COSMOS

Gas Detection & Alarm Systems
for Industrial Use
PRODUCT GUIDE

System Configuration

Gas detection & alarm system V3 series are compact systems which can flexibly combine with indicator units, alarm units, and various gas detector heads.

Indicator Unit / Alarm Unit

V3 series

Alarm Unit Indicator Unit

Indicator Unit
V3 type □

	Detection Principle
Hi	Hot wire
Hv	semiconductor
C	Catalytic
Cv	combustion
D	Electrochemical cell
Ti	Thermal
Tv	conductivity
O	Galvanic cell
M	Analog input

Alarm Unit
VAS

The photo shows single case specification.

V series

Alarm Unit Indicator Unit

Indicator Unit
V □-□-□

	Alarm Type
1	1st stage alarm
2	2nd stage alarm

	Single Case
0	Fixed in the standard case
1	For panel instrumentation

	Detection Principle
H	Hot wire semiconductor
C	Catalytic combustion
ZN	Semiconductor for NH_3
D	Electrochemical cell
T	Thermal conductivity
O	Galvanic cell

Alarm Unit
VAL □-□

	Alarm Type
1	1st stage alarm
2	2nd stage alarm

	Single Case
0	Fixed in the standard case
1	For panel instrumentation

The photo shows single case specification.

V2 series

Alarm Unit Indicator Unit

Indicator Unit
V □-□-□

	Alarm Type
1	1st stage alarm
2	2nd stage alarm

	Single Case
0	Fixed in the standard case
1	For panel instrumentation

	Detection Principle
H	Hot wire semiconductor
C	Catalytic combustion
D	Electrochemical cell
T	Thermal conductivity
O	Galvanic cell
M	Analog input

Alarm Unit
VAL □-□

	Alarm Type
1	1st stage alarm
2	2nd stage alarm

	Single Case
0	Fixed in the standard case
1	For panel instrumentation

The photo shows single case specification.

Single Case for Panel Instrumentation

Each single case incorporates an indicator unit or an alarm unit of V3 series (or V/V2 series). The case can be embedded in existing instrumentation panel.

Indicator Unit Single Case

Floor Type

The compact floor type system which panel is equipped with single cases incorporating indicator units and alarm unit.

V-830

Wall Mount Type

The system of wall-mount panel incorporating indicator units and alarm unit of V3 series (or V/V2 series).

V-810 (6-point type)

Indicator Unit Model	Applicable Detector Head			
	Model	Sampling Method	Detection Principle	Target Gas
Combustible gas/ For ppm				
V3 typeHi ※ VH	KD-2A · KD-3A · KD-14	Diffusion/Eductor	 Hot wire semiconductor sensor	 Combustible gas(LPG, CH_4, etc.)
	PD-14 · PE-2CC · PE-2DC	Extractive		
V3 typeHv ※ V2H	KD-5A · KD-5B	Diffusion/Eductor	 Hot wire semiconductor sensor	 Combustible gas(LPG, CH_4, etc.)
	PD-5F · PD-5N · PS-4HP	Extractive		
Combustible gas/ For %LEL				
V3 typeCi ※ VC	KD-2A · KD-3A	Diffusion/Eductor	 Catalytic combustion	 Combustible gas(LPG, CH_4, etc.)
	PD-14 · PE-2CC · PE-2DC	Extractive		
V3 typeCv ※ V2C	KD-5A · KD-5B	Diffusion/Eductor	 Catalytic combustion	 Combustible gas(LPG, CH_4, etc.)
	PD-5F · PD-5N	Extractive		
NH_3				
※VZN	KD-2AS	Diffusion/Eductor	 Semiconductor for NH_3	 NH_3
	PE-2CZ	Extractive		
Toxic gas				
V3 typeD ※ VD V2D	KCM-3A · KD-5D · KS-2D	Diffusion	 Electrochemical cell	 Semiconductor manufacturing gas/ Toxic gas
	PS-2DE	Eductor		
	PS-2DP · PS-2CD · PS-2CK III PS-2DKP · PS-2DPS · PS-4DP	Extractive		
Inert gas/ For vol%				
V3 typeTi ※ VT	KD-2A · KD-3A	Diffusion/Eductor	 Thermal conductivity	 H_2, Helium, Argon, CO_2, CH_4
	PE-2CC · PE-2DC	Diffusion/Eductor		
V3 typeTv ※ V2T	KD-5A · KD-5B	Diffusion/Eductor	 Thermal conductivity	 H_2, Helium, Argon, CO_2, CH_4
	PD-5F · PD-5N	Diffusion/Eductor		
Oxygen				
V3 typeO ※ VO V2O	KS-2O · KD-5O	Diffusion	 Galvanic cell	 O_2
	PS-2OE	Eductor		
	PS-4OP · PS-2OP	Extractive		
For analog output				
V3 typeM ※ V2M	KD-8 · KD-12 series · KS-7 series	Diffusion	For 4-20mA/DC input	
	PD-8F · PD-8N · PS-2 I · PS-6DKP PS-7 series · IRC series PD-12 series	Extractive		

Indicator Unit/ Alarm Unit

Outline

An indicator unit supplies power to the gas detector head and processes the signals from the detector. It displays the gas concentration in 3-color LED bar-graph, it will activate the alarm automatically at alarm set value and transmit the signals to the alarm unit and external output devices (contact output, analog output).

The alarm unit receives the signals (non-contact output) from V3 series indicator unit, displays the alarm (buzzer and lamp), and outputs control contacts to external devices.

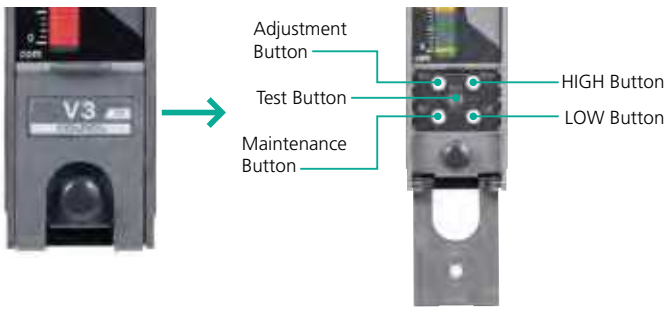
Part Names V3 series

FEATURES

1st Stage Alarm　　2nd-Stage Alarm

The digital bar-graph of indicator unit will inform alarm, along with lamp and buzzer. The color of bar graph will turn orange at 1st stage alarm, and red at 2nd stage alarm.

- Easy to notice the alarm status with 3-color LED display.
- Maintenance Mode which will stop the alarm output to external devices during the maintenance, to allow a maintenance work alone.
- It can be replaced in the existing COSMOS gas detection system due to the failures.
- The cover attachment of PCB makes safe to use.
- The switch cover prevents accidental operation.
- The switch cover for alarm unit can also be selected (option).



V3 Series Specifications
Indicator Unit

Model		V3	
Type		Hv, Hi, Cv, Ci, Tv, Ti, D, O	M
Gas Concentration Display		3-color LED bar graph (50 split)	
Alarm Indication	Power Lamp	Normal: Green POWER lamp lights up, Initial energization: Green POWER lamp flashes for 30s.	
	Alarm Lamp	Red ALARM lamp flashes (lights up on reset)	
	Trouble Lamp	Yellow TROUBLE lamp flashes	
Alarm Set Value		Adjustable within the detection range for 1st and 2nd stage alarm.	
Alarm Accuracy		Combustible gas: Within +/-25% of alarm set value	Depends on the detector head specifications
		Toxic gas: Within +/-30% of alarm set value	
		Oxygen: Within +/-1.0vol% of alarm set value	
Response Time		Combustible gas: Within 30s at 160% concentration of alarm set value	Depends on the detector head specifications
		Toxic gas: Within 60s at 160% concentration of alarm set value	
		Oxygen: Within 5s at 10vol% (oxygen deficiency)	
External Output	Contact Output	1c no-voltage (100V AC/ 1A resistance load, 24V DC, 1A-resistance load), 1a for trouble contact	
	Analog Output	4 - 20mA DC	
Power Source		24V DC +/-10%	
Power Consumption		Approx. 5.0W (excluding power consumption of extractive gas detector)	Approx. 5.0W (excluding power consumption of detector)
Other Functions		Linearization, maintenance mode, zero suppression [Option] Peak hold function, alarm delay, low flow rate alarm function (can be set by connecting detector)	
Operating Temperature		-10 to 40 degrees C, 10 to 90%RH	
Dimensions		W36×H144×D70 mm (excluding protrusions)	
Weight		Approx. 600g (including 450g single case)	

V/ V2 Series Specifications

Model		VH/V2H	VC/V2C	VZN	VD/V2D	VT / V2T	VO/V2O	VM/V2M
Detection Principle		Hot wire Semiconductor	Catalytic Combustion	Semiconductor for NH_3	Electrochemical cell	Thermal Conductivity	Galvanic cell	Analog
Target Gas		Combustible gas	Combustible gas	NH_3	Specialty gases Various toxic gases	H_2, Helium, Argon, CO_2, CH_4 etc.	O_2	4-20mA DC input
Detection Range		Depends on the detector specifications						
Gas Concentration Display		LCD bar graph						
Alarm Set Value		Adjustable within the detection range						
Alarm Accuracy		Combustible gas: Within +/-25% of alarm set value Toxic gas: Within +/-30% of alarm set value Oxygen: Within +/-1.0vol% of alarm set value						–
Response Time		Combustible gas: Within 30s at 160% gas concentration of alarm set value Toxic gas: Within 60s at 160% concentration of alarm set value Oxygen: Within 5s at 10vol% (oxygen deficiency)						–
Alarm Indication	Power Lamp	Normal: Green POWER lamp lights up, Trouble: Off, Initial energization: Green POWER lamp flashes for 30s.						
	Alarm Lamp	Alarm: Red lamp flashes, Lights up by reset, latching type (standard. Non-latching can be specified)						
External Output	Contact Output	1c no-voltage (100V AC/ 1A resistance load), 1a for trouble contact						
	Analog Output	4-20mA (standard), 0-100mV and 1-5V (option *1), Digital Output (option)						
Alarm Delay Circuit		Approx. 30s delay is available (option)						
Operating Temperature		-10 to 40 degrees C						
Power Source		24V DC +/-10%						
Power Consumption		Approx. 5W						
Dimensions		W36× H144×D150 mm						
Weight		Approx. 650g (including 450g single case)						

* The above specifications inlude single case.
* V2 series have additional functions of indicator backlight, maintenance mode as standard.
*1: V2 series are not capable of 0-10mA analog output.

Alarm Unit

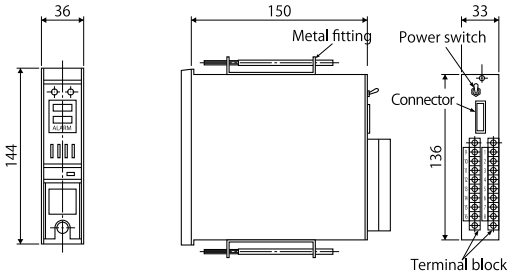
Model		VAS
Number of Alarm Stage		2 stages
Connectable Indicator Unit		V3 series
Power Lamp		Green POWER lamp lights up
Alarm Indication	Alarm Lamp	Red ALARM lamp lights up (normally off)
	Trouble Lamp	Yellow TROUBLE alarm lights up (normally off)
	Buzzer	Alarm: intermittent sound, Trouble: continuous sound (more than 70dB(A)/m)
External Output	Alarm Contact	1c no-voltage for 1st and 2nd stage alarm (100V AC, 1A-resistance load)
	Trouble Contact	1a no-voltage (100V AC/ 1A resistance load, 24V DC, 1A-resistance load)
	Buzzer Contact	1a no-voltage (100V AC/ 1A resistance load, 24V DC, 1A-resistance load)
Power Source		24V DC +/-10%
Power Consumption		Approx. 3.5W (24V for alarm)
Other Functions		Complete lock type (to be specified) With the operation button cover (to be specified)
Operating Temperature		-10 to 40 degrees C, 10 to 90%RH
Dimensions		W36×H144×D70 mm (excluding protrusions)
Weight		Approx. 600g (including 450g single case)

V series

V2 series

For Panel Instrumentation Single Case (V3 series)

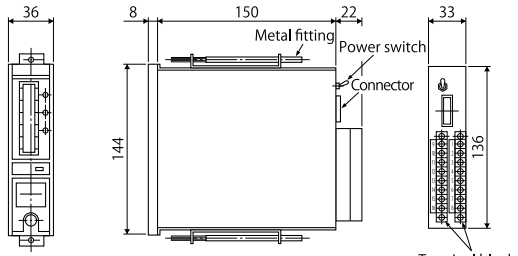
Alarm unit dimensions



Terminal arrangements

1	P	Power source: 24V DC
2	N	
3	TR	Trouble: 1a 1A@100V AC
4	TC	
5	AS	External reset
6		
7	N	
8		
9	ZA2	Alarm 2: 1c no-voltage 1A@100V AC
10	ZC2	
11	ZB2	
12	ZA1	Alarm 1: 1c no-voltage 1A@100V AC
13	ZC1	
14	ZB1	
15	BZ	Buzzer contact: 1a no-voltage 1A@100V AC
16	BC	

Indicator unit dimensions

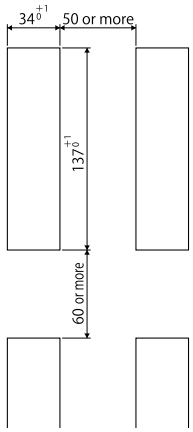


Terminal arrangements

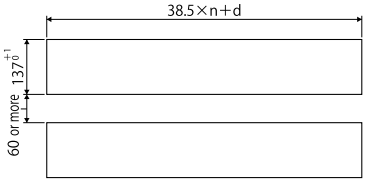
1	P	Power source: 24V DC
2	N	
3	PA	
4	PB	
5	A	Gas detector head
6	B	
7	C	
8	D	
9	ZC	Common
10	ZA2	2nd alarm: 1c
11	ZB2	
12	ZA1	1st alarm: 1c
13	ZB1	
14	TZ	Trouble: 1a
15	G	Analog output
16	H	

Panel cutout dimensions

For one-by-one instrumentation



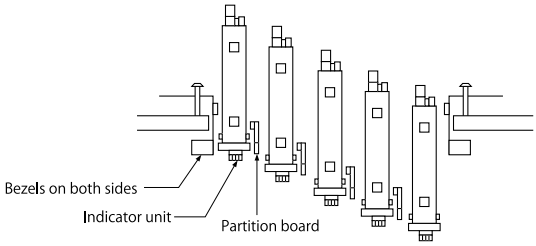
For multi-point close instrumentation



n : Number of units to be mounted
d : Correction value

n	1～10	d	3
n	11～15	d	4
n	16～20	d	5
n	21～25	d	6
n	26～30	d	7

Panel instrumentation of single cases (for close instrumentation)



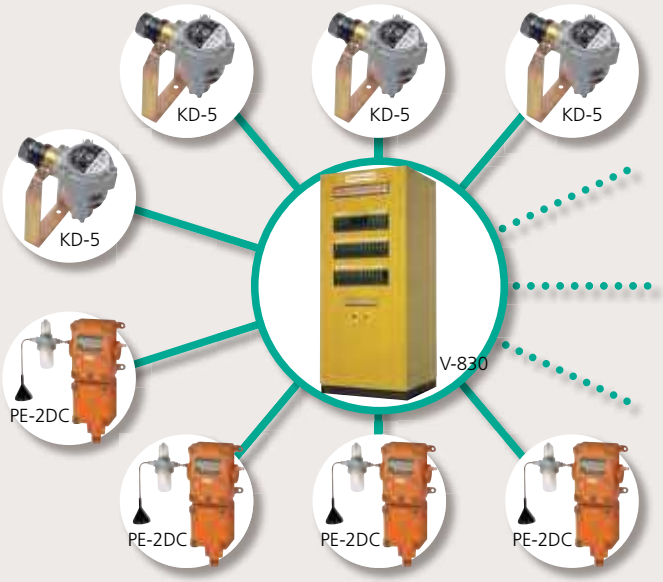
(Front side of a panel)

Floor Type V-830

Outline

V-830 gas detector is a compact floor type system of which panel is equipped with single cases incorporating indicator units and an alarm unit, and is best suited for multi-point monitoring.

