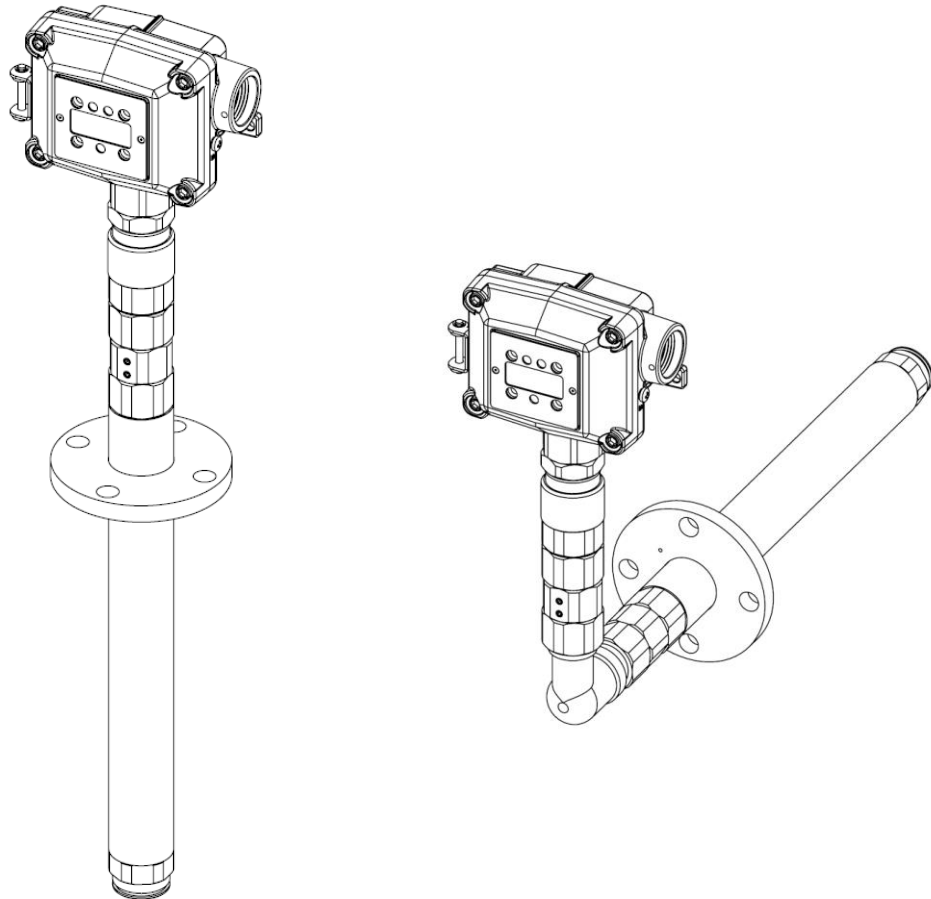


# Diffusion Type Gas Detector

## KD-12HT series

### Instruction Manual



- Keep this manual for easy reference.
- Carefully read this manual prior to use.
- This manual describes the standard model. If your unit contains customer-specific options, the delivery specifications will supersede this manual.

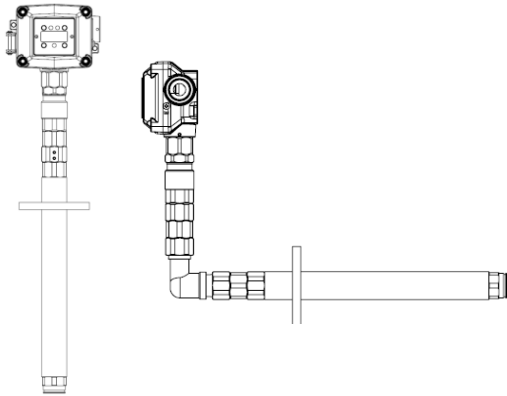


**NEW COSMOS ELECTRIC CO., LTD.**

Instruction Manual No.  
GAE-162-02  
September 2022

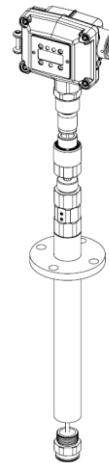
- **Unit Dimensions and Components**

Pages 5 to 9



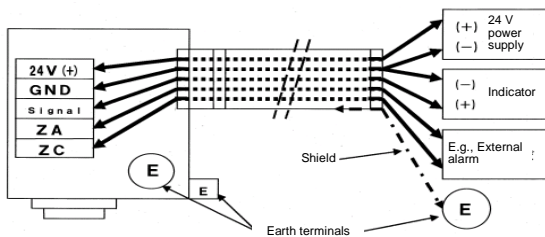
- **Sensor Unit Replacement**

Pages 30 and 31



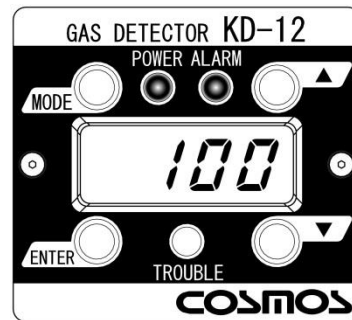
- **Wiring**

Pages 13 to 17



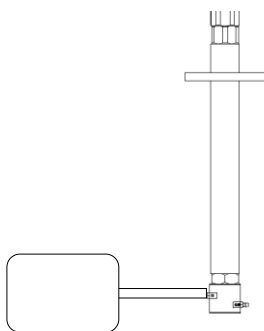
- **Display and Operation Modes**

Page 19



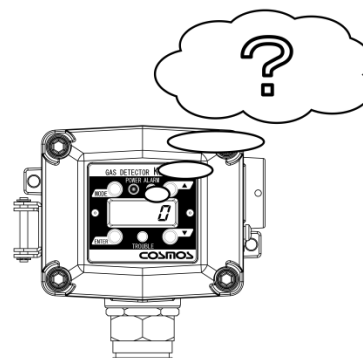
- **Maintenance, Operational Checks/Procedures**

Pages 21 to 31



- **Troubleshooting**

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# 1. Introduction

- Thank you for purchasing the New Cosmos KD-12HT series diffusion type gas detector. Before use, please read this instruction manual carefully to ensure safe and reliable operation.
- There are two models depending on the probe shape (straight and L-shaped), KD-12HT-T and KD-12HT-L. In addition, two sizes of the flanges are available depending on the location in which the detector is installed.
- The KD-12HT detector can detect gas generated inside a heated area (e.g., drying furnace) during manufacturing process. It is intended for use in industrial facilities for the early detection of a gas leak/centralized gas monitoring by relaying the gas concentration value as an analog signal to an external device while simultaneously displaying the gas concentration value on its display.  
If gas concentrations reach a preset level, the red ALARM LED will start blinking and activate an external relay contact, thus helping prevent incidents such as fires, and explosions.
- Periodic maintenance is essential to maintain the reliability of your detection system. Perform periodic maintenance in accordance with the instructions given in this manual.

## Symbols Used in this Instruction Manual

This manual uses Danger, Warning, Caution and Note symbols to draw attention to procedures, materials, methods, and processes, which require particular attention.

 <b>DANGER</b>	Indicates an imminently hazardous situation that can result in death or serious injury.
 <b>WARNING</b>	Indicates a potentially hazardous situation that may result in death or serious injury.
 <b>CAUTION</b>	Indicates a hazardous situation that may result in minor injury or property damage.
<b>NOTE</b>	Provides information on product handling.

## 2. General Precautions

- Carefully read this manual prior to use.
- To ensure safe operation, follow the precautions below.
- Only use this product in accordance with the applicable laws and regulations.

### **WARNING**

- Ground the detector to prevent electric shocks.
- In the event of a gas leak alarm, follow safety procedures in accordance with your company's regulations.
- Before opening any part of the gas detector, ensure no explosive atmosphere is present.
- The cable gland (not included) shall be ATEX/UKEx/IECEX-certified as "Flameproof Enclosure 'db'", and shall meet the below special conditions of use.

### **Special conditions of use**

- If used in an ATEX hazardous area, an ATEX-certified cable gland (not included) must be used in accordance with EN IEC 60079-0:2018 and EN 60079-1:2014.
- If used in an UKEx hazardous area, an UKEx-certified cable gland (not included) must be used in accordance with EN IEC 60079-0:2018 and EN 60079-1:2014.
- If used in an IECEx hazardous area, an IECEx-certified cable gland (not included) must be used in accordance with IEC 60079-0:2017 Edition 7.0 and IEC 60079-1:2014 Edition 7.0.
- Fasteners (M5x16 hexagonal head screws) must have a yield stress of at least 450 N/mm<sup>2</sup>.
- Cable entry requirements for cable gland:

Thread size:	G3/4 or PF3/4
Pitch:	1.81 mm
Minimum depth of engagement:	10.86 mm
Minimum threads engaged:	6 threads
- Ambient temperature

Main body:	-10°C to 50°C
Probe:	0°C to 160°C
- The dimensions of the flameproof joint between the case and the case cover of the KD-12 flameproof housing must meet the minimum requirements specified in EN/IEC 60079-1. Please contact the manufacturer for inspection, repair or adjustment of the flameproof joint.
- If any damage or deformation of the enclosure or joint surfaces is found during maintenance/inspection, cease using the detector and contact New Cosmos or its authorized representative.
- Be careful not to damage the gas detector during installation/maintenance. Keep joint surfaces clean and free from any damage. Contaminates such as scratches, fingerprints, dirt and oil may adversely affect the explosion-proof characteristics of the device.
- Use a conductor with a cross-sectional area of at least 4mm<sup>2</sup> for grounding the detector.

 **CAUTION**

- Wiring and installation should only be performed by a qualified electrician with knowledge of wiring/installation procedures.
- Explosion-proof wiring and installation should only be performed by a qualified electrician with knowledge of explosion-proof components/installation procedures.
- Do not disassemble, modify, or alter the structure of this unit or its electrical circuits. Doing so may compromise the explosion-proof nature of the product.
- Do not use the product in a place or near a place where silicone sealant/vapor may be present. Doing so may compromise the performance of the product.

### 3. Package Contents

A standard package consists of the following items. If any items are missing or damaged, please contact New Cosmos or its authorized representative for replacement.

Standard package	Optional Items
Gas detector Accessory kit *1 Gasket (dia. 10-11)   x 1 pc Gasket (dia. 12-13)   x 1 pc Washer (dia. 12)       x 1 pc Flange gasket (PTFE) x 1 pc  Hex wrench (2 mm)        x 1 pc *2 Hex wrench (4 mm)        x 1 pc *2  Instruction manual *2 Magnetic stick (MJ-1) *2	Calibration cap (GCP-09) *3 Gas calibration kit (Z-001K) 2-bulb hand pump Capillary for 2-bulb hand pump

\*1. A gasket (dia.11-12) and a washer (dia.14) have been preinstalled in the detector when delivered.

\*2. One pc is provided per order.

