

# Carbon Monoxide Detector

## KS-7D

### Instruction Manual

- Keep this manual for easy reference.
- Carefully read this manual prior to use.
- This manual describes the standard model. If your unit has end-user-specific options, this manual will be superseded by your delivery specifications.



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

Instruction Manual No.  
GAE-053-04  
December 2020

# Table of Contents

1. Introduction .....	1
2. General Precautions .....	2
3. Package Contents .....	3
4. Unit Dimensions and Components .....	4
4-1. Outer Appearance .....	4
4-2. Inner Components .....	5
5. Installation .....	6
6. Wiring .....	9
6-1. Pin Terminal/Insulated Sleeve Installation .....	10
6-2. Wire Connection/Disconnection to/from Terminal Block .....	11
6-2-1. Power Terminal Block .....	11
6-2-2. External Output Terminal Block .....	11
6-3. Cable Tie Installation .....	11
6-4. AC Power Cable (PC0125) Wiring Procedure .....	12
7. Operation .....	13
7-1. Precautions before Use .....	13
7-2. Operating Procedure .....	13
7-3. LCD Operation .....	15
7-3-1. LCD .....	15
7-3-2. Normal Operation Status .....	15
7-3-3. Full Scale and Alarm Set Values Display .....	16
7-3-4. Peak Value Display and Reset .....	16
7-3-5. Operation during Gas Alarm .....	16
7-4. User Mode .....	17
7-4-1. User Mode Operation .....	17
7-4-2. Switching Maintenance Mode On/Off [Mode1] .....	18
7-4-3. Zero Adjustment [Mode 2] .....	19
7-4-4. Span Adjustment [Mode 3] .....	19
7-4-5. Alarm Test [Mode 4] .....	20
7-4-6. Alarm History [Mode 5] .....	21
7-4-7. Clock Setting [Mode 6] .....	22
7-5. Maker Mode .....	23
7-5-1. Maker Mode Activation .....	23
7-5-2. Operating Time Refresh .....	23
7-5-3. Alarm Set Value Change .....	25
8. Maintenance .....	26
8-1. Inspection Contents and Frequency .....	26
8-2. Backup/Clock Battery Replacement .....	28
9. Troubleshooting .....	30
10. Specifications .....	32
11. Warranty .....	33
12. Expected Sensor Life .....	33
13. Detection Principle .....	34
14. Glossary .....	35
15. Proper Product Disposal at End of Life .....	36

# 1. Introduction

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Thank you for purchasing the New Cosmos KS-7D carbon monoxide detector.


To ensure safe and reliable operation, please read this instruction manual prior to use.


This unit detects the toxic and combustible gas, carbon monoxide. The unit is intended for use in a non-hazardous indoor area, e.g., office, laboratory, and clean room, for the early detection of a gas leak and relaying the gas concentration value as an analog signal (4-20mADC) to external equipment while simultaneously displaying the gas concentration value on its display.


If the gas concentration reaches a preset level, the unit will produce audio-visual alarms and activate relay contacts, thus helping prevent serious incidents such as gas poisoning.

## SYMBOLS

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

 **DANGER** : Indicates an imminently hazardous situation that can result in death or serious injury.

 **WARNING** : Indicates a potentially hazardous situation that may result in death or serious injury.

 **CAUTION** : Indicates a hazardous situation that may result in minor injury or property damage.

**NOTE** : Provides information on product handling.

## 2. General Precautions

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- Carefully read this manual prior to use.
- Follow the precautions below to ensure safe operation.
- Only use this product in accordance with the applicable laws and regulations.
- Only a qualified electrician with knowledge of wiring and installation procedures should perform wiring and installation.

### **WARNING**

- In the event of a gas alarm, follow the safety procedures in accordance with your company's regulations.
- This product is not explosion-proof and should not be installed in a hazardous area.
- Secure the cover by tightening the two fastening screws. Proper gas detection is not possible if the cover is not tightly closed.

### **CAUTION**

- Do not disassemble, modify, or alter the structure of this unit or its electrical circuits. Doing so may compromise the performance of the product.
- This product is not drip-proof and should be kept away from water.
- Use the correct orientation as specified in 5. "Installation" when installing the unit to ensure its proper performance.
- Because of its sensor structure, the detector should not be stored in an orientation other than instructed on the package box. If incorrectly stored, sensor output may temporarily drop when powered even if installed in the correct orientation. The output drop may be seen within one week after installation and usually lasts for one hour before returning to normal. If incorrectly stored for an extended period, the output drop may last two hours.
- When using the detector's analog output to display gas concentrations using high-layer monitoring software, perform a zero suppression setting using the high-layer monitoring software.
- The product's analog output resolution ranges from 250 to 400 (contingent on full scale setting). Because of the difference in resolution or number of displayed gas concentration digits between this product and high-layer monitoring software, or connected impedance, some errors in displayed gas concentration value may be

### **NOTE**    Operation during power outage

- In the event of a power outage during operation, the detector will cease operation if the backup battery is not installed. The detector will automatically resume operation once power is restored, as long as the main power switch, under the cover, is in the on (up) position. A backup battery is included in the package (not pre-installed) when delivered. Install it into the detector if the detector needs to continue running during a power outage.
- If the backup battery level becomes very low while the detector operates on the backup battery, "E-B" (Backup battery is Empty) will be displayed on the LCD. If the detector continues operating while "E-B" is displayed, it will cease operation automatically to prevent over-discharge. In this case, the detector will not automatically resume operation even if power is restored.
- Remove the backup battery from the detector before a planned power outage etc., if the detector is expected to operate on the backup battery for an extended period of time.
- Refer to 8-2. "Backup/Clock Battery Replacement" for battery installation/removal/replacement. Under normal condition, the detector's operation will not be affected whether the backup battery installed or removed.

### 3. Package Contents

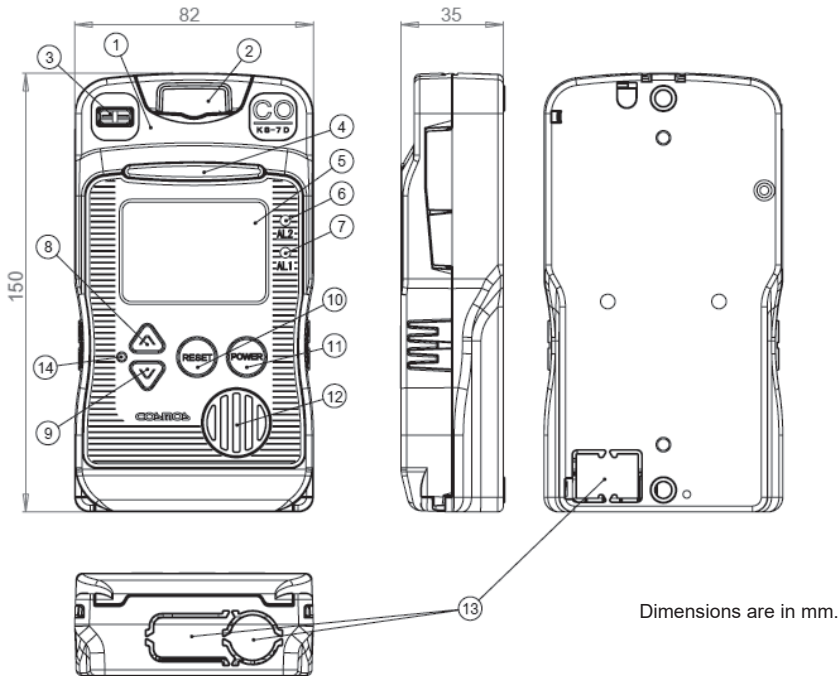
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The following items are included in a standard package. If any items are missing or damaged, please contact New Cosmos or its authorized representative for replacement.

Item	Quantity	Description
CO detector	1	KS-7D
Mounting screw	2	M5x12 with spring washer (wall mounting)
Cable tie	1	To be used to bundle electric cables
Pin terminal	9	To be crimped to cables and inserted into the terminal block
Insulating sleeve	9	To be installed in a crimped pin terminal to provide insulation
Instruction manual	1	This manual
Inspection certificate	1	
Backup battery	1	CR2 lithium battery
AC power cable (Optional)	1	100 VAC power cable with 2-pin power plug at one end and two pin terminals at the other end Length: 2.5 m Note: AC power cable is not included unless specified at the time of order, even though your unit has AC power option.

