Diffusion Type Gas Detector

KD-5A

(Explosion-proof structure d3aG4)

KD-5B

(Explosion-proof structure d2G4)

Instruction Manual

- Keep this instruction manual where it is readily accessible.
- Thoroughly read this intruction manual before using the equipment so it can be used safely and correctly.

NEW COSMOS ELECTRIC CO.,LTD.

Instruction Manual No.
GAE-010-01
November 2006

Table of Contents

1.Introduction

Thank you for purchasing the diffusion type Gas Detector Model KD-5A/KD-5B to be used in conjunction with COSMOS Gas Detection and Alarm System. This Gas Detector is designed to detect the leakage of combustible gas and other types of gases using a Catalytic combustion on a platinum filament or Hot-wire semiconductor sensor.

This Manual describes the specifications, functions and installation instructions, carefully read and thoroughly understand this manual before operating the Gas Detector Model KD-5A/KD-5B. Also read the instruction for the indictor unit.

2.Safe Operation

Carefully read the following so you can use the equipment correctly.

Read and understand all applicable laws and regulations and ensure that you are in complete compliance with the said laws and regulation before installing or operating the equipment. Installation, wiring, and other works concerning the equipment should be carried out by qualified persons, following all applicable federal, state, and local health and safety laws and regulations including OSHA.

The following safety symbol are listed in this manual and must be observed without fail:

Symbols

The following symbols are used for safety purposes:

⚠ **DANGER** : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury

⚠ **WARNING** : Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury

⚠ **CAUTION** : Indicates a potentially hazardous situation where, if not avoided, may result in minor injury or moderate injury. It may also be used to alert against unsafe practices.

MEMO : Operational advice and or instruction.

⚠ **WARNING**

- Ground the equipment in order to prevent electric shocks.
- In case of an alarm, carry out your predetermined measures for gas leakage.

⚠ **CAUTION**

- Do not disassemble, alter the equipment, or change its structure and electric circuit. It may affect the performance of the equipment.
- If you control the interlock of external equipment etc. with equipment's output signal, we are not responsible for any injuries or damages caused by it.
- The equipment is not waterproof. Install it in a place where it will not get wet.
- Follow all related laws and regulations when using the equipment.
- Do not use any equipment that generates electrical noises such as cellular phones or radio-communications within 30 cm of the alarm panel.

3.Unpacking

The following standard components are packed together with the Gas Detector/alarm. Carefully check the contents against the list when unpacking. If any components are missing or damaged, contact our dealer / agency.

Diffusion type gas detector (KD-5A or KD-5B)	Quantity
Pressure tight packing set※1 ・Pressure tight packing φ11 ～ 15 1 each ・Flat washer φ12・φ14・φ15 2 each	1 set per 1 gas detector unit
Fixing plate (stand・saddle)	1 set per 1 gas detector unit
Attachment metal fixture set ・M6 hexagon bolt 2pcs.※2 ・φ6 nut 2 pcs.※2 ・M5 screw 2 pcs.※3 ・Crimp contact 3 pcs.	1 set per 1 gas detector unit
Hex key wrench (1 each for M2, M4, M5)	1 set
Instruction manual	1
Rainproof cover (KW-15)	Optional item
Rainproof cap (KW-22)	Optioanl item

※ 1 use them for cable entry when wiring with pressure tight packing. φ12 pressure tight packing (1 pc.) and φ12 flat washer (2 pcs.) are provided as standard with the gas detector unit.

※ 2 use to fasten the fixing plates on the wall

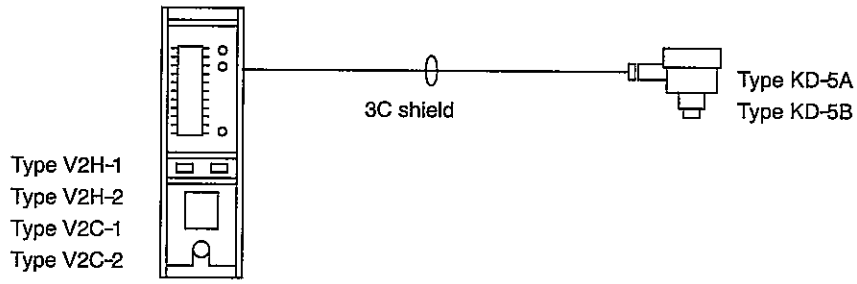
※ 3 use to fasten the detector unit on the fixing plates