\*3. KD-12 series optional items

#### **WARNING**

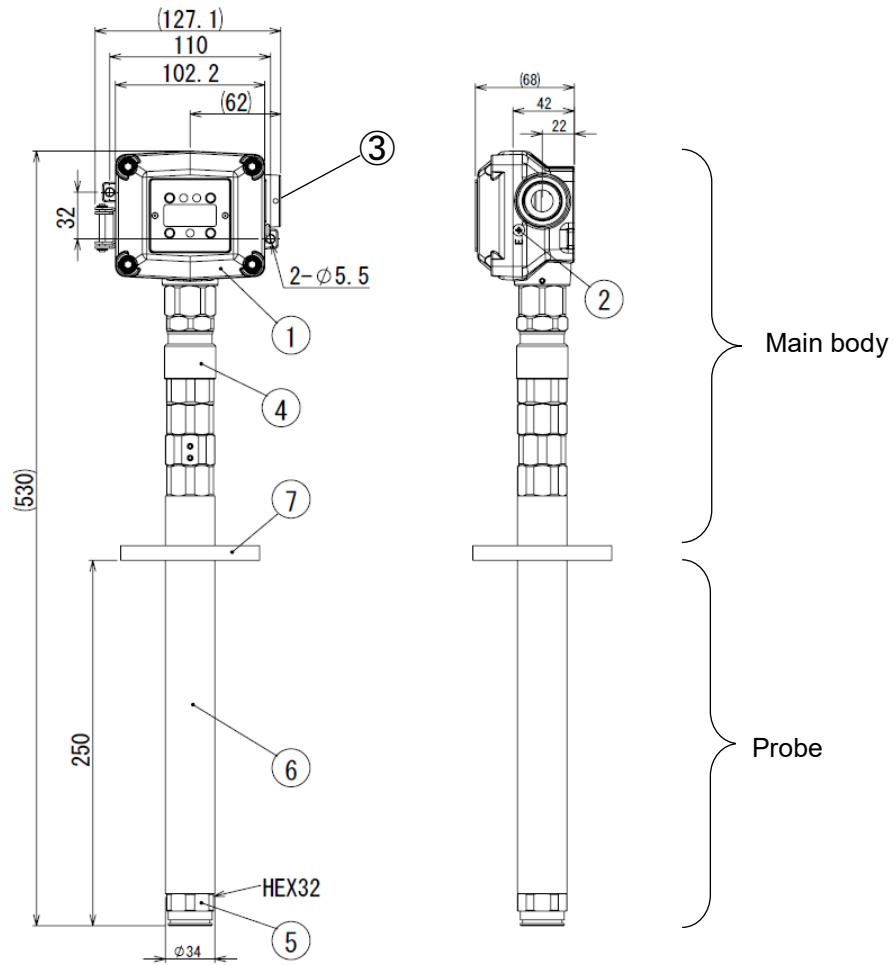
- Do not use the magnetic stick for any purposes other than its intended use.
- Keep in mind that when the magnetic stick attracts magnetic objects, tools, iron pieces, etc., your hands may be pinched and injured.
- For those allergic to metals, skin may become chapped or irritated if the magnet comes in contact with bare skin. If symptoms appear, do not touch the magnet.
- Magnets easily fracture and corrosion may form from the fractured surfaces. Particles/chips may enter the eye and cause injury. Do not drop the magnetic stick or bump it against a hard surface.
- The components of the magnet may dissolve in water. Do not drink water exposed to the magnetic stick.
- Keep the magnetic stick away from electronic medical devices such as cardiac pacemakers. Failure to do so may impair the normal operation of such devices.

#### **CAUTION**

- Keep the magnetic stick away from magnetic tapes, floppy disks, and bank/credit cards. Failure to do so may magnetize them, making them unusable.
- Keep the magnetic stick away from high-precision devices such as personal computers and watches. Failure to do so may cause a device failure.

## 4. Unit Dimensions and Components

### 4.1. Exterior Appearance (KD-12HT-T)



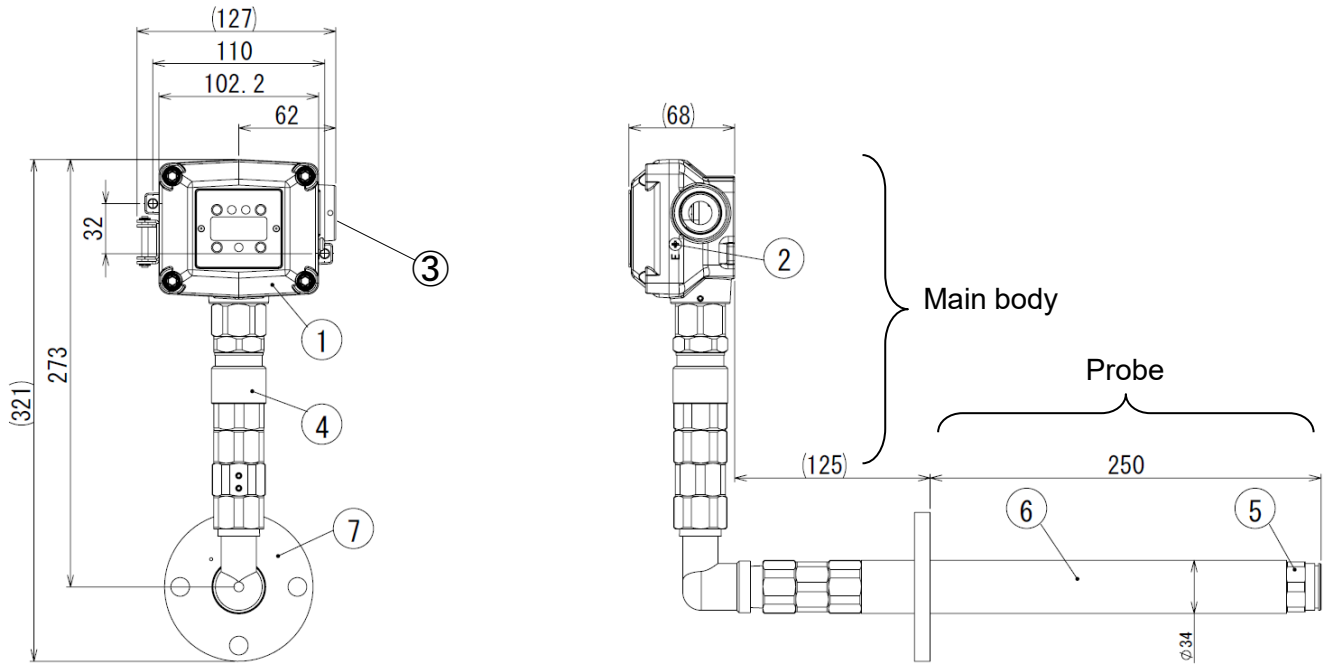
(Dimensions are in mm)

Item	Component	Description/Function
1	Main body	
2	Earth terminal (external)	Used for grounding the frame
3	Cable entry	Thread size: G3/4 or PF3/4 Pitch: 1.81 mm Min. depth of engagement: 10.86 mm Min. engaged threads: 6 threads Applicable cable gland*1 must be provided by end user.
4	Cable gland	Used for securing the sensor unit cable Thread size: G3/4
5	Sensor unit	Incorporates a built-in gas sensor
6	Probe (straight)	Connects the main body and the sensor unit Probe is to be inserted into a furnace
7	Flange	JIS B 2220 Nominal pressure: 5K Nominal size: 25A or 50A

\*1. Cable gland should be ATEX/UKEx-certified according to EN IEC 60079-0:2018 and EN 60079-1:2014 for use in an ATEX/UKEx hazardous area, and IECEx-certified according to IEC 60079-0:2017 Edition 7.0 and IEC 60079-1:2014 Edition 7.0 for use in an IECEx hazardous area.



## 4.2. Exterior Appearance (KD-12HT-L)

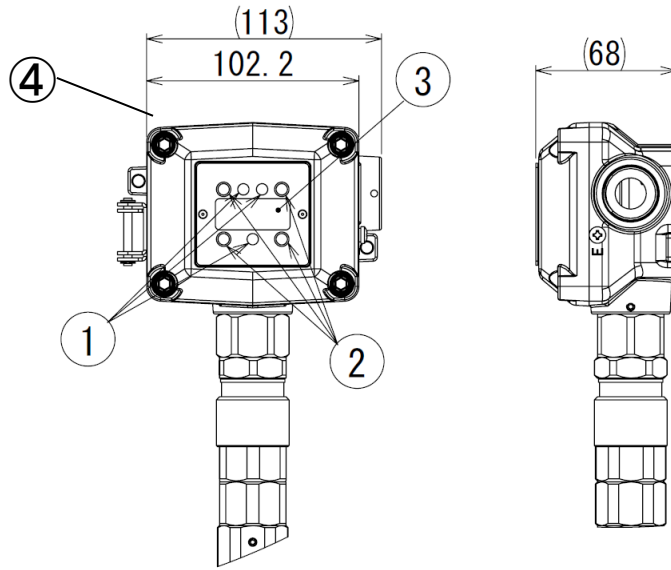


(Dimensions are in mm)

Item	Component	Description/Function
1	Main body	
2	Earth terminal (external)	Used for grounding the frame
3	Cable entry	Thread size: G3/4 or PF3/4 Pitch: 1.81 mm Min. depth of engagement: 10.86 mm Min. engaged threads: 6 threads Applicable cable gland* <sup>1</sup> must be provided by end user.
4	Cable gland	Used for securing the sensor unit cable Thread size: G3/4
5	Sensor unit	Incorporates a built-in gas sensor
6	Probe (L-shaped)	Connects the main body and the sensor unit Probe is to be inserted into a furnace
7	Flange	JIS B 2220 Nominal pressure: 5K Nominal size: 25A or 50A

\*1. Cable gland should be ATEX-certified according to EN IEC 60079-0:2018 and EN 60079-1:2014 for use in an ATEX hazardous area, and IECEx-certified according to IEC 60079-0:2017 Edition 7.0 and IEC 60079-1:2014 Edition 7.0 for use in an IECEx hazardous area.