## 4. Unit Dimensions and Components

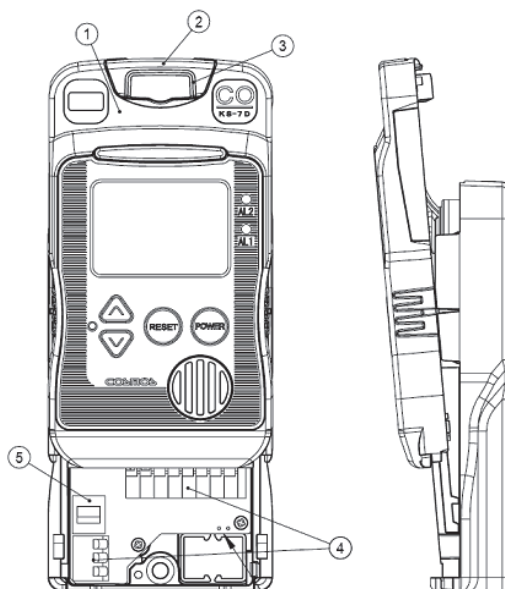
### 4-1. Outer Appearance



Item	Component	Description/Function
1	Cover	Slide up and lift the cover to access to the main power switch and to wire external cables. This cover is normally closed.
2	Screw cover	Houses one mounting screw, and two fastening screws that attach the cover to the unit. This cover is normally closed.
3	Gas detection port	Gas inlet to the CO sensor.
4	Status indicator (red/amber/green)	During normal operation all three green internal LEDs are lit. In the event of an 1 <sup>st</sup> /2 <sup>nd</sup> stage alarm, four internal amber/red LEDs light sequentially.
5	LCD	Displays CO concentration, parameter values, error code, and status icons.
6	AL2 alarm LED (red)	Flashes red in the event of a 2 <sup>nd</sup> stage alarm. The LED will become solid if reset by pressing the RESET button.
7	AL1 alarm LED (amber)	Flashes amber in the event of a 1 <sup>st</sup> stage alarm. The LED will become solid if reset by pressing the RESET button.
8	▲ (Up) button	During normal operation, press to display the highest peak value of gas concentration after powering-up on the LCD. Used for making settings in combination with other button operation.
9	▼ (Down) button	Used for making settings in combination with other button operation.
10	RESET button	During normal operation, press to display the full scale and alarm set values. Used for muting an on-going audio alarm.
11	POWER button	Press and hold for 3 seconds to turn on/off the detector.

Item	Component	Description/Function
12	Speaker opening	Opening for audio.
13	Cable entry (3 places)	Make a cutout (cable entry) with a nipper to connect external cables to the terminals.
14	Maintenance button	Recessed button used for making settings.

## 4-2. Inner Components



Item	Component	Description/Function
1	Cover	Slide up and lift the cover to access to the main power switch and to wire external cables. This cover is normally closed.
2	Screw cover	Houses one mounting screw, and two fastening screws that attach the cover to the unit. This cover is normally closed.
3	Fastening screw (2 places)	Located under the screw cover. Screws that attach the screw cover to the unit.
4	Terminal block	Connect to external wiring.
5	Main power switch	Turns on/off the main power.

## 5. Installation

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### **WARNING**

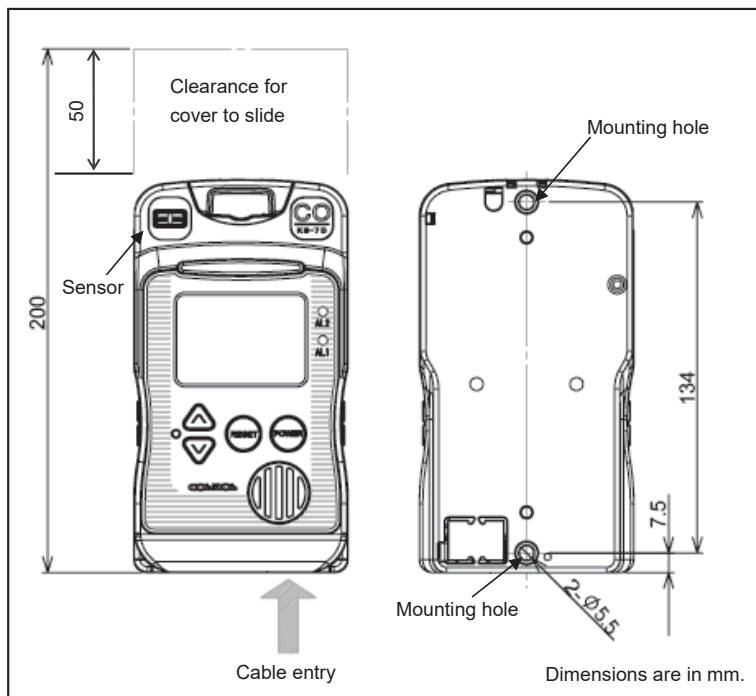
This product is not explosion-proof and should not be installed in a hazardous area.

### **CAUTION**

- Avoid strong mechanical shock, impact or vibration to the detector by dropping or bumping. Failure to do so may impair the performance of the detector.
- Do not install the detector in the following conditions.
  - Outdoors
  - Exposure to water spray
  - Outside the following operating temperature/humidity
    - 5 to +40 °C (no rapid temperature change)
    - 30 to 85% RH (no condensation)
  - Presence of corrosive gas
  - Exposure to impact or vibration
  - Presence of high frequencies or a magnetic field
  - Exposure to electrical noise
- Install the detector in a location that ensures easy access for maintenance.
- Install the detector vertically with the sensor on top. Proper gas detection is not possible if installed inverted, at an angle, or horizontally.
- Sensor height should be 75 to 150 cm from the floor unless otherwise required by the applicable laws or regulations. Install the unit with its gas detection port free from obstructions.
- Secure the cover by tightening the two fastening screws. Proper gas detection is not possible if the cover is not tightly closed.

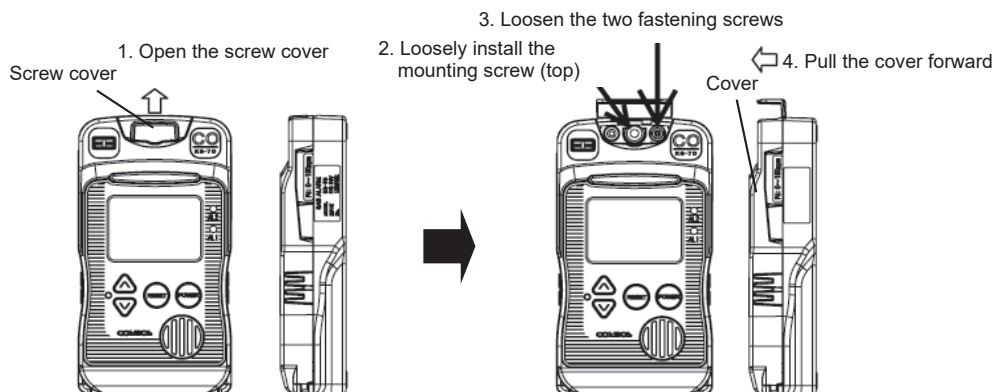
### **NOTE**

- Leave a distance of more than 30mm from each side of the detector for removal purpose.
- Leave a distance of more than 50mm from the top of the detector to allow the cover to slide open.
- Leave enough space for cable wiring below the detector.

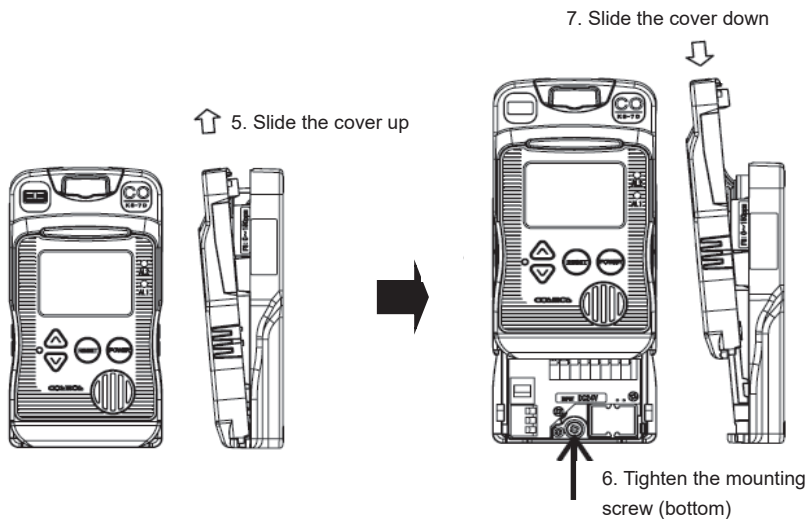


Wall-mount the detector using two M5 mounting screws (pitch: 134) according to the following procedure.