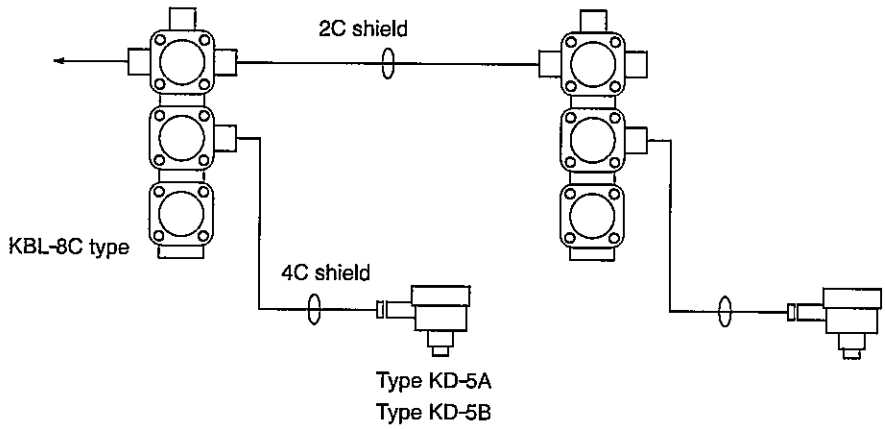
4.Composition of System

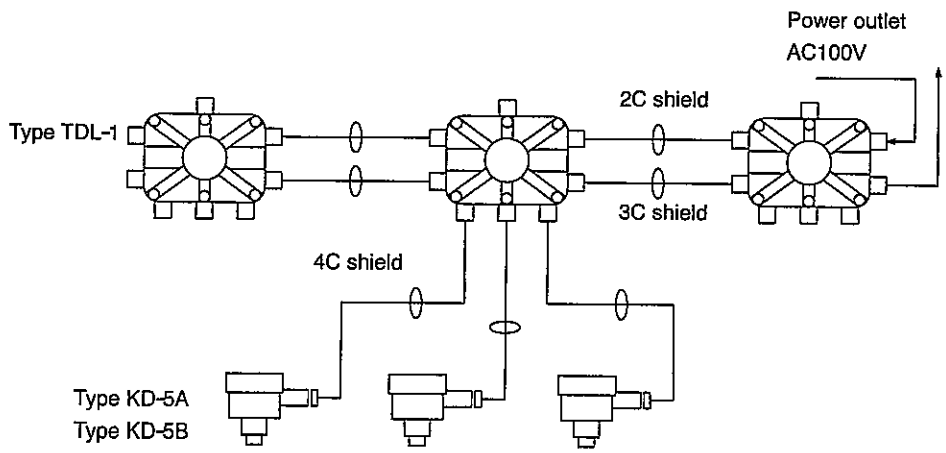
The Diffusion type gas detector unit KD-5A/KD-5B converts gas concentration to an electrical signal.
The gas detection system is composed of a Gas Detector, Gas Indicator, and Gas Alarm unit, or power line carrier type gas detection system composed of a loop between the Gas Detector and Signal Converter.

Applicable Gas Indicator unit :Model V2H-1, V2H-2, V2C-1, V2C-2
Applicable Signal Converter : Model KBL-8C, TDL-1

