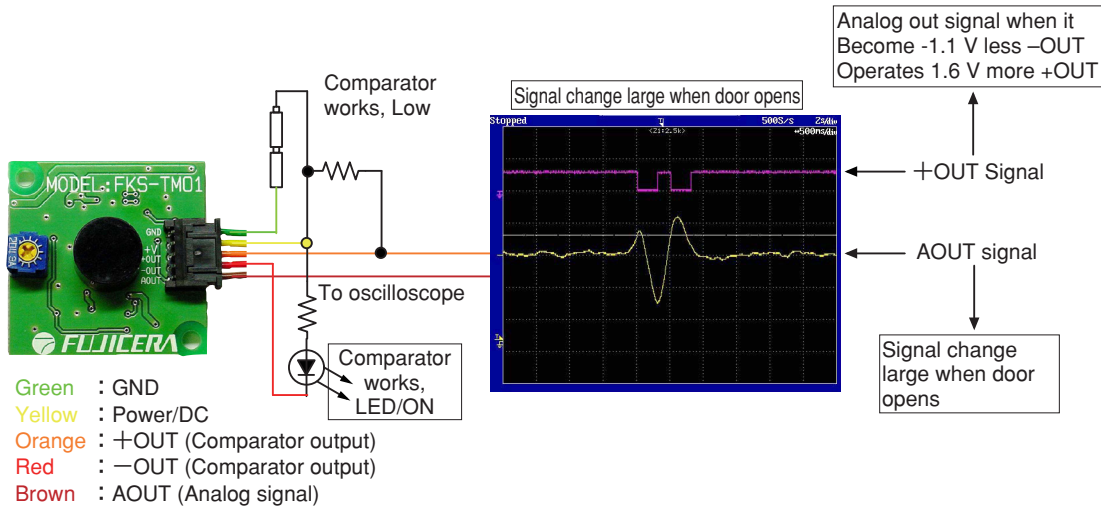


Module circuit frequency characteristic

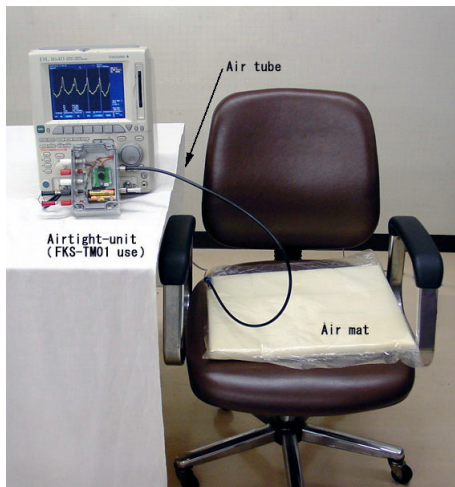
# Ultra-sensitive air pressure sensor FKS-111

## Examples of learning modules FKS-TM01 connection

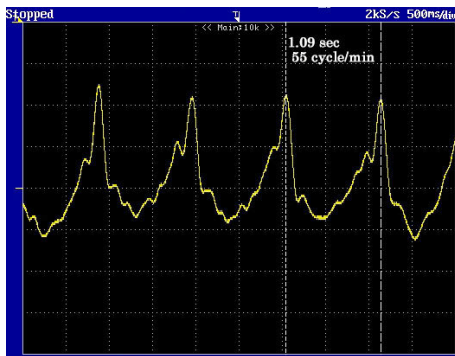
### ■ Output signal of when the door is opened



### ■ Pulse detection of human body



◀ It put on the chair, and pulse can be detected when sitting on air mat.



◀ Amplitude is observed every 1.09 sec. This corresponds to 55 times of pulse frequency/minute. Additionally, the living body signal is observed.

- This module, please use to understand the operating characteristics of the sensor. If it applied to the actual product, it can not bear responsibility.
- The contents of this article are subject to change without notice for improvements.