

Chemical Tape Method Sensor: FP



Stationary tape
Example: FCL-002E

1. Brief description

This sensor uses cellulose tape impregnated with a color former. It lets detectable gas enter this tape by allowing it to pass through it or diffuse into it. The sensor electrically measures reflected light based on the tape color caused by the reaction between the color former and detectable gas to quantitatively recognize a very low concentrations of toxic gas.

Category	Detectable gas
Optical	Toxic

2. Structure and principles

[Structure]

The sensor has a gas chamber that lets in detectable gas. This chamber is a light-resistant container that is internally arranged and housed so that the light source and light-receiving section can recognize the tape color. The sensor consists of this gas chamber and other components such as a reel mechanism for rewinding tape after each measurement.

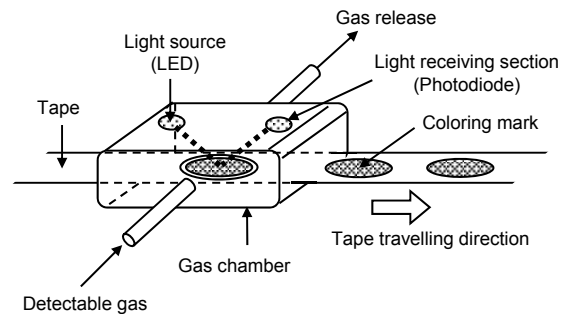
[Principles]

When a detectable gas comes in contact with the tape impregnated with a color former, a chemical reaction occurs, causing the tape to color. For example, if phosphine (PH₃) comes into contact with the tape, silver colloid is produced as shown in the formula below, causing a coloring mark to appear on the white tape.



The sensor applies light to the spot on the tape that has colored to determine the change in reflected light intensity before and after the entry of the detectable gas; thus it accurately quantifies the gas concentration.

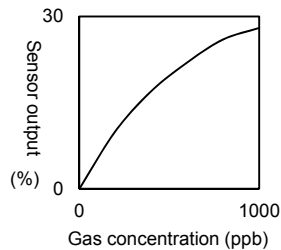
[Structure]



3. Features (of the sensors FP-300 and FCL-002E (PH₃) as examples)

◦Output characteristics

When a detectable gas enters the detection section, the tape starts to color and the output gradually increases. Since the sensor determines changes in color, the output forms a curve.

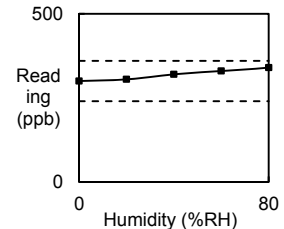


◦Aging characteristics

Continuous running tests on the sensor indicate that with no deterioration in gas sensitivity, it provides stable measurement.

◦Temperature and humidity characteristics

For PH₃, the tape-based sensors FP-300 or FCL-002E does not depend on temperature. Without greatly depending on humidity as well, this sensor provides accurate reading within the operating temperature and humidity ranges.



◦ Features of the tape-based sensor

- Very high sensitivity with excellent selectivity
- Use of cassette tape, which is easy to replace
- Tape feed on a per-measurement basis, which allows no hysteresis
- Coloring caused by detectable gas accumulates on the tape, which allows for detection of very low concentrations of gas

4. Detectable gas, molecular formula, model, and detection range (examples*)

Detectable gas	Molecular formula	Model #	Detection range
Arsine	AsH ₃	FCL-001	0-15/150 ppb
Hydrogen selenide	H ₂ Se		0-200 ppb
Formaldehyde	HCHO	FCL-018	0-0.5/1/5 ppm
Phosphine	PH ₃	FCL-002E	0-900 ppb
Diborane	B ₂ H ₆		0-300 ppb
Silane	SiH ₄		0-15 ppm
Disilane	Si ₂ H ₆		0-10 ppm

* Tape FP-300 used as an example

5. Products of this type (examples)

◦ Stationary products

... FP-300, FP-301