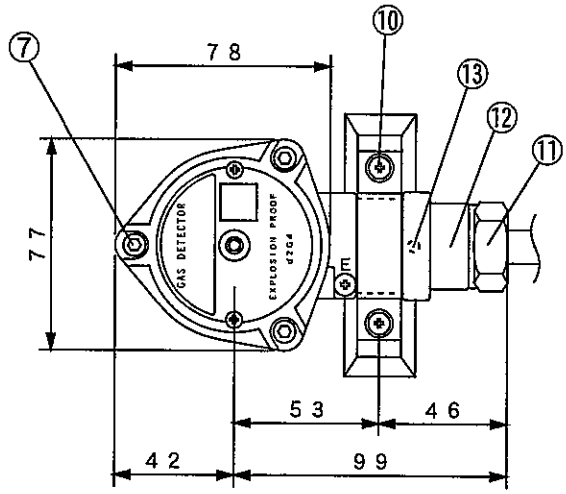
System composition

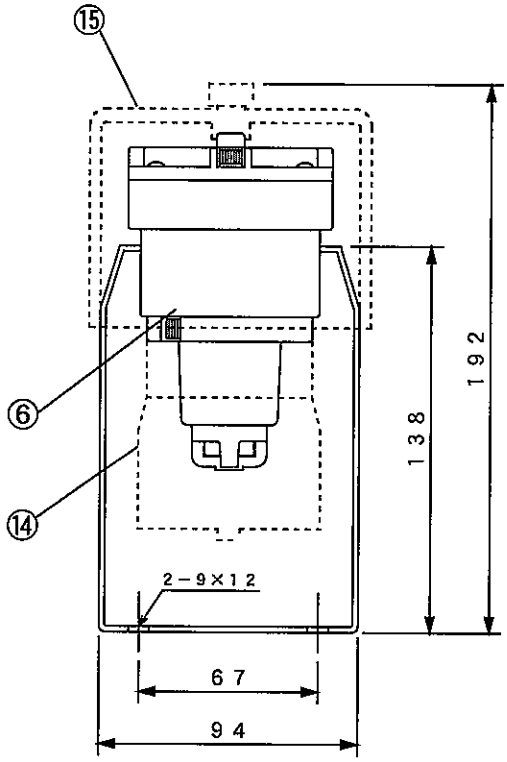


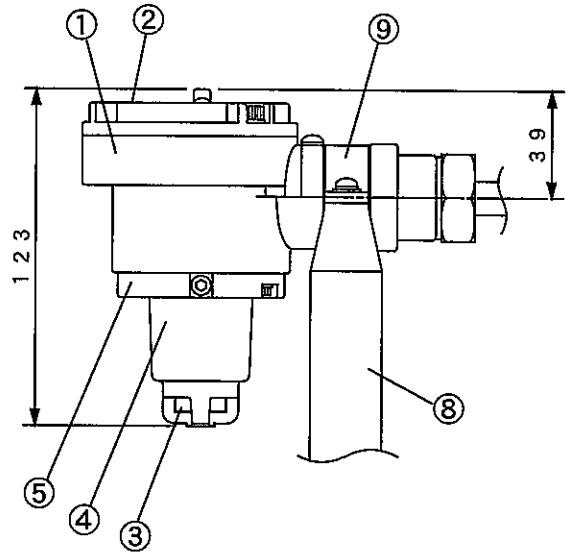




5.Exterior view and Dimension







#		Remarks
1	Terminal box	
2	Terminal box cover	
3	Sensor unit	
4	Sensor guard	
5	Guard attachment ring	
6	Hex socket bolt M4	Fastens the sensor guard(use the M 4 hex key wrench).
7	Hex socket bolt M5	Fastens the terminal cover(use the M 5 hex key wrench).
8	Mount arms (stand)	
9	Saddle	
10	Pan head screw	
11	Gland	
12	Gland cover	
13	Hexagon socket head bolt	Fixes the gland(use the M2 hex key wrench).
14	Rainproof cap	Optional item
15	Rainproof cover	Optional item