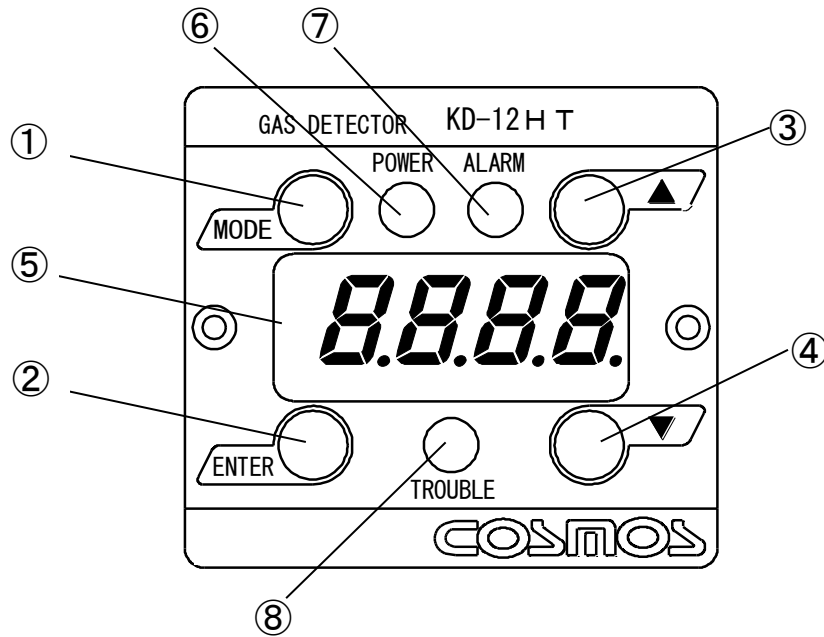
### 4.3. Exterior Appearance (Main Body)



(Dimensions are in mm)

Item	Component	Description/Function
1	Status LED (3 places)	Indicate the status of the unit: power (green), alarm (red), and fault (amber)
2	Magnetic switch (4 places)	Insert the magnetic stick into each magnetic switch opening to operate
3	Display	Displays the gas concentration, parameter value and status message
4	M5x16 hexagonal head screws (4 places)	Secures the case cover Use 4mm hex key wrench (included).

## 4.4. Display and Controls

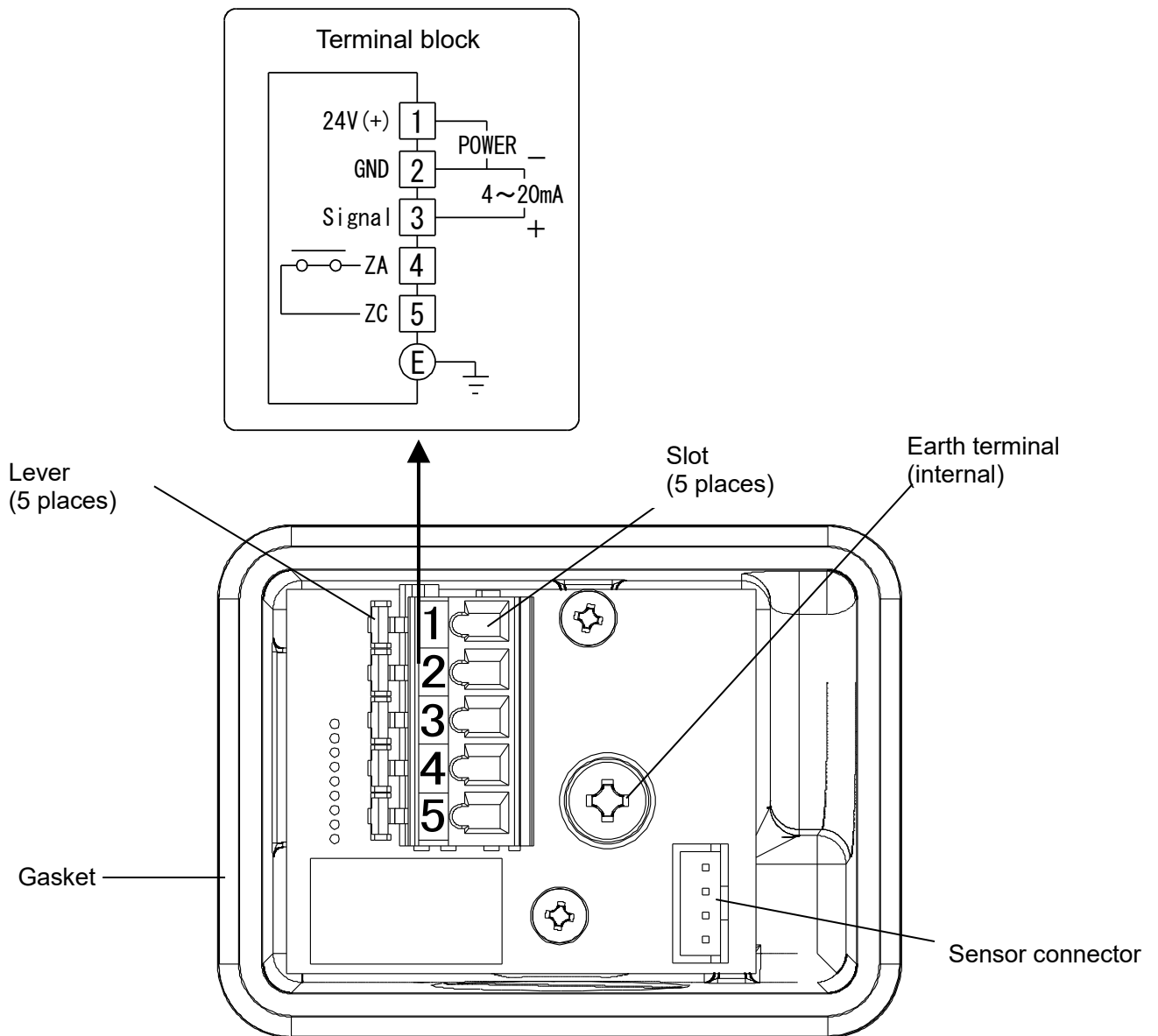


<b>Magnetic Switches</b>		
Use the magnetic stick (MJ-1) to operate the magnetic switches.		
Item	Component	Description/Function
1	MODE switch	Changes the operation mode or cancels the current operation
2	ENTER switch	Confirms a setting or executes an operation
3	▲ (up) switch	Increases the parameter value
4	▼ (down) switch	Decreases the parameter value

Item	Component	Description/Function
5	Display	Displays gas concentration, parameter value and status message

<b>Status LEDs</b>		
Item	Component	Description/Function
6	POWER LED, green	When lit, the unit is on
7	ALARM LED, red	When lit, alarm notification
8	TROUBLE LED, amber	When lit, fault (device error) detected

## 4.5. Terminal Block



Item	Name	Description/Function
1	24 V (+)	Power supply voltage (+)
2	GND	Power supply voltage (-) and analog signal (-) common
3	Signal	4-20mA analog signal (+)
4	ZA	External relay contact
5	ZC	
ⓔ and Ⓧ	Earth terminal (internal)	Used for grounding the frame

## 5. Installation

### 5.1. Guideline



#### WARNING

- Before opening any part of the gas detector, ensure no explosive atmosphere is present.
- The cable gland (not included) shall be ATEX/UKEx/IECEX-certified as “Flameproof Enclosure ‘db’”, and shall meet the special conditions of use on page 2.
- If used in an ATEX hazardous area, an ATEX-certified cable gland (not included) must be used in accordance with EN IEC 60079-0:2018 and EN 60079-1:2014.
- If used in an UKEx hazardous area, an UKEx-certified cable gland (not included) must be used in accordance with EN IEC 60079-0:2018 and EN 60079-1:2014.
- If used in an IECEX hazardous area, an IECEX-certified cable gland (not included) must be used in accordance with IEC 60079-0:2017 Edition 7.0 and IEC 60079-1:2014 Edition 7.0.
- Fasteners (M5x16 hexagonal head screws) shall have yield stress of at least 450 N/mm<sup>2</sup>.
- The dimensions of a flameproof joint between the case and the case cover of the KD-12 flameproof housing must meet the minimum requirements specified in EN/IEC 60079-1. Please contact the manufacturer for inspection, repair or adjustment of the flameproof joint.
- Cable entry requirements for cable gland
  - Thread size: G3/4 or PF3/4
  - Pitch: 1.81 mm
  - Minimum depth of engagement: 10.86 mm
  - Minimum threads engaged: 6 threads



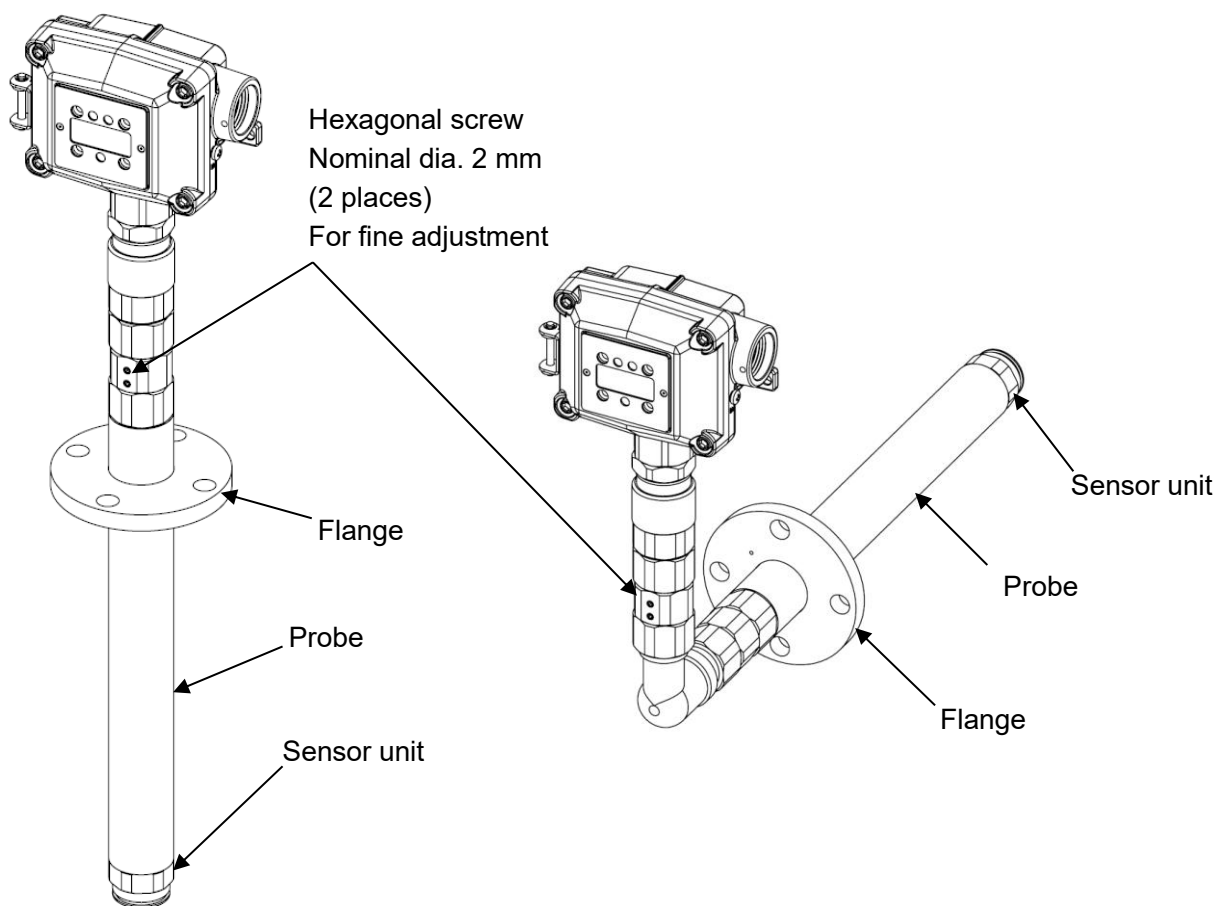
#### CAUTION

- Be careful not to damage the gas detector during installation. Keep joint surfaces clean and free from any damage. Contaminates such as scratches, fingerprints, dirt and oil may adversely affect the explosion-proof characteristics of the device.
- Do not install the gas detector in the following conditions:
  - Ambient temperature is outside of the specified operating temperature range (−10°C to 50°C for main body and 0°C to 160°C for probe).
  - Condensation prone areas
  - Exposure to water
  - Presence of corrosive gas
  - In the vicinity of equipment which can generate high frequencies or a magnetic field
  - In environments where silicone sealant/gas is or may be used
- Install the gas detector in a place where it can be easily accessed for maintenance or inspection.
- Install the gas detector in a place free from vibration.
- Install the gas detector in a place free from sudden temperature changes.
- Avoid impacts to the gas detector.
- Burn risk. Be careful to avoid possible hot air from the mounting aperture during

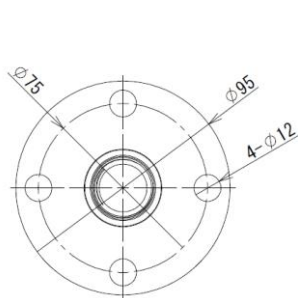
Secure the gas detector to the mounting location (e.g., furnace's wall) by using the flange. The flange specifications are given below.

