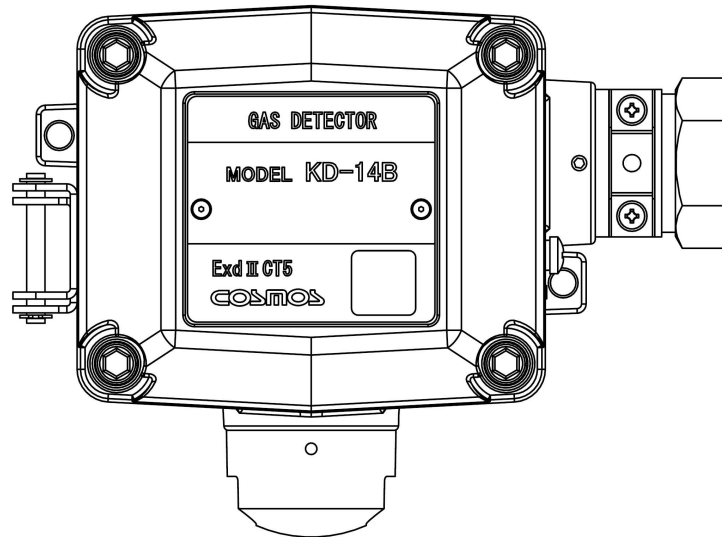


Diffusion type Gas Detector

Model KD-14

Instruction Manual



- Keep this instruction manual where it is readily accessible.
- Thoroughly read this instruction manual before using the equipment so it can be used safely and correctly.
- This manual provides information concerning standard specifications. If the specifications of your model are nonstandard, refer to the delivery specifications.

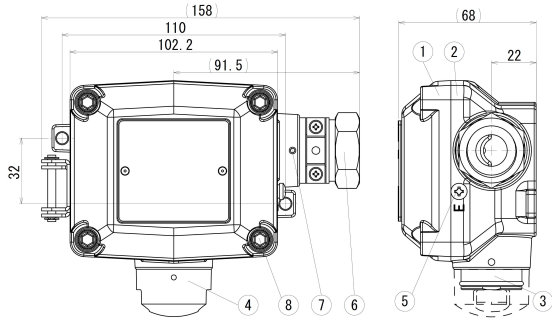


NEW COSMOS ELECTRIC CO., LTD.

Instruction Manual No.
GAE-043
August 2012

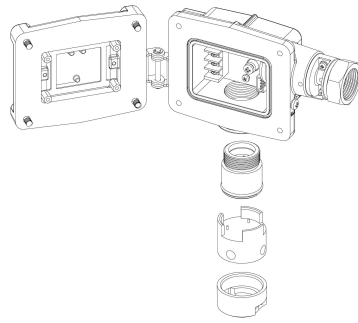
● **Part Names and Functions**

See pages 4 to 5.



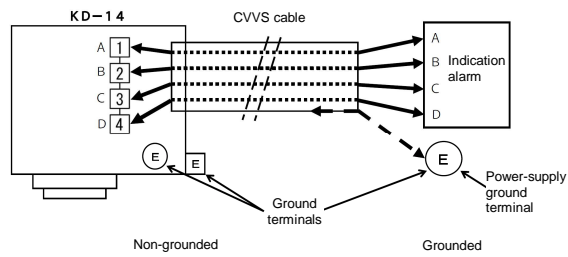
● **Replacement of Sensor Unit**

See pages 18 to 19.



● **Wiring and Connecting Methods**

See pages 11 to 13.



● **Maintenance Check and Operation Methods**

See pages 15 to 17.

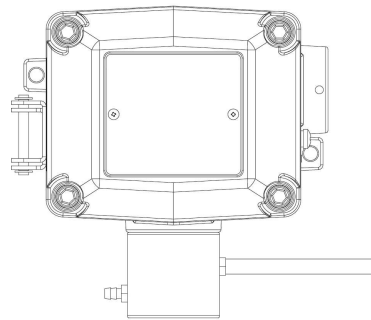


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1. Introduction

- Thank you for purchasing the KD-14 Diffusion type Gas Detector.
- In order to ensure the correct and safe operation of this product, be sure to read this manual before use.
- This product detects various types of gas including combustible gas. The product detects gas leakage at an early stage in industrial facilities, such as gas production plants and depots, chemical plants, paint factories, and power plants.
- Select from KD-14A, KD-14B and KD-14C models, each of which incorporates a gas sensor, according to the required specifications. The detection principle for the gas sensor differs for these models.
- Maintenance and inspection are indispensable to the reliable performance of the Gas Detection/Alarm System. Be sure to perform the maintenance checks described in this manual.

Explanation of Symbols

The following symbols are used to indicate and classify precautions in this manual.

 DANGER	Indicates information that, if not heeded, is likely to result in death or serious injury.
 WARNING	Indicates information that, if not heeded, could possibly result in death or serious injury.
 CAUTION	Indicates information that, if not heeded, could result in minor injury, or damage to the product.
MEMO	Indicates advice on handling the product.

2. Precautions

- Read this manual completely and be sure you understand the information provided herein before attempting to use the product.
- Abide by all applicable laws and regulations when using this product.



WARNING

- Be sure to ground the product to prevent electric shocks.
- If there is a gas leak alarm, take the necessary measures in accordance with your company's regulations.



CAUTION

- Licensed members should implement all necessary work for the product including wiring and installation in accordance with all applicable laws and regulations.
- Do not disassemble the product or modify the construction or electric circuits of the product. Otherwise, the explosion-proof construction of the product may be adversely affected.
- Do not install the product in places or near places where silicone sealant or gas is used. Otherwise, the performance of the product may be adversely affected.
- Do not use the Detector continuously over a long period of time in an environment that contains organic solvents, such as aromatic hydrocarbons and halogen hydrocarbons.
- Be sure to provide a protective cover (optional) if the product is installed outdoors.
- Use the product in accordance with applicable laws and regulations.