6.Installation

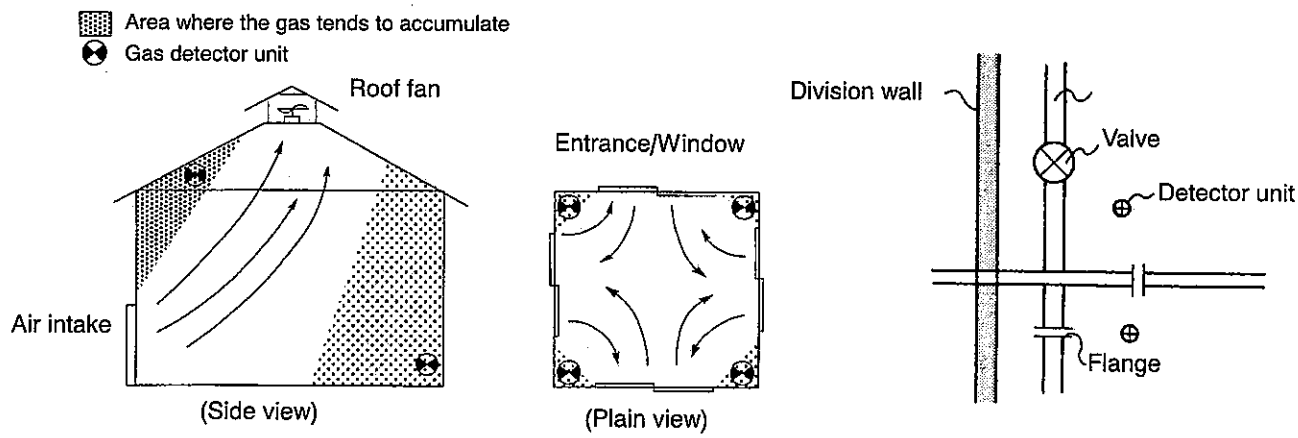
⚠ CAUTION

- The gas detector unit must be handled carefully to avoid damaging the explosion proof construction.
- Do not install the Gas Detector in locations listed below
  - Location where the ambient temperature may drop lower than –10°C or exceed 60°C.
  - Location where dew condensation may occur.
  - Location where it could be exposed to direct water.
  - Location where corrosive gases may exist.
- Do not install the Gas Detector in an atmosphere contaminated with silicon compounds, as silicon could poison and/or impair the sensitivity of the sensor.
- The Gas Detector should be installed in a location free from vibration, and not nearby a source of electrical noises.
- Do not install in a location where an extreme temperature fluctuation may occur.
- Avoid severe shocks and/or mechanical impact to the Gas Detector.
- When the Gas Detector is to be installed in an outdoor location, make sure to use a rain protective cover or cap (Optional item must be purchased separately).
- The height for installation is an important factor and related to the gas to be detected, refer to table below.

Kind of gas	Installation height	Remarks
Heavier than air (such as LPG)	About 10cm above the floor level	For maintenance purpose allow at least 7cm space from floor level.
Equivalent to air (such as CO)	75~150cm above floor level	Careful consideration of the S.G. and environment of location.
Lighter than air (such as town gas)	Near the ceiling	Select a location where maintentance can be easily conducted.

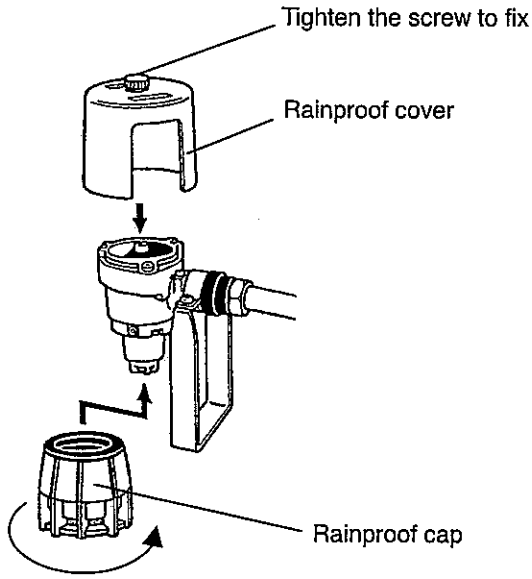
Installing location

●The gas detector unit should be installed in a location where the gas tends to accumulate.



Indoor installation **Outdoor installation**

How to install Rainproof cover and Rainproof cap



7.Wiring

7-1. Wiring procedures

●All wiring work conducted in hazardous areas must be pressure-tight flame/explosion proof wiring.

Cable procedures

> **⚠ CAUTION**
>
> Flame/explosion proof wiring must be installed only by a qualified electrician trained and experienced with flame/explosion proof construction and by a trained gas-detection personnel. It must be in complete compliance with applicable government, Health and Safety Laws and Regulations.

●Use a vinyl or rubber insulated electric cable, or an armored cable (CVVS 1.25mm2 – 2.00mm2) depending on the environment of wiring, the cross-section of the cable should be circular with a smooth sheath, and to protect the electric cable from flame/explosion it should be laid in a steel conduit pipe line, or the electric cable could be laid in a metal or concrete duct

●It is recommended not to make connection between cable, and in case a branching circuit is required it should be made by using a pressure-tight explosion proof junction box.

●When a pressure tight packing method is employed for the cable inlet, select the applicable packing to match the outer diameter of the electric cable (refer to table below), to prevent the propagation of flame and explosive gases, make sure to securely tighten the packing material and lock the fitting with a set screw.