The sensor unit's outside diameter is HEX32. The mounting hole which the sensor unit and probe fit through should be 36 mm in dia. or more.

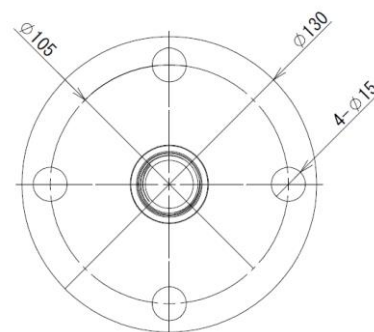
For fine adjustment of the direction of the detector face, untighten the two hexagonal screws to adjust the face to the right position, and then retighten the screws to firmly secure the detector.



Flange Specifications



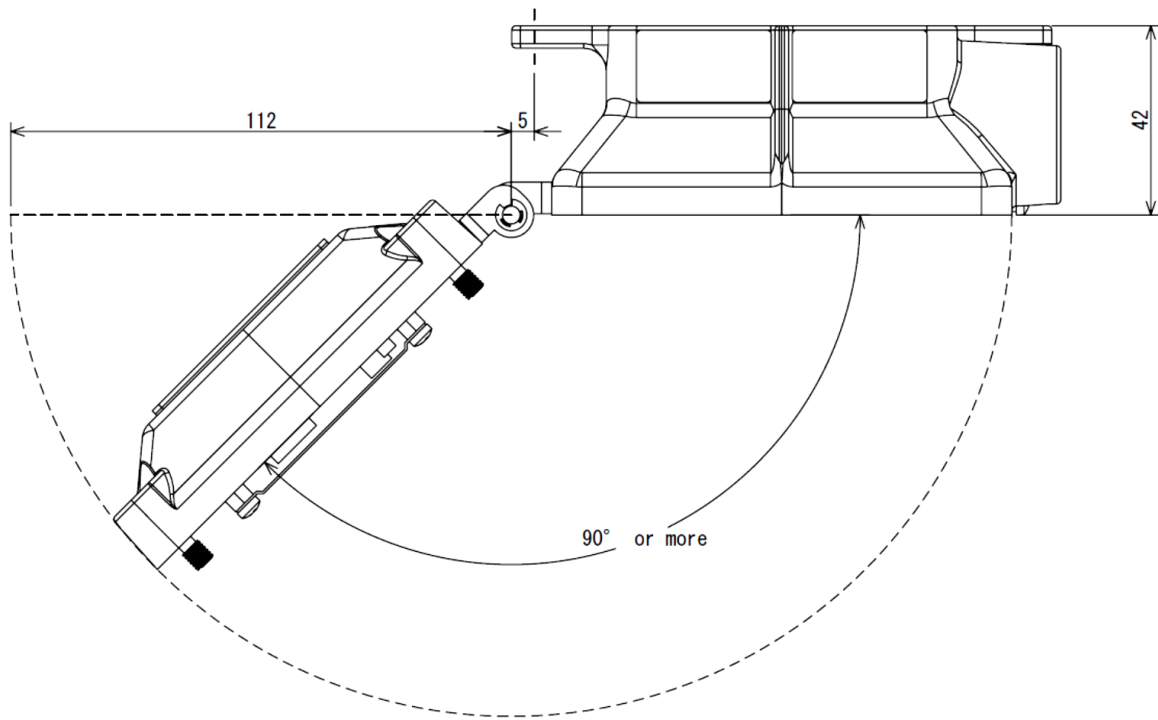
JIS B 2220  
 Nominal pressure: 5K  
 Nominal size: 25A  
 Flange thickness: 10 mm  
 Recommended screw: M10



JIS B 2220  
 Nominal pressure: 5K  
 Nominal size: 50A  
 Flange thickness: 14 mm  
 Recommended screw: M12

(Dimensions are in mm)

The case cover of the detector needs be able to open during installation, wiring, or sensor replacement. Make sure to keep sufficient space so that the cover can be opened to 90° or more.



(Dimensions are in mm)

## 6. Wiring

### 6.1. Guideline

Use explosion-proof wiring when installing the detector in a hazardous area.

#### **WARNING**

- Before opening any part of the gas detector, ensure no explosive atmosphere is present.
- The cable gland (not included) shall be ATEX/UKEx/IECEx-certified as “Flameproof Enclosure ‘db’”, and shall meet the special conditions of use on page 2.

#### **CAUTION**

- Wiring and installation should only be performed by a qualified electrician with knowledge of explosion proof components/installation.

#### Cable Work

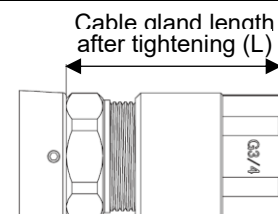
- Use a shielded cable with 1.25 to 2.00 mm<sup>2</sup> wires, such as a CVV-S cable. Sheath the cable in a protective tube, such as a metal conduit or carbon steel pipes, or other protective structure, such as a metal or concrete duct. When using a protective tube, use a cable heat-resistant to 70°C.
- When using the external relay contact function of the product, a five-conductor cable, with a maximum cable conductor size of 1.25 mm<sup>2</sup> is required. If only the analog signal function is used without the external relay contact function, then a three-conductor cable, with a maximum cable conductor size of 2.00 mm<sup>2</sup>, is required.
- When using a pressure-resistant explosion-proof gasket type cable gland (not included), use a cable whose outer diameter matches the inner diameter of the gasket by referring to the table below. Firmly tighten the cable gland with a hex wrench, to the appropriate values as shown on the ‘Cable gland length after tightening’ column in the table below to prevent the formation of a flame path for explosive gas or fire.
- Connecting a cable with another cable outside the gas detector is not recommended. Direct or branching connections of cables should be done inside the gas detector by using terminals.
- For sensor replacement, this product needs to be detached. Allow an extra length of 50 cm or more in the cable.

Table 6-1.. Cable gland length after tightening

Cable outer dia.(mm)	Gasket inner dia. (mm) (Marked on gasket)	Washer Inner dia. (mm)	Cable gland length after tightening L (mm)	Optional or included
10-11	Dia. 10-11	12	55.1 (Cable dia.10) - 58.1 (Cable dia.11)	Included
11-12	Dia. 11-12	14	55.0 (Cable dia.11) - 58.1 (Cable dia.12)	Included (pre-installed)
12-13	Dia. 12-13	14	54.8 (Cable dia.12) - 58.0 (Cable dia.13)	Included
13-14	Dia. 13-14	15	54.5 (Cable dia.13) - 58.0 (Cable dia.14)	Optional
14-15	Dia. 14-15	15	54.3 (Cable dia.14) - 57.9 (Cable dia.15)	

\* A gasket (dia.11-12) and a washer (dia.14) have been preinstalled in the detector when delivered.

\* A gasket (dia 10-11) and a gasket (dia. 12-13) and a washer (dia.12) are included in the standard package when delivered.





## 6.2. Wiring/Connection

### WARNING

- Before opening the case cover of the gas detector, be sure to eliminate possible source of ignition. Disconnect the power supply to the detector and all devices connected to it (e.g., indicator unit and signal converter).
- Ground the gas detector to prevent an electric shock.

### CAUTION

- Connect wires to their corresponding terminals.
- Keep the connection cable (power and signal lines from the detector) away from other power lines.

### Connecting Power and Signal Lines

- If needed, use dedicated breakers for power lines going to devices connected to the detector, such as an indicator unit or a signal converter.
- Use a shielded cable that has 1.25 to 2.00 mm<sup>2</sup> wires, such as a CVV-S cable.
- Ensure that the power voltage supplied to the gas detector is within the specifications.
- Ensure that the load resistance of the signal line, including the resistance of the wire, is not more than 300 ohm.

### NOTE

**Single-point grounding (grounding at a single point) is mandatory.** Do not ground the gas detector via the earth terminal (external/internal) located on the gas detector when it is grounded on the power supply side. Doing so creates 2-point grounding. Grounding on the power supply side (right side of the drawing) is recommended as shown in the drawing below.