3. Contents of Package

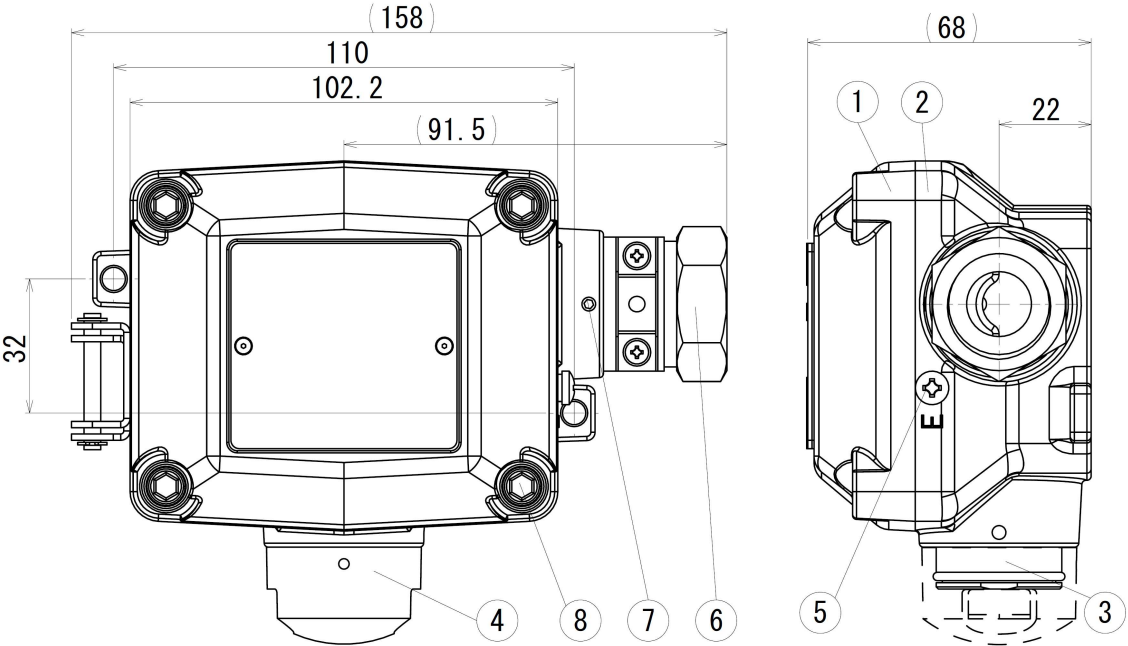
- The product is provided with the following items. Make sure that none of these items is missing.
- Although the product is packed and shipped with the utmost care, contact your New Cosmos representative if there should be any damage or missing items.

Accessories	Optional items
Detector head Accessory set (see note 1) 12- and 13-mm-dia. pressure-proof packings: 1 each 11- and 14-mm-dia. washers: 2 each One C-clamp Two M5 screws Hexagon wrench (nominal dia. 2 and 4): 1 each (see note 2) Instruction Manual (see note 2)	Protective cover (see note 3) Horizontal type: KW-41 Vertical type: KW-42 PB-1 2B Pole Mounting Bracket (see note 3) SK-1 Sensor Replacement Jig (see note 3) GCP-09 Calibration Cap (see note 3) Z-001K Gas Calibration Kit 2 bulb hand pump Capillary for 2 bulb hand pump

- Note: 1. The standard product incorporates a built-in pressure-proof packing (12.5-mm dia.), washer (12-mm dia.), and B-clamp.
2. A hexagon wrench and Instruction Manual are provided for each order.
3. The optional items are for use only by the KD-14.