O.D. of cable	Packing hole diameter	Washer hole diameter
Φ10－Φ10.9	Φ11	Φ12
Φ11－Φ11.9	Φ12	Φ12
Φ12－Φ12.9	Φ13	Φ14
Φ13－Φ13.9	Φ14	Φ14
Φ14－Φ14.9	Φ15	Φ15

7-2. Wiring and Connections

Power supply circuit

●An exclusive circuit breaker must be installed on the power supply circuit to the gas Indicator (Gas Alarm unit.) / signal converter.

Electric cable between Gas detector unit and Indicator unit

●Use CVVS type cable (1.25mm^2~2.00mm^2) .

●The length of the electric cable between the gas detector unit and the indicator unit should be within the followings.

- Conductor of cross-section area 2.00mm^2 within 1,000 meter
- Conductor of cross-section area 1.25mm^2 within 600 meter

⚠ WARNING

- Should the sensor cover need to be opened for maintenance, make sure to isolate the power supply to avoid the danger of igniting the hazardous atmosphere.
- It is recommended to have the sensor connected to a good ground.

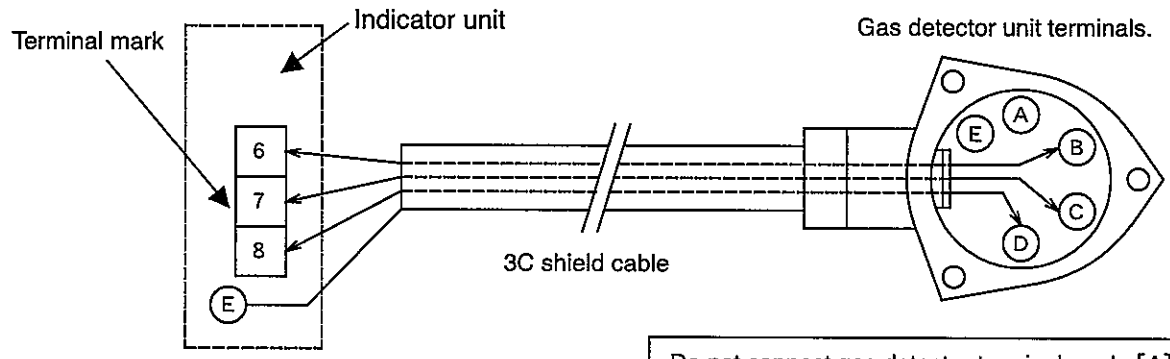
⚠ CAUTION

- Confirm and make sure that the wiring connection between the Gas Indicator unit an Gas Detector are connected to the correct terminals.
- The connecting cable wiring should not be laid near electric power lines, large capacity transformers or electric motor.
- The Flame/Explosion proof wiring must be installed only by a qualified electrician trained and experienced with flame/explosion proof construction and by trained gas-detection personnel. It must be in complete compliance with applicable government and local health and safety laws and regulation.

MEMO

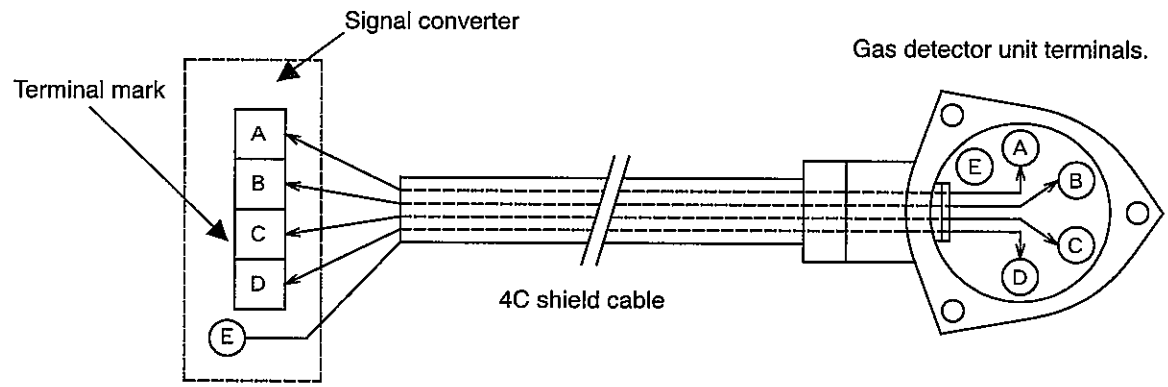
Do not connect the shield cable to the E of the detector unit if the system is grounded with the indicator unit or signal converter in order to avoid double groundings.