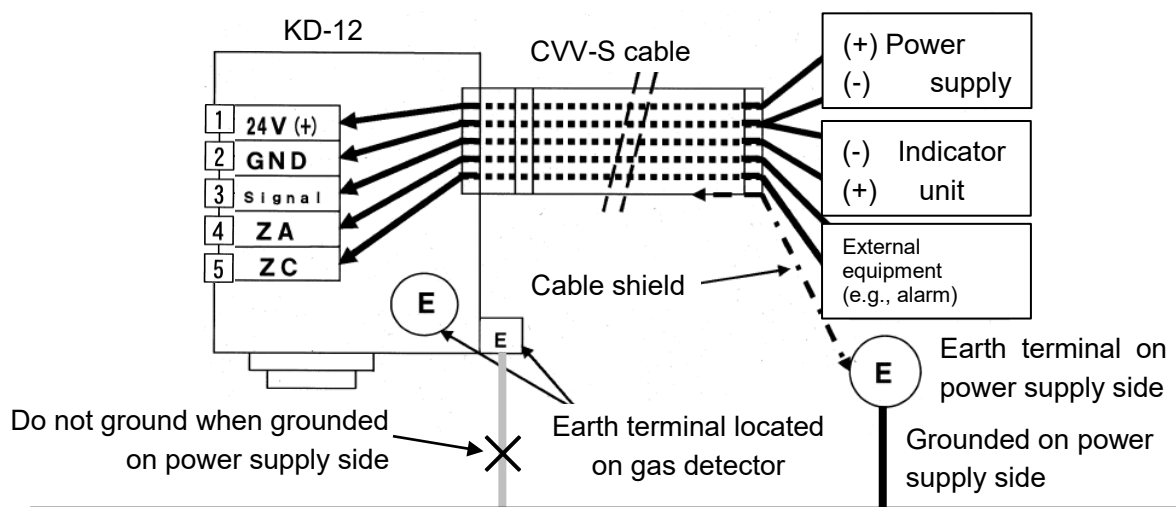
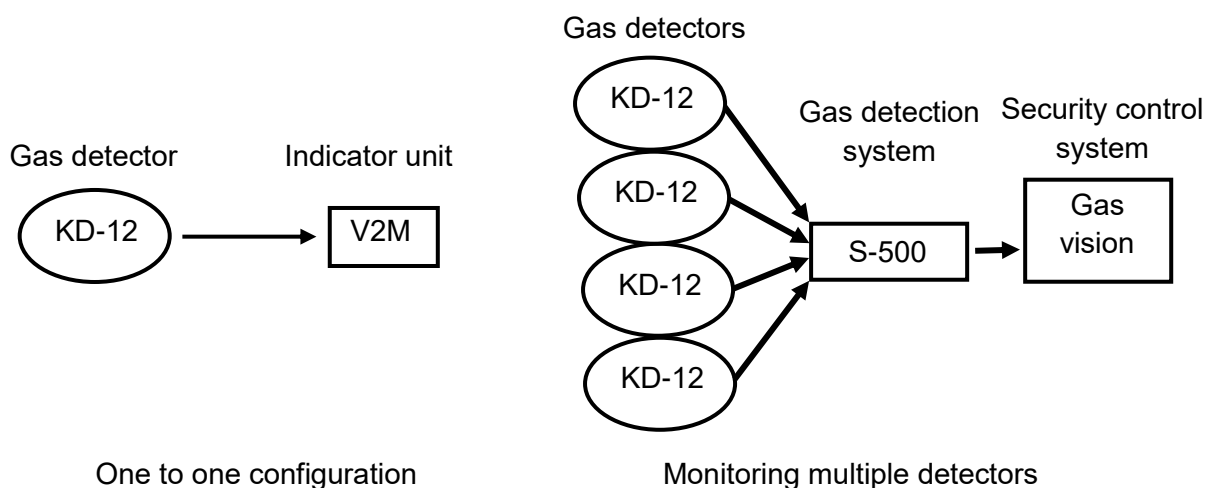


Figure 6-1. Typical Wiring Connection when Grounded on Power Supply Side

## Typical System Configuration



**Figure 6-2. Typical System Configuration**

- Refer to the instruction manual of each device for full information.

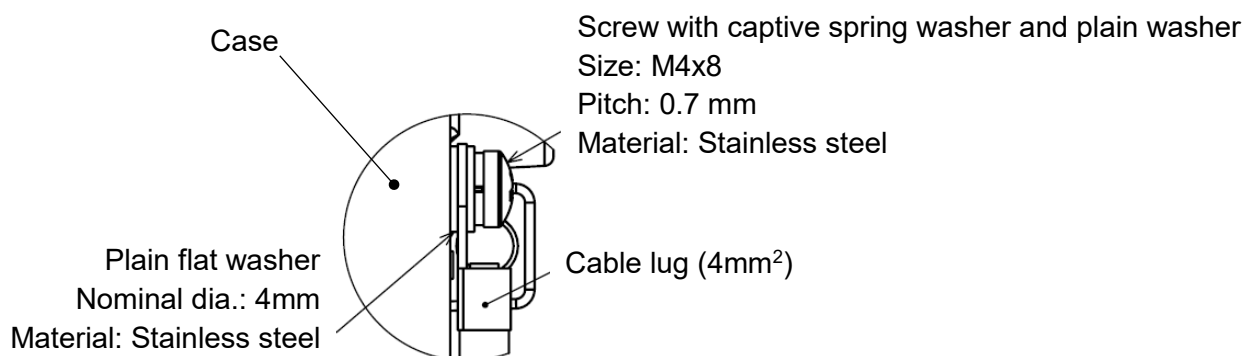
## External Earth Terminal Connection



### WARNING

- Direct contact between the case and the terminal will compromise the explosion-proof nature of the product. When grounding the external earth terminal of the detector, place a plain washer between the case and the terminal to prevent the terminal from having direct contact with the gas detector.
- Use a conductor with a cross-sectional area of at least 4mm<sup>2</sup> for grounding the detector.

Place a plain flat washer between the case and the terminal.



**Figure 6-3. Typical External Earth Terminal Connection**

## Terminal Block Wiring Procedure

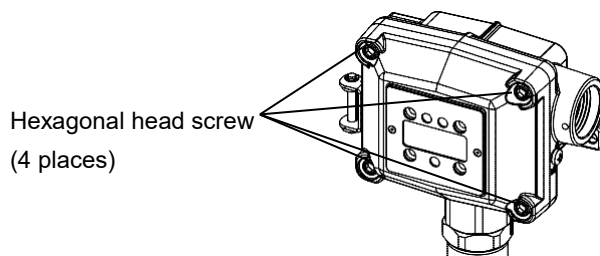
### CAUTION

- Do not touch or let any tool (e.g., flat-head screwdriver, wrench) touch the inside surface of the case or case cover. Keep joint surfaces clean and free from any damage. Contaminates such as scratches, fingerprints, dirt and oil may adversely affect the explosion-proof characteristics of the device.
- Be careful not to damage the circuit board or harness with a tool (e.g., flat-head screwdriver, wrench) while operating the levers.
- While operating the levers with a tool (e.g., flat-head screwdriver, wrench), avoid diagonal stress to them.
- Do not excessively stress each lever once it reaches its stop position.
- When closing the case cover, make sure it does not catch on the gasket or any loose cables.

- (1) Ensure that 24V power supply is used.

\*Do not supply power to the gas detector before the wiring is complete.

- (2) To open the case cover, loosen the four hexagonal head screws located at the four corners of the case cover using the 4mm hex wrench (included).



- (3) Loosen the sealing nut of the cable gland (not included). Feed the cable (3-wire or 5-wire cable, as needed) through the gland cable.



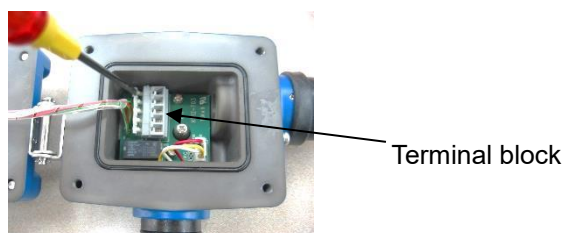
Cable gland (not included)

- (4) Press down on each lever of the terminal block with a flat-head screwdriver to open the corresponding slot.

- (5) Insert the tip of each wire into the slot.

Connect the (PWR+) wire to the slot marked "24V(+)". Connect the (PWR-) wire to the slot marked "GND". Connect the (Analog 4-20mA) wire to the slot marked "Signal".

As needed, connect the external relay contact wires to the slots marked "ZA" and "ZC".



- (6) Remove the screwdriver from the lever to close it. This will securely connect the wire to the terminal.
- (7) Check that the connected wires are secure in their corresponding terminals.
- (8) Tighten the sealing nut.
- (9) Close the case cover. Attach the case cover to the case by tightening the four hexagonal head screws at the four corners of the case cover with the hex wrench (yield stress of at least 450 N/mm<sup>2</sup>).

## 7. Precautions before Use

### CAUTION

- Before turning on any of the devices connected to this product (e.g., indicator unit, signal converter), check that all wiring is correct, particularly between the gas detector and indicator unit or signal converter.

### ● In Case of Gas Leakage

### DANGER

- Remain calm and check that there is no fire present. Do not touch any electric switches under any conditions. Sparks caused by turning on or off electric switches may cause an 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.
- Identify the location of the gas leak, and promptly take the necessary measures.

## 8. Display at Power-up (Warm-up)

### CAUTION

- Check that there is no gas present before powering on the gas detector.
- When the sensor output is not stable, the external relay contact may possibly activate. To prevent possible activation of the external relay contact after the warm-up is complete, release the interlocks of the external devices, if needed.
- During the warm-up, the analog signal is fixed at 4.0 mA (default) and the external relay contact does not activate.

### NOTE

- The magnetic stick is not usable during the warm-up.
- The warm-up cycle lasts approx. 30 seconds once the unit is powered.

- (1) Once the unit is powered, the warm up process will begin. All the status LEDs (green, amber and red) and the display will be lit.



- (2) While the status LEDs (green, amber and red) are lit, the display shows the following messages for one second each in the order below.

Software version number installed in this gas detector



Full scale value      Example: [ **100** ] %LEL is displayed when the full-scale value is 100%LEL.



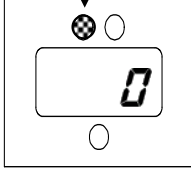
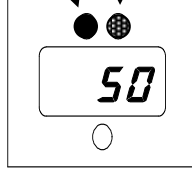
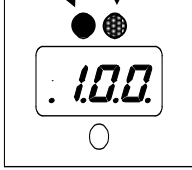
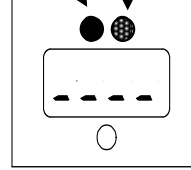
Alarm set value      Example: [ **25** ] %LEL is displayed when the alarm set value is 25%LEL.

- (3) The POWER LED (green) blinks for approx. 25 seconds.
- (4) When the blinking POWER LED (green) becomes solid, the warm-up cycle is completed and the detector is now in gas monitoring mode.

### NOTE

- If the sensor unit has not been energized for a long time of period (e.g., from factory to initial power-up), it may take some time for the sensor output to stabilize.
- If needed, energize the gas detector for approx. one week, and perform the zero and span adjustments before use. Refer to 11.3 "Calibration" on page 24 for adjustments.

## 9. Display and Operation Modes

		When the alarm set value is exceeded			
		Gas monitoring mode	Test mode	Maintenance mode	
				Gas monitoring mode	Test mode
Display	<p>Green LED blinks</p> 	<p>Green LED is lit Red LED blinks</p> 	<p>Green LED is lit Red LED blinks</p> 	<p>Green LED is lit Red LED blinks</p> 	
	<p>Gas concentration value is displayed</p> <p>The value slowly approaches to zero when powered on in clean air</p>	<p>Gas concentration is displayed</p>	<p>[Set concentration]</p> <p>Test from -10% to 110% of full scale is possible</p>	<p>[Gas concentration]</p> <p>displayed alternately</p>	<p>[Test value]</p> <p>displayed alternately</p>
Analog signal 4-20 mA	Fixed at 4.0mA	Gas concentration value is output	Test value is output	Gas concentration value is output	Test value is output
Relay Contact operation (Normally Open)	Not activated. (Open)	Activated (Closed)	Activated (Closed)	Not activated. (Open)	Not activated. (Open)

## 10. Trouble Alarms

- This product has a self-diagnosis function, and a trouble (fault) alarm will activate if a problem is found.
- This product alerts the user of a problem by showing the corresponding error code on the display when a trouble alarm activates. The error codes are listed in the table below.
- When a trouble alarm activates, the analog signal becomes 0.9 mA or less.