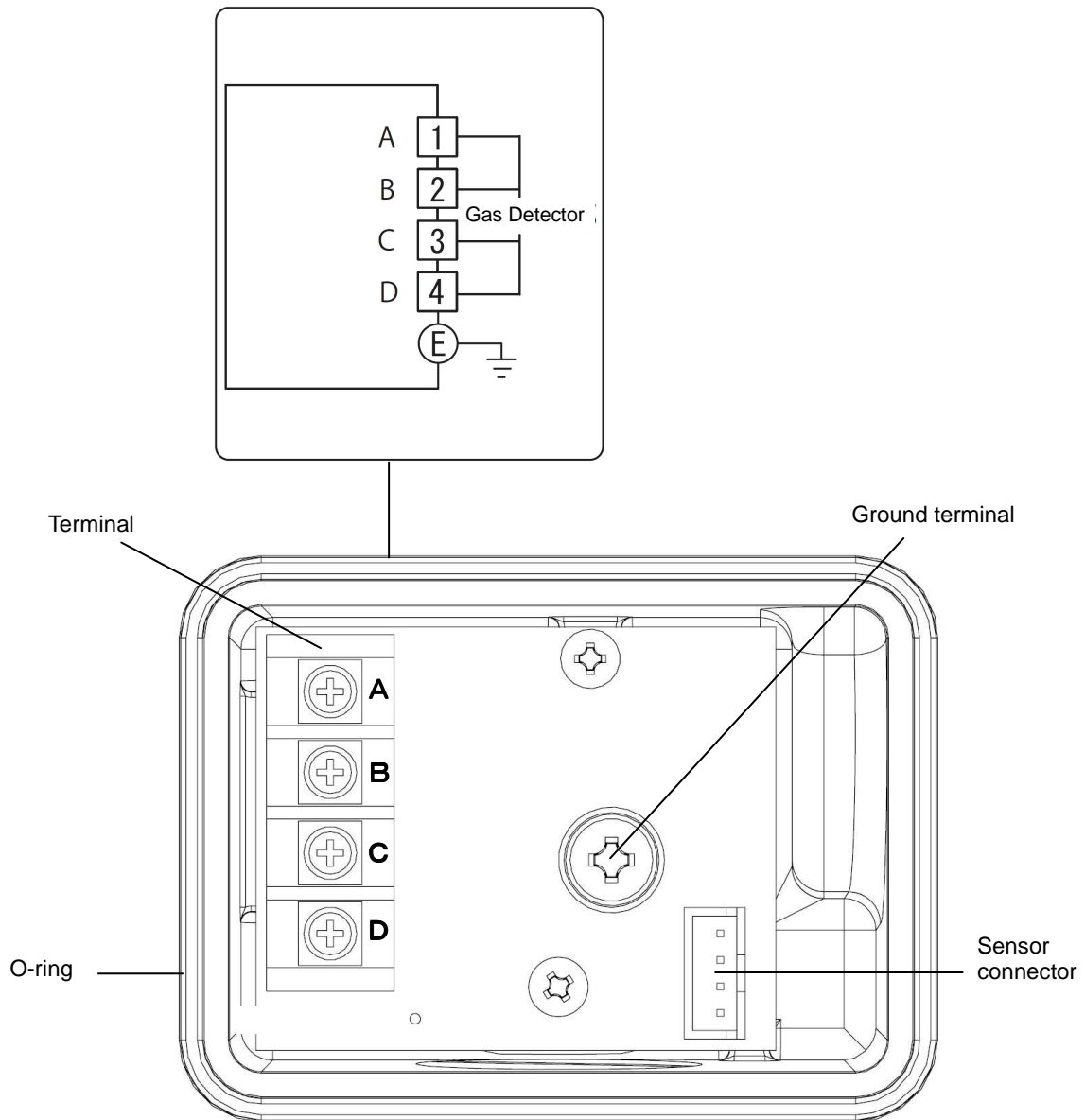
4. External Dimensions and Nomenclature

4-1. Main Unit



Number	Name	Description
1	Casing cover	
2	Casing	
3	Sensor unit	Incorporates a gas sensor.
4	Sensor guard	Protects the sensor unit.
5	Ground terminal	Used when grounding the frame.
6	Cable gland	Used to secure the cable. Compatible screw: G3/4.
7	Bolt with hexagon socket	Used for securing the cable gland. Use a hexagon wrench with a nominal diameter of 2 mm.
8	Bolt with hexagon socket	Used for securing the casing cover. Use a hexagon wrench with a nominal diameter of 4 mm.

4-2. Terminal Block



Number	Description
A	Gas detectors
B	
C	
D	
Ground terminal	Use to ground the frame.

5. Installation

5-1. Installation Method



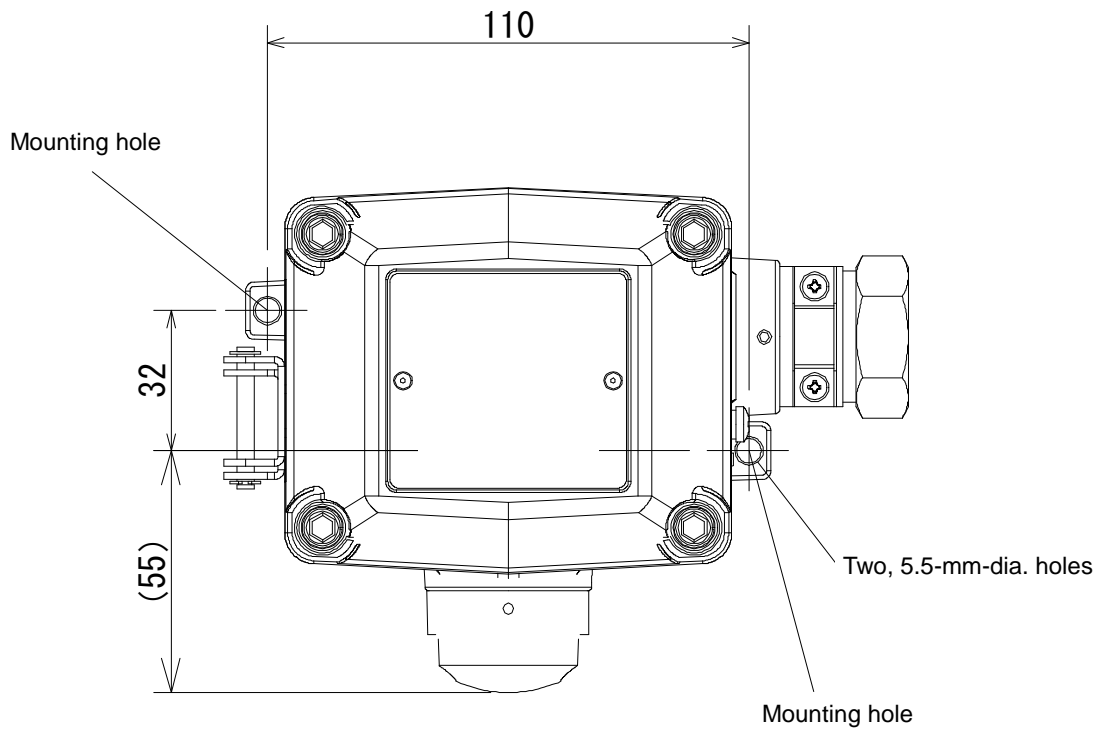
CAUTION

- Be careful not to damage the gas detector when installing it. Otherwise, the explosion-proof performance of the gas detector will be lost.
- Do not install the product in the following places.
 - Places where the ambient temperature exceeds the operating temperature range (–10°C to 50°C).
 - Places where condensation occurs.
 - Places where exposed to water directly.
 - Places subject to corrosive gas.
 - Places close to equipment that generates high frequencies or a magnetic field.
 - Places where silicone sealant is used or likely to be used.
 - Places where silicone gas is used or likely to be used.
- Install the gas detector in places where it can be maintained and inspected with ease.
- Install the gas detector in places free from vibration.
- Install the gas detector in places free from sudden temperature changes.
- Keep the gas detector free from impacts.
- When installing the gas detector outdoors, be sure to install the protective cover (optional).
- The installing height of the gas detector has an important relation to the specific gravity of the target gas to be detected. Install the gas detector in accordance with required regulations.

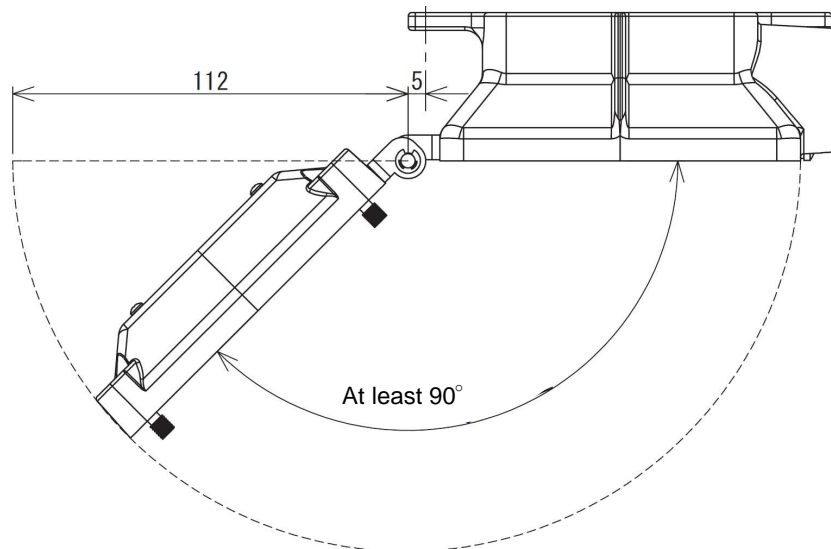
• Installing Height

Type of gas	Installing height	Remarks
Gas heavier than air (Example: LPG)	A maximum of 10 cm above the floor. (Height to the sensor guard tip)	Keep a space of approximately 7 cm from the sensor guard tip for ease of maintenance and inspection.
Gas almost the same as air in specific gravity (Example: Carbon monoxide)	75 to 150 cm above the floor. (Height to the sensor guard tip)	Decide the height by considering the specific gravity and mounting environment.
Gas lighter than air (Example: City gas and hydrogen)	Near the ceiling	Decide the height by considering arrangements for ease of maintenance (e.g., a scaffold).