Use example



Wall (Panel) Mount Type V-810 VB-810

VB-810 (incorporating a backup power supply unit)

Cases are for 3/6 points.

Outline

- V-810 gas detector is a compact system of wall (panel) mount type which combines indicator units, an alarm unit, and various gas detector heads of the V series.
- Detects combustible gases, toxic/specialty gases, and oxygen (oxygen deficiency) and gives an alarm signal when the gas concentration goes over a set value (or under a set value for oxygen deficiency), so as to prevent gas accidents such as gas explosion, poisoning, and oxygen deficiency.
- VB-810 incorporates a backup power supply unit.

FEATURES

- Compact design.
- Standard cases for 3/6/9/12/15/18/21 points are available.
- Wide variety of input power sources.
- Can be equipped with a Zener barrier.
- 2-stage alarm is also available.
- Combination of the V3 series (or V/V2 series) units allows detection of and alarm for various gases.

Specifications

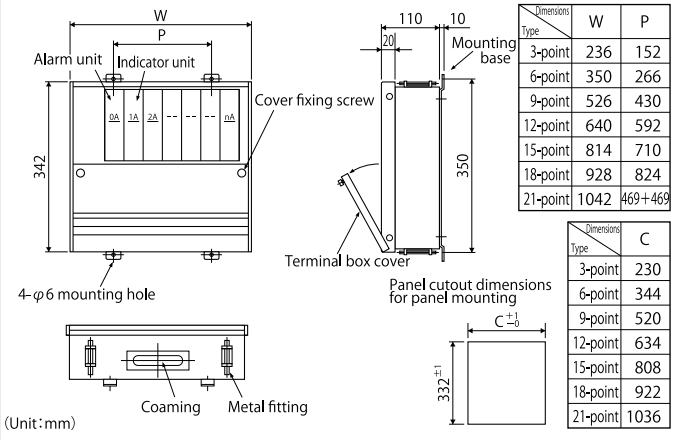
Item \ Model	V-810
Gas Detected and Detection Range	As per specifications
Gas Concentration Indication	Depends on the indicator unit specifications
Alarm Set Value	Adjustable within the detection range
Alarm Accuracy	Combustible gas: +/-25% of an Alarm Set Value Toxic gas: +/-30% of an Alarm Set Value Oxygen: +/-1.0vol% of an Alarm Set Value (Conforms to JIS T 8201)
Alarm Indication	See table below
Contact Output	Indicator unit (individual alarm): 1st stage (1a), 2nd stage (1a), 1A@100V AC (resistance load) Alarm unit (collective alarm): Alarm 1 (1c), Alarm 2 (1c), 1A@100V AC (resistance load), Trouble (1a), Buzzer (1a)
External Output *1	4-20mA, 0-10mV, 1-5V (option), RS-232C output (option)
Operating Temperature Range	-10 degrees C to 40 degrees C
Power Source	100-110V AC+/-10%, 200/220V AC+/-10%, 24V DC+/-10%
Power Consumption	Diffusion type: (25+5n)VA, Extractive type: (25+10n)VA (n is the number of the detection points)
Others	1.Green lamp flashes for 30s upon energization 2.Alarm delay (option) 3.Linearization (option) 4.Low flow alarm (option for V2/V3 series)

	Indicator Unit	Alarm Unit
Gas Leakage Alarm	Alarm lamp (red) flashes* (Lights up after Reset)	Lights up red and buzzer sounds intermittently on alarm from at least one indicator unit (Buzzer stops after Reset)
Trouble Alarm	Power lamp (green) goes out (Non-latching)	Lights up red and buzzer sounds continuously on trouble with at least one indicator unit (Buzzer stops after Reset)

* Latching is standard for the alarm indication of the indicator units and the alarm units. (Non-latching is also available.)

*1 V2 series are not capable of 0-10mV output.

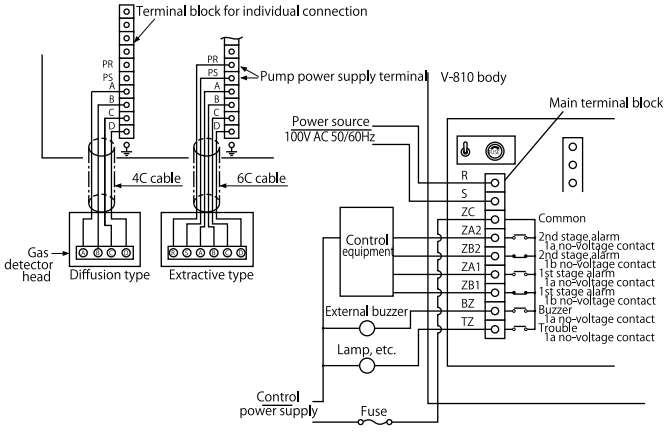
Dimensions (V-810)



Type \ Dimensions	W	P
3-point	236	152
6-point	350	266
9-point	526	430
12-point	640	592
15-point	814	710
18-point	928	824
21-point	1042	469+469

Type \ Dimensions	C
3-point	230
6-point	344
9-point	520
12-point	634
15-point	808
18-point	922
21-point	1036

Terminal Arrangements (V-810)



Gas Detection & Alarm System NV Series

FEATURES

- Monitors gas leakage even during a power failure or other lifeline failures.(on models with a built-in backup power supply)
  Continuously monitors for 30 minutes after a power failure, then intermittently monitors for 2 days. The interval between observations depends on the number of detection points. (NV-500)
  Continuously monitors for 30 minutes after a power failure. (NV-400/410/600HS)
- Operated normally in a seismic qualification test equal to intensity of 7 on the Japanese earthquake scale.
  Earthquake-resistant design considering great earthquakes.
  A plastic molded case which contains the electronic circuit is hard to break and has substantially improved insulation. The case structure has been refined to increase the strength.
- Gas concentration at the time of an alarm is shown at a glance.
  NV-410 shows a scale of 0 to 10. (No unit)
- Battery life can be measured by one-touch operation. (Battery life check function)
- Very easy to change the alarm set value. (▲▼ key)
- NV-500 has extremely easy zero adjustment and span adjustment. (One-touch calibration function)
- Wide operating voltage range of 85-264V.
- NV-500 comes with Zero suppression function.

▲ Indicator unit

▲ Alarm unit

System Configuration

Indicator/Alarm Unit

LP gas detection & alarm system NV-500

Town gas, Industrial gases detection & alarm system
NV-400 NV-410

Combustible gas | Hot wire semiconductor sensor | Catalytic combustion sensor

Gas Detector Heads

Diffusion type

KD-14
(Explosion-proof Ex d IIC T5)

Extractive type

PD-14
(Explosion-proof Ex d IIB+H2T4 T5)

Accessories/Options

Options (sold separately)

KW-41

EB-5
External buzzer

Options (sold separately)

KW-42

EB-5
External buzzer

Options (sold separately)

PW-41

EB-5
External buzzer

Gas Detection & Alarm System NV Series

LP Gas Detection & Alarm System NV-500 Specifications

Combustible gas　Catalytic combustion sensor

Item \ Model		NV-500
Detection Principle		Catalytic combustion
Gas Detected		LPG
Detection Points per Unit		Monitors 2 points per unit
Detection Range		0-100%LEL (isobutane)
Concentration Indicator Alarm Set Value Indication Backlight Peak Hold Function (on alarm)		LCD bar-graph meter (53 dots×2 lines) Direct reading scale Yes Holds a peak value on alarm, which is canceled by the Reset
Alarm Set Value(default value)/Change of the Set Value		24%LEL
Alarm Accuracy		+/-25% of Alarm Set Value (under identical conditions)
Response Time		30s or less at 160% concentration of an Alarm Set Value (excluding sampling delay for extractive type)
Alarm Indication	Individual Alarm Lamp Latching	On alarm: Flashes red, lights up after the Buzzer Stop Complete lock (Turn off by the Reset after the level declined)
Alarm Sound	Standard Operation	On alarm: Intermittent buzzer, stops after the Buzzer Stop
	Voice Alarm	On alarm: Intermittent buzzer
External Alarm Output	Individual Alarm Contact	1a no-voltage (Contact capacity: 2A@100V AC)
	Individual Voltage Output	0-6-12V DC (20mA or less)
	Collective Alarm Contact	1c no-voltage (Contact capacity: 2A@100V AC)
	Centralized Monitor Panel Output	0-6-12V DC (20mA or less)
	External Buzzer Contact	1a no-voltage (Contact capacity: 2A@100V AC)
	External Buzzer Voltage Output	Intermittent voltage signal (12V DC, 10mA or less)
Alarm Delay		Selectable by a DIP switch (10s constant)
Main Power Source		85-264V AC
Power Consumption	When using KD-14	Diffusion type (15+3.5n)VA
	When using PD-14	Extractive type (15+7.5n)VA
Backup Power Source (only on models with a built-in backup power supply)	Battery Type	Sealed lead acid battery
	Overdischarge Prevention Function	Yes
	Battery Life Check Function	Yes
	Battery Voltage Indication	2-digit LED
Exterior Color		Munsell 2.5PB 7.0/1.0

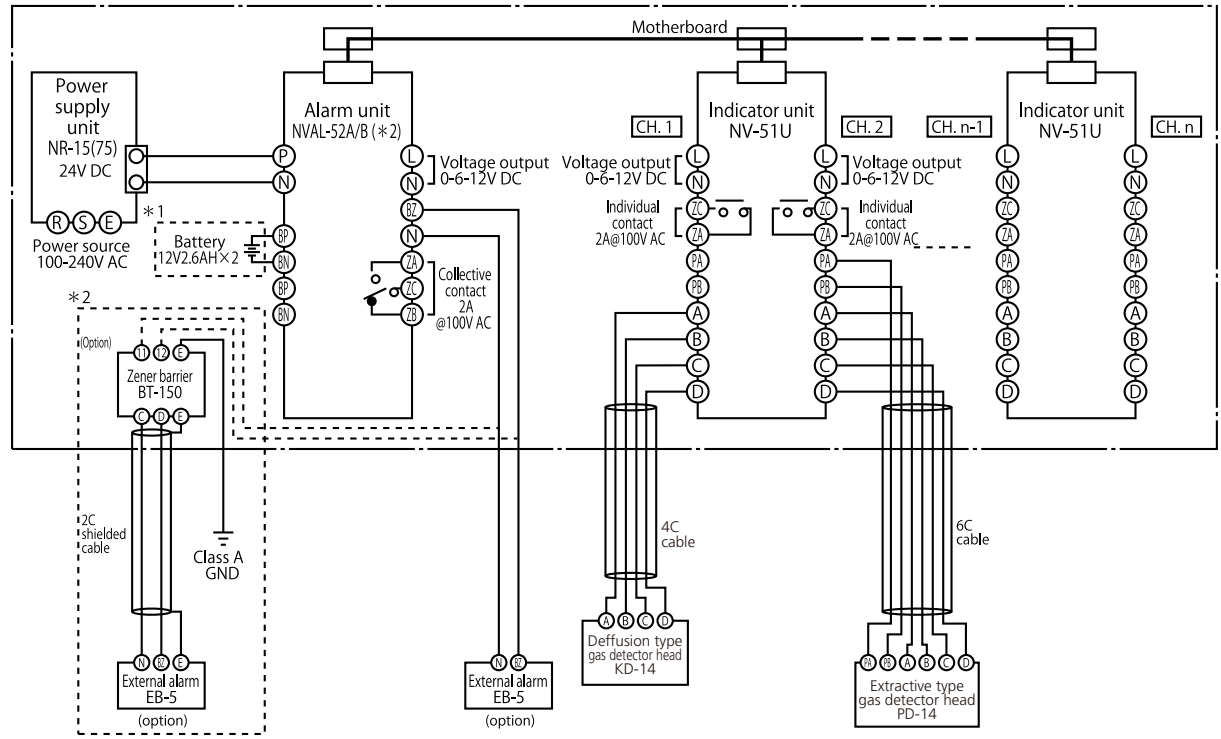
Town gas, Industrial gases Detection & Alarm System NV-400/NV-410 Specifications

