SDT: Toxic and Combustible Gas Detector

General

SDT intelligent gases detection sensor employs a variety of measurement principles including catalytic combustion, semiconductor, electrochemical, fluorescence, photo-ionization PID and infrared technology to real-time monitor the concentration of toxic and combustible gases for industrial and municipal areas. The use of explosion-proof cast aluminum housing makes it possible to apply SDT in hazardous environments.

This series of intelligent sensors can be used either individually (i.e., with optional local display, 4 to 20mA output, alarm relay, integrated sound-light alarm) or jointly to match GDC General Display & Controller for simultaneous multi-channel multi-parameter measurements.

Measuring Principle

Catalytic Combustion Method: Under certain temperature conditions, any flammable gas in the air-gas mixture stream on the detection element carrier surface causes, in the role of catalyst, flameless combustion which raises the carrier temperature and in turn makes platinum resistance change upon which to measure the concentration of the gas. This is typically used for the combustible gas application. The best concentration range for detection of Combustible gases is in 100% LEL or Volume %. The sensor provides features of fast response, high precision, long life and anti- toxic properties.

Semiconductor Method: The sensor is an adsorption-desorption type and built on solid-state sensing element. The principle of the detection is as follows: when a gas is absorbed on the active catalyst surface of the element, it causes a resistance change between two electrodes embedded in the catalyst. The catalyst surface is maintained at a preset temperature. The amount of the resistance change depends on the variation of the gas composition, the type of gas-solid interaction and the preset surface temperature. The resistance change induces a signal which is processed to activate the meter display and alarms. The sensor offers fast response, high accuracy, excellent repeatability, and good stability. It can detect toxic gases in the low PPM range. Since there is no liquid and no combustion process involved, the sensor life is much longer; it is not affected by temperature and humidity changes, and it has very little zero drift. It can be used for little oxygen supply or vacuum environment.

Electrochemical Method: The sensor is built on the use of electrochemically active properties of flammable, toxic and harmful gases and their redox reactions. The characteristic reaction can distinguish the gas composition and its concentration. Different gases have different redox properties, which results in fuel cell type, constant potential electrolysis cell type, concentration cell type, and limit current type sensors for detecting different kind of gases.

Infrared Method: The sensor makes use of NDIR infrared absorption properties to detect gases. The sensor possesses specially structured optical cavity, light source and dual-channel detectors to carry out dual optical reference compensation. The built-in temperature measurement performs temperature compensation. The sensor provides very small linearity error, very little zero drift, and low power consumption, it can be used for little oxygen supply or vacuum environment.

The table below lists some commonly used gases. For other gases, please consult from the sensor manufacturers.

GASES	Catalytic Combustion	Semiconductor Method	Electrochemical Method	Infrared Method	Range (ppm)	Optional Range (ppm)
Chlorine (Cl_2)		0200	0300		0~3	10, 50
Chlorine Dioxide (ClO_2)			1300		0~15	5, 200
Hydrogen Sulfide (H_2S)		2200	2300		0~10	50, 500, 1000
Sulfur Dioxide (SO_2)		3200	3300		0~15	5, 50, 100, 250, 500
Carbon Monoxide (CO)	4100	4200	4300	4600	0~100%LEL, 0~250	100, 500, 1000
Ammonia (NH_3)		5200	5300		0~100%LEL, 0~75	100, 500, 1000
Non-Methane Hydrocarbons	6100	6200	6300	6600	0~100%LEL, 0~100	50, 500, 1000
Hydrogen (H_2)	7100	7200	7300		0~100%LEL, 0~1000	2000
Methane (CH_4) or Combustible Gases	8100	8200	8300	8600	0~100%LEL, 0~1000	5000, 10000
Freon		9200			0~1000	250, 500, 5000
Sulfur Trioxide (SO_3)			A300		0~15	5, 50
Bromine (Br_2)			B300		0~0.3	
Phosgene ($COCl_2$)			C300		0~1	0.3, 5
Carbonyl Fluoride			D300		0~5	10
Nitrogen Dioxide (NO_2)			E300		0~2	9
Fluorine (F_2)			F300		0~3	10, 30
Formaldehyde (HCHO)	6100		G300	6600	0~2	20
Hydrazine (N_2H_4)			H300		0~2	
Hydrogen Cyanide (HCN)			J300		0~3	0.3, 10, 30
Ozone (O_3)			K300		0~0.3	3
Acetic Acid Gas (CH_3COOH)	6100		L300	6600	0~30	
Nitric Oxide (NO)			M300		0~100	300, 1000
Hydrogen Chloride (HCl)			N300		0~50	5, 10, 100, 200
Carbon Dioxide (CO_2)				T600	0~1000	2000, 5000, 10%VOL