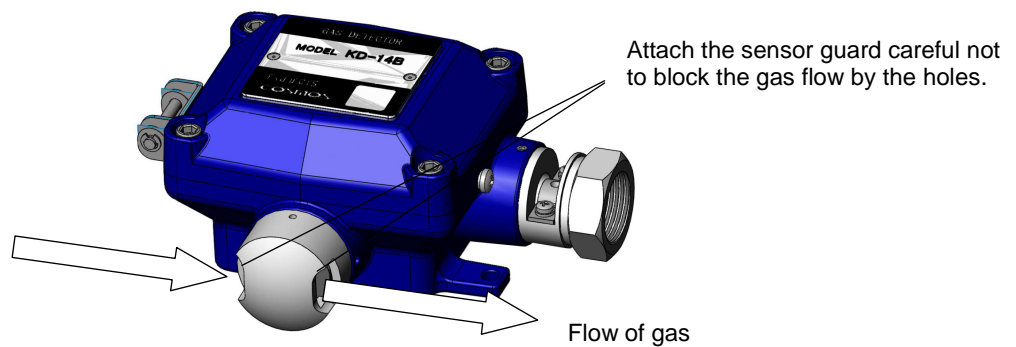
- Mount the main unit to the wall with the M5 screws that are provided with the product. Be sure to install the protective cover (optional) when mounting the main unit outdoors. Mount the main unit with a 2B pole mounting bracket (optional) when mounting the main unit to a 2B pole. Refer to 5-3 Mounting of Options for details of optional products.



- The casing cover of the Detector must be opened to connect the wiring or replace the sensor unit. When installing the gas detector, provide sufficient space to enable the casing cover to be opened to at least 90°.




- When installing the diffusion type gas detector to the ceiling or high location, consider to secure the work space underneath the detector for inspection and maintenance. Also, in case of installing the detector at higher location than 3 meters, the sampling pipe should be laid down to the ceiling.
- In case of installing at the ceiling or high location, please do not attach the sensor guard. On the other hand, in case of installing the detector at the floor where it may be exposed to water, make sure to attach the sensor guard.
- Decide the direction of holes, considering the gas flow when attaching the sensor guard.

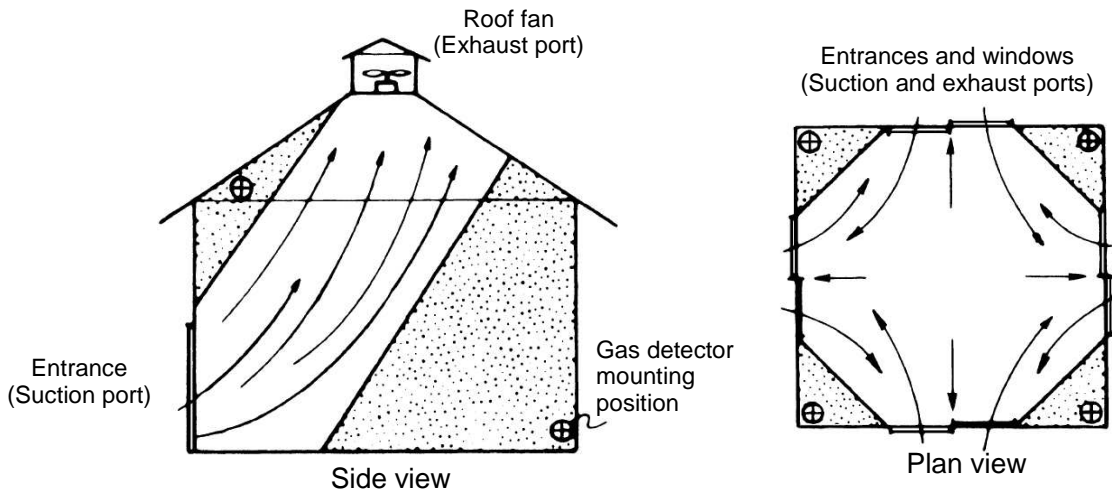


5-2. Examples of Installation Positions

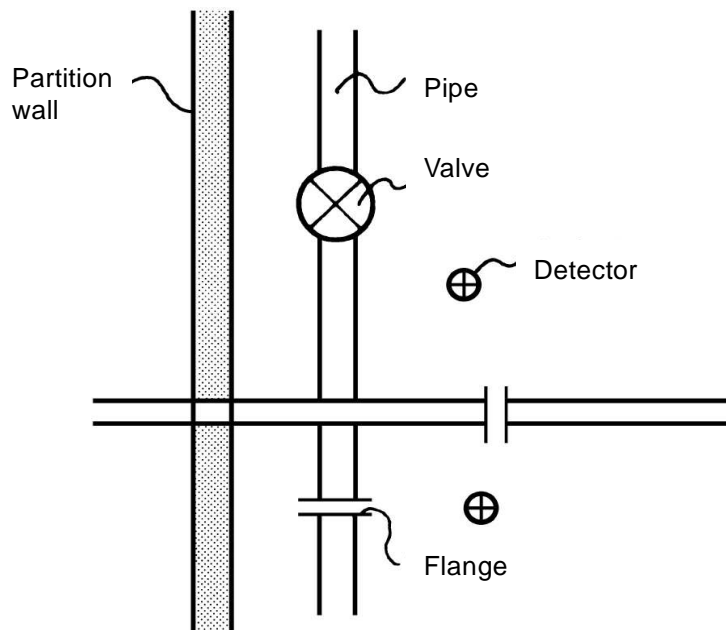
- Install the product in places where gas easily accumulates.