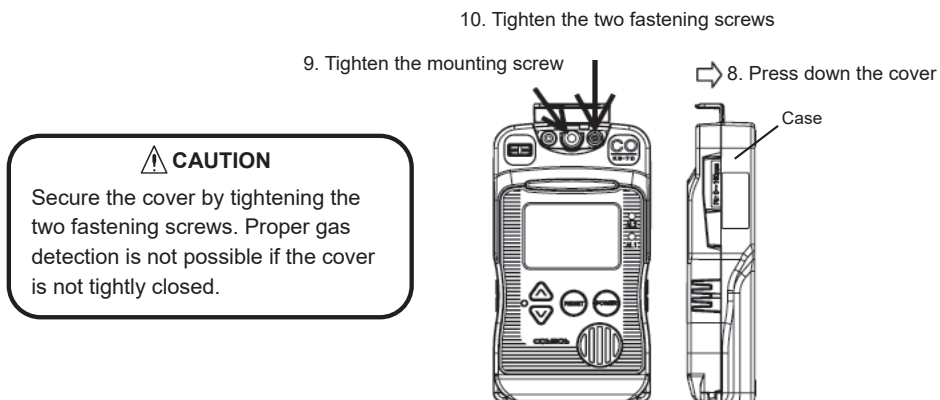
1. Open the screw cover.
2. Loosely install the mounting screw (top).
3. Loosen the two fastening screws.
4. Slightly pull the cover forward.



5. Slide the cover up (cover is open).
6. Firmly tighten the mounting screw (bottom) to secure the detector to the wall.
7. Slide the cover down (cover is closed).



8. While pressing down the cover toward the case,
9. tighten the mounting screw (top).
10. Secure the screw cover to the case with the two fastening screws.
11. Close the screw cover.



# 6. Wiring

 **WARNING**

- Remove any power source during wiring work to prevent electric shocks.
- After wiring is completed, close the detector's cover to prevent electric shocks.

 **CAUTION**

- New Cosmos is not responsible for the cost or any damage resulting from controlling external equipment (e.g., interlock) by using the carbon monoxide concentration outputs (e.g., analog output, alarm relay contact output) from this product.
- Connect wires to their corresponding terminals by referring to the marking on the terminal block.
- Keep the connection cable away from the electrical power line.
- When using with external devices, isolate the product's 4-20mA analog output from power lines of external devices in order to prevent inflow current and noise.

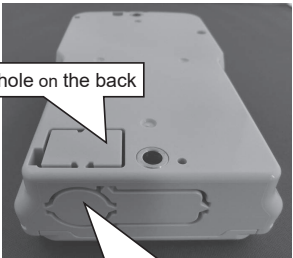
The knockout holes for cable entry are provided on the back and bottom of the unit, and can be removed using a nipper.

Use a shielded cable (with 0.5 to 1.25 mm<sup>2</sup> wires) up to 500 m in length with an outside diameter of 10.5 mm or less.

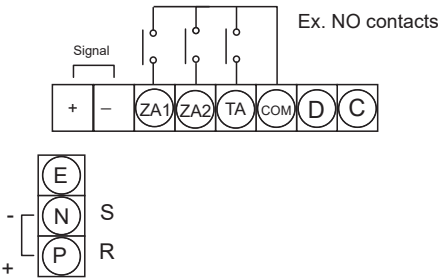
**NOTE**

Refer to page 12 for the wiring procedure for the optional AC power cable.

Knockout hole on the back



Knockout hole on the bottom



AC	DC		Power supply 24 VDC or 100 VAC
R	P	+	
S	N	-	
E			Earth terminal for grounding the detector
Signal	+		Analog output
	-		4-20mADC
ZA1	1 <sup>st</sup> stage alarm relay contact (Dry NO or NC)		
ZA2	2 <sup>nd</sup> stage alarm relay contact (Dry NO or NC)		
TA	Fault alarm relay contact (Dry NO or NC)		
COM	Common		
D	Not used		
C			

NO: Normally Open NC: Normally Closed

## 6-1. Pin Terminal/Insulated Sleeve Installation

Recommended parts/tools

Part	Model (Manufacturer)	Description
Electric cable		Shielded cable (with 0.5-1.25 mm <sup>2</sup> wires) Outer diameter: 10.5 mm or less
Pin terminal	TC1.25-16 (Nichifu)	(Included in package) Used for 0.25-1.65 mm <sup>2</sup> twisted wire
Insulating sleeve	VC1.25 (Nichifu)	(Included in package)
Crimping tool	NH1 (Nichifu)	1.25

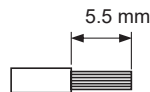
Terminal block (reference)

Part	Model (Manufacturer)	Description
Power terminal block	ML-1400-S1L-3P (Sato Parts)	Dia. 0.65-1.6 mm
External output terminal block	FFKDSA1/H1-5, 08-8 (Phoenix Contact)	Dia. 0.2-1.5 mm

### 1. Wire stripping

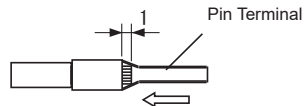
Strip the wire.

Recommended stripped wire length: 5.5 mm



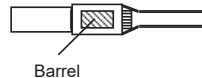
### 2. Pin terminal installation

Insert the stripped wire into a pin terminal until 1 mm of stripped wire can be seen from the end of the pin terminal's barrel.



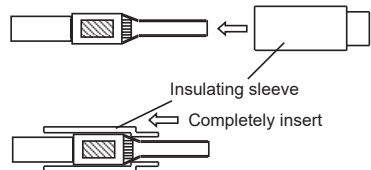
### 3. Terminal crimping

Crimp the center of the barrel.



### 4. Insulating sleeve installation

Attach an Insulating sleeve to the crimped pin terminal.



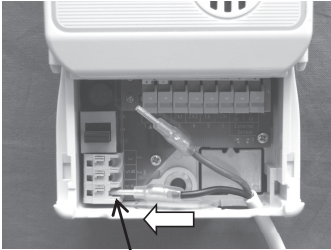
#### NOTE

Completely insert the pin terminal into the insulating sleeve. Not doing so may cause an insufficient pin length when wired to the terminal block, which may result in a poor connection.

## 6-2. Wire Connection/Disconnection to/from Terminal Block

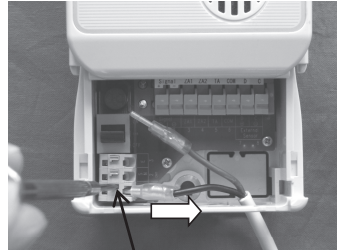
### 6-2-1. Power Terminal Block

(Connection)



Insert each pin terminal to its corresponding slot on the terminal block.

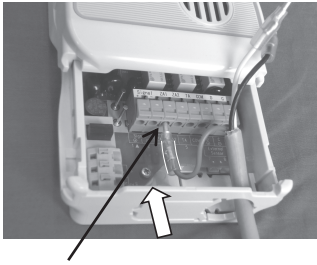
(Disconnection)



While pressing the release button with a precision screwdriver (recommended tip thickness: 2.6 mm), lift the pin terminal.

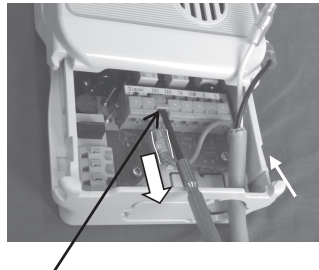
### 6-2-2. External Output Terminal Block

(Connection)



Insert each pin terminal to its corresponding slot on the terminal block.

(Disconnection)

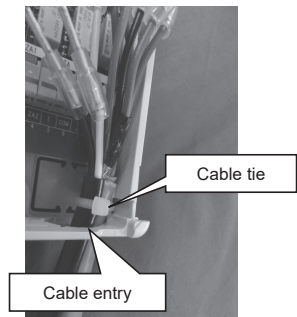


While pressing the release button with a precision screwdriver (recommended tip thickness: 3.0 mm), lift the pin terminal.

## 6-3. Cable Tie Installation

Use a cable tie for bundling the in-coming cables through the cable entry and secure them to the unit's wall.

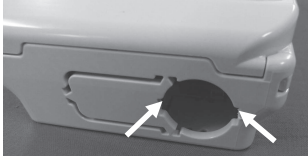
The unit has a cable tie holder inside its case near the bottom. Pre-install a cable tie by feeding it through the tie holder and make a loop. To easily bundle the wiring of in-coming cables to the terminal block, feed these cables through this loop and secure to the case wall.