Fluorescent Method: The sensor is designed and built based on the principle of the quenching mechanism in physics when some selected substances act as dynamic fluorescence quenchers. High-energy light irradiates on fluorescent substance, which excites it to emit fluorescence. The fluorescence excitation time and intensity correlate with the concentration of the gas being detected.

GASES	Fluorescent Method	Range (ppm)	Optional Range (ppm)
Oxygen (O_2)	O400	0~25%	0~4.2%, 0~100%
Carbon Dioxide (CO_2)	T400	1~25%@1atm	

Photo-ion (PID) Method: The sensor detects the gas concentration by applying photo ions to ionize the gas. This is carried out by utilizing UV light generated by an ion lamp to irradiate or bombard the target gas. When the target gas absorbs enough energy of UV light, it gets to be ionized. The gas concentration is determined by measuring the minute current in the gas ionization process and using it to calculate the result based on the known relations between the current and. the gas concentration. As the vast majority of air composition (N_2, O_2 and CO_2) have light ion energy higher than that an ion lamp can provide, it is normally impossible to detect ambient air composition by the sensor. Therefore, the photo-ion (PID) gas sensor is very suitable for detecting the volatile organic compounds (VOCs) in ambient air, and it is free from interference of air, which makes the detection easily possible to achieve ppb level measurement accuracy.

GASES	Photo-ion (PID) Method	Range (ppm)	Optional Range (ppm)
Benzene, Xylene, Naphthalene, etc.	P500	0~100ppm	0~1000, 10000ppm
Halogenated Hydrocarbon, Esters, Thiosulfate Hydrocarbon, Alcohols, etc.	Q500	0~10ppm	0~500, 1000ppm, 0~5mg/m^3
Octane, Ethylene, Cyclohexane, etc.	R500	0~20ppm	0~200, 2000ppm

SPECIFICATION

	Catalytic Combustion	Semiconductor Method	Electrochemical Method	Fluorescent Method	Photo-ion (PID) Method	Infrared Method
Accuracy	±3%	±3%	±2%	±1%	±1%	±2%
Respond Time	T90<20s	T90<30s	T90<20s	T90<10s	T90<20s	T90<30s
Zero Drift	<5%/Month	<2%/year	<5%/Month	<1%/Month	<2%/Year	<1%/Month
Lift of Sensor	>1 year	>2 years	>1 year	>5 years	>5 years	>5 years
Repeatable	±2%					
Operate Temp.	-40 to 150°F (-40 to 65°C)					
Humidity	5%~95%R.H. Non-Condensing					
Housing	316L, or Cast Aluminum, Ex d IIC T4, IP65					
Electrical interface	3/4" NPT					
Power Supply	By GDC, or 12 to 36VDC, 90-260VAC for Integrated style with display, <5W					
Output	4~20mA, Two alarm relay, optional sound and light alarm					
Digital Interface	RS485 Modbus RTU					
Display (Optional)	LED screen, Units: ppm, mg/L, %LEL					

ORDER CODE

SDT Digital Toxic and Combustible Gases Sensor

0 Cl_2 Chlorine
1 ClO_2 Chlorine Dioxide
2 H_2S Hydrogen Sulfide
3 SO_2 Sulfur Dioxide
4 CO Carbon Monoxide
5 NH_3 Ammonia
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Other Gas in the tables above or contact factory

1 Catalytic Combustion
2 Semiconductor Method
3 Electrochemical Method
4 Fluorescent Method
5 Photo-ion (PID) Method
6 Infrared Method
Detail in the tables above or contact factory

- No Display
-D with LED Display

- No Alarm
-AL with sound and light alarm

\- Powered by GDC
-DC 24VDC (12 to 36VDC)
-AC 90 to 240VAC, 50/60Hz

SDT	8	1	00	-D	-AL	-DC

TERMINALS		
GDC-01/02 Terminal Single or dual-channels	**GDC-04/06/08 Controller** Multi-channels up to eight	**GDC-Ex Terminal** Single channel Ex-proof