 Places where gas easily accumulates.

 Gas Detector



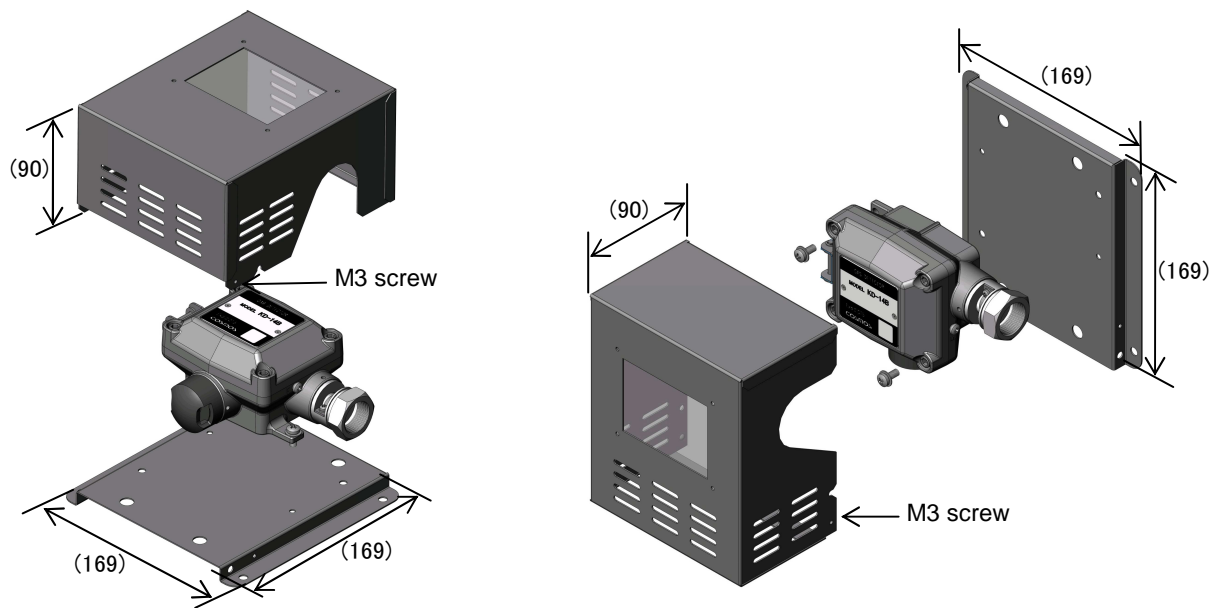
Example of Installation Position



Example of Outdoor Installation Position

5-3. Mounting of Optional Items

• Protective Cover



Horizontal Type (KW-41)

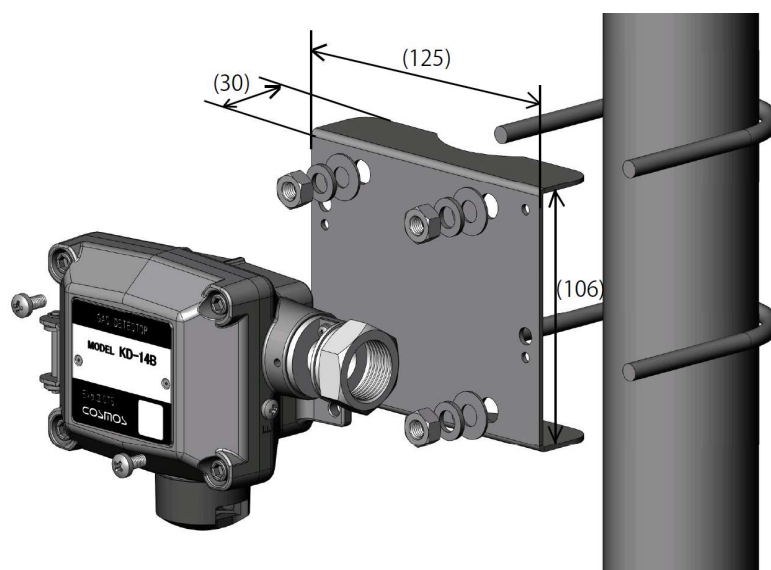
Vertical Type (KW-42)



CAUTION

- Secure the casing cover with M3 screws if strong winds are expected.

• 2B Pole Mounting Bracket



6. Wiring Method

6-1. Wiring Work

- Be sure to provide explosion-proof wiring if the product is to be used in hazardous places.



CAUTION

- Licensed members should implement all necessary work for the product including wiring and installation in accordance with all applicable laws, regulations and standard.

Cable Work

- Use a shielded cable, such as CVV-S with a thickness of 0.75 to 2.00 mm². Lay all cables in protective tubes, such as metal conduits or carbon steel pipes, or other protective structure, such as a concrete duct.
- When using the explosion-proof packing lead-in method, refer to the following table and use a cable with the finished diameter matching the inner diameter of the packing. In order to prevent the spread of explosive gas or fire, securely tighten the cable gland.
- It is recommended not to connect two cables together. If it is unavoidable, however, connect them or branch them within the explosion-proof casing of the main unit.

Cable outer dia.	Packing	Washer	Clamp	Accessory or Optional item
	Inner dia.	Inner dia.		
10 to 10.4	11.5	11	C Clamp	Optional item
10.5	12	11		Accessory
11	12	12		
11.5	12.5	12	B Clamp	Built-in accessory
12	13	14		Accessory
12.5	13.5	14	A Clamp	Optional item
13	14	14		

- * A pressure-tight packing with diameter of 12.5 mm, a washer with diameter of 12 mm, and a B clamp, all of which correspond to a cable with diameter of 11.5 mm, are built into the standard model.
- * Each one of pressure-tight packing with diameter of 12 and 13 mm, two washers with diameter of 11 and 14 mm, and a C clamp are provided with the standard model, to correspond to cables with a diameter of 10.5, 11 and 12 mm.
- * If the cable diameter is other than 10.5 to 12 mm, select the corresponding pressure-resistant packing, washer, and clamp from the above table, and order them from New Cosmos.

6-2. Wiring and Connection

WARNING

- Before opening the casing cover of the gas detector, be sure to turn off the product and all devices (e.g., indicator unit and signal converter) connected to the product.
- If the power is turned ON, the power supply may become a source of ignition.
- Be sure to ground the product to prevent electric shocks.