## 6-4. AC Power Cable (PC0125) Wiring Procedure

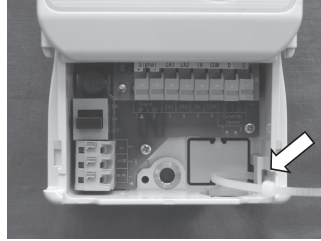
1. Make a cutout (cable entry) on the bottom of the unit with a nipper.

Note: The knockout holes for cable entry are provided on the back and bottom of the unit, and either can be used as cable entry.

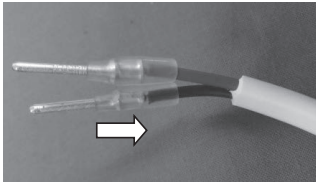


Cut here (2 places)

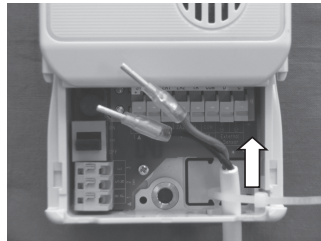
2. Install a cable tie by feeding it through the tie holder and make a loop.



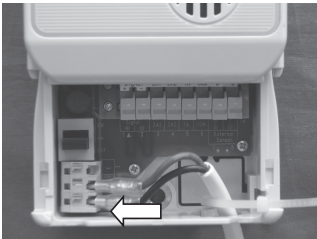
3. Ensure that the insulating sleeves are completely installed to the pin terminals of the AC power cable.



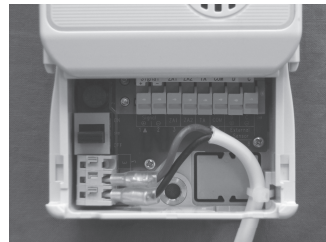
4. Feed the AC power cable through the cable entry and the loop of the cable tie.



5. Insert the pin terminals into the slots (Nos. R and S) on the terminal block.  
Note: Either pin terminal can be connected to either slot.



6. Pull the cable tie to secure the AC power cable to the case wall. Cut off the excess strap with a nipper.



## 7. Operation

### 7-1. Precautions before Use

#### WARNING

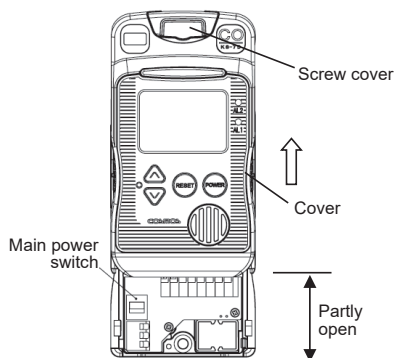
- Before tuning on the unit, confirm that the power supply is:  
24 VDC $\pm$ 10% when DC power is used.  
100 VAC $\pm$ 10% and 50/60Hz $\pm$ 10% when AC power is used.

#### CAUTION

- Before turning on the unit, check that all wiring is correct. Refer to 6. "Wiring" or delivery specifications if provided.
- Because of its sensor structure, the detector should not be stored in an orientation other than instructed on the package box. If incorrectly stored, sensor output may temporarily drop when powered even if installed in the correct orientation. The output drop may be seen within one week after installation and usually lasts for one hour before returning to normal. If incorrectly stored for an extended period, the output drop may last two hours.
- Turn on the unit in clean air.
- When the sensor output is not stable, the external relay contact may possibly activate after the warm-up. To prevent possible activation of the external relay contact after the warm-up is completed, release the interlocks of the external devices, as needed.
- During the warm-up, the analog signal output is fixed at 4 mA and the external relay contacts are disabled.

### 7-2. Operating Procedure

- Follow Steps 1, 3, 4, and 5 of 5. "Installation" to slide up and open the cover (cover is not fully opened).
  - Open the screw cover.
  - Loosen the two fastening screws.
  - Slightly pull the cover forward.
  - Slide the cover up (cover is open).
- Set the main power switch to the on (up) position.

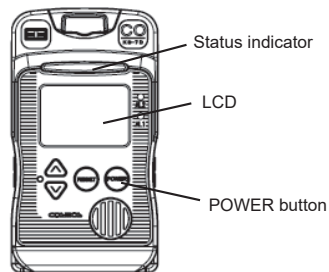


- 3) Follow Steps 7, 8, and 10 of 5. "Installation to close the cover and tighten the screws.
7. Slide the cover down (cover is closed).
8. While pressing down the cover toward the case,
10. secure the screw cover to the case with the two fastening screws.



#### CAUTION

Secure the cover by tightening the two fastening screws. Proper gas detection is not possible if the cover is not tightly closed.



- 4) Press and hold the POWER button for 3 seconds to turn on the detector (two beeps). The three green LEDs inside the status indicator start flashing and "-- -- --" is displayed on the LCD. The warm-up cycle lasts 90 seconds.



Warm-up operation



Normal operation

- 5) When the warm-up cycle is completed, the three green flashing LEDs inside the status indicator become solid, the gas concentration is displayed on the LCD, and normal operation starts.



#### CAUTION

If the indicated carbon monoxide concentration value is negative when the unit is turned on, turn off the unit for approx. one hour to let the sensor stabilize, then turn the unit on again.

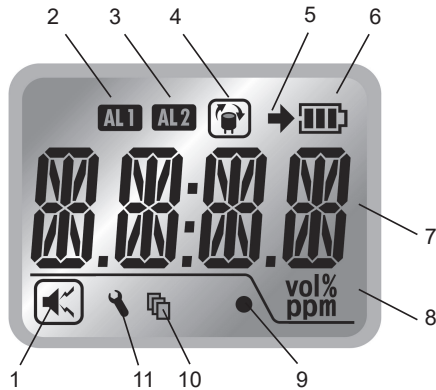
- 6) Perform an alarm test by referring to 7-4-5. "Alarm Test". Confirm that an alarm activates.
- 7) To turn off the detector, press and hold the POWER button for 3 seconds to stop the operation, then set the main power switch to the off (down) position.

#### NOTE

Once the POWER button is turned off, the backup power is not available. The backup power is activated if the main power switch is turned off, as long as the POWER button is in the on position.

## 7-3. LCD Operation

### 7-3-1. LCD



Item	Icon/Display	Description/Function
1	Audio alarm icon	Always present
2	AL1 icon	1 <sup>st</sup> stage alarm notification
3	AL2 icon	2 <sup>nd</sup> stage alarm notification
4	Sensor replacement icon	Sensor needs to be replaced
5	Backup battery icon	Unit is operating on the backup battery
6	Backup battery level indicator	Battery level of the backup battery used during power outage
7	Concentration value and information	CO concentration value, parameter values, error code, etc.
8	Unit of measurement	A unit of gas concentration
9	Clock battery level indicator	Clock battery level is low
10	Alarm history icon	Alarm history is being accessed
11	Maintenance mode icon	Maintenance mode is active

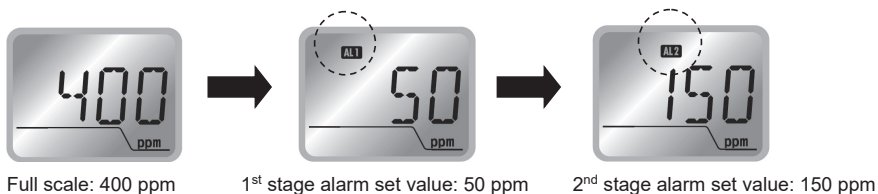
### 7-3-2. Normal Operation Status

During normal operation the green status indicator is fully lit, the gas concentration value is displayed on the LCD, and the AL1 and AL2 alarm LEDs are off.

Operation buttons	
	POWER button
	RESET button
	▲ (UP) button
	▼ (DOWN) button
	Maintenance button

### 7-3-3. Full Scale and Alarm Set Values Display

Press the RESET button (one beep) to display the “full scale concentration”, “1<sup>st</sup> stage alarm set value”, and “2<sup>nd</sup> stage alarm set value” in sequence.



### 7-3-4. Peak Value Display and Reset

Press the ▲ button (one beep). The “peak value after powering-up” and “PEAK” will be displayed alternately.



To return to the normal gas concentration display, press the RESET button (one beep).

The display will show the full scale value and alarm set value, then return to the normal gas concentration display.

To reset the peak value, press the ▲/▼ button at the same time (two beeps).

The peak value is reset then the display returns to the normal gas concentration display.

### 7-3-5. Operation during Gas Alarm

When the CO concentration reaches the alarm set value, the alarm LED flashes, the status indicator sequentially-flashes and an audio alarm sounds.

#### NOTE

**Audio alarm mute:** If the RESET button is pressed during a gas alarm, the audio alarm will be muted and the flashing alarm LED(s) will become solid. If the RESET button is pressed and held, the alarm will not be muted.