Error code on display	Amber TROUBLE LED	Problem	Probable cause	Solution
<i>E-24</i>	Blinking	Power supply voltage drop	Insufficient power supply voltage	Check the power supply voltage.
<i>E-8</i> <i>E-9</i>	Blinking	Sensor error	Sensor connector disconnected or damaged sensor wire	Check that the sensor connector is securely connected. If the sensor connector is defective or if the wire is damaged, contact New Cosmos or its authorized representative for repair.
<i>E-13</i>	Off			
<i>E-6</i> <i>E-7</i>	Off	Zero adjustment error	Gas is present in the ambient air	Perform zero adjustment in clean air.
<i>E-4</i> <i>E-5</i>	Off	Span adjustment error	Incorrect gas type and/or concentration used for adjustment	Check the gas type and concentration of calibration gas. If they are incorrect, replace the gas with correct one. Perform fine span adjustment with the correct calibration gas.
				Check the gas type and concentration of calibration gas. If they are correct, perform coarse span adjustment.

- If a code other than the ones listed is displayed, refer to 12. "Troubleshooting". If the product does not reset to normal operation after taking the steps shown in the table or if your problem is not listed in the table, please contact New Cosmos or its authorized representative.
- If the detector goes into any unintended mode during adjustment or setting, cease using the detector and consult with your system administrator.

# 11. Maintenance, and Operational Checks/Procedures

## 11.1. Routine Check and Annual Inspection

- Routine checks are carried out by the user, while annual inspections are performed by New Cosmos or its authorized representative.

	Frequency	Item	Procedure
Routine check	Min.1 per month	Visual check	<ul style="list-style-type: none"> <li>• Check that POWER LED (green) is lit.</li> <li>• Check that gas concentration value is displayed.</li> <li>• Check gas detector for corrosion.</li> <li>• Check mounting screws for corrosion.</li> </ul> Replace any worn or damaged parts.
	Every two months	Check alarm operation by using actual gas sample	Apply the test gas to the gas detector and check the operation of the alarm. <ul style="list-style-type: none"> <li>• Attach the calibration cap to the detector, apply test gas, and check the operation of the alarm.</li> </ul>
		Detector vicinity	Check that the sensor unit is free from objects that may interfere with the gas diffusion.
Annual inspection	Min.1 per year	Contact New Cosmos or its authorized representative for inspection.	

- Use optional items (e.g., calibration cap, gas calibration kit) when actual gas is used for check.

### Important Notice for Annual Inspection

In order to ensure the reliability of this gas detection and alarm system, it is vital to perform periodic maintenance and inspections. Further, it is necessary to carefully perform inspection and calibrations by using actual gas (combustible or poisonous gas). It is highly recommended that a maintenance contract with a New Cosmos local representative be made for the performance of annual inspections.

Installation, inspection, maintenance, calibration and proof testing shall only be performed by trained personnel.



## 11.2. Calibration Gas Preparation

- Prepare calibration gas (actual gas) for inspection or maintenance use.
- Typical method to prepare calibration gas, toluene, is given below as an example.

### (1) Required tools and items

- Toluene reagent
- Gasbag with two openings
- Gas sampling bag
- Syringe
- Measuring pump
- Calibrator for toluene

### (2) Preparation

- a. Clean the inside of the gasbag with ambient air.
- b. Completely remove air from the gasbag.
- c. Decide the inlet and outlet of the bag.
- d. Determine the target gas concentration value by referring to the calibration table.

#### NOTE

Be careful when checking the calibration table to avoid misreading.

### (3) Calibration gas preparation

#### CAUTION

- Avoid contact between the toluene reagent and the tube while injecting toluene into the gasbag. Inaccurate concentration may result.
- If abnormality (e.g. unusual smell) is found in the atmosphere, immediately cease the gas preparation.

- a. Sample the specified amount of toluene reagent in a syringe.  
For example, to produce 30%LEL (= 3600 ppm) toluene gas in 20L gasbag,
- b. Sample 20L of clean air with the measuring pump. Inject the air into the gasbag through its inlet.
- c. Inject toluene reagent into the gasbag through its inlet.
- d. Inflate the bag with clean air until reaching the 20L.
- e. Leave the gas inside the bag at room temperature for approx. 30 minutes before use, to allow the liquid inside the bag to evaporate completely.



## **DANGER**

Ensure that there is no open flame or source of ignition when handling a flammable gas.

- (4) Check the gas concentration value of the prepared gas.
  - a. Check that the reagent inside the gasbag completely evaporates.
  - b. Use a portable gas detector to measure the concentration value from the outlet of the gasbag.
  - c. Check that there is no deviation between the measured value and...

### **NOTE**

- If the obtained gas concentration deviates from the target value by more than  $\pm 5\%$ , start over to prepare the calibration gas.
- Inexact calibration gas can be used for checking the alarm operation. When calibrating the detector, the gas concentration must be checked with a calibrated gas detector (e.g. New Cosmos portable gas detector, Model: XP-3110) before the calibration.

### 11.3. Calibration

#### CAUTION

- For calibration with actual gas, the detector needs to be removed from the external equipment (e.g., drying furnace).  
For calibration, use the dedicated calibration cap (sold separately).  
After use in connection with a high-temperature furnace, the probe and its surrounding area become very hot. Allow them to cool down to the room temperature before starting calibration.

#### ● Maintenance Mode

#### CAUTION

- During the maintenance mode, the external relay contact does not operate even if gas concentrations reach or exceed the alarm set value. The detector in the maintenance mode maintains this status and the display shows [— — — —].
- The maintenance mode can be canceled by taking the steps (1) to (4) below, turning off the detector or automatically cancelled after an 8 hours waiting period. Ensure that the detector is not left in the maintenance mode as gas detection will not be possible for 8 hours when it will automatically reset.

#### NOTE

- Use the magnetic stick for the switch operation.
- Carefully handle the magnetic stick during operation or setting, because it has a strong attractive force. Refer to 3 “Package Contents” for full information.

- (1) While in the gas monitoring mode, press the MODE switch, then press the ▲ switch within approx. 2 seconds.
- (2) The detector displays **CAL.** first, followed by a number.  
E.g. **0.0** is displayed when the power-up operation has been completed and no further operation has been done.
- (3) If the number **0.0** is not displayed, press the ▲ or ▼ switch to set the value to **0.0**.



- (4) Press the ENTER switch.
- (5) If — — — — and the gas concentration value are alternately displayed, the detector is now in maintenance mode.
- (6) While — — — — is displayed, the maintenance mode is still ongoing.
- (7) The maintenance mode can be canceled by performing the steps (1) to (4) above then turning off the detector, or by waiting for 8 hours.

## ● Zero Adjustment



### CAUTION

- To prevent possible activation of the external relay contact during the zero adjustment, set the detector to maintenance mode or release the interlocks of the external devices, if needed.
- Perform a zero adjustment in a place where there is no target or interfering gas in the ambient atmosphere.

#### NOTE

- Use the magnetic stick for the switch operation.
  - Carefully handle the magnetic stick during operation or setting, because it has a strong attractive force. Refer to 3 “Package Contents” for full information.
  - If an error code is displayed, refer to 10 “Trouble Alarms”.
- (1) While in the gas monitoring mode, press the MODE switch, then press the ▲ switch within approx. 2 seconds.
  - (2) The detector displays *CAL.* first, followed by a number.
  - (3) If the number *...* is not displayed, press the ▲ or ▼ switch to set the value to *...*.
  - (4) Press the ENTER switch.
  - (5) When the following messages are displayed, the zero adjustment is complete.

*2.E.r.o.*  
↓  
*0*  
↓  
*Good*

- (6) Upon completion of the zero adjustment, the detector will automatically return to the gas monitoring mode.

## ● Fine Span Adjustment

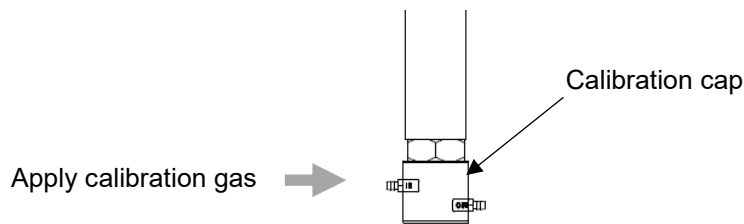
### CAUTION

- To prevent possible activation of the external relay contact during the fine span adjustment, set the detector to maintenance mode or release the interlocks of the external devices, if needed.
- Only New Cosmos technician or personnel who have completed a maintenance seminar can perform a span adjustment.

### NOTE

- Use the magnetic stick for the switch operation.
- Carefully handle the magnetic stick during operation or setting, because it has a strong attractive force. Refer to 3 “Package Contents” for full information.
- Complete a zero adjustment before performing fine span adjustment.
- Perform a coarse span adjustment if **E- 4** or **E- 5** is displayed.
- If an error code is displayed, refer to 10 “Trouble Alarms”.

- (1) Attach a gasbag with the corresponding calibration gas to the gas detector. Apply gas at an even flow using 2-bulb pump and capillary (optional) or equivalent.



- (2) Allow time for the sensor to become exposed to the gas.
- (3) While in the gas monitoring mode, press the MODE switch, then press the ▲ switch within approx. 2 seconds.
- (4) The detector displays **CAL.** first, followed by a number.
- (5) If the number **. . 2 .** is not displayed, press the ▲ or ▼ switch to set the value to **. . 2 .**
- (6) Press the ENTER switch.
- (7) The detector displays **S.F.** first, followed by the present gas concentration.
- (8) Press the ▲ or ▼ switch of the detector to adjust the display of the detector to the actual calibration gas concentration.
- (9) Press the ENTER switch.
- (10) Fine span adjustment is complete when **Good** is displayed.
- (11) Upon completion of the fine span adjustment, the detector will automatically return to the gas monitoring mode.
- (12) Remove the gasbag.

## ● Coarse Span Adjustment

Perform coarse span adjustment, if *E- 4* or *E- 5* is displayed.

### CAUTION

- To prevent possible activation of the external relay contact during the coarse span adjustment, set the detector to maintenance mode or release the interlocks of the external devices, if needed.
- Only New Cosmos technician or personnel who have completed a maintenance seminar can perform a span adjustment.