Combustible gas　Hot wire semiconductor sensor

Item \ Model		NV-400/NV-410 *1
Detection Principle		Hot wire semiconductor
Gas Detected		NV-400:Town gas (Natural gas) NV-410:Town gas or Industrial gases
Detection Points per Unit		Monitors 2 points per unit
Detection Range		NV-400: 0-100%LEL NV-410: As per specifications
Concentration Indicator Alarm Set Value Indication Backlight Peak Hold Function (on alarm)		LCD bar-graph meter (53 dots×2 lines) Direct reading scale(except NV-410) Yes Holds a peak value on alarm, which is canceled by the Reset
Alarm Set Value (default value)		NV-400: 10%LEL for 1st stage, 24%LEL for 2nd stage NV-410: As per specifications
Alarm Accuracy		+/-25% of an Alarm Set Value (under identical conditions)
Response Time		NV-400/410: 30s or less at 160% concentration of an Alarm Set Value (excluding sampling delay for extractive type)
Alarm Indication	Individual Alarm Lamp Latching	On alarm: Flashes red, lights up after the Buzzer Stop Complete lock (Turn off by the Reset after the level declined)
Alarm Sound		On alarm: Intermittent buzzer, stops after the Buzzer Stop
External Alarm Output	Individual Alarm Contact	1a no-voltage (Contact capacity: 2A@100V AC)
	Individual Voltage Output	0-6-12V DC (20mA or less)
	Collective Alarm Contact	1c no-voltage (Contact capacity: 2A@100V AC)
	Centralized Monitor Panel Output	0-6-12V DC (20mA or less)
	External Buzzer Contact	1a no-voltage (Contact capacity: 2A@100V AC)
	External Buzzer Voltage Output	Intermittent voltage signal (12V DC, 10mA or less)
Alarm Delay		Selectable by a DIP switch (10s constant)
Main Power Source		85-264V AC
Power Consumption	When using KD-14	Diffusion type (15+3.5n)VA
	When using PD-14	Extractive type (15+8n)VA
Backup Power Source (only on models with a built-in backup power supply)	Battery Type	Sealed lead acid battery
	Overdischarge Prevention Function	Yes
	Battery Life Check Function	Yes
	Battery Voltage Indication	2-digit LED
Exterior Color		Munsell 2.5PB 7.0/1.0

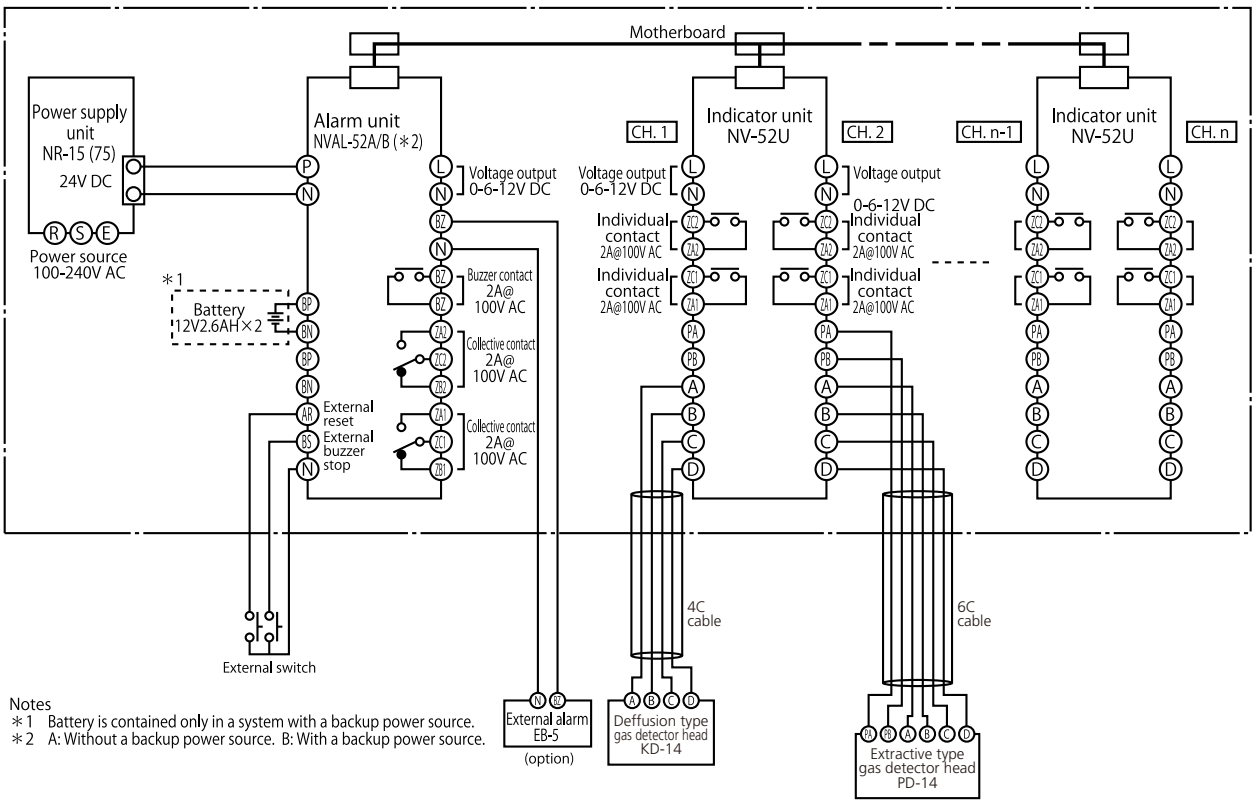
*1 Also usable for other gases.

NV-500 Terminal Arrangements



Notes
*1 Battery is contained only in a system with a backup power source.
*2 For intrinsically safe explosion-proof work.

NV-400 / NV-410 Terminal Arrangements



Notes
*1 Battery is contained only in a system with a backup power source.
*2 A: Without a backup power source. B: With a backup power source.

Gas Detection & Alarm System NV Series

NV-600HS Gas Detection System for Hydrogen Fueling Station

Indication Alarm

In Offices

Indication Alarm NV-600HS

Multi-point type gas detection system to monitor the leakage at hydrogen fueling stations

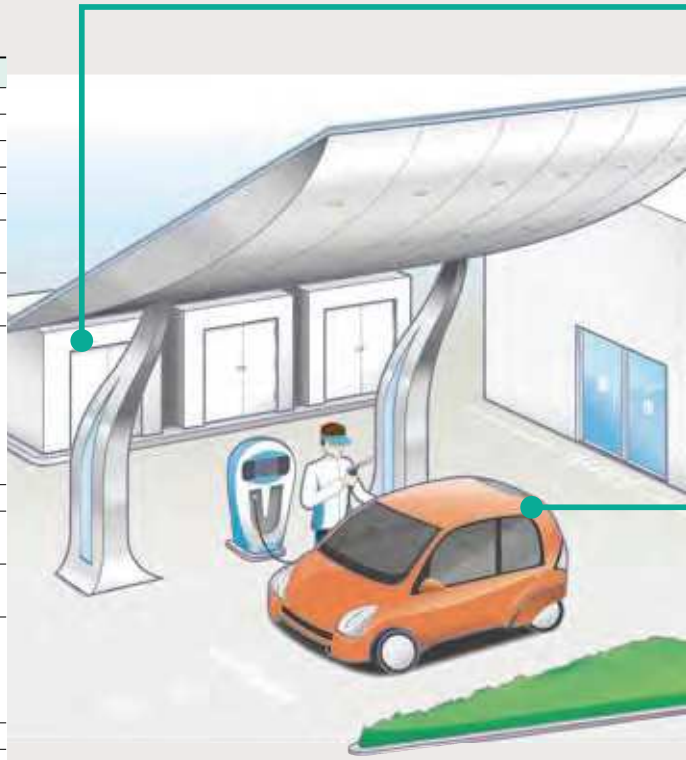
FEATURES

- Displays gas concentration during gas alarm on bar graph.
- Maintains normal operating condition under seismic test.
- Keeps monitoring for over 30 minutes at electric power failure *

* For backup battery specifications.

Specifications of Indication Alarm

Model		NV-600HS
Detection Point		2 points per unit
Detection Range		As per specifications
Indicator		LCD bar graph with backup light
Alarm Set Value		As per specifications
Alarm Accuracy		+/-25% of preset alarm point
Response Time		Within 30 sec using test gas concentration 1.6 times that of preset alarm point
Alarm Indication		1st stage alarm: 1st stage red lamp blinks 2nd stage alarm: 2nd stage red lamp blinks
Alarm Output Terminal	Individual Alarm Contact	1a no-voltage(contact capacity:100VAC, 2A:resistance load)
	Individual Voltage Output	0-6-12V DC within 20mA
	Collective Alarm Contact	1c no-voltage(contact capacity:100VAC, 2A:resistance load)
	Buzzer Contact	1a no-voltage(contact capacity:100VAC, 2A:resistance load)
	External Buzzer Contact	Intermittent voltage signal(12V DC within 10mA)
	Centralized Monitor Output	0-6-12V DC within 20mA
Alarm Delay		Selectable by DIP switch (Standard: 10s)
Power Source		100-240V AC, 50/60Hz (standard) 24V DC (need to be specified)
Power Consumption		Diffusion: (15+3.5n) VA Extractive: 4 VA per 1 set
Backup Power Supply (only built-in backup power type)		Battery type: Sealed lead acid battery Backup Time: 30m within 12-point diffusion type detector Overdischarge Prevention Function Charging Time: Approx. 24-hour
Operating Temperature		0 to 40 degrees C
Body Color		Munsell 2.5PB 7.0/1.0

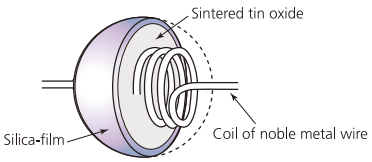


Reasons Why Cosmos Hydrogen Sensor is to be Selected

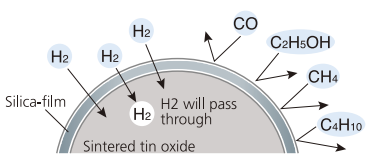
In hydrogen fueling station, it requires detecting hydrogen at very low concentration as less than 1000ppm (0.1%). Therefore the sensor sensitivity must be increased, and it makes sensors to be more susceptible to surrounding gas, thus it requires the performance of detecting only hydrogen selectively. The surface of New Cosmos hydrogen-selective

Hot wire semiconductor sensor (CH-H sensor) is covered by silica-film which has "molecular sieving" function to allow passage of hydrogen, which molecule is smaller than other gas. That makes high selectivity for hydrogen.

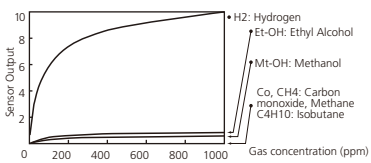
Drawing



Molecular Sieving function



Output Characteristics of CH-H Sensor

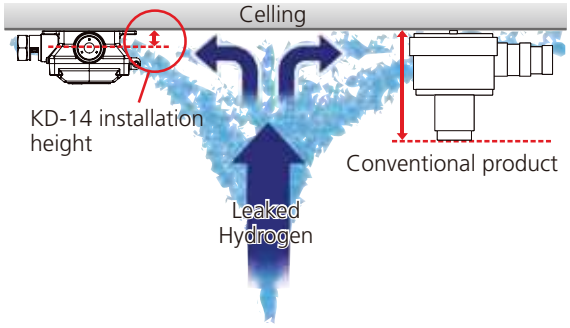


In Building

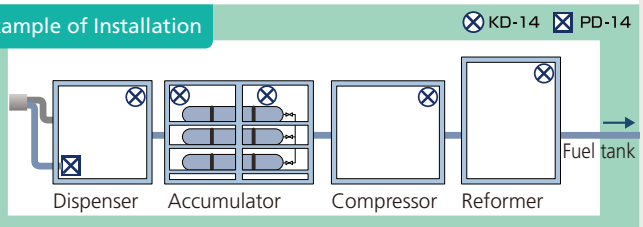
Gas Detector
Diffusion KD-14

Thin and compact designed detector

- Easy to replace unit type gas sensor
- Water and dust proof structure (Degree of Protection: IP65)
- Approvals: Ex d IIC T5
- Early detection of hydrogen leakage near the ceiling is possible with thin design.



Example of Installation

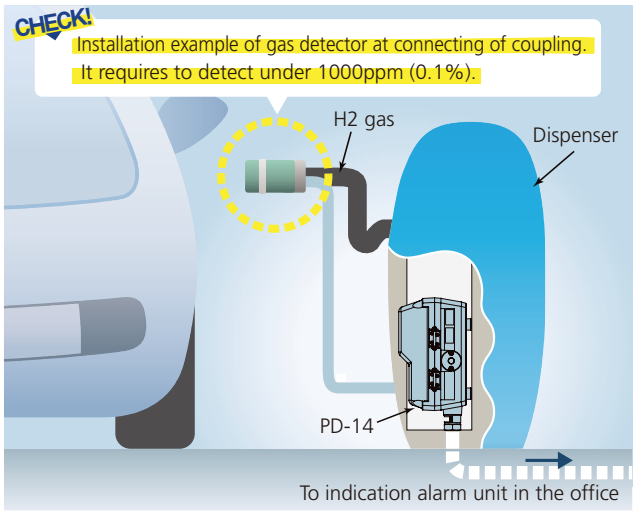


For Coupling

Gas Detector
Extractive PD-14

Hydrogen explosion-proof detector

- Easy to replace unit type gas sensor
- Approvals: Ex d IIB + H2T4
- Water and dust proof structure
- (Degree of Protection: IP65)



Option (Sold Separately)

KW-41

KW-42

PW-41

One-Point Type Gas Detection & Alarm System NV 100 Series

FEATURES

- Full maintenance functions with very easy zero and span adjustment.
- Proven reliability with years of experience - COSMOS gas sensors have a small zero drift, a small sensitivity decrease, and a long life.
- Zero suppression function cancels slight fluctuations of the reading due to environmental change.
- Compact Indicator/Alarm unit - W113×H204×D71.5mm, approx. 1.5kg.
- Battery provides backup power in case of a power failure, allowing continuous monitoring over 60 minutes after the failure. (option)

Type Explanation

NV-100□

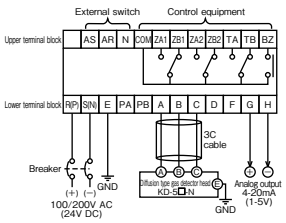
C	For combustible gas
H	For combustible gas (High sensitive)
D	For toxic gas/specialty gas
S	For oxygen
M	For 4-20mA DC input