CAUTION

- Wire the connecting terminals correctly.
- Separate connection cables from power lines as far as possible.
- When closing the casing cover, make sure that the power supply cord, harness, or O-ring is not caught by the casing cover.

Connecting Power Supply and Signal Wires

1) Connecting power supply

Provide dedicated breakers, if needed, to lines that are connected to peripheral devices, such as indicator units and signal converters.

2) Connecting between indicator unit and gas detector

Use the appropriate cable for the installation site, such as 600V vinyl insulated wire (VI), VCT, or CVV (0.75 square millimeter to 2.00 square millimeter).

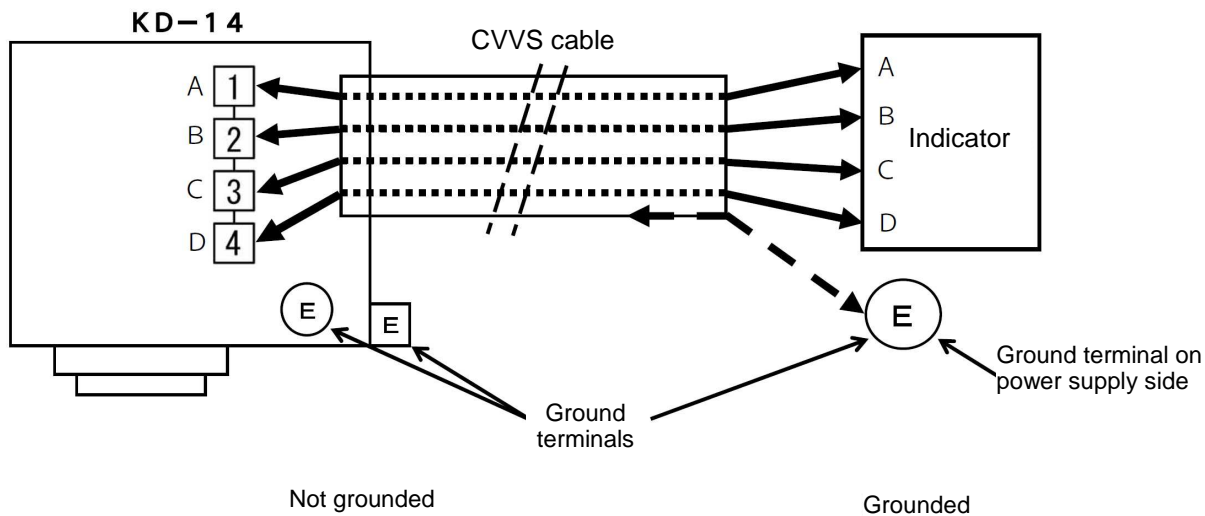
MEMO

- The length of wiring should be less than 10 ohm of the single line resistance.
The following are the examples.
 - 0.75 square millimeter wire: within 400 meter
 - 1.25 square millimeter wire: within 600 meter
 - 2.00 square millimeter wire: within 1 kilometer

MEMO

- If the main unit is grounded on the power supply side, do not connect a shielded cable to the ground terminal (E) in the gas detector, or otherwise two-point grounding will result.

Connection example with power supply side grounded



7. Precautions before Use



CAUTION

- Before turning ON any of the devices (e.g., indicator unit, signal converter) connected to the product, recheck that all of the connections are correct. Make sure that the gas detector and indicator unit or signal converter, in particular, are connected properly.

● In Case of Gas Leakage



DANGER

- Without panicking, check that there is no fire around the product. Do not touch any electric switches under any conditions. Sparks from turning electric switches ON or OFF may cause ignition.



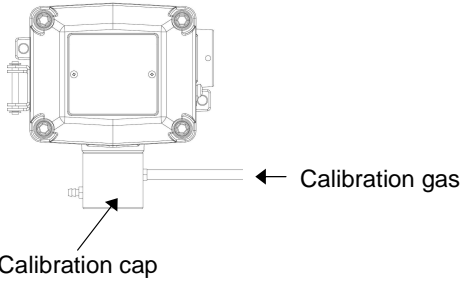
WARNING

- If there is a gas leak alarm, take the necessary measures specified by your company.
- If a gas leak occurs indoors, open the windows and doors to ventilate the room.
- Check the gas leakage location and promptly take the necessary measures.

8. Maintenance Check and Operation Method

8-1. Daily Inspection and Periodical Inspection

Daily inspections are conducted by the user, while periodical inspections are conducted by your local representative.

	Frequency	Checking item	Contents of inspection
Daily inspection	At least once a month	Visual check	<ul style="list-style-type: none"> · Clogging of flame arrester. · Corrosion of flame arrester. · Corrosion of the main unit. · Corrosion of mounting screws. If a failure is found, replace the parts.
	At least once every few months	Alarm operation check with real gas	Apply inspection gas to the gas detector and check the alarm operation. <ul style="list-style-type: none"> · Use the calibration cap, apply inspection gas, and check the alarm operation. 
		Condition around gas detector	Check that nothing interrupts the diffusion of gas around the gas detector.
Periodical inspection	At least once a year	Consult your local representative.	

- Use optional products to conduct real gas inspections.

Periodical Inspections

In order to maintain the reliability of the gas detection/alarm system, it is extremely important to conduct maintenance and inspections.

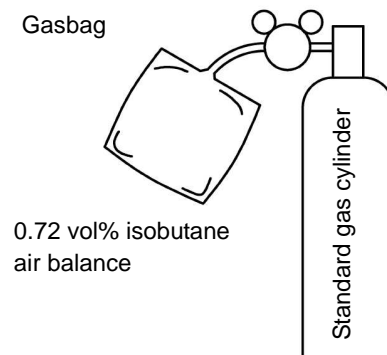
Moreover, it is necessary to use actual gas (combustible gas or poisonous gas), to carefully conduct inspection and calibration. It is highly recommended that you consider periodical inspections under a maintenance contract with your local representative.

8-2. Preparing Calibration Gas

- Calibration gas is used for actual gas inspection.
- The following example shows how to prepare a standard gas of 0.72vol% (40%LEL) isobutane.

With a standard gas cylinder

- Fill a gas bag with standard gas as shown the figure below.
- Evacuate the air from gas bag completely before filling the gas to prevent gas concentration error due to the air in gas bag.



MEMO

- Use a urethane gasbag. Leave for about 30 minutes after filling gas to bring humidity in gas bag close to the ambient condition before use.