- There are two options to clear a gas alarm, manual-resetting and self-resetting. By default, the detector is set to manual-resetting mode. Please specify the alarm clearance option at the time of order, if necessary.
- The alarm hysteresis range is 2 ppm. The alarm will not be cleared until the gas concentration exceeds the alarm set value by more than the hysteresis value. E.g., when the alarm set value is 50 ppm and an alarm is activated, the alarm will not be cleared until the concentration reaches 47 ppm or lower.

#### NOTE

**Alarm relay contact reset:** If the RESET button is pressed while the concentration is below the alarm set value, the alarm relay contact will return to its normal position and the alarm LED will turn off.

#### < 1<sup>st</sup> stage alarm >

- Amber AL1 alarm LED flashes and the status indicator sequentially-flashes amber.
- Audio alarm beep: Fast, high and low beep tones.
- ZA1 alarm relay contact is closed. (When normally open contacts are used)

#### < 2<sup>nd</sup> stage alarm >

- Red AL2 and A1 alarm LEDs flash and the status indicator sequentially-flashes red.
- Audio alarm beep pattern: Very fast high and low beep tones.
- ZA2 alarm relay contact closes and ZA1 alarm remains closed. (When normally open contacts are used)

## 7-4. User Mode

### NOTE

- During the User mode, gas detection, alarm operation, analog output, and contact output activation are active as during normal operation mode. However, audio alarm mute and alarm clearance are not active and cannot be used.
- Return to normal operation mode after using the User mode.

### 7-4-1. User Mode Operation

To enter the User mode, press the maintenance button while the unit is on. After one beep, “1” and its abbreviated mode name “MT” will be alternately displayed.



### NOTE

Use a rounded pin (e.g., precision screwdriver) for pressing the maintenance button.

- To select the mode options, use the ▲ and ▼ buttons.
- To confirm your selection, press the maintenance button. To return to the previous step, press the RESET button.
- To execute the selected mode, press and hold the maintenance button for 3 seconds.
- To return to the normal operation mode, press and hold the RESET button for 5 seconds.

Mode	Mode name	Abbreviated mode name
1	Switching the maintenance mode on/off	MT
2	Zero adjustment	0 ppm
3	Span adjustment	*** ppm
4	Alarm test	AL T
5	Alarm history	AL H
6	Clock setting	DATE

## 7-4-2. Switching Maintenance Mode On/Off [Mode1]

### WARNING

During the Maintenance mode, the external relay contacts and audio alarm are disabled. Turn off the Maintenance mode during normal operation.

- 1) Enter the User mode. Press the ▲/▼ button to select "1" (each press of the button is followed by one beep). "MT" and "1" will be alternately displayed.



- 2) Press the maintenance button (one beep). "OFF" will flash.

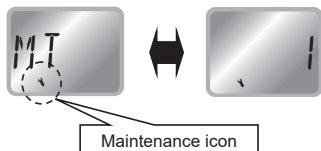


- 3) Press the ▲ button (one beep). "ON" will flash.



- 4) Press and hold the maintenance button for 3 seconds (beep pattern: short-long-short-short) to confirm the selection.

The maintenance icon is displayed, and "1" and "MT" will be alternately displayed, indicating that the unit is in the Maintenance mode.



### NOTE

If the unit is returned to normal operation mode while in the Maintenance mode, the "concentration value" and " \_ \_ \_ " will be alternately displayed and the maintenance icon will remain displayed.



- 5) To exit the Maintenance mode, take Steps 1) to 4) above to switch the mode from "ON" to "OFF".  
Confirm the maintenance icon has turned off.



### 7-4-3. Zero Adjustment [Mode 2]

#### CAUTION

- Perform a zero adjustment in clean air that is free from target gas or interfering gases.
- Proper gas detection is not possible without a correct zero adjustment.

- 1) Enter the User mode. Press the ▲/▼ button to select "2" (each press of the button is followed by one beep). "0 ppm" and "2" will be alternately displayed.



- 2) Press the maintenance button (one beep). The current CO concentration (ppm) will be displayed.



(Ex. Current concentration is 3 ppm)

- 3) Check that there is no gas present. Press and hold the maintenance button for 3 seconds to start a zero adjustment (beep pattern: short-long-short-short). "0 ppm" and "2" will be alternately displayed, indicating that the zero adjustment is complete.



### 7-4-4. Span Adjustment [Mode 3]

#### CAUTION

Mode 3 (span adjustment mode) is for manufacturer use only. For span adjustment, contact your New Cosmos representative (fees apply). Proper gas detection is not possible without a correct span adjustment.

- 1) Press the ▲/▼ button to select "3" (each press of the button is followed by one beep). "400 ppm" (span adjustment concentration) and "3" will be alternately displayed.



(Ex. Span adjustment concentration is 400 ppm)

### 7-4-5. Alarm Test [Mode 4]

When an alarm test is executed, the alarm test value (concentration) will be displayed on the LCD, and corresponding analog output and alarm outputs (external relay contacts, audio alarm, alarm LEDs) will activate. This will allow the user to test the alarm operation.

#### NOTE

If the unit is in the Maintenance mode, the external relay contacts and audio alarm are disabled (alarm LEDs and analog outputs are active).

#### CAUTION

An alarm test activates the external relay contacts of the detector. If the detector's external relay contacts are used to operate the interlocks, etc., of the external devices, release the interlocks beforehand, as needed to prevent a possible activation of the interlocks. Notify those concerned before starting an alarm test or inspection.

- 1) Enter the User mode. Press the ▲/▼ button to select "4" (each press of the button is followed by one beep). "AL T" and "4" will be alternately displayed.



- 2) Press the maintenance button (one beep).  
The current alarm test value (ppm) will be displayed.



(Ex. Test value is currently set to 75 ppm)

- 3) To change the alarm test value (ppm), press the ▲/▼ button.

#### NOTE

To increase/decrease the test value, press the ▲/▼ button. Holding the button continuously increases/decreases the value.



(Ex. Test value is changed to 150 ppm)

- 4) Press and hold the maintenance button for 3 seconds to start an alarm test (two beeps).
- 5) To cancel the ongoing alarm test, press the RESET button (one beep). The current alarm test value (ppm) will be displayed.  
(Note: If the RESET button is pressed and held, the alarm will not be cancelled and the unit will return to normal operation mode.)
- 6) To change the test value, repeat Steps 3) to 5).
- 7) Press and hold the RESET button for 5 seconds to return to normal operation mode.



## 7-4-6. Alarm History [Mode 5]

- Up to the 10 most recent alarm events can be displayed (automatically updated).
- For each alarm event, the following sequence of information is displayed: peak value (ppm) during the alarm, starting and ending times (year/month/day/time) of the alarm.
- Press the RESET button to return to the previous screen.

- Enter the User mode. Press the ▲/▼ button to select "5" (each press of the button is followed by one beep). "AL H" and "5" will be alternately displayed.



- Press the maintenance button (one beep) to display the alarm history. The most recent alarm event number "H1" will be displayed. If there is no alarm history event, "INIT" will be displayed.



- Use the ▲ button (each press of the button is followed by one beep) to select (display) the desired alarm event from H1 to H10.



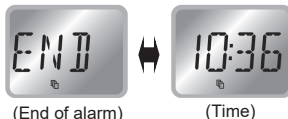
### NOTE

Each press of the ▲ button cycles through alarm events. The sequence is H1, H2, through H10, and INIT. To delete the alarm history, select "INIT", then press and hold the maintenance button for 3 seconds (beep pattern: short-long-short-short).

- Press the maintenance button (one beep). "AL" with history icon and the "peak value (ppm) during alarm" of the selected alarm event are alternately displayed.



- Each press of the ▼ button cycles through the details of the selected alarm event. The sequence is: starting year, date, and time and ending year, date, and time of the event.



- 1) Press the RESET button (one beep) to display the selected alarm event number "H \*".  
To display other alarm event, repeat Steps 3) to 5).



To delete the alarm history, select "INIT" in Step 3), then press and hold the maintenance button for 3 seconds (beep pattern: short-long-short-short). The deletion is complete.



### 7-4-7. Clock Setting [Mode 6]

Clock is used when recording the alarm history.

- 1) Enter the User mode. Press the ▲/▼ button to select "6" (each press of the button is followed by one beep). "DATE" and "6" will be alternately displayed.
- 2) Press the maintenance button (one beep). "YEAR" and "\*\*\*\* (year)" will be alternately displayed.
- 3) Select the item to change with the ▲/▼ button. The item and its currently set value will be displayed.