### NOTE

- Use the magnetic stick for the switch operation.
  - Carefully handle the magnetic stick during operation or setting, because it has a strong attractive force. Refer to 3 “Package Contents” for full information.
  - Precise adjustment is not possible using coarse span adjustment only. Perform a fine span adjustment once the coarse span adjustment is complete.
  - If an error code is displayed, refer to 10 “Trouble Alarms”.
- (1) Attach a gasbag with the corresponding calibration gas to the gas detector. Apply gas at an even flow using 2-bulb pump and capillary (optional) or equivalent.
  - (2) Allow time for the sensor to become exposed to the gas.
  - (3) While in the gas monitoring mode, press the MODE switch, then press the ▲ switch within approx. 2 seconds.
  - (4) The detector displays *CAL.* first, followed by a number.
  - (5) If the number *. . . 7* is not displayed, press the ▲ or ▼ switch to set adjust the value to *. . . 7*.
  - (6) Press the ENTER switch.
  - (7) The detector displays *Sr. . .* first, followed by the present gas concentration.
  - (8) Press the ▲ or ▼ switch to set the displayed value closest to the actual calibration gas concentration.
  - (9) Press the ENTER switch.
  - (10) Coarse span adjustment is complete when *Good* is displayed.
  - (11) On completion of the coarse span adjustment, the detector will automatically return to the gas monitoring mode.
  - (12) Remove the gasbag.

## ● Full-scale and Alarm Set Values Display

### NOTE

- Use the magnetic stick for the switch operation.
- Carefully handle the magnetic stick during operation or setting, because it has a strong attractive force. Refer to 3 “Package Contents” for full information.
- The full-scale and alarm set values are only displayed and cannot be changed by the user.

(1) While in the gas monitoring mode, press the MODE switch, then press the ▲ switch within approx. 2 seconds.

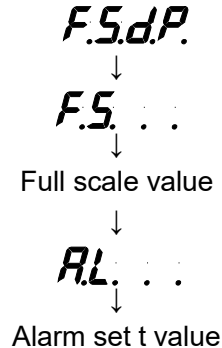
(2) The detector displays **CAL.** first, followed by a number.

(3) If the number **. . .4** is not displayed, press the ▲ or ▼ switch to set the value to **. . .4**.

(4) Press the ENTER switch.



(5) The following messages are displayed in the order below so that the user can check the full-scale and alarm set values.



(6) After the full-scale and alarm set values are displayed, the detector will automatically return to the gas monitoring mode.

## ● Test Mode

Test mode is used to set the test value.

### ⚠ CAUTION

- To prevent possible activation of the external relay contact during the test mode, set the detector to maintenance mode or release the interlocks of the external devices, if needed.
- The test mode can be canceled by taking the steps (1) to (4) below, turning off the detector or automatically cancelled after an 8 hours waiting period.

### NOTE

- Use the magnetic stick for the switch operation.
  - Carefully handle the magnetic stick during operation or setting, because it has a strong attractive force. Refer to 3 “Package Contents” for full information.
- (1) While in the gas monitoring mode, press the MODE switch, then press the ▲ switch within approx. 2 seconds.
  - (2) The detector displays **C.A.L.** first, followed by a number.
  - (3) If the number **10** is not displayed, press the ▲ or ▼ switch to set the value to **10**.



- (4) Press the ENTER switch.
- (5) The following messages are displayed in the order below.

**L.E.S.L.**



Test value

Tests are possible with a concentration range from –10% to 110% of the full-scale value. For example, if the full scale is 2000 ppm, the test is possible using a range from –200 to 2200 ppm. If the full scale is 100%LEL, the test is possible using a range from –10%LEL to 110%LEL.

- (6) Press the ▲ or ▼ switch to set the value to your desired calibration gas concentration. The test will automatically start once the value is set. If the set value is outside the operating range, **LLLL** or **HHHH** will be displayed.
- (7) To end the test mode, press the ENTER or MODE switch.
- (8) Ending the test with the ENTER switch will save the tested value. Ending the test with the MODE switch, will save the previously saved value.



## 11.4. Sensor Unit Replacement

### **WARNING**

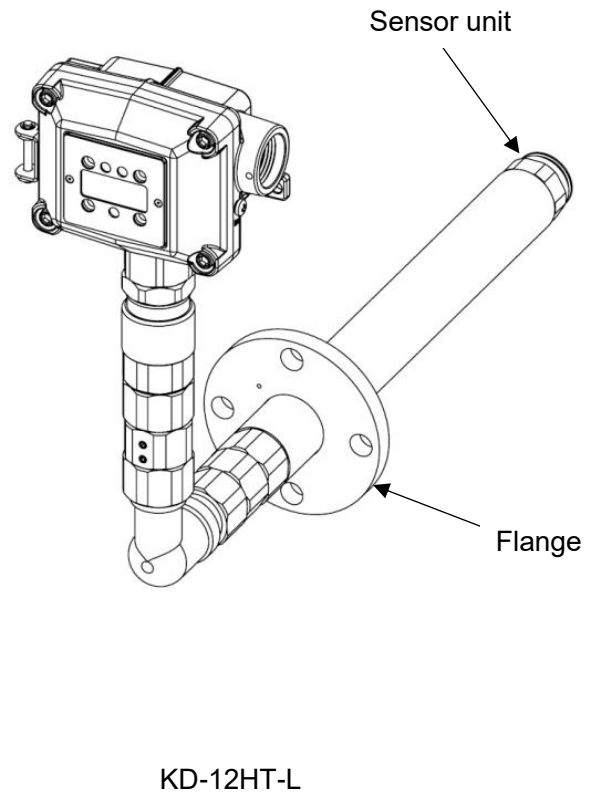
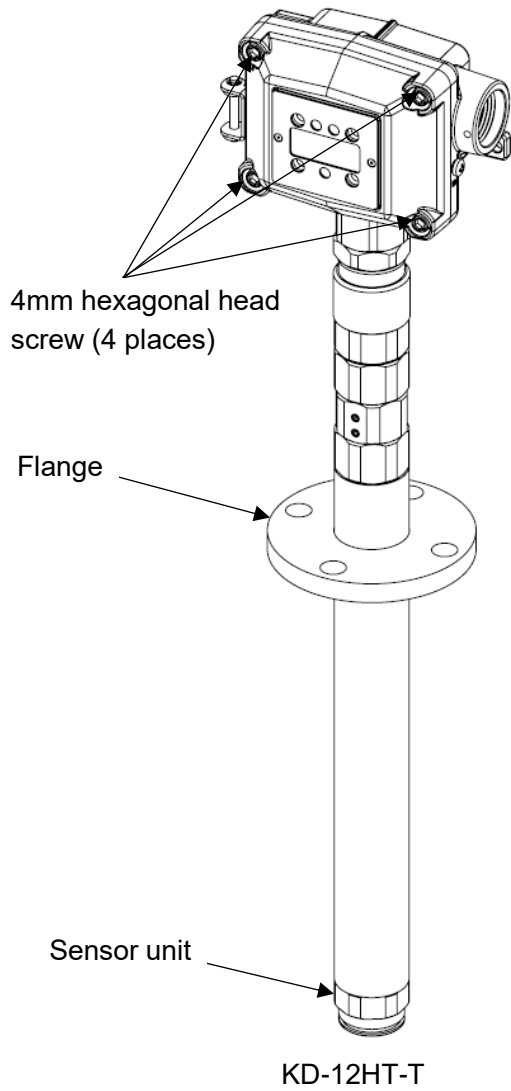
- Disconnect the power supply to the gas detector before replacing the sensor unit. Failure to do so may cause a source of ignition.

### **CAUTION**

- Only New Cosmos technician or personnel who have completed a maintenance seminar can replace the sensor unit.
- Burn risk. Be careful to avoid possible hot air from the mounting aperture during installation or removal of the gas detector.
- The probe and sensor unit reach a very high temperature. Allow them to cool down before sensor unit replacement.
- Handle the sensor unit with care. Failure to do so may result in broken components such as the sensor wire or in a failure of the sensor.
- When the sensor output becomes unstable while replacing the sensor unit, the external relay contact may possibly activate. To prevent possible activation of the external relay contact during the replacement, release the interlocks of the external devices, if needed.
- When removing or installing the sensor unit, take care not to twist the harness of the sensor connector.
- When closing the case cover, make sure it does not catch on the gasket or any loose cables.

The sensor unit is different depending on the detector model.  
Use an appropriate sensor unit.

Detector model	Sensor unit type
KD-12HT-T	EK-12HT-T
KD-12HT-L	EK-12HT-L





## 12. Troubleshooting

- Before requesting repair, please refer to the table below. If the detector does not return to normal after performing the corresponding steps in the table, or if your issue is not found in the table, consult New Cosmos or its authorized representative.
- If the gas detector goes into any unintended mode during adjustment or setting, cease using the detector and consult with your system administrator.

Problem	Probable cause	Steps	Reference page
POWER LED (green) does not turn on	Incorrect wiring	Check and rewire.	Page14 Wiring/Connection
TROUBLE LED (amber) blinks or error code is displayed	<b>E-24</b> Low voltage state	Check the power supply voltage.	Page14 Wiring/Connection
	<b>E- 8</b> <b>E- 9</b> <b>E- 13</b> Defective sensor unit, disconnected connector, or damaged sensor wire.	Check that the sensor connector is securely connected.  If there is a possibility of a defective sensor or damaged sensor wire, contact New Cosmos or its authorized representative.	
Gas concentration value and <b>- - - -</b> are blinking alternately	Product is in maintenance mode	Set the product to gas monitoring mode.	Page 24 Maintenance Mode
External relay contact does not function (no alarm signal to external equipment)	Product is in maintenance mode	Set the product to gas monitoring mode.	Page 24 Maintenance Mode
	Incorrect wiring	Check and rewire.	Page14 Wiring/Connection
	Incorrect alarm point setting	Check the alarm setting.	Page 28 Full-scale and Alarm Set Values Display
Analog signal does not change	Product is in test mode	Set the product to gas monitoring mode.	Page 29 Test Mode
Value and <b>HHHH</b> are blinking alternately	Sensor output is too high	Gas concentration exceeds the full scale value. Check the ambient environment.	
Value and <b>LLLL</b> are blinking alternately	Sensor output is too low	Perform zero adjustment in clean air.	Page 25 Zero Adjustment
Cannot make or adjust setting	Product is in warm-up cycle	Operate the product after the 30-second warm-up cycle is completed.	Page 18 Display at Power-up (Warm-up)