Without standard gas cylinder

- Use Gas Calibration Kit (optional item) and pure gas cylinder (isobutane 99 vol% or more). Dilute isobutane with air to produce calibration gas of 0.72 vol% (40%LEL).

Memo The calibration gas can be used to check the alarm function. Check the concentration using Gas Detector XP-3110 or a similar device before using the gas for calibration.

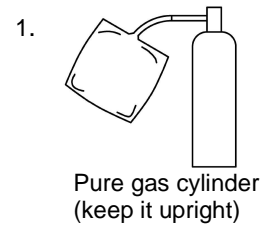


DANGER

Make sure that there are no flammables nearby when handling flammable gas with a concentration over LEL (lower explosive limit).

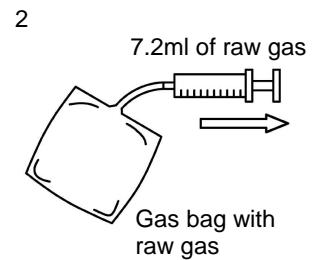
1) Drawing raw gas

Connect gas bag to pure gas cylinder and fill with gas slightly more than necessary. Bend back the hose and clamp by pinchcock to prevent the gas from leaking.



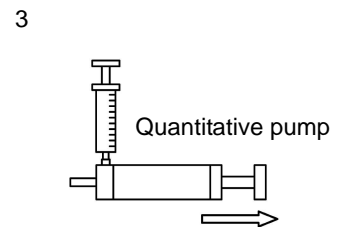
2) Drawing a fixed amount of raw gas

Connect 10 ml syringe to gas bag and take 7.2 ml of raw gas. (Take the gas slightly more than necessary and then carefully discharge the excess gas.)



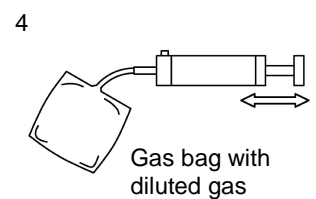
3) Transferring raw gas into a quantitative pump

Connect syringe to the inlet of quantitative pump, and pull the piston to fill pump with raw gas in the syringe. Remove the syringe and pull the piston all the way out (100 ml).



4) Making diluted gas

Connect empty gas bag to the outlet of quantitative pump and push the piston. Move the piston back and forth for 9 times to add air and make dilute gas.



8-3. Replacement of Sensor Unit



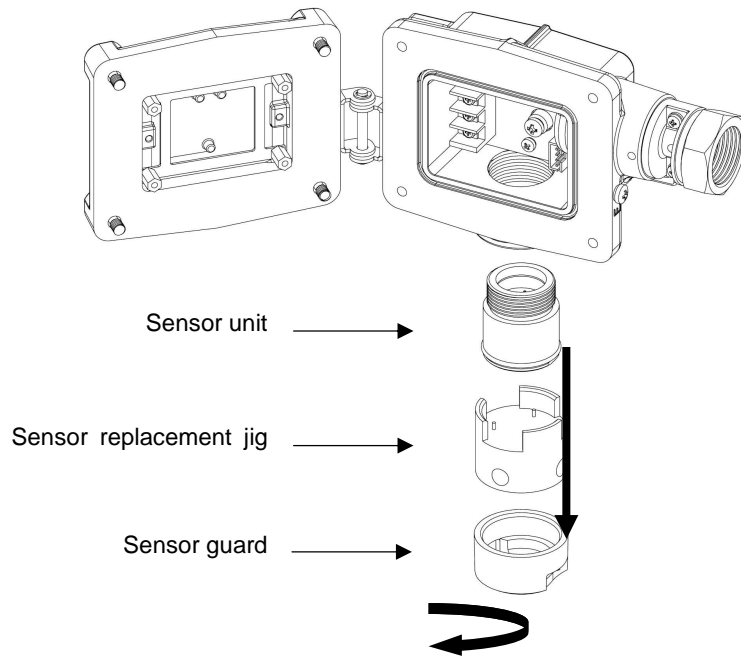
WARNING

- Be sure to turn OFF the indicator unit or signal converter before replacing a sensor unit. Otherwise, they may become a source of ignition.
- Do not damage the surface of detector when sliding the sensor unit, or the explosion proof performance may be adversely affected.



CAUTION

- The setup data of the Detector may have to be re-written depending on the type of the sensor. Only your local representative's maintenance service members or personnel who have completed a maintenance seminar can replace the sensor unit.
- Be sure to handle the sensor unit with care. Do not drop or throw the sensor unit. Otherwise, the sensor wire may be disconnected or a sensor failure may result.
- The external contact may operate when replacing the sensor unit if the sensor output is not stable. Release the interlocks of the external devices if needed.
- When removing or mounting the sensor unit, do not twist the harness of the sensor connector.
- When closing the casing cover, make sure that the power supply cord, harness, or O-ring is not caught by the casing cover.



- (1) Turn OFF the power supply connected to the product.
- (2) Loosen the bolt with a hexagon socket on each of the four corners of the main unit with the provided hexagon wrench with a nominal diameter of 4 mm, and open the casing cover of the main unit.
- (3) Disconnect the sensor connector.
- (4) Dismount the sensor guard.
- (5) Use the sensor replacement jig, and turn and pull out the sensor unit.
- (6) Insert a new sensor unit and tighten the sensor unit by using the sensor replacement jig.
- (7) Connect the sensor connector.
- (8) Check that the sensor connector is connected securely.
- (9) Mount the sensor guard.
- (10) Tighten the bolt with a hexagon socket on each of the four corners of the main unit with the provided hexagon wrench with a nominal diameter of 4 mm, and close the casing cover of the main unit.

MEMO

- The sensor replacement jig is an optional product.
- Return the used sensor unit to your local representative.
- When the sensor unit has been replaced, it is necessary to make zero adjustment and span adjustment after keeping the product turned ON for approximately one week to stabilize the sensor output.