Connection with the indicator unit V2H-1 · V2H-2 · V2C-1 · V2C-2

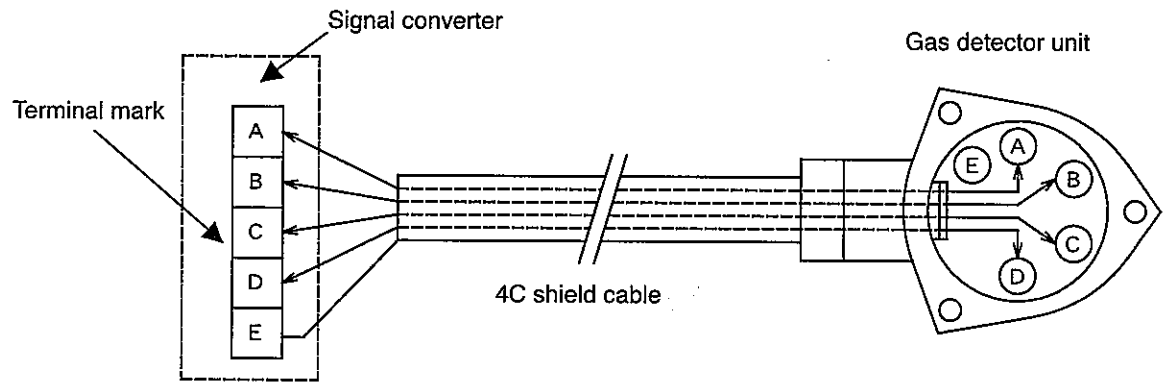


Do not connect gas detector terminal mark [A]

Signal converter KBL-8C



Signal converter TDL-1



8.Notes to users

⚠ CAUTION

Make sure that all parts are correctly connected before turning on the power. Check that the terminals of the gas detector, the indicator and the alarm unit are correctly connected.

When gas leaks

⚠ DANGER

Once the presence of combutible gases has been detected, take all appropriate precautions to avoid fire and explosion. Do not operate electric ON/OFF switch as the spark of such switch operation could ignite the gas in the atmosphere.

⚠ CAUTION

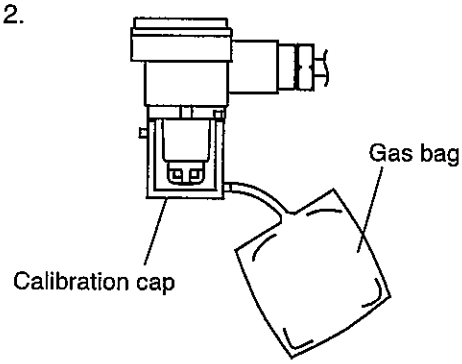
In case of an alarm, carry out your predetermind measures for gas leakage.

MEMO

- When gas leaks indoors, open windows and doors for better ventilation.
- Locate where the gas leakage is from and shut off the gas flow immediately if such can be conducted without any risk.

9.Maintenance and Inspection

9-1. Maintenance and Inspection

	Frequency		Inspection method
Daily inspection	More than once a month	Visual inspection	●Check for dirty, clogged and corroded sintered metal ●Check for corroded Gas Detector housing ●Check for corroded mount arms If any irregularities are noted with the above visual check, arrange to replace the damaged component or parts.
	More than once every 2-3 months	Performance test using actual gas	Apply the calibration gas to the gas detector and check if an alarm works. 9 – 2 :How to make the calibration gas⇒Refer to page 12. 
		Situation around the gas detector	
Periodic inspection	More than once a year	Contact our dealer / agency.	

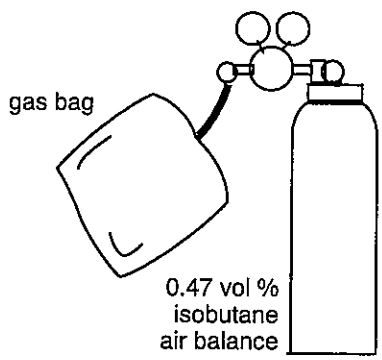
⚠ CAUTION

In order to maintain the reliability of the gas detection system, the maintenance and inspection are most important. The inspection using combustible and toxic gases should be conducted with special attention and care. Ask your authorized dealer for information regarding maintenance and periodical inspection.

9-2. Preparation of Calibration Gas (used for actual gas performance test)

(1)If you have a standard gas cylinder

Fill a gas bag with standard gas as shown in the right side. Completely vacuum the air from the bag before filling the gas because the air in the bag may cause an error of the gas concentration.



