

Carbon Monoxide Detector

Model KS-7D

Instruction Manual

- Keep this Instruction Manual available for quick reference when needed.
- Read this Instruction Manual and understand the information thoroughly before using.
- This Instruction Manual describes the standard specification. For the users' specification, see the separate delivery specifications.



NEW COSMOS ELECTRIC CO., LTD.

Instruction Manual No.
GAE-053-00
July 2014

Table of Contents

1. Introduction	1
2. Safe Operation	2
3. Contents in the Package and Options.....	2
3. Contents in the Package and Options.....