Indicator/Alarm Unit Specifications

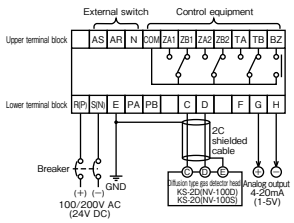
Model	NV-100C	NV-100H	NV-100D	NV-100S	NV-100M
Detection Principle	Catalytic combustion	Hot wire semiconductor	Electrochemical cell	Galvanic cell	Depondson the detector head specifications
Gas Detected	Combustible gas (LPG, Methane, etc.)		Toxic gas/ Specialty gas	Oxygen (deficiency/leakage)	
Detection Range	0-100%LEL	As per specifications	As per specifications	0-25vol% (deficiency) 0-50vol% (leakage)	
Concentration Indicator	LCD bar-graph meter with backlight				
Alarm Accuracy	+/-25% of an Alarm Set Value		+/-30% of an Alarm Set Value	+/-1.0vol% of an Alarm Set Value (Conforms to JIS T 8201)	Depondson the detector head specifications
Operating Temperature Range	0 degrees C to 40 degrees C				
Power Source	100-240V AC, 50/60Hz (standard), 24V DC (option)				
Power Consumption	Diffusion type: 12VA/17VA (with the backup power source)Extractive type: 4VA per unit to be added				7VA/12DA (with the backup power source)
Alarm Indication	1st stage: Red lamp for 1st stage alarm flashing 2nd stage: Red lamps for 1st and 2nd stage alarms flashing				
Trouble Indication	Power source lamp lights up in orange				
External Output	Alarm output terminal: 1st alarm (1c no-voltage contact), 2nd alarm (1c no-voltage contact), Trouble alarm (1c no-voltage contact); Buzzer (1a no-voltage contact); Analog output: 4-20mA; Contact capacity: 2A@100V AC (resistance load)				
Dimensions	Without backup power source: W113×H204×D71.5mm, Approx. 1.5kg With backup power source: W113×H234×D110mm, Approx. 3kg				

Terminal Arrangements

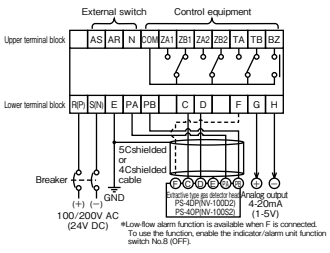
NV-100C/100H (Diffusion type detector head)



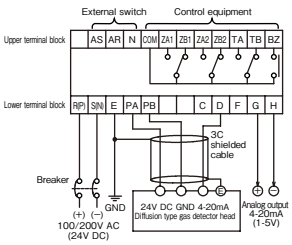
NV-100D/100S (Diffusion type detector head)



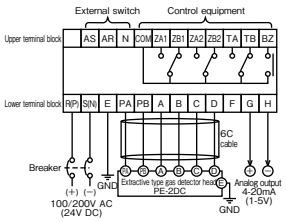
NV-100D/100S(PS-4DP/PS-40P)



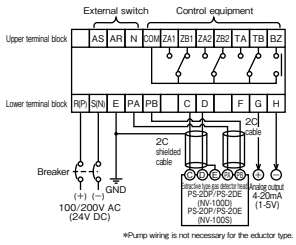
NV-100M (Diffusion type detector head)



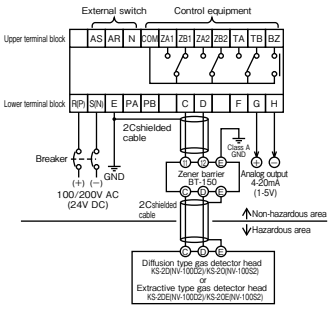
NV-100C/100H(Extractive type detector head)



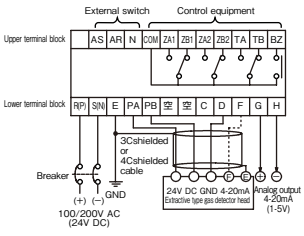
NV-100D/100S(Extractive type detector head)



NV-100D/100S(KS-2D/2DE/KS-20/20E)



NV-100M(Extractive type detector head)



Indicator/Alarm Unit

■For combustible gas
NV-100C

■For combustible gas
(High sensitivity) **NV-100H**

■For toxic gas/ specialty gas
NV-100D

■For oxygen
NV-100S

■For 4-20mA DC input
NV-100M

Gas Detector Head

Model		Sampling Method	Explosion-Proof Structure	Cable	Detection Principle	Gas Detected
	**KD-5A-N**	Diffusion	d3aG4	CVV-3C	Catalytic Combustion Sensor	Combustible Gas
	KD-5B-N		d2G4			
	**PE-2DC**	Extractive	d2G4	CVV-6C	Catalytic Combustion Sensor	Combustible Gas

Model		Sampling Method	Explosion-Proof Structure	Cable	Detection Principle	Gas Detected
	**KD-5A-N**	Diffusion	d3aG4	CVV-3C	Hot Wire Semiconductor Sensor	Combustible Gas
	KD-5B-N		d2G4			
	**PE-2DC**	Extractive	d2G4	CVV-6C	Hot Wire Semiconductor Sensor	Combustible Gas

Model		Sampling Method	Explosion-Proof Structure	Cable	Detection Principle	Gas Detected
	**KS-2D**	Diffusion	i3nG5*	CVVS-2C	Electrochemical Cell Sensor	Toxic Gas/ Specialty Gas
	**PS-2DP** **PS-4DP**	Extractive/ Eductor	——	CVV-2C for Pump CVVS-2C for Signal	Electrochemical Cell Sensor	Toxic Gas/ Specialty Gas
				5C shielded		

* With a Zener barrier

Model		Sampling Method	Explosion-Proof Structure	Cable	Detection Principle	Gas Detected
	**KS-2O**	Diffusion	i3nG5*	CVVS-2C	Galvanic Cell Sensor	Oxygen Concentration
	**PS-20P** **PS-40P**	Extractive/ Eductor	——	CVV-2C for Pump CVVS-2C for Signal	Galvanic Cell Sensor	Oxygen Concentration
				5C shielded		

* With a Zener barrier

NV-100M can connect with various gas detectors and gas alarms.

Connectable Products

• Gas Detector

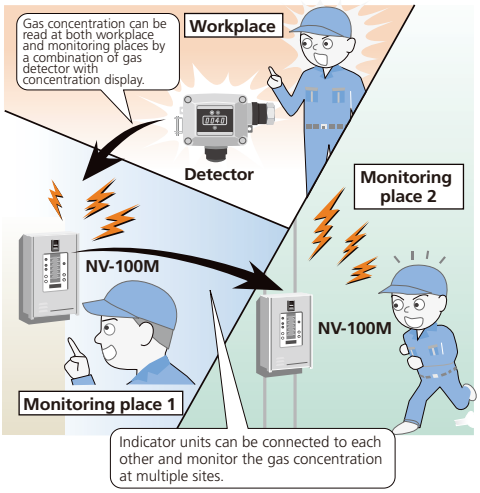
Gas detector with concentration display KD-12 series/ PD-12 series

Gas detector for semiconductor plants PS-7 series

• Gas Alarm

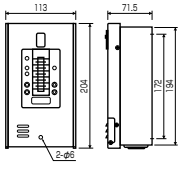
Gas alarm for oxygen KS-6O/ KS-7 series

Example of Use

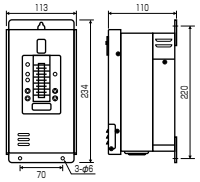


Dimensions (Indicator/Alarm Unit)

• Without backup power

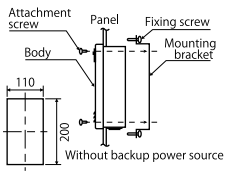


• With backup power



• Panel mount type

Attach fixing bracket to the back side with mounting screw and tighten to the panel with fixing screw. It can be installed to the panel 1.6 to 6 mm thick.



One-Point Type Oxygen Indicator & Alarm KS-7O

FEATURES

- Clear flowing lamp for gas alarm.
- Automatic backup to operate under electric power failure for more than 2 weeks (350hrs).
- Small and lightweight for easy installation.

Applications

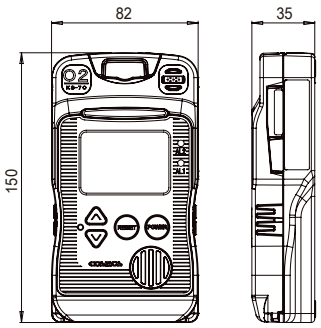
- Clean rooms for semiconductor factory
- Various test rooms

For continuous monitoring of oxygen deficiency, and for the safety under construction.

Specifications

Model	KS-7O
Target Gas	Oxygen
Detection Range	0 - 25.0 vol% or 0 - 50.0 vol%
Concentration Indication	LCD 3-digit digital, 0.1 vol% resolution (with backlight)
Alarm Set Value	For 25.0 vol%: 1st stage 19.0 vol%, 2nd stage 18.0 vol% For 50.0 vol%: 1st stage 18.0 vol%, 2nd stage 25.0 vol%
Alarm Indication	1st stage: Orange LED blinks, flowing Orange status lamp 2nd stage: Red LED blinks, flowing Red status lamp Buzzer: more than 70dB/1m
External Output	Gas concentration analog output: 4-20mA DC Gas alarm contact for 1st and 2nd stage: 1a non-voltage Latching (standard) or non-latching
Other Functions	Maintenance mode, alarm stop
Operating Temperature	-10 to 40 degrees C, 30 to 85% RH
Power Source	24V DC +/-10%
Power Consumption	Monitoring: 1W, During alarm: 3W
Dimensions	W82×H150×D35mm (excluding protrusions)
Weight	Approx. 300g
Options	Separate Sensor Unit KS-7OF, Battery Unit KS-7xB

Dimensions



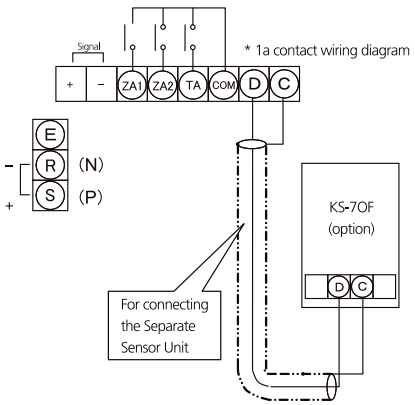
Indicator Unit

Indicator Unit V3 type M

Option

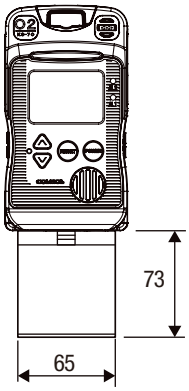
Model	KS-7xB	
Battery Unit	Power Source:	4×AA dry cell battery
	Continuous Use:	Approx. 8800hrs (at 20 degrees C, without alarm, backlight off)
	Dimensions:	W65×H73×D25mm
Model	**KS-7OF**	
Separate Sensor Unit	Extension Cable:	Within 50m of connection cable with KS-7O
	Adaptive Cable:	Single-conductor shielded cable (0.5 to 0.75mm²) Within 6.5mm in diameter, within 50m in length
	Dimensions:	W40×H87×D26mm

Terminal Arrangements

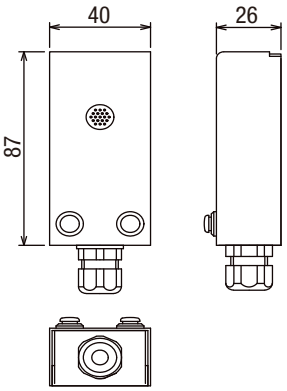


AC 100V	DC 24V		
R	P	+	Power Souce 24V DC
S	N	–	
E	Earth grand		
Signal	+ Analog output		
	– 4-20mA DC		
ZA1	1st alarm contact (non voltage 1a or 1b)		
ZA2	2nd alarm contact (non voltage 1a or 1b)		
TA	Malfanction contact (non voltage 1a or 1b)		
COM	Common		
D	+		Terminals for the
C	– (Sealed)		Separate Sensor Unit

Battery Unit Dimensions



Separate Sensor Unit Dimensions



One-point Type CO indicator & Alarm KS-7D

FEATURES

- lear flowing lamp for gas alarm.
- Automatic backup to operate under electric power failure for more than 2 weeks (350hrs).
- Small and lightweight for easy installation.

Applications

- Offices of iron plants
- Research facilities of universities
- Underground parking lot
- For prevent carbon monoxide poisoning.