MEMO

Use gas sampling bag of urethane material, and in order to allow the interior of the bag to become the same as surrounding atomosphere, leave the gas sampling bag at least for 30 minutes after collecting the calibration gas mixture.

(2)If you do not have a standard gas cylinder

Make 0.47vol% (26%LEL) calibration gas by diluting pure gas (iso-butane 99%) with the air using the calibration equipment kit.

MEMO

The calibration gas can be used to check the alarm function. Check the concentration using Gas Detector XP-311 or a similar device before using the gas for calibration of the detector.

⚠ 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 a gas bag to an iso-butane 99vol% cylinder and draw a little more than you actually need.

Bend back the hose and pinch with a pinch cock so the gas does not leak from the bag.

2) Drawing a fixed amount of raw gas

Connect a 10ml syringe to a gas bag and draw 4.7ml of raw gas. (Draw a little more than you actually need then discharge the excess.)

3) Transferring raw gas into a quantitative pump

Connect a syringe to the inlet of a quantitative pump then pull out the pump's piston. Raw gas in the syringe is sucked into the pump. Remove the syringe and pull the piston all the way out (100ml).

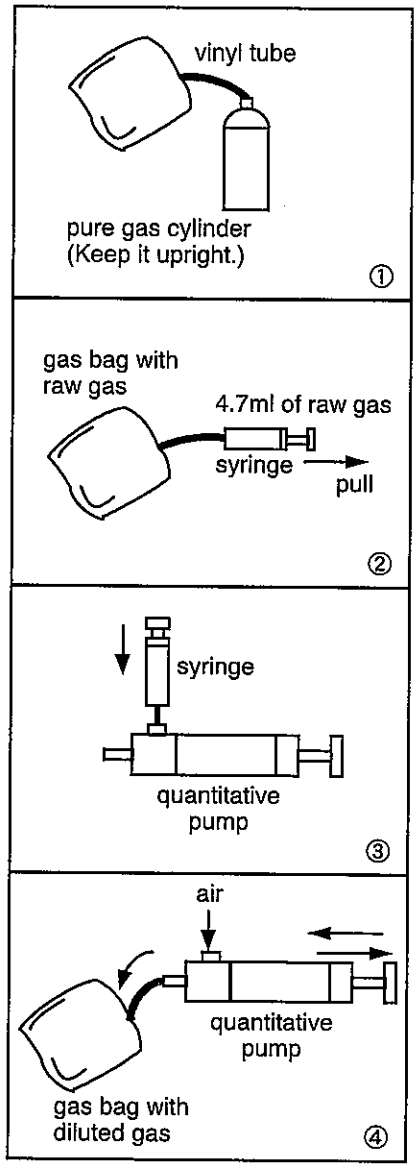
4) Making diluted gas

Connect an empty gasbag to the outlet of the quantitative pump then push in the pump's piston.

Move the piston back and forth nine times to add air in order to make diluted gas.

MEMO

If you take 4.7ml of raw gas and move the quantitative pump's piston back and forth ten times (a back-and-force motion: 100ml),
4.7ml/(100ml×10)=0.0047
0.47vol% diluted gas is made.
Is-obutane's lower explosive limit (LEL) is 1.8vol%.
0.47/1.8×100=26.1
26%LEL diluted gas is made.



9-3. Replacing the Gas Sensor

⚠ WARNING

- Turn OFF the power of Indicator / Alarm unit before opening the cover of the gas detector.
- Opening the cover of the gas detector when the power is on may cause a fire.

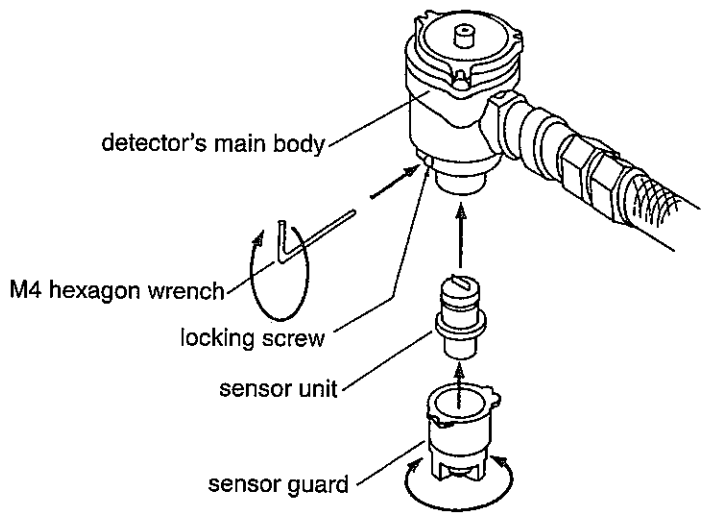
⚠ CAUTION

Always contact our dealer when replacing the sensor because improperly doing so may decrease the equipment's performance. Zero and span adjustments are also necessary after replacing the sensor.