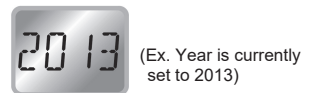


#### NOTE

Each press of the ▲ button cycles through: "YEAR", "MON" (month), "DAY", "HOUR" and "MIN" (minute).

When selecting "YEAR", for example,

- 4) Press the maintenance button (one beep). The currently set year will be displayed.
- 5) Change the set value by using the ▲/▼ button.



- 6) Press and hold the maintenance button for 3 seconds to confirm the change (beep pattern: short-long-short-short). "YEAR" and the set year will be alternately displayed.



- 7) To change the other items, repeat Steps 3) to 6).

- 8) Press and hold the RESET button for 5 seconds (two beeps) to return to normal operation mode.



## 7-5. Maker Mode

All the items set in the Maker mode (e.g., alarm set value) are password-protected.

### WARNING

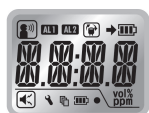
- Incorrect settings in the Maker mode may change the detector's specifications. Never operate in a way other than as described in this instruction manual.
- Only a selected administrator should have the authority to make changes in the Maker mode.
- Gas detection is not possible during the Maker mode. To exit the Maker mode and return to normal operation, power cycle the unit before use.

### 7-5-1. Maker Mode Activation

First, turn off the detector. Simultaneously press and hold down the ▲ and ▼ and POWER buttons for 3 seconds (two beeps) to activate the Maker mode. The software version is displayed then all the LCD segments turn on, and finally "775" starts flashing. Now the Maker mode is active.



Software version is displayed



All LCD segments turn on



"775" flashes  
<Maker Mode activates>

Maintenance button

Main power switch



### 7-5-2. Operating Time Refresh

This detector is designed to notify when a sensor needs replacement by referring to 8-1.6) "Sensor Replacement". Reset the operating time to zero after battery replacement.

- 1) Read 7-5. "Maker Mode" including the WARNING beforehand. Enter the Maker mode. Now "775" is flashing.
- 2) Press the ▲ button twice (two beeps) to change the password from 775 to 777. Now "777" is flashing.



"775" flashes

### WARNING

Before moving to the next step, "777" must be displayed. If this step is not taken, it may change the detector's specifications.



"777" flashes

- 3) Press the maintenance button (one beep). "4mA" will be displayed.

**NOTE**

Use a rounded pin (e.g., precision screwdriver) for pressing the maintenance button.



- 4) Press the ▲ button (one beep). The total operating time will be displayed in hex notation.

**⚠ WARNING**

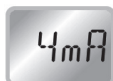
Before moving to the next step, "total operating time" must be displayed. If this step is not taken, it may change the detector's specifications.



(Ex. Total operating time is 66A8 or 3 years)

**NOTE**

Each press of the ▲ button cycles through the details of total operating time. The sequence is shown below.



Total operating time

- 5) Press and hold the maintenance button for more than 3 seconds (beep pattern: short-long-short-short). The "operating time" will be reset to "0".

**NOTE**

If the operating time refresh is not successful, two beeps are heard and the value does not become "0". In this case, press and hold the POWER button for 3 seconds to turn off the unit, then repeat the procedure. If the unit still fails to refresh, contact your New Cosmos representative for repair.



(Total operating time is reset)

- 6) To end the refresh, press and hold the POWER button for 3 seconds to turn off the unit.

### 7-5-3. Alarm Set Value Change

- 1) Read 7-5. "Maker Mode" including the WARNING beforehand. Enter the Maker mode. Now "775" is flashing.



"775" flashes

- 2) Press the maintenance button (one beep). "AL 1" will be displayed and the AL1 alarm LED will turn on.



- 3) Use the ▲/▼ button (one beep) to select the alarm stage.

**NOTE**

Each press of the ▲ / ▼ button alternates between "AL 1" and "AL 2".



(1<sup>st</sup> stage alarm)



(2<sup>nd</sup> stage alarm)

- 4) Press the maintenance button (one beep) to confirm the selection. The current alarm set value for the selected alarm stage will be displayed.



(Ex. AL1 alarm set value  
Is currently set to 50 ppm)

- 5) Change the alarm set value by using the ▲/▼ button.

- 6) Press and hold the maintenance button for more than 3 seconds (beep pattern: short - long - short - short) for confirmation. The new alarm set value has been set and "AL1" or "AL2" is displayed.



(Ex. Changed to 25 ppm)

**NOTE**

If the alarm set value change is not successful, two beeps are heard and the previous set value remains displayed. In this case, press and hold the POWER button for 3 seconds to turn off the unit, then repeat the procedure. If the unit still fails to change the alarm set value, contact your New Cosmos representative for repair.



- 7) To change another alarm set value, repeat Steps 3) to 6).
- 8) To end the procedure, press and hold the POWER button for 3 seconds to turn off the unit.
- 9) Press and hold the POWER button for 3 seconds to restart the unit in normal operation mode. Check the alarm set values. (Refer to 7-3-3. "Full Scale and Alarm Set Value Display".)

## 8. Maintenance

Daily checks are carried out by the user, while monthly and annual inspections are performed by the user, New Cosmos or its authorized representative.

### Important Notice for Maintenance

In order to ensure the reliability of the gas detector, it is vital to perform periodic span adjustment on the gas sensor. It is highly recommended that a maintenance contract with a local New Cosmos representative be made for the performance of scheduled sensor adjustment and replacement.


### 8-1. Inspection Contents and Frequency

Check items	Start-up	Expansion or relocation	Periodic Inspection		Daily check
			Monthly	Annually	
1) Concentration display	√	√			√
2) Backup battery level	√	√		√ *1	√
3) Alarm test	√	√	√		
4) Zero adjustment *2	√	√	√		
5) Span adjustment (gas calibration)				√	
6) Sensor replacement				√ *3 Every 3 years	


\*1. Regardless of the battery level, the first battery replacement should be done within 3 years from the purchase date. Succeeding replacements should be done every 3 years.

\*2. Perform a zero adjustment in clean air that is free from target gas or interfering gases.

\*3. The first sensor replacement should be done within 3 years from the purchase date. Succeeding replacements should be done every 3 years. Contact your New Cosmos representative for sensor replacement (fees apply).

- 1) Concentration Display
  - Check that the CO concentration is displayed on the LCD and that the detector operates properly.
- 2) Backup Battery Level
  - Check the backup battery level on the LCD. If the low battery icon  appears (indicating 70 hours or less of operation), then battery replacement is recommended.
  - The unit can continuously operate for about 350 hours with a new backup battery (at 20°C, with no alarm activation and backlight being off).

#### NOTE

- Backup powering is not possible while the empty battery alert icon  is flashing. A low battery does not affect the detector's operation, but replace the battery or remove it from the unit in order to prevent possible battery leakage.
- If a gas alarm occurred while the backup battery was being used, a significant amount of battery was consumed. Battery replacement is recommended.
- Even though the backup battery was unused, replace it every 3 years to prevent possible battery leakage. (Replace the clock battery every 10 years regardless of its battery level.)
- Refer to 8-2. "Sensor/Backup Battery/Clock Battery Replacement" for battery replacement procedure.

### 3) Alarm Test

Check that an alarm activates correctly by referring to 7-4-5. "Alarm Test".

#### CAUTION

- Perform an alarm test in accordance with the applicable local laws and regulations. For example, the applicable law in Japan specifies that alarm activation must be checked by performing a circuit check once every month.
- An alarm test activates the external relay contacts of the detector. If the detector's external relay contacts are used to operate the interlocks, etc., of the external devices, release the interlocks beforehand, as needed to prevent a possible activation of the interlocks. Notify those concerned before starting an alarm test or inspection.

### 4) Zero Adjustment

Check that the displayed concentration is "0 ppm" while in clean air.

If "0 ppm" is not displayed, perform a zero adjustment by referring to 7-4-3. "Zero Adjustment".

### 5) Span Adjustment (Gas Calibration)

To ensure reliable gas sensor performance, perform a span adjustment at least once a year.

#### CAUTION

Contact your New Cosmos representative for span adjustment or sensor replacement (fees apply). Proper gas detection is not possible without correct adjustments.

### 6) Sensor Replacement

It is highly recommended to replace the sensor every three years when used in a normal environment. However, if any abnormality, e.g., a significant decrease in sensor sensitivity, is found during a periodic inspection or daily check, the sensor needs to be replaced. Contact your New Cosmos representative for sensor replacement.