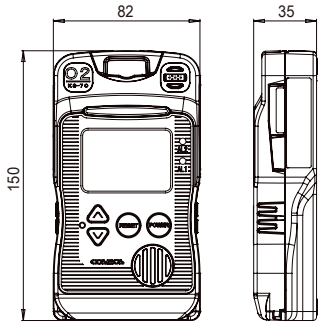
Specifications

Model	KS-7D
Target Gas	Carbon Monoxide
Detection Range	0 - 75ppm, 0 - 150ppm, 0 - 250ppm, or 0 - 400ppm
Concentration Indication	LCD 4-digit digital, 1ppm resolution (with backlight)
Alarm Set Value	For F.S.75ppm: 25/50ppm For F.S. 150ppm: 50/100ppm For F.S. 250ppm: 50/150ppm For F.S. 400ppm: 50/150ppm
Alarm Indication	1st stage: Orange LED blinks, flowing Orange status lamp 2nd stage: Red LED blinks, flowing Red status lamp Buzzer: more than 70dB/1m
External Output	Gas concentration analog output: 4-20mA DC Gas alarm contact for 1st and 2nd stage: 1a non-voltage Latching (standard) or non-latching
Other Functions	Maintenance mode, alarm stop
Operating Temperature	-5 to 40 degrees C, 30 to 85% RH
Power Source	24V DC +/-10%
Power Consumption	Monitoring: 1W, During alarm: 3W
Dimensions	W82×H150×D35mm (excluding protrusions)
Weight	Approx. 300g
Options	Separate Sensor Unit KS-7OF, Battery Unit KS-7xB

Option

Model	KS-7xB	
Battery Unit	Power Source:	4×AA dry cell battery
	Continuous Use:	Approx. 8800hrs (at 20 degrees C, without alarm, backlight off)
	Dimensions:	W65×H73×D25mm

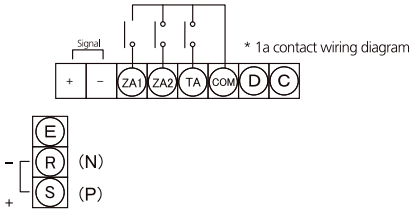
Dimensions



Indicator Unit

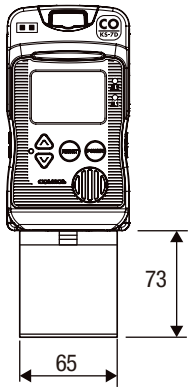
Indicator Unit V3 type M

Terminal Arrangements



AC 100V	DC 24V		
R	P	+	Power Souce 24V DC
S	N	–	
E		Earth grand	
Signal		+	Analog output
		–	4-20mA DC
ZA1		1st alarm contact (non voltage 1a or 1b)	
ZA2		2nd alarm contact (non voltage 1a or 1b)	
TA		Malfanction contact (non voltage 1a or 1b)	
COM		Common	
D		Non - use	
C			

Battery Unit Dimensions



Three-Point Simplified Type Gas Alarm B-770

FEATURES

- Affordable, feature-rich gas detector alarm for industrial use
- Reliable, pre-calibrated smart sensor for immediate installation
- Superior performance, eliminating false alarm
- Selectable gas detector head to match your installation site
- Variety of signals outputs to meet customers needs
- Compact body and simple to operate
- Easy installation and low maintenance
- Built-in self-diagnostic function
- A wide range of options

Specifications

Detected gas	LP gas	Natural gas
No. of connectable detectors	KD-5G, KD-5T, GD-1B	KD-5M
Alarm type	Flashing red lamp (illuminated after alarm shut-off), alarm sound, non-latching (can be set to latching using DIP switch)	
Alarm volume	70 dB/m min.	
Alarm shut-off	By pressing a button	
Malfunction display	Flashing yellow lamp	
Display of alarm unit operation	Illuminated green lamp	
Power source	100V AC to 220V AC, 50/60Hz (Terminal block type)	
Power consumption	Approx. 5W when monitoring (maximum) Approx. 10W during alarm (maximum)	
External output	1) 2-stage voltage (6V DC when monitoring, 12V DC during alarm, 0V during error) 2) 100V AC to 220V AC during alarm, 1A max. output (35-second output delay, can be changed to immediate output with DIP switch) 3) 1a, 1b contacts 220V AC, 1A max, or 24V DC, 1A max (35-second output delay, can be changed to immediate output with DIP switch)	
Operating Temperature Range	-10 degrees C to 40 degrees C	
Dimensions / Weight	W138×H230×D45 mm / Approx. 480 g	
Accessories	Inspection gas, Mounting plate, Wood screws, Crimp terminals, Hex wrench	

Detector head

For storage facilities

Explosion-proof type

KD-5G

For consumption facilities

Weatherproof type

KD-5T/KD-5M

Indoor type

GD-1B

Options

Drip-proof cover for GD-1B (OU-18)

External buzzer EB-8

Rotating beacon light

Specifications

Model	KD-5G	KD-5T	KD-5M	GD-1B
Detection Principle	Catalytic combusion type (energy-saving type)		Hot wire semiconductor type	Catalytic combusion type (energy-saving type)
Gas Detected	LPG		Town gas (Natural gas)	LPG
Gas concentration for alarm	1/100 to 1/4 of LEL (1%LEL to 25%LEL)			
Response time	1 minute max.			30 seconds max.
Power source	24V DC +/-20% (Supplied from the B-770)			
Power consumption	30mA max. @ 24V DC			
Structure	Explosion-proof structure (d2G4)	Weatherproof		Drip-proof
Output signal	2-stage voltage (6V DC when monitoring, 12V DC during alarm, 0V during error)			
Maximum Loop Length	500m max. (CVV 1.25mm^2, 3-conductor cable)			200m max. (using 0.5mm^2, 3-conductor cable)
Operating Temperature Range	-10 degrees C to 60 degrees C		-10 degrees C to 50 degrees C	-10 degrees C to 45 degrees C
Dimensions	W94×H141×D123mm (excluding protrusions)			W43×H116×D37mm (excluding protrusions)
Weight	Approx. 1.5kg			Approx. 220g
Mounting method	Screws			Mounting plate and bands
Accessories	Stand, Rain Cap, Rain cover, Screws, Curled plugs, Crimp terminals			Mounting plate, Wood screws, Bands, Connectors, Curled plugs, Crimp terminals

Wall (Panel) Mount Type Odor Monitor V-819

Detector head

Indicator/Alarm unit
(photo: 3-point type)

* Refer to P.6 (V-810) for dimensions.

FEATURES

- Our original metal oxide odor sensors detect target odors with high sensitivity.
- Achieved continuous monitoring, which was impossible with sensory evaluation or instrumental analysis.
- You can freely create a monitoring system according to the number of detector heads you need.
- Equipped with an external output terminal which allows continuous recording.
- Equipped with a 50-dot bar-graph meter which indicates the odor level in real time.

Applications

- Odor monitoring at site boundaries of various factories
- Indoor environmental monitoring
- Inside-equipment odor monitoring
- Odor control at exhaust ports of various factories
- Performance control of deodorizing equipment and air cleaners

Specifications

Model	V-819 (3-point type to 12-point type)	
Gas Detected	Various fragrance/odor component	Mainly hydrogen sulfide odor
Detection Principle	High sensitive tin oxide hot wire sintered semiconductor sensor	Supersensitive zinc oxide substrate thin film semiconductor sensor
Indicator	LCD bar graph (0-10 scale, no unit, 50 dots) with backlight	
Sampling Method	Diffusion type (Non-explosion-proof)	
Alarm Set Value	Adjustable	
Alarm Indication		Indicator Unit / Alarm Unit
	Odor level alarm*	Alarm lamp (red) flashes (Lights up after Reset) / Lights up red and buzzer sounds intermittently on alarm from at least one indicator unit (Buzzer stops after Reset)
	Trouble alarm*	Power lamp (green) goes out (Non-latching) / Lights up red and buzzer sounds continuously on trouble with at least one indicator unit (Buzzer stops after Reset)
	* Non-latching is standard for the alarm indication of the indicator units and alarm units.	
Contact Output	Indicator unit (individual alarm): Alarm (1a) 1A@100V AC (resistance load) Alarm unit (collective alarm): Alarm (1c) 1A@100V AC (resistance load) Trouble (1a), Buzzer (1a)	
External Output	4-20mA (Input resistance: 500Ω or lower)	
Operating Temperature Range	-10 degrees C to 40 degrees C	
Power Source	110V AC+/-10%, 200/220V AC, 50/60Hz, 24V DC+/-10%	
Power Consumption	(25+5×n)VA (n is the number of the detection points)	
Installation	Wall mount (or Panel mount)	
Applicable Cable	CVVS of 1.25-2.00mm², 3C (Cable resistance: one way resistance of 10Ω or lower)	
Exterior Color	Munsell N8.0 (Indicator/Alarm unit) Munsell N7.0 (Detector head)	
Options	Rainproof cover (KW-14A)	

Abnormal Temperature Detection System Using Odor Sensor CAN-NETSU-KUN

Odor detector

Odor capsules

FEATURES

- An odor detector immediately detects the odor caused by overheated insulating materials.
- An odor capsule senses overheating and emits odor, which is detected by the odor detector.

Specifications

■ Odor detector

Model	ESM-100
Power Source	100-240V AC, 50/60Hz
Power Consumption	3W
Alarm System	Alarm delay system (with 30s timer)
Alarm Indication	Red LED lights up, Buzzer sounds
External Output	No-voltage(1a) contact, Contact capacity: 1A@30V DC or 1A@240V AC
Dimensions/Weight	W96×D96×H41mm/Approx. 150g
Detectable Volume	Approx. 13m³ (with one odor capsule, regardless of whether there's a ventilation fan or not)
Recommended Replacement Period	5 years

■ Odor capsule

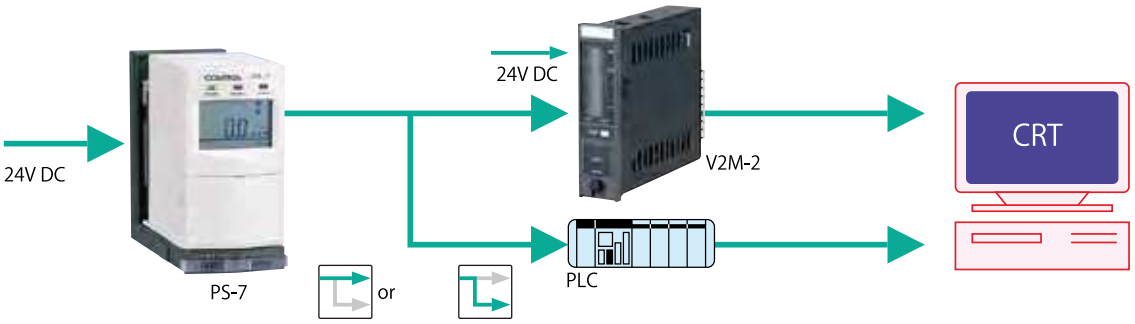
Model	NC-80 (80 degrees C level) green, NC-100 (100 degrees C level) yellow, NC-120 (120 degrees C level) red
Designed Action Temperature	80, 100, 120 degrees C
Dimensions/Weight	φ15×H7mm/Approx. 5g
Recommended Replacement Period	5 years
Setting Method	Double side adhesive tape or exclusive holder
Feature of Odor Liquid	Harmless to humans, no hazard of fire

Out Line

- Detects slight signs of fire immediately.
- Prevents electrical fire from occurring.

COSMOS Gas Detector Head **PS-7**

Analog Transmission Type



FEATURES

1. Sensor units are already calibrated when delivered to the site. Sensor units only need zero check and operation checks after being replaced, and they are ready to monitor gas consentration.
2. Used sensor units are returned when obtaining new ones so they can be recycled.
3. Sensor units and gas flow path can be replaced without tools.
4. All functional parts are in modules for easy replacement.
5. The Cosmos assists in reliable management of the timing for sensor unit and gas flow path replasement.

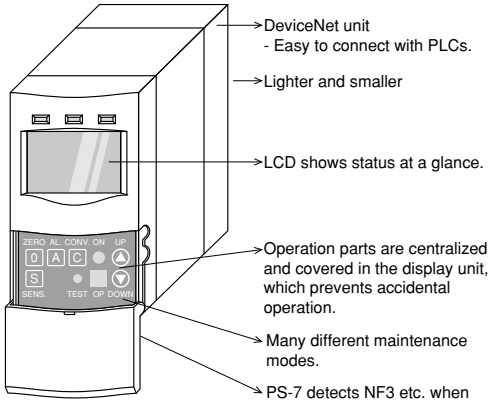
Options

Pyrolyzer

Electrochemical cell sensor detects NF3 etc. when combined with a pyrolyzer.

DeviceNet unit

Using DeviceNet as a protocol to communicate with higher level systems, it is easy to connect with PLCs (when combined with a DeviceNet unit).



Wide Range of CDS-series Sensor Units

New Cosmos tecnology has developed a wide range of sensor units for a variety of semiconductor gases.

Gas	Full Scale	Detection Principle	Model No.
SiH_4	25ppm	Electrochemical	CDS-7
SiH_4	5ppm		
PH_3	1ppm		
B_2H_6	0.5ppm		
AsH_3	0.25ppm		
H_2Se	0.25ppm		
Si_2H_6	25ppm		
SiH_2Cl_2	25ppm		
GeH_4	1ppm		
NH_3	100ppm		
HF	10ppm		
PF_3	10ppm		
HCl	25ppm		

Gas	Full Scale	Detection Principle	Model No.
HCl	5ppm	Electrochemical	CDS-7
HBr	10ppm		
F_2	5ppm		
Cl_2	5ppm		
ClF_3	1ppm		
O_3	1ppm		
CO	250ppm		
H_2S	50ppm		
NF_3	100ppm	Electrochemical with pyrilyzer	CDS-7
CCl_4	100ppm		
H_2	500ppm	Hot wire semiconductor	CHS-7
H_2	1000ppm		
O_2	25vol%	Galvanic cell	COS-7

Contact your representative for gases other than those listed.

Specifications

Model	PS-7	
	Standard Type	**With a Pyrolyzer**
Detection Principle	Electrochemical cell, Hot wire semiconductor, Galvanic cell	Pyrolysis+Electrochemical cell
Sampling Method	Extractive type (Sample flow rate: 0.5L/min, automatic control)	
Sampling Tubing *1	Teflon - External diameter: 6mm, Internal diameter: 4mm, Tubing length: 20m or less	
Gas Concentration Indication	4-digit LCD (with measuring unit), 20-step bar graph	
Alarm Indication	●Gas alarm (1st and 2nd stage) ・Alarm: Red LED lamp flashing LCD - ALARM1 for 1st stage, ALARM1 and ALARM2 for 2nd stage ●Low flow alarm ・Clogging indication: LCD - Flow sign rotates slowly ・Alarm: Yellow LED lamp flashing LCD - FLOW indication, Flow sign stops rotating ●Sensor trouble alarm/Incorrect sensor insertion alarm ・Alarm: Yellow LED lamp flashing LCD - SENS. indication ●Pyrolyzer wire break alarm *2 ・Alarm: Yellow LED lamp flashing LCD - CONV. indication	
External Output	・Gas concentration analog output: 4-20mA DC (shared with the power source negative terminal) ・Gas alarm contact (1st and 2nd stage): 1a no-voltage contact/Non-latching ・Trouble alarm contact (Open collector/Non-latching)	
Applicable Cable	3C or 4C shielded control cable (φ8-11mm)×2	
Operating Temperature/Humidity Range	0 degrees C to 40 degrees C (No sudden change), 30-85%RH (No condensation)	
Power Source	24V DC+/-10%	
Power Consumption	Approx. 7W	
Dimensions	W62×H124×D143mm (excluding options and protrusions)	
Weight	Approx. 1.0kg	
Installation	Wall mount	

*1 Teflon is recommended. But it depends on operating conditions when the gas adsorption capacity is high, so contact us for more information. The specifications above are subject to change without prior notice.
*2 Only for the model with a pyrolyzer.