1) Turn the power supplied to the Gas Indicator unit or Signal Converter OFF position.
2) Use a hex-key wrench (M4) and loosen the screw.
3) Rotate the sensor guard counterclockwise about 30° and pull off the sensor guard.
4) To remove the sensor, pull the sensor downward and take if off.
5) Take a new sensor and install in reverse order.
6) Attach a new sensor unit and turn the sensor guard to the right until it fits properly.
   Use the hex-key wrench and tighten the screw.
7) Turn the power switch of the Gas Indicator unit or Signal Converter ON position.
8) When the sensor is replaced, it is necessary to conduct zeroing and span adjustments.

MEMO

Return the old and used sensor to your authorized dealer or representative.



10.Specifications

Model	KD-5A	KD-5B
Sampling method	Diffusion type	
Type of sensor	Catalytic Combustion Sensor · Hot-wire Semiconductor Sensor	
Detecting range	As per specification	
Number of cabel cores	As per specification	
Applicable cable	1.25 ～ 2mm^2 CVVS etc.	
Explosion proof	d3aG4 (for H2)	d2G4
Operating temperature and humidity	−10℃ ～ 60℃ 85%RH (subject to no dew condensation)	

11.Warranty

New Cosmos Electric Company Limited (New Cosmos) offers the following as the sole and exclusive limited warranty available to 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 (customer) that gas detection product supplied by New Cosmos shall be free from defects in materials and workmanship for a period of fourteen (14) months from the date of shipment from New Cosmos, or one (1) year from the date of first use, whichever occurs first. 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 allegedly defective product return to New Cosmos, with freight prepaid, should the product fail to conform to this warranty, 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.

We warrant the equipment against defects for one full year from date of purchase. If the equipment malfunctions after it has been installed and is used as described in the installation instructions, instruction manual, and specifications during the warranty period, we will repair the equipment based on the terms described in the warranty. See the warranty for detailed information.

The warranty shall be invalidated if the equipment is used improperly or not used as described in the instruction manual or installation instructions.

12.Principle of Detection

Catalytic Combustion Sensor

The sensor consists of a sensing element, created by depositing a carrier on a coil of platinum wire, when a combustible gas comes into contact with the gas sensor element, the gas is oxidized by the catalytic action of the sensor, even though the level of concentration is below the lower explosion limit.

With the rise of temperature generated, the electric resistance of the platinum coil increases, and to seek the difference of potential by measuring the variation of the resistance with a Whetstone bridge circuit. Making it possible to detect combustible gases below lower explosion limit (LEL).

Hot-wire Semiconductor Sensor

The hot-wire semiconductor sensor measures the change of electrical conductivity initiated by adsorption of the electron of combustible gases onto the surface of the metal oxide semiconductor heated with a platinum filament, the electron concentration increases, and improves the conductivity of the semiconductor. As a result, the temperature of the semiconductor declines, and the resistance of the platinum filament decreases, to seek the deviation voltage with a Whetstone bridge.

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 dangerous atmosphere where explosive gases may mix with air and explode or start a fire. An area where gas may be present.
Non area	: An area where electric equipment that has no potential to create a dangerous atmosphere.
Dangerous 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

Edition No.	Date	Revisions
GAE-010	August 2002	0
GAE-010-01	November 2006	1

Additional copies of this Operation Manual are available.

Contact the following address for ordering information.

Distributor:

Manufacturer:

New Cosmos Electric Co., Ltd.
2-5-4 Mitsuya-naka Yodogawa-ku
Osaka 532-0036, Japan
Phone 81-6-6309-1505
Fax 81-6-6308-0371
Email e-info@new-cosmos.co.jp
http://www.new-cosmos.co.jp

New Cosmos Electric Co., Ltd.