#### NOTE

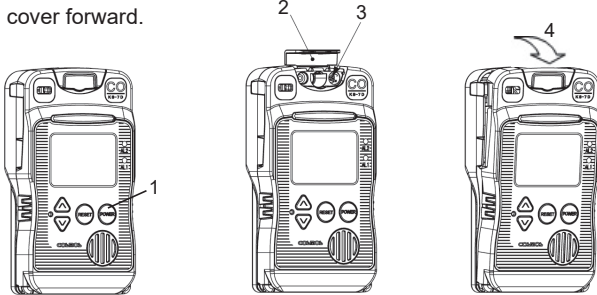
- Even if the detector is unused for a long period of time, replace the sensor three years from the purchase date. Contact your New Cosmos representative for sensor replacement (fees apply).
  - This detector counts each hour while it is on. When the total operating time reaches three years, sensor replacement alert will be notified by audio alarm and onscreen indication. The audio alarm sounds at a one-minute interval. To mute the audio alarm, press the RESET button. The muted audio alarm will become audible, once the detector is power cycled. To mute the resumed audio alarm, press the RESET button.
- \* The sensor replacement alert is set to on by default when shipped out, and it can be muted if specified. Please specify the mute option at the time of order, if necessary. Onscreen sensor replacement alert is always set to on regardless of the audio setting.

## 8-2. Backup/Clock Battery Replacement

### CAUTION

- Use a “CR2 lithium battery, cylindrical type” for backup battery.
- Use a “CR2032 lithium battery, coin type” for clock battery.

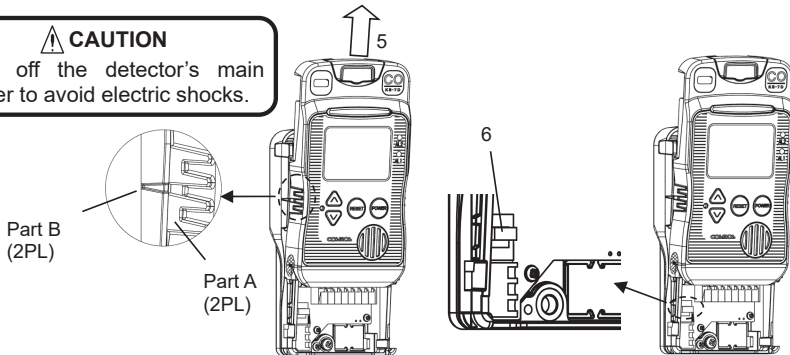
1. Press and hold the POWER button for 3 seconds to turn off the detector.
2. Open the screw cover.
3. Loosen the two fastening screws (these screws cannot be fully removed).
4. Slightly pull the cover forward.



5. Slide the cover up by holding Part A (2 places, each side of the cover) until the middle alignment markings on Part A and the alignment markings on Part B match.
6. Turn off the main power by setting the main power switch to the off (down) position.

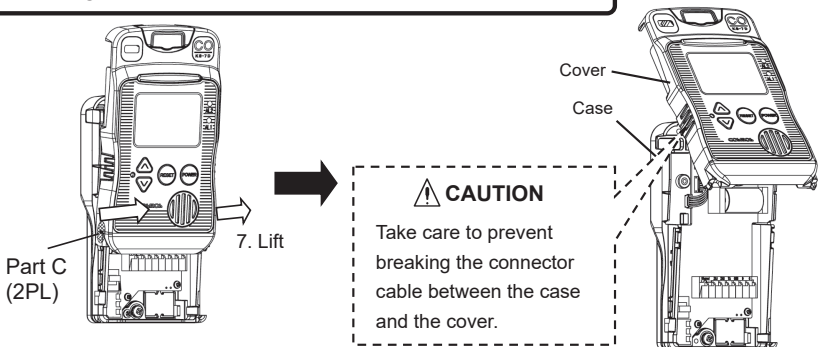
### CAUTION

Turn off the detector's main power to avoid electric shocks.

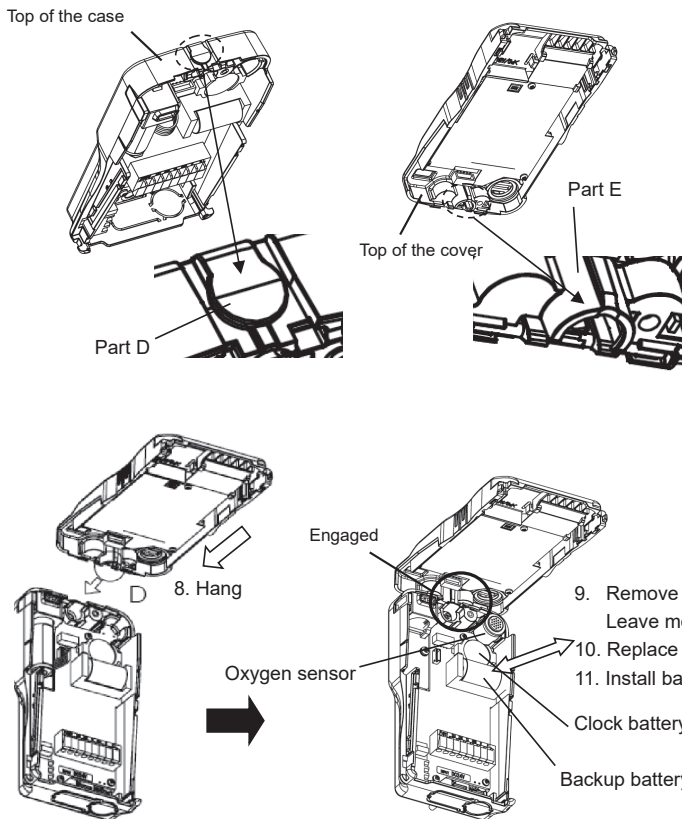


7. Pull and detach the cover from the case by holding Part C (2 places, each side of the cover).

### CAUTION Cover and case are connected with a connector cable.



8. Temporarily hang the cover on the top of the case by engaging the cover's Part E into the case's Part D.



9. Replace the backup battery/clock battery with a new one.

**CAUTION**

Correctly install a battery by checking the polarity marking on the battery holder.

10. (Reverse Step 8) Pull and detach the case from the top of the case by holding the Part C (2 places, each side of the cover). Align Part A to Part B (2 places, each side of the cover) to engage the cover into the case.
11. Turn on the main power by setting the main power switch to the on (up) position
12. (Reverse Step 5) By holding Part A (2 places, each side of the cover), match the middle alignment markings on Part A and the alignment markings on Part B, slide down and close the cover.
13. Press up and open the screw cover. Tighten the two fastening screws.

**CAUTION**

Secure the cover by tightening the two fastening screws. Proper gas detection is not possible if the cover is not tightly closed.

14. Close the screw cover.

## 9. Troubleshooting

Before requesting repair, please refer to the table below. If the detector does not return to normal operation 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.

Problem	Probable cause	Solution	Reference section
Green status indicator not lit	Main power switch or POWER button is off	Set the main power switch to on position or press and hold the POWER button for 3 seconds.	7-2. Operating Procedure
	Incorrect wiring or loose connection	Check and rewire/reconnect.	6. Wiring
	No power supplied	Supply correct power.	7-1. Precautions before Use
Maintenance icon displayed on LCD, and gas concentration value and "____" displayed alternately	Product is in Maintenance mode	Switch the Maintenance mode to OFF.	7-4-2. Switching Maintenance Mode On/Off
No audio alarm	Product is in Maintenance mode	Switch the Maintenance mode to OFF.	7-4-2. Switching Maintenance Mode On/Off
	Incorrect alarm set value	Check the alarm set value.	7-3-3. Full Scale and Alarm Set Value Display
	Non-audio unit selected at time of order	Consult your New Cosmos representative.	
Alarm relay contacts do not activate	Product is in Maintenance mode	Switch the Maintenance mode to OFF.	7-4-2. Switching Maintenance Mode On/Off
	Incorrect wiring or loose connection	Check and rewire/reconnect.	6. Wiring
	Incorrect alarm set value	Check the alarm set value.	7-3-3. Full Scale and Alarm Set Value Display
<ul style="list-style-type: none"> <li>• Sensor replacement icon displayed on LCD</li> <li>• Once a minute sensor replacement audio alarm</li> </ul>	Total operating time has reached three years, and the sensor replacement alert is activated.	<p>Contact your representative for sensor replacement.</p> <p>To mute the audio alarm, press the RESET button. The muted audio alarm will become audible, once the detector is power cycled.</p> <p>To mute the resumed audio alarm, press the RESET button.</p>	8-1. 6) Sensor Replacement