9. Specifications

Corresponding sensor type	Hot wire semiconductor type (KD-14A) Catalytic combustion type (KD-14B) Thermal conductivity type (KD-14C)
Sampling method	Diffusion type
Detection gas	Depends on the specifications
Detection range	Depends on the specifications
Explosion-proof performance	Exd II CT5 (Japan)
Degree of protection	IP65
Applicable cable	Cable outer diameter (10 to 13 mm) 4-core cable (sensor power, sensor output) CVV-S 0.75 square millimeter, 1.25 square millimeter, or 2.0 square millimeter. Interconnection resistance should be less than 10 ohm.
Operating temperature and humidity range	Temperature: -10 to 50 degrees C Humidity: 10 to 90%RH (0 to 50 degrees C) (No radical temperature or humidity changes and no condensation)
Power consumption	1W max.
Dimensions	158 (W) x 116 (H) x 68 (D) mm (excluding protrusions)
Weight	Approx. 1.2kg
Mounting method	Wall mounting

The above specifications are subject to change without notice.

If your specifications are nonstandard, refer to the delivery specifications.

10. Warranty

New Cosmos Electric Company Limited (New Cosmos) offers the following as the sole and exclusive limited warranty available to the customer.

This warranty is in lieu of, and customer waives, all other warranties of any kind or nature, expressed or implied, including without limitation, any warranty for merchantability or fitness for a particular purpose. The remedies set forth herein are exclusive.

New Cosmos warrants to the original purchaser and no other person or entity (the customer) that the gas detection product supplied by New Cosmos shall be free from defects in materials and workmanship for a period of one (1) year from the date of purchase. This warranty does not include consumables, such as fuses, filters, etc. Certain other accessories not specifically listed here may have different warranty periods.

After examination of an allegedly defective product returned to New Cosmos, with freight prepaid, should the product fail to conform to this warranty, the customer's only remedy and New Cosmos's only obligation shall be, at New Cosmos's sole option, replacement or repair of such non-conforming product or refund of the original purchase price of the non-conforming product. In no event will New Cosmos be liable for any other special, incidental or consequential damages or losses of any kind whatsoever, including but not limited to, loss of anticipated profits and any other loss caused by reason of non-operation of the product.

This warranty is valid only if the product is maintained and used in accordance with New Cosmos's instructions and/or recommendations. New Cosmos shall be released from all obligations under this warranty in the event repairs or modifications are made by persons other than its own or authorized service personnel or if the warranty claim results from physical abuse or misuse of the product.

11. Life Expectancy

- The design period longevity under a general environmental condition of this container is about five years from purchase. The design life expectancy after the guaranteed term passes is not the one to guarantee this. It is only a guide when a prescribed gas is proofread and it uses it. It might be impossible to use between the proofreading and the proofreading schedule for the next term.
- The life of the sensor after the date of purchase under a general environmental condition is recommended in the table below. The sensor may not detect gas correctly with the lapse of the sensor life. Replace the sensor at intervals of the sensor life.

The life of the sensor is specified on the condition that the sensor is serviced properly and that the sensor is not exposed to high-density gas or sensor poisoning gas. New Cosmos, however, does not guarantee the specified life of the sensor.

Model	Detection principle	Sensor life
KD-14A	Hot wire semiconductor	Approx. 5 years
KD-14B	Catalytic combustion	Approx. 3 years
KD-14C	Thermal conductivity	Approx. 5 years

12. Detection Principle

12-1. Catalytic Combustion

Catalytic combustion occurs on the catalyst even at a gas concentration below the lower limit of combustion due to the operation of the catalyst applied to the platinum coil. The electrical resistance of the platinum coil increases because of the rise in the temperature at this point. This difference is extracted as deviation voltage in the bridge circuit.

Detection of combustible gases is possible up to the lower explosion limit (LEL).

12-2. Hot Wire Semiconductor

When a metal-oxide semiconductor heated by a platinum coil adsorbs an electron-donating gas, such as a combustible gas, its electron concentration increases and the thermal conductivity of the semiconductor improves. As a result, the temperature of the semiconductor falls and the resistance of the platinum wire reduces. This difference is extracted as deviation voltage in the bridge circuit.

The feature of this sensor is its extreme sensitivity at low temperatures, which makes it suitable for sensitive detection.

12-3. Thermal Conductivity

As compared to when only air is present around the sensor, the heat dissipation state of the detection piece (heated to around 150°C) to which an inert substance is applied and sintered on a platinum wire varies with the increase or decrease in the thermal conductivity of the gas, and the temperature of the detection piece changes. This difference is almost proportional to the gas concentration, and therefore, the difference in the resistance of the platinum wire can be extracted as deviation voltage of the bridge circuit.

Although only gases whose thermal conductivity is different from air can be measured, it is possible to detect high-concentration gases between 0% and 100% by volume.

13. Glossary

Indicator / Alarm unit:	A unit that receives signals from the gas detector and indicates gas concentration and alarms.
Detector:	A unit that detects gas concentration and converts it to electric signals.
Backup power source device:	A device that supplies power to the gas detector, indicator / alarm unit in order to maintain its performance during a power failure.
Flow meter:	A meter to measure air flow in gas sampling pipe.
Gas collector:	A gas collecting probe that enhances gas collection efficiency and blocks water and dust.
Diffusion type:	A method to detect gas by utilizing convection and diffusion of gas.
Explosion proof construction:	A totally enclosed structure. When an explosive gas explodes in a container, the container can resist the pressure and prevent the ignition of explosive gases outside of it.
Preset alarm value:	A preset value for the alarm to go off when gas concentration reaches a certain value.
Gas to be detected:	Gas that is detected and indicated which sets off an alarm.
Detection range:	Range of gas's concentration that can be indicated and set off an alarm.
Alarm accuracy:	Difference between the preset alarm value and gas concentration when an alarm actually occurs or as the percentage of the difference compared to the preset alarm value.
Response time:	Time it takes from when the gas detector is exposed to a gas with a concentration higher (lower) than the preset alarm value until an alarm goes off.
Temperature range:	Range of temperature where the equipment can perform its functions.
Maintenance and inspections:	Work to guarantee that the equipment perform its required functions.
Calibration gas:	Gas used to calibrate scales of the equipment.
Peak hold:	A function to constantly update and hold the peak value of input signals.
Hazardous area:	An area in a plant or facility with a hazardous atmosphere where explosive gases may mix with air and explode or start a fire. An area where gas may be present.
Non hazardous area:	An area where electric equipment that has no potential to create a hazardous atmosphere.
Hazardous atmosphere:	Atmosphere within the explosive limit where explosive gas and air are mixed.
LEL:	Lower Explosive Limit. The lowest concentration of flammable gas that will explode when mixed with air and ignited.

(Quoted from gas detection terms and detector tube gas meter terms used by the Industrial Gas Detector Alarm Association)

Manual Revision History

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