Desktop Type Gas Detection **PGD-120**

1. Pull back the detector

2. Insert the sensor

3. Turn ON the power

FEATURES

- Easy to monitor over 20 gases simply by changing a plug and play sensor.
- Maintenance free
- Portable and flexible
- NF_3 monitoring is available. (model specify)

Specifications

Model	PGD-120	
Detection principle	Electrochemical, Hot wire semiconductor, Galvanic cell	
Sampling method	Extractive type	
Detection range	As per specifications	
Gas concentration display	4-digit digital LCD display (incl. units) 20-segment bar graph	
Alarm set point	2 stage alarm type (adjustable)	
Alarm display	Alarm lamp, Buzzer (no buzzer selectable)	
External output	Analog	4-20mA
	Alarm 1	1c voltage contact
	Alarm 2	1c voltage contact
	Trouble alarm	1c voltage contact
Contact capacity	125V AC, under 5A	
Power supply	100V AC to 220V AC	
Dimensions	W164×H210×D220mm	
Weight	Approx. 5kg	
Options	Battery, Pyrolyzer for NF3	

Diffusion Type with LED Concentration Display KD-12

ATEX CE Ex KC PESO

FEATURES

- Simpler, smarter and reliable gas detector with digital display
- Simple and cost effective installation
- Rugged, compact and lightweight design
- Environmental friendly product
- NDIR (non-dispersive infrared sensor) mounted type
- Approvals:
  - Ex d IIC T5 (KD-12A/B/C)
  - Ex d IIB T5 (KD-12D/R/O)
  - ATEX standard (KD-12A/B/C/D/O/R)
  - CE Marking (EMC Directive)
  - SIL2 (KD-12B)

Specifications

Model	KD-12A	KD-12B	KD-12C	KD-12R	KD-12D		KD-12O
Detection Principle	Hot wire semiconductor	Catalytic combustion	Thermal conductivity	Non-dispersive infrared	Electrochemical cell		Galvanic cel
Target Gas	Combustible / Toxic gas		Hydrogen, Helium, Carbon dioxide	Methane, Carbon dioxide	Carbon monoxide	Hydrogen sulfide	Oxygen
Sampling Method	Diffusion type						
Detection Range	As per specifications				0-100ppm, 0-150ppm, or 0-250ppm*1	0-30ppm or 0-50ppm*1	0-25.0vol%
Alarm Set Value	As per specifications				FS100ppm: 25ppm (recommendation) FS150/250ppm: 50ppm (recommendation)	10ppm	18.0vol%
Alarm Accuracy	Combustible gas: +/-25% of alarm set value Toxic gas: +/-30% of alarm set value			+/-25% of alarm set value	+/-30% of alarm set value		+/-1.0vol% of alarm set value
AResponse Time	Combustible gas: within 30s at 1.6 times of alarm set value. Toxic gas: within 60s at 1.6 times of alarm set value			Within 30s at 1.6 times of alarm set value	Within 60s at 1.6 times of alarm set value		Within 5s to reach 18vol% under condition of 10vol%*2
Warning Display	Gas alarm: Red LED lamp flashes Trouble alarm: Yellow LED lamp flashes (sensor trouble, power voltage malfunction, etc.)						
Display	Four-digit digital LED display						
Operation	At 4 points of magnetic switches						
Approvals	Ex d IIC T5 (ATEX)			Ex d IIB T5			
Degree of Protection	IP65						
CE marked	Complied with CE Directive 2004/108/EC						
Applicable Cable	Cable out diameter: 10 to 13 mm 5-conductor cable*3: CVV-S 1.25mm², 3-conductor cable: CVV-S 2mm² or 1.25mm²						
Operating Temperature and Humidity*4	Temperature: -10 to 50°C Humidity: 10 to 90%RH (0 to 50°C)				Temperature: -10 to 40°C Humidity: 30 to 85%RH		Temp: 0 to 40°C Hum: 30 to 85%RH
Power Supply	24V DC (18 to 30V DC)						
Power Consumption	3W max.			2.2W max.	1.2W max.		
Dimensions	W158 ×H116×D68mm (excl. protrusion)			W158×H120×D68mm (excl. protrusion)			
Weight	Approx. 1.2kg			Approx. 1.3kg			

*1 Specify when purchasing. *2 Under the condition of 20+/-2 degrees C. *3 Screwless type only. *4 No radical temperature or humidity changes and no condensing.

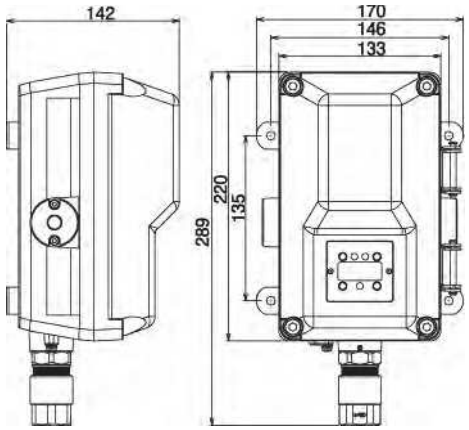
Extractive Type with LED Concentration Display PD-12

ATEX CE Ex KC PESO

FEATURES

- Small and lightweight with concentration and alarm display.
- Extractive type with hydrogen explosion proof.
- Detecting decreased flow rate function except PD-12C (option).
- Environmentally friendly product.
- Approvals:
- ATEX
  Ex d IIB + H2T4X
  CE Marking (EMC Directive)

External Dimensions (mm)



Specifications

Model	PD-12A	PD-12B	PD-12C
Detection Principle	Hot wire semiconductor	Catalytic combustion	Thermal conductivity
Target Gas	As per specifications		
Sampling Method	As per specifications		
Suction Flow	Over 0.5L/min		
Detection Range	As per specifications		
Alarm Set Value	As per specifications		
Alarm Accuracy	Combustible gas: ±25% of alarm set value under identical conditions Toxic gas: ±30% of alarm set value under identical conditions		
Alarm Delay	Combustible gas: Within 30 seconds with 1.6 times of alarm set concentration Toxic gas: Within 60 seconds with 1.6 times of alarm set concentration		
Warning Display	Gas alarm: Red LED lamp flashes Trouble alarm: Yellow LED lamp flashes (sensor disconnection, sensor zero drop, power supply voltage error, etc.)		
Display	Four-digit digital LED display		
Operation	At 4 points of magnetic switches		
Approvals	Ex d IIB + H2 T4X		
Degree of Protection	IP65		
Applicable Cable	Cable outer diameter: 10.5 to 14.5mm 6-conductor shielded cable: CVV-S 1.25mm^2 or 2.0mm^2		
Operating Temperature and Humidity	Temperature: -10 to 50°C Humidity: 10 to 90%RH (0 to 50°C) No radical temperature or humidity changes and no condensation		
Power Supply	24V DC (18 to 30V DC)		
Power Consumption	7.5W max.		
Dimensions	W133×H260×D132mm (excluding protrusion)		
Weight	Approx. 5.2kg		

Diffusion Type KD-14

FEATURES

- Compact designed diffusion type gas detector
- Easy to replace unit type sensor
- Water and dust-proof construction (Degree of protection: IP65)
- Approvals: Ex d IIC T5

Specifications

Model	KD-14A	KD-14B
Sampling Method	Diffusion type	
Detection Principle	Hot wire semiconductor	Catalytic combustion
Target Gas	Hydrogen	
Detection Range	0-2000ppm	0-100%LEL
Explosion-proof	Ex d IIC T5	
Degree of Protection	IP65	
Applicable Cable	Cable diameter: 10-13mm 4-core shield cable: CVV-S 0.75mm^2, 1.25mm^2 or 2.0mm^2	
Operating Temperature and Humidity	Temperature: -10 to 50 degrees C Humidity: 10 to 90%RH (0-50 degrees C)	
Power supply	Supplied by indicator unit	
Dimensions	W158×H158×D68mm	
Weight	Approx. 1.2kg	

Extractive Type PD-14

FEATURES

- Hydrogen explosion-proof extractive gas detector
- Easy to replace unit type sensor
- Water and dust-proof construction (Degree of protection: IP65)
- Approvals: Ex d IIB + H2T4

Specifications

Model	PD-14A-D	PD-14B-D
Sampling Method	Extractive type	
Detection Principle	Hot wire semiconductor	Catalytic combustion
Target Gas	Hydrogen	
Detection Range	0-2000ppm	0-100%LEL
Explosion-proof	Ex d IIB + H2T4	
Degree of Protection	IP65	
Applicable Cable	Cable diameter: 10-14.5mm 6-core shield cable: CVV-S 0.75mm^2, 1.25mm^2 or 2.0mm^2	
Operating Temperature and Humidity	Temperature: -10 to 50 degrees C Humidity: 10 to 90%RH (0-50 degrees C)	
Power supply	Supplied by indicator unit	
Pump power source	24V DC +/-10%	
Dimensions	W133×H260×D132mm	
Weight	Approx. 5.2kg	

Diffusion Type - for Combustible Gas

KD-2A • KD-3A

Combustible gas | Hot wire semiconductor sensor | Catalytic combustion sensor | Thermal conductivity sensor

Model	KD-2A	KD-3A
Detection Principle	Hot wire semiconductor, Catalytic combustion, or Thermal conductivity	
Gas Detected	Combustible gas	
Detection Range	As per specifications	
Power Source for Sensor	Supplied from the indicator unit	
Maximum Loop Length	1km (with 2mm² cable)	
Sampling Method	Diffusion type	
Explosion-Proof Structure	d2G4	d3aG4/d3cG4
Operating Temperature Range	-10 degrees C to 40 degrees C	
Applicable Cable	4C	
Dimensions	W144×H180×D100mm	
Weight	Approx. 1.2kg	

Diffusion Type - for Combustible Gas

KD-5A • KD-5B

Combustible gas | Hot wire semiconductor sensor | Catalytic combustion sensor | Thermal conductivity sensor

Model	KD-5A	KD-5B
Detection Principle	Hot wire semiconductor, Catalytic combustion, or Thermal conductivity	
Gas Detected	Combustible gas	
Detection Range	As per specifications	
Power Source for Sensor	Supplied from the indicator unit	
Maximum Loop Length	1km (with 2mm² cable)	
Sampling Method	Diffusion type	
Explosion-Proof Structure	d3aG4	d2G4
Operating Temperature Range	-10 degrees C to 60 degrees C	
Applicable Cable	3C shielded	
Dimensions	W141×H192×D94mm	
Weight	Approx. 1kg	

Diffusion Type - for Toxic Gas/Oxygen

KS-2D • KS-2O

Toxic gas | Oxygen concentration | Electrochemical cell sensor | Galvanic cell sensor

Model	KS-2D	KS-2O
Detection Principle	Electrochemical cell	Galvanic cell
Gas Detected	Toxic gas	Oxygen
Detection Range	As per specifications	
Power Source for Sensor	Supplied from the indicator unit	
Maximum Loop Length	1km (500m when using a Zener barrier; with 2mm² cable)	
Sampling Method	Diffusion type	
Explosion-Proof Structure	Intrinsically safe explosion-proof 3nG5 when combined with a Zener barrier	
Operating Temperature Range	0 degrees C to 40 degrees C	
Applicable Cable	2C shielded	
Dimensions	W102×H200×D75mm(excluding protrusions)	
Weight	Approx. 1.5kg	

Diffusion Type - for Toxic Gas

KD-2AS-NH3

Toxic gas | Semiconductor sensor

Model	KD-2AS-NH3
Detection Principle	Semiconductor
Gas Detected	NH3
Detection Range	As per specifications
Power Source for Sensor	Supplied from the indicator unit
Maximum Loop Length	1km (with 2mm² cable)
Sampling Method	Diffusion type
Explosion-Proof Structure	d2G4
Operating Temperature Range	-10 degrees C to 40 degrees C
Applicable Cable	4C shielded
Dimensions	W144×H180×D100mm
Weight	Approx. 1.2kg

Diffusion Type - for Toxic Gas

KCM-3A

Toxic gas | Electrolysis sensor with gel electrolyte

Model	KCM-3A
Detection Principle	Electrolysis sensor with gel electrolyte
Gas Detected	$COCl_2$, HCN, others
Detection Range	As per specifications
Power Source for Sensor	Supplied from the indicator unit
Maximum Loop Length	1km (500m when using a Zener barrier; with 2mm² cable)
Sampling Method	Diffusion type
Explosion-Proof Structure	Intrinsically safe explosion-proof 3nG5 when combined with a Zener barrier
Operating Temperature Range	0 degrees C to 40 degrees C
Applicable Cable	2C shielded
Dimensions	W152×H190×D120mm
Weight	Approx. 1.3kg

Extractive Type - for Combustible Gas

PE-2CC•PE-2DC

Combustible gas | Hot wire semiconductor sensor | Catalytic combustion sensor | Thermal conductivity sensor

Model	PE-2CC	PE-2DC
Detection Principle	Hot wire semiconductor, Catalytic combustion, or Thermal conductivity	
Gas Detected	Combustible gas	
Detection Range	As per specifications	
Power Source for Sensor	Supplied from the indicator unit	
Power Source for Pump	100V AC+/-10%	24V DC+/-10%
Maximum Loop Length	1km (with 2mm^2 cable)	
Sampling Method	Extractive	
Explosion-Proof Structure	d2G4	
Operating Temperature Range	-10 degrees C to 40 degrees C	
Applicable Cable	6C	
Dimensions	W122xH390xD96mm(excluding accessories)	
Weight	Approx. 6.2kg	

Extractive Type - for Toxic Gas

PE-2CZ-NH$_3$•PE-2DZ-NH$_3$

Toxic gas | semiconductor sensor

Model	PE-2CZ-NH$_3$	PE-2DZ-NH$_3$
Detection Principle	Semiconductor	
Gas Detected	NH$_3$	
Detection Range	As per specifications	
Power Source for Sensor	Supplied from the indicator unit	
Power Source for Pump	100V AC+/-10%	24V DC+/-10%
Maximum Loop Length	1km (with 2mm^2 cable)	
Sampling Method	Extractive	
Explosion-Proof Structure	d2G4	
Operating Temperature Range	-10 degrees C to 40 degrees C	
Applicable Cable	6C	
Dimensions	W122xH390xD96mm(excluding accessories)	
Weight	Approx. 6.2kg	

Extractive Type - for Oxygen

PS-2OP•PS-2OE

Oxygen concentration | Galvanic cell sensor

Model	PS-2OP	PS-2OE
Detection Principle	Galvanic cell	
Gas Detected	Oxygen	
Detection Range	As per specifications	
Power Source for Sensor	Supplied from the indicator unit	
Power Source for Pump	100V AC+/-10% or 24V DC+/-10%	
Air Supply		Instrumentation air 0.3-0.7MPa
Maximum Loop Length	1km (with 2mm^2 cable)	1km (500m when using a Zener barrier; with 2mm^2 cable)
Sampling Method	Extractive	Eductor
Explosion-Proof Structure	Non-explosion-proof	Intrinsically safe explosion-proof 3nG5 when combined with a Zener barrier
Operating Temperature Range	0 degrees C to 40 degrees C	
Applicable Cable	2C+2C shielded	2C shielded
Dimensions	W300xH350xD100mm(excluding protrusions)	
Weight	Approx. 5.6kg	

Extractive Type - for Toxic Gas

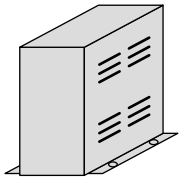
PS-2CK III

Toxic gas

Model	PS-2CK III
Detection Principle	Pyrolysis ionization
Gas Detected	TEOS and other alkoxide vapors
Detection Range	As per specifications
Power Source for Sensor	Supplied from the indicator unit
Power Source for Pump	100V AC+/-10%
Maximum Loop Length	1km (with 2mm^2 cable)
Sampling Method	Extractive
Explosion-Proof Structure	Non-explosion-proof
Operating Temperature Range	0 degrees C to 40 degrees C
Applicable Cable	2C+4C shielded
Dimensions	W300xH350xD100mm(excluding protrusions)
Weight	Approx. 9.3kg

Rainproof Covers etc.