Problem	Probable cause	Solution	Reference section
<ul style="list-style-type: none"> <li>• Status indicator flashing between green and red</li> <li>• “E-E1”, “E-E2” or “E-E3” displayed on LCD</li> <li>• Audio alarm sounds</li> <li>• Fault alarm relay contact activates</li> <li>• Analog output is lower than 0.9 mA</li> </ul>	Internal error	Press and hold the POWER button for 3 seconds to turn off the detector. After a few minutes, turn the detector on again. If the product does not return to normal operation, contact your New Cosmos representative for repair.	7-2. Operating Procedure
<ul style="list-style-type: none"> <li>• “E-S1” or “E-S3” displayed on LCD</li> <li>• Analog output is less than 0.9mA</li> </ul>	Sensor Error	If “E-S3” may be displayed within a week after installation, then the unit will automatically return to normal after approx. one hour. If the unit fails to return to normal, contact your New Cosmos representative for repair.	2. General Precautions
<ul style="list-style-type: none"> <li>• “E-B” displayed on LCD</li> <li>• Audio alarm sounds</li> </ul>	Backup battery is empty	<p>Replace the backup battery with a new one.</p> <p>Pressing the RESET button can mute the audio alarm for one hour.</p>	8-2. Backup Battery/Clock Battery Replacement
Other than the above	Microcomputer may malfunction due to noise.	<p>Turn off the detector and remove the backup battery from the unit, then reinstall. Turn on the detector. If the product does not return to normal operation, contact your New Cosmos representative for repair.</p>	<p>7-2. Operating Procedure</p> <p>8-2. Backup Battery/Clock Battery Replacement</p>

## 10. Specifications

Detection principle	Electrochemical sensor
Sampling method	Diffusion type
Target gas	Carbon Monoxide
Detection range	0-400 ppm (Service range: F.S. value to 1,000 ppm)
Display	Four-digit LCD with backlight, resolution 1 ppm
Alarm set value (AL1/AL2)	F.S. 400 ppm: 50/150 ppm
Indication accuracy *1	+/- 30% of the alarm set value
Alarm delay	Alarm is triggered in less than 60 seconds after exposure to test gas (80 ppm)
Alarm	<ul style="list-style-type: none"> <li>Gas alarm (in two stages) 1<sup>st</sup> stage alarm: AL1 alarm LED flashes (lit if the audio alarm is muted), amber status indicator sequentially-flashes, audio alarm sounds, and AL1 icon is displayed on LCD. 2<sup>nd</sup> stage alarm: AL1 and AL2 alarm LEDs flash (lit if the audio alarm is muted), red status indicator sequentially-flashes, audio alarm sounds, and AL1 and AL2 icons are displayed on LCD.</li> <li>Alarm clearance method: Manual-resetting (standard) or self-resetting*3</li> </ul>
External output	<ul style="list-style-type: none"> <li>Gas concentration analog output *2: 4-20mADC (common negative with power supply) (Current sensing resistor must be 300Ω or less including a wiring resistance)</li> <li>Gas alarm relay contacts (in two stages): Dry NO (standard) or NC contacts, manual-resetting (standard) or self-resetting *3 (Max load: 0.5 A at 125 VAC or 2 A at 30 VDC (resistance load))</li> <li>Fault alarm relay contact: Dry NO (standard) or NC contact, manual-resetting (standard) or self-resetting *3 (Max load: 0.5 A at 125 VAC or 2 A at 30 VDC (resistance load))</li> </ul>
Explosion-proof	Not explosion-proof
Other features	Maintenance mode used to disable gas alarm relay contacts, audio alarm mute, and backup battery used in the event of power outage
Applicable cable	0.5-1.25 mm <sup>2</sup> shielded cable. Outer diameter: less than 10.5 mm
Cable length	Up to 500 m
Operating temperature and humidity	-5 to +40°C, 30 to 85%RH (No rapid temperature/humidity changes. No condensation)
Power supply	24 VDC±10% or 100 VAC±10% 50/60Hz±10% *3
Power consumption	24 VDC: 1 W during normal operation, 3 W during alarm, or 100 VAC: 2 VA during normal operation, 6 VA during alarm
Dimensions	W82 x H150 x D35 mm (excluding protruding parts)
Mass	Approx. 300g
Mounting method	Wall mounting, indoors

\*1. Under identical measurement conditions.

\*2. Output concentration value is within the detection range.

\*3. Manual-resetting or self-resetting; NO (normally open) or NC (normally closed) are specified at the time of order.

# 11. Warranty

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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.

## 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 or repair service. This warranty covers the New Cosmos product/parts only and not third party product/parts.

## 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.

# 12. Expected Sensor Life

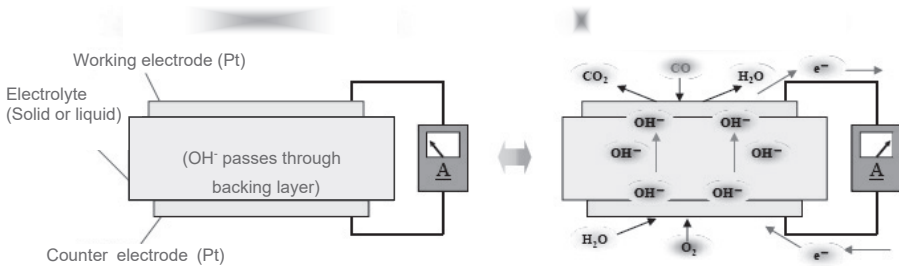
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The estimated service life of the sensor is shown in the table below. The sensor may fail to provide correct detection after its service life expires. Replace the sensor before its expiration. This expected service life assumes that maintenance is 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.

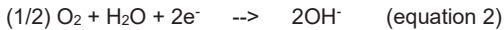
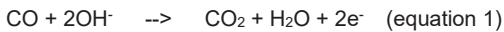
Detection principle	Expected sensor life
Electrochemical	3 years

# 13. Detection Principle

## Electrochemical Sensor



Sensor consists of a working electrode (noble metal), a counter electrode and an electrolyte. When the CO reaches the working electrode, electrons are generated resulting from the reaction between CO and anions in the electrolyte such as OH<sup>-</sup> (see equation 1). By creating a short circuit between the working and counter electrodes with external wiring, electrons move to the counter electrolyte through the external wiring. At that point, the consumed anions in the electrolyte at the working electrode are replenished and move to the electrolyte by the reaction of CO<sub>2</sub>, water, and electrons as shown in equation 2. The total reaction is expressed as shown in equation 3. Measuring the current generated here allows determining the concentration of CO gas.



## 14. Glossary

Term	Definition
Clean air or normal air	Standard atmosphere which contains 20.9 to 21.0% oxygen in dry condition or atmosphere without target gas or interference gases.
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.
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.
Service range	A range of target gas concentrations the detector is able to indicate, which are usually outside the Detection Range and used only as reference.
Alarm set value	Preset gas concentration level at which an alarm is triggered.
Alarm accuracy	Difference between the alarm set value and gas concentration value at which an alarm is actually triggered, or percentage of the difference compared to the alarm set value.
Alarm delay	Time required for an alarm to trigger after the detector is exposed to a gas concentration level, higher or lower than the alarm set value.
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.
Self-resetting	Gas alarm clearance method. When the gas concentration falls below (or above when the alarm set value is the lower limit) the gas alarm set value after an alarm has been signaled, relevant alarm lights, gas alarm icon and alarm relay contacts will automatically return to their normal positions/statuses.
Manual-resetting	Gas alarm clearance method. Even if the gas concentration falls below (or above when the alarm set value is the lower limit) the gas alarm set value after an alarm has been signaled, relevant alarm lights, gas alarm icon, and alarm relay contacts will not automatically return to their normal positions/statuses. Manual operation is only possible when the gas concentration is below (or above) the gas alarm set value.
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.
Explosive atmosphere	Mixture of air and flammable substances in the form of dust or vapor which are within their explosive limits.
Sequentially-flash	There are several LEDs inside the status indicator. In the event of a gas alarm, one LED lights at a time and the lit LED moves from left to right.

## 15. Proper Product Disposal at End of Life

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The Waste Electrical and Electronic Equipment (WEEE) directive (2012/19/EU) is intended to promote recycling of electrical and electronic equipment and their components at end of life. This symbol (crossed-out wheeled bin) indicates separate collection of waste electrical and electronic equipment in the EU countries. This product contains two Lithium batteries. Specific battery information is given in this instruction manual. Batteries must be recycled or disposed of properly.

At the end of its life, this product must undergo separate collection and recycling from general or household waste. Please use the return and collection system available in your country for the disposal of this product.



### Revision History

Document No.	Date	Revision
GAE-053-00	July 2014	0
GAE-053-01	May 2016	1
GAE-053-02	October 2018	2
GAE-053-03	June 2019	3
GAE-053-04	December 2020	4

Additional copies of this instruction manual may be purchased.  
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