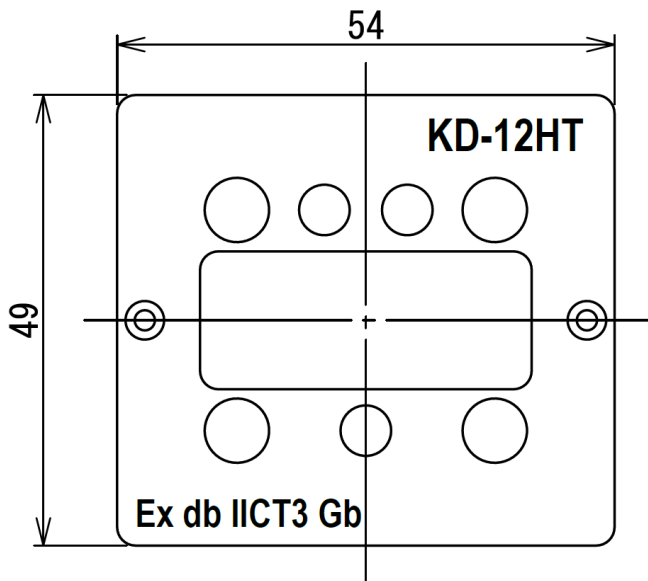
## 13. Specifications

Model	KD-12HT-T	KD-12HT-L
Detection principle	Catalytic sensor	
Sampling method	Diffusion type	
Target gas	N-Methyl-2-Pyrrolidone (NMP)	
Detection range	0-100%LEL	
Gas concentration display	Four-digit seven-segment LED display	
Alarm set value	As per delivery specifications	
Alarm accuracy	±25% of alarm set value under identical conditions	
Alarm delay	Less than 30 seconds with a gas concentration that is 1.6 times higher than the alarm set concentration	
Alarms	<ul style="list-style-type: none"> <li>• During gas alarm (single stage only), the red ALARM LED blinks.</li> <li>• During trouble alarm in the event of sensor disconnection, zero drift, power supply voltage error, internal EEPROM communication error, the amber TROUBLE LED blinks.</li> </ul>	
External output	<p>&lt;Gas concentration analog signal &gt;</p> <ul style="list-style-type: none"> <li>• 4-20 mA DC (common negative with power supply)</li> <li>• 0.9 mA or less in the event of trouble alarm</li> <li>• Load resistance of the analog signal line, including the resistance of the wire, is not more than 300 ohm</li> </ul> <p>&lt;Gas alarm contact (single stage only)&gt;</p> <ul style="list-style-type: none"> <li>• Normally open or normally closed dry contact*1 ; normally energized or normally de-energized *1 ; automatic resetting</li> <li>• Max. load: 0.5 A resistive at 250 VAC or 0.5 A resistive at 30 VDC</li> </ul>	
Equipment or Protective System intended for use in Potentially Explosive Atmospheres	Directive 2014/34/EU SI 2016 No.1107	
Explosion-proof	ATEX:  II 2 G Ex db IIC T3 Gb UKEx:  II 2 G Ex db IIC T3 Gb IECEx: Ex db IIC T3 Gb	
Approvals	ATEX certificate No. CML 21ATEX1411X UKEx certificate No. CML 22UKEX1374X IECEx certificate No. IECEx CML 21.0055X	
Harmonised/Designated standards	EN IEC 60079-0:2018 EN 60079-1:2014 IEC 60079-0:2017 Edition 7.0 IEC 60079-1:2014 Edition 7.0	
Applicable cable	Cable outer diameter: 10 mm to 13 mm <ul style="list-style-type: none"> <li>• 5-wire CCV-S cable (power, analog signal and relay contact) Wire size: 1.25 mm<sup>2</sup></li> <li>• 3-wire CCV-S cable (power and analog signal) Wire size: 1.25 mm<sup>2</sup> or 2 mm<sup>2</sup></li> </ul>	

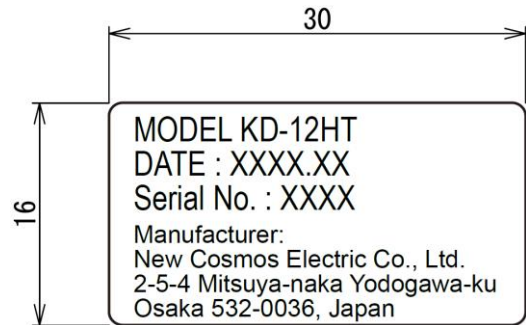
Operating temperature and humidity	Main body: -10°C to 50°C Probe: 0°C to 160°C 10% to 90%RH at 0°C to 50°C No sudden temperature or humidity changes. No condensation	
Power supply	24 VDC (18 to 30 VDC)	
Power consumption	1.5 W during normal operation (Max. 3 W)	
Dimensions	127 (W) x 530 (H) x 68 (D) mm (Excluding protruding parts and including probe) Probe size inside the furnace: Dia.34 x 250 mm Flange size: 25A or 50A	127 (W) x 321 (H) x 443 (D) mm (Excluding protruding parts and including probe) Probe size inside the furnace: Dia.34 x 250 mm Flange size: 25A or 50A
Mass	Approx. 3.6 kg with 25A flange Approx. 4.2 kg with 50A flange	Approx. 4.1 kg with 25A flange Approx. 4.9 kg with 50A flange
Mounting method	Using a flange	

- The above specifications are subject to change without notice.
  - If your specifications are nonstandard, refer to the delivery specifications.
- \*1. Specified at the time of order.

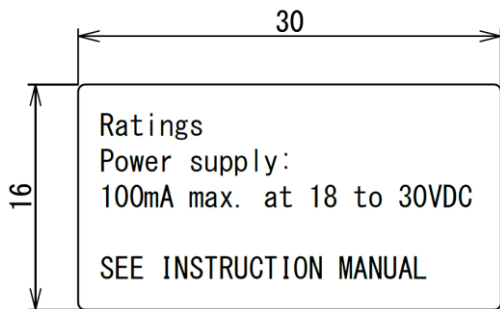
## External markings for explosion-proof



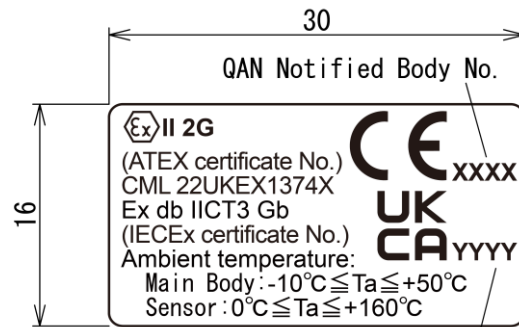
Nameplate detail



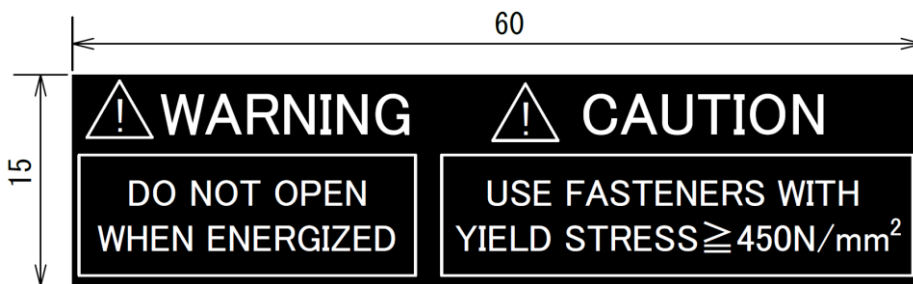
Serial number label detail



Rating label detail



Approved Body No.  
Certificate label detail



Warning label detail

### Harmonised/Designated standards

EN IEC 60079-0:2018

EN 60079-1:2014

IEC 60079-0:2017 Edition 7.0

IEC 60079-1:2014 Edition 7.0

## 14. Warranty

The warranty period is one (1) year from the date of purchase.

You are entitled to the limited warranty, if the product malfunctions due to a manufacturing defect during normal use in accordance with the instruction manual, specifications and labels.

### 1. Warranty Scope

If the product fails or is found to be damaged due to a manufacturing defect during the warranty period, and used in accordance with the instruction manual and specifications, we will provide a free replacement and repair service. This warranty covers the New Cosmos product/parts only and not third party product/parts.

### 2. Warranty Exclusions (The following will be repaired at the cost of customer even during the warranty period.)

- (1) Failures and damages incurred by incorrect use, deliberate acts or negligence of the user.
- (2) Failures and damages caused by disaster, earthquake, storm and flood, lightning, extreme climate, abnormal power supply voltage, excessive electromagnetic interferences, or other acts of God.
- (3) Failures and damages resulting from repair and/or modification by non-New Cosmos certified technicians.
- (4) Consumables and failures and damages resulting from improper consumable replacement.
- (5) Other failures and damages not attributable to the manufacturer.

## 15. Life Expectancy of Sensor

The estimated service life of the sensor is shown in the table below. The sensor may fail to provide correct detection after its service life expires. Replace the sensor before the expiration. This service life assumes that maintenance is done properly and periodically and that the sensor is not exposed to high concentration gas or gas that may cause sensor poisoning. This does not imply that the sensor will provide correct detection values up to the end of the service life. Thus, no warranty will be given after the one-year period is over.

Model	Detection Principle (Sensor Type)	Life Expectancy (from the date of purchase)
KD-12HT	Catalytic	Approx. 2 years

## 16. Service Life of Detector

The service life of this product is 10 years. The unit can operate for up to 10 years with a standard installation and used in accordance with the instruction manual. When the service life has expired, replacement is needed for continued reliable performance.

## 17. Detection Principles

### Catalytic Sensor

Catalytic combustion occurs on the catalytic layer applied on a platinum coil even if the gas concentration is well below the lower combustion limit. This causes a rise in temperature of the platinum coil and increases its electrical resistance. This change is read as a differential voltage using a bridge circuit. This process enables detection of combustible gases in air up to the lower explosive limit (LEL).

## 18. Glossary

Term	Definition
Gas detector	Device used to detect the presence of a target gas and to give its concentration in the form of an electrical signal.
Diffusion type	Sampling method using convective diffusion while placing a gas detector at a detection point.
Flameproof enclosure (explosion-proof enclosure)	Enclosure in which the parts which can ignite an explosive atmosphere are placed. This enclosure can withstand the pressure created during an internal explosion of an explosive mixture, and prevent the ignition of an explosive atmosphere outside the enclosure.
Target gas	Specific gas to be detected, concentration displayed, and used to trigger alarms.
Detection range	A range of target gas concentrations that can be displayed and trigger alarms.
Operating temperature and humidity ranges	Ambient temperature and humidity ranges in which the gas detection and alarm system can operate normally.
Maintenance and inspection	Tasks performed to ensure that equipment operates normally and correctly.
Calibration gas (test gas)	Gas specifically prepared to calibrate/adjust the gas detection and alarm system.
Hazardous area	An area in which an explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.
Non-hazardous area	An area in which an explosive atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.
Explosive atmosphere	Mixture of air and flammable substances in the form of dust or vapor which are within their explosive limits.
Lower Explosive Limit (LEL)	Lowest concentration (percentage) of a gas or vapor in air capable of producing a flash fire, or explosion in the presence of an ignition source like arc, flame or heat.



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### Revision History

Document No.	Date	Revision
GAE-162-00	July 2021	Initial issue
GAE-162-01	September 2021	01
GAE-162-02	September 2022	02

Additional copies of this instruction manual may be purchased.  
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