External View

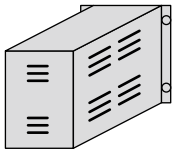


*1

Floor mount

Model	KW-11
Applicable detector head	KD-2A(S), KD-3A(S)
Dimensions	W110×H197×D170mm

External View

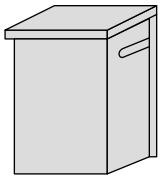


*1

Wall mount (2B stanchion)

Model	KW-12(U)
Applicable detector head	KD-2A(S), KD-3A(S)
Dimensions	W110×H170×D197mm

External View

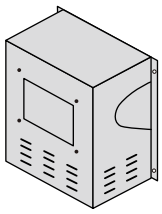


*1

Wall mount (2B stanchion)

Model	PW-51(U)
Applicable detector head	PE-2CC, CZ, DC, DZ
Dimensions	W228×H434×D155mm

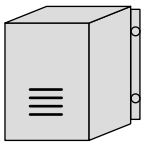
External View



*2

Model	KW-42
Applicable detector head	KD-12, 14
Dimensions	W142×H171×D92mm

External View

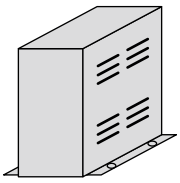


*1

Wall mount (2B stanchion)

Model	KW-31(U)
Applicable detector head	KS-2D, KS-2O
Dimensions	W140×H300×D120mm

External View

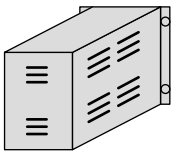


*1

Floor mount

Model	KW-51
Applicable detector head	KD-5A, 5B
Dimensions	W110×H197×D170mm

External View

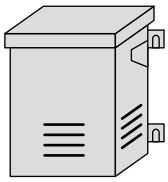


*1

Wall mount (2B stanchion)

Model	KW-52(U)
Applicable detector head	KD-5A, 5B
Dimensions	W110×H170×D197mm

External View

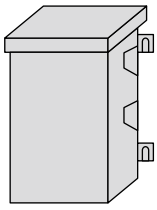


*1

Wall mount (2B stanchion)

Model	KW-81(U)
Applicable detector head	KBL-8, KD-8
Dimensions	W260×H370×D220mm

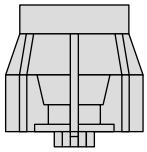
External View



*1

Model	KW-82(U)
Applicable detector head	KBL-8C
Dimensions	W260×H486×D220mm

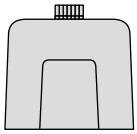
External View



*1

Model	KW-22
Applicable detector head	KD-2A(S), KD-3A(S), KD-5
Dimensions	ϕ64×H65mm

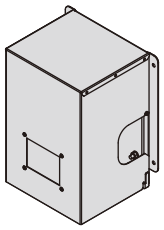
External View



*1

Model	KW-15
Applicable detector head	KD-5
Dimensions	ϕ97×H93mm

External View



*2

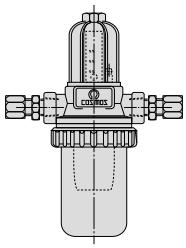
Model	PW-41
Applicable detector head	PD-12, 14
Dimensions	W183×H279×D168mm

*1 Consult us for the material (SPCC or SUS). *2 Material (SUS).

Sampling Unit Parts

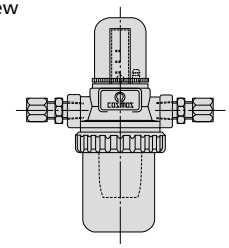
■Flow Checkers

External View



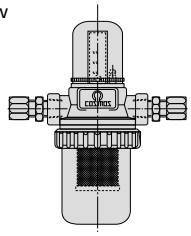
Model	FC-32A
Cup Material	Acrylic
Filter Materia	Double layer filter
Dimensions	W68×H155mm

External View



Model	FC-32B
Cup Material	Pyrex
Filter Material	Double layer filter
Dimensions	W68×H140mm

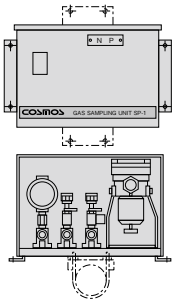
External View



Model	FC-32C
Cup Material	Pyrex
Filter Materia	SUS
Dimensions	W68×H140mm

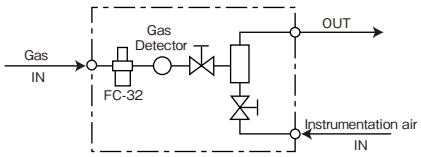
■Sampling panel (Gas Sampling Units)

External View

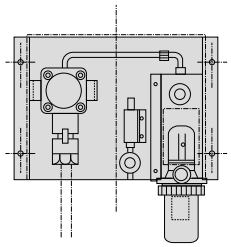


Model	Eductor type (SP-1)
Installation	Wall mount/2B hole
Dimensions	W280×H200×D200mm (Excluding protrusions)

Sampling flow example

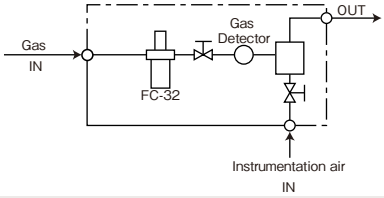


External View

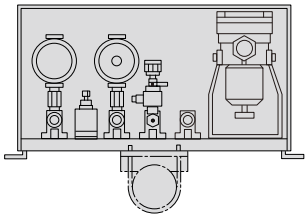


Model	Eductor type (P-4382)
Installation	Wall mount/2B hole
Dimensions	W240×H200×D200mm (Excluding protrusions)

Sampling flow example

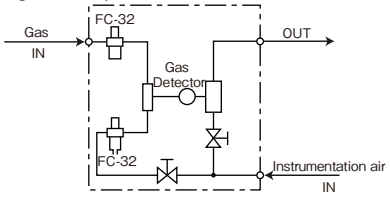


External View



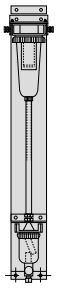
Model	Eductor type(Air mixing)
Installation	Wall mount/2B hole
Dimensions	W360×H200×D200mm (Excluding protrusions)

Sampling flow example



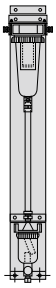
■Auto-Drain Filters

External View



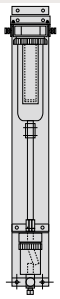
Model	AD-40
Use	Removes moisture from a sampling gas to reduce its influence on a detector head.
Dimensions	W90×H700×D105mm

External View



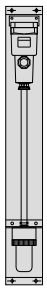
Model	AD-40G
Use	Useful when a target gas is an organic solvent etc.
Dimensions	W90×H700×D105mm

External View



Model	AM-15-10
Use	Removes dust and mist from sampling gas.
Dimensions	W90×H920×D195mm

External View



Model	AM-150-10
Use	Removes dust and mist from sampling gas.
Dimensions	W90×H700×D90mm

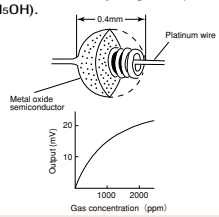
COSMOS Gas Sensors

Hot Wire Semiconductor Sensor (CH)

Detects resistance change across both edges of platinum wire as a result of variation in thermal and electrical conductivity due to a gas absorbed on the surface of a semiconductor.

■Features

①Sensitive and large variation in output at low gas concentration.
②Less initial stabilization time, more compact, more energy saving as compared with a semiconductor sensor.
③Long service life, high stability, and high durability.
④Selective sensitivity to gases (H_2, CH_4, C_2H_5OH).

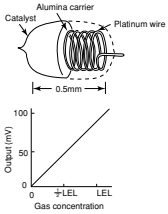


Catalytic Combustion Sensor (CS)

Detects the temperature rise (change in resistance) of the platinum coil by oxidizing a gas in contact with the surface of a catalyst.

■Features

①Output - gas concentration is linear to LEL.
②High accuracy, superior repeatability.
③Immune to surrounding temperature and humidity.
④Power saving type (CSS) consumes only 1/4 of our conventional contact combustion sensor.

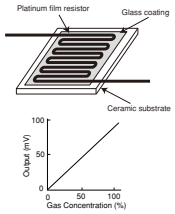


Thermal Conductivity Sensor (CT)

Detects temperature variation of the heat source (platinum coil) by the gas heat conduction differential.

■Features

①Output - gas concentration is linear up to 100vol%, suitable for high concentration gas measurements.
②Employment of thermal conductivity, a physical property of a gas, makes measurement free from catalyst deterioration or poison, and ensures economy.
③O_2 not required.

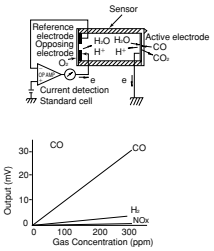


Electrochemical cell Sensor (COS)

Detects gas concentrations through electrolytic current which results from gas electrolysis.

■Features

①Extremely sensitive - 1ppm of CO detectable.
②Selective sensitivity to gases, most suited to detection of toxic gas.
③Superior linearity at low concentration, suitable to analytical applications.
④High immunity to interfering gas.

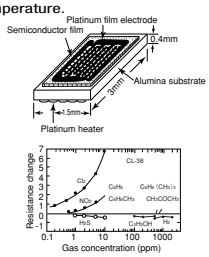


Thin Film Semiconductor Sensor (AET)

Detects electric conductivity variation due to a gas absorbed on a thin film semiconductor having the thickness of 100nm.

■Features

①More sensitive than the semiconductor sensor.
②Selective to gases (Cl_2, H_2S, EO, etc.)
③Self-cleaning effect on the surface ensuring high repeatability and long-term stability due to high working temperature.

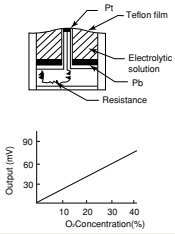


Galvanic Cell Sensor (OS)

Detects reactive current resulting from using oxygen as an active material for the battery cell which consists of electrodes Pt-Pb, diaphragm, and electrolytic solution.

■Features

①Requires no external power supply.
②Easy to use, inexpensive, wide marketability.
③Output is proportional to oxygen concentration linear up to 40vol%.

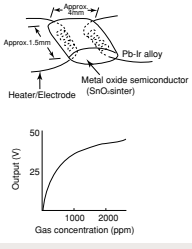


Semiconductor Sensor (CZ)

Detects variation in electric conductivity caused by a gas absorbed on the surface of a metal oxide semiconductor.

■Features

①High sensitivity, large output variation at low concentration.
②Long service life, long-term stability.
③Superior to catalytic combustion sensors in toxic gas or severe atmospheric conditions.

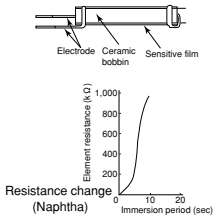


Orgastor Sensor (OR)

Detects variation in resistance representing swelling property of a carbon resistor, especially binding polymer, with respect to oil or organic solvent vapor.

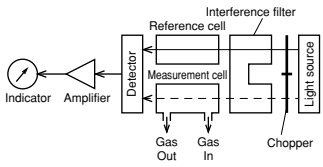
■Features

①Works at normal temperatures with high response speed.
②Compact, lightweight, excellent to withstand mechanical shocks.
③Selective detection for oil or organic solvent vapor by choosing binding agent.



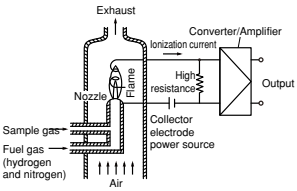
Infrared Absorption Sensor (Non-Dispersive)

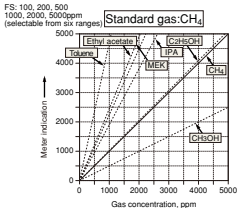
Detects gas types and concentration by the infrared absorption spectrum of the gas and the amount of absorption respectively.



Flame Ionization Detector (FID)

Detects the concentration of hydrocarbon gases by a phenomenon in which they ionize and the electric conductivity increases when they are brought into a hydrogen flame.





Pyrolysis Ionization Sensor

Fine particles decomposed in pyrolysis chamber are detected by an ionization smoke detector and converted to electrical signals.

The ionization smoke detector has an external ionization chamber (IO1) and internal ionization chamber (IO2), both of which are equipped with Americium-241.

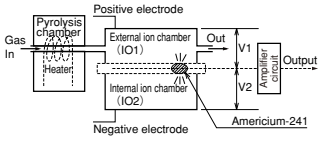
Americium-241 ionizes air.

Normally, ionization currents flow through IO1 and IO2 in equal proportions, so the two voltages V1 and V2 are the same and the output of an amplifier circuit is 0 volt.

When fine particles decomposed in pyrolysis chamber go through IO1 of the smoke detector, the ionization current in IO1decreases.

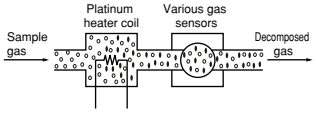
This reduction in the ionization current causes difference between two voltages V1 and V2, and the output of the amplifier circuit becomes positive, which is outputted as a signal to an indicator unit.

The internal ionization chamber (IO2) is also used to compensate for changes in temperature and atmospheric pressure.



Pyrolysis (Pretreatment)

When halogenated hydrocarbons or other halides come into contact with a Platinum heater coil, they decompose into halogen molecules or hydrogen halides. A sample gas is detected by measuring these decomposed gases with a Electrochemical cell sensor, a Galvanic cell sensor, or other gas sensors or with detector tubes.



Principle of pyrolysis (pretreatment)

Classification of Explosive Gases and Explosion-Proof Structure

Classification of Explosive Gases

■Classification Based on Japanese Standards on Explosion-Protected Electrical Apparatus

●Explosion Classes and Ignition Groups of Typical Explosive Gases

Explosion Class \ Ignition Group	G1	G2	G3	G4	G5
1	Acetone Ammonia Carbon monoxide Ethane Acetic acid Ethyl acetate Toluene Propane Benzene Methanol Methane	Ethanol Isopentyl acetate 1-Butanol Butane Acetic anhydride	Gasoline Hexane	Acetaldehyde Ethyl ether	
2	Coal gas	Ethylene Ethylene oxide			
3	Water gas Hydrogen	Acetylene			Carbon disulfide

●Classification of Explosion Classes

Explosion Class	Minimum gap with a 25mm length of patch which permits the flame propagation
1	Over 0.6mm
2	Over 0.4mm up to 0.6mm
3	Up to 0.4mm

●Explosion classes are classified into three classes as shown in the table above according to the value of flame propagation limit of explosive gas using a standard container.

●Classification of Ignition Groups

Ignition Group	Ignition Temperature
G1	Over 450℃
G2	Over 300℃ up to 450℃
G3	Over 200℃ up to 300℃
G4	Over 135℃ up to 200℃
G5	Over 100℃ up to 135℃
G6	Over 85℃ up to 100℃

●Ignition groups are classified into six groups as shown in the table above according to the ignition temperature of explosive gases.

■Classification Based on International Standards of the International Electrotechnical Commission (IEC)

●Groups and Temperature Classes of Typical Explosive Gases

Temperature Class \ Group	T1	T2	T3	T4	T5
ⅡA	Acetone Ammonia Carbon monoxide Ethyl acetate Toluene Propane Benzene Methanol Methane LP gas Ethane Acetic acid	Ethanol Isobutane 1-Butanol Isopentyl acetate Acetic anhydride	Gasoline n-Hexane	Acetaldehyde	
ⅡB	Town gas	Ethylene Ethylene oxide		Ethyl ether	
ⅡC	Hydrogen	Acetylene			Carbon disulfide

●Classification of Groups

Flameproof

Group	Range of Maximum Safety Gap of Gases or Vapors (mm)
ⅡA	0.9mm or more
ⅡB	0.5-0.9mm
ⅡC	0.5mm or less

Intrinsic Safety

Group	Range of Minimum Ignition Current Ratio of Gases or Vapors
ⅡA	Over 0.8
ⅡB	0.45-0.8
ⅡC	Less than 0.45

●Classification of Temperature Classes

Temperature Class	Range of Maximum Surface Temperature (℃)
T1	Over 300 up to 450
T2	Over 200 up to 300
T3	Over 135 up to 200
T4	Over 100 up to 135
T5	Over 85 up to 100
T6	85 or less

About Explosion-Proof Structure

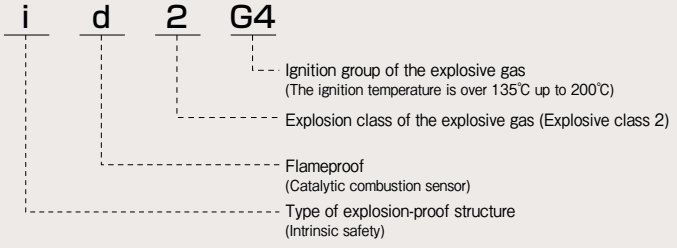
■Symbols Based on Japanese Standards on Explosion-Protected Electrical Apparatus

●Symbols

Item to be Indicated	Symbol	Meaning of Symbol
Type of Explosion-Proof Structure	d	Flameproof
	o	Oil immersion
	f	Pressurization
	e	Increased safety
	i	Intrinsic safety
	s	Special
Explosion Class of Explosive Gas	1	Applicable to gases or vapors of explosion class 1
	2	Applicable to gases or vapors of explosion class 1, 2
	3a	Applicable to explosion class 1, 2, water gas, and hydrogen
	3b	Applicable to explosion class 1, 2, and carbon disulfide
	3c	Applicable to explosion class 1, 2, and acetylene
	3n	Applicable to all gases
Ignition Group of Explosive Gas	G1	Ignition temperature is over 450℃
	G2	Ignition temperature is over 300℃ up to 450℃
	G3	Ignition temperature is over 200℃ up to 300℃
	G4	Ignition temperature is over 135℃ up to 200℃
	G5	Ignition temperature is over 100℃ up to 135℃
	G6	Ignition temperature is over 85℃ up to 100℃

*Using apparatus in Zone 0 is limited to intrinsically safe one.

■Example of Indicating Explosion-Proof Structure

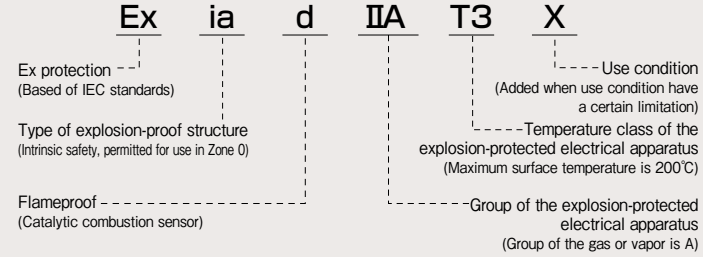


■Symbols Based on International Standards of the International Electrotechnical Commission (IEC)

●Symbols

Item to be Indicated	Symbol	Meaning of Symbol
Explosion-Proof Structure	Ex	Explosion-proof structure in conformity to the IEC-harmonized standards
Type of Explosion-Proof Structure	d	Flameproof
	o	Oil immersion
	p	Pressurization
	e	Increased safety
	ia	Intrinsic safety (Use permitted in zone 0)
	ib	Intrinsic safety (Use not permitted in zone 0)
	s	Special
Group of Explosion-Protected Electrical Apparatus	Ⅱ	For factory and place of business
	ⅡA	Applicable to gases or vapors of class A
	ⅡB	Applicable to gases or vapors of class B
	ⅡC	Applicable to gases or vapors of class C
Temperature Class of Explosion-Protected Electrical Apparatus	T1	Maximum surface temperature is up to 450℃
	T2	Maximum surface temperature is up to 300℃
	T3	Maximum surface temperature is up to 200℃
	T4	Maximum surface temperature is up to 135℃
	T5	Maximum surface temperature is up to 100℃
	T6	Maximum surface temperature is up to 85℃

■Example of Indicating Explosion-Proof Structure



Danger of Combustible Gases, Toxic Gases, and Vapors

Gas/Vapor	Molecular Formula (Chemical Formula)	Flammable (Explosive) Range (vol%)	Explosion Class	Ignition Group*	Ignition Temperature (℃)*	Threshold Limit Value (ppm)	Specific Gravity of Gas (air=1)
Hydrogen	H_2	4.0 – 75.0	3	G1	(gas)	—	0.07
Methane	CH_4	5.0 – 15.0	1	G1	(gas)	1000	0.55
Propane	C_3H_8	2.1 – 9.5	1	G1	(gas)	1000	1.56
n-Butane	C_4H_{10}	1.6 – 8.5	1	G2	(gas)	1000	2.05
Isobutane	C_4H_{10}	1.8 – 8.4 K	1	G2	(gas)	1000	2.00
n-Pentane	C_5H_{12}	1.5 – 12.5	1	G3	<−40	600	2.49
Ethylene	C_2H_4	2.7 – 36	2	G2	(gas)	—	0.97
Propylene	C_3H_6	2.0 – 11.0	1	G2	(gas)	200	1.49
Butylene (cis-2-Butene)	C_4H_8	1.7 – 9.0 K	1	G2	(gas)	500	1.93
Acetylene	C_2H_2	1.5 –100	3	G2	(gas)	—	0.90
Toluene	$C_6H_5CH_3$	1.2 – 7.1	1	G1	6	20	3.18
o-Xylene	$C_6H_4(CH_3)_2$	1.0 – 6.0	1	G1	30	100	3.66
Methanol	CH_3OH	6.0 – 36	1	G1	11	200	1.10
Ethanol	C_2H_5OH	3.3 – 19	1	G2	12	1000	1.59
Acetone	$(CH_3)_2CO$	2.1 – 13	1	G1	<−20	500	2.00
Methyl ethyl ketone	$CH_3COC_2H_5$	1.8 – 11.5	1	G1	−1	200	2.48
Ethyl acetate	$CH_3COOC_2H_5$	2.0 – 11.5	1	G1	−4	400	3.04
Butyl acetate	$CH_3COO(CH_3)_2CH_3$	1.7 – 7.6	1	G2	22	150	4.01
Town gas	—	(5.0−)	2	G1	(gas)	—	0.55
LPG	—	(1.8 – 8.4)	1	G1	(gas)	1000	2.00
Gasoline	—	1.0 – 7.0	1	G3	<−20	300	3−4
Kerosene	—	0.7 – 5 K	1	G3	35−50	—	4.5
n-Hexane	$CH_3(CH_2)_4CH_3$	1.1 – 7.5	1	G3	−21.7	50	2.79
Butadiene	$CH_2=CHCH=CH_2$	2.0 – 12	2	G2	(gas)	2	1.87
Acetaldehyde	CH_3CHO	4.0 – 60	1	G4	−37.8	C25	1.52
Polyvinyl chloride	$CH_2=CHCl$	3.6 – 23	1	G2	(gas)	1	2.16
Carbon monoxide	CO	12.5 – 74	1	G1	(gas)	25	0.97
Ammonia	NH_3	15.0 – 28	1	G1	(gas)	25	0.59
Hydrogen sulfide	H_2S	4.0 – 44	2	G3	(gas)	1	1.19
Chlorine	Cl_2	— —	—	—	Incombustible	0.5	2.5
Sulfur dioxide	SO_2	— —	—	—	—	0.25	2.25
Benzene	C_6H_6	1.3 – 7.1	1	G1	−11	0.5	2.70
Acrylonitrile	$CH_2=CHCN$	3.0 – 17	1	G1	−5	2	1.83
Methyl bromide	CH_3Br	10.0 – 16.0 H	1	G1	Practically incombustible	1	3.28
Ethylene oxide	CH_2CH_2O	3.6 –100	2	G2	(gas)	1	1.52
Hydrogen cyanide	HCN	5.6 – 46.6	1	G1	<−20	C4.7	0.93
Phosgene	$COCl_2$	— —	—	—	Incombustible	0.1	3.41
Hydrogen chloride	HCl	— —	—	—	—	C2	1.27
Arsine	AsH_3	4.5 – 78 K	—	—	—	0.005	2.70
Phosphine	PH_3	1.8 – H	—	—	—	0.3	1.18
Silane	SiH_4	1.37−100 H	—	—	—	5	1.3
Diborane	B_2H_6	0.8 – 88 H	—	—	—	0.1	0.96
Germane	GeH_4	— —	—	—	—	0.2	2.66
Dichlorosilane	SiH_2Cl_2	4.1 – 99 H	—	—	—	—	3.48
Hydrogen selenide	H_2Se	— —	—	—	—	0.05	2.81
Fluorine	F_2	— —	—	—	—	1	1.3
Nitrogen dioxide	NO_2	— —	—	—	—	0.2	1.6
Chlorine trifluoride	ClF_3	— —	—	—	—	C0.1	3.2
Hydrogen fluoride	HF	— —	—	—	—	0.5	0.7
Hydrogen bromide	HBr	— —	—	—	—	C2	2.8

Notes: ● Range of inflammability/explosion is based on "Recommended Practice for Explosion-Protected Electrical Installations in General Industries 1979" (the Technology Institution of Industrial Safety, Apr.20 2001) and "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry 1994" (National Institute of Industrial Safety, Ministry of Labour), where the value with "H" is based on Hazardous Chemical Substances Manual (1999) (Japan Industrial Safety and Health Association), and the values with "K" are based on "Kagaku Bousai Shishin shusei (1996)" (The Chemical Society of Japan).
The values in parentheses ( ) are reference data.
● Threshold Limit Values are based on the TLV-TWA (Threshold Limit Value-Time Weighted Average) of the TLV table (ACGIH, 2003). The values with "C" indicate TLV-C (Threshold Limit Value-Ceiling).
* Based on classification according to Japanese standards on explosion-protected electrical apparatus.

Flammable (Explosive) Range: When combustible gas is mixed with air or oxygen, the concentration of the mixed gas within a certain range will cause an explosion phenomenon on contact with an ignition source. This range of concentration is called Explosive Range. The minimum concentration of the range is called Lower Explosive Limit or LEL, and the maximum is called Upper Explosive Limit or UEL.

Threshold Limit Value (TLV): Airborne concentrations of substances, such as toxic gases, to which workers can work consistently for eight hours a day, day after day, with no harmful effects. Established as guidelines by the ACGIH and the Technology Institution of Industrial Safety.

We received ISO 9001 certification for our design, manufacturing, sales, and service operations at our head office, branches and factories.

Registered No. : JQ 064C

We obtained the ISO 14001 International Environmental Management System certification at head office.

Type of Gas Detected

- Combustible gas
- Toxic gas
- Oxygen concentration
- CFC
- Ozone
- Oil
- Odor
- Steel dust concentration
- Indoor air pollutant
- Others

Detection Principle

- Hot wire semiconductor sensor
- Catalytic combustion sensor
- Thin film semiconductor sensor
- Semiconductor sensor
- Thermal conductivity sensor
- Electrochemical cell sensor
- Galvanic cell sensor
- Orgastor sensor
- Electrolysis sensor with gel electrolyte
- Infrared sensor

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SAFETY WARNING

Read the operating instructions thoroughly before use. Always operate in accordance with the instructions.
Be sure to choose the sensor designed to detect the required type of gas. Use of the wrong sensor type could cause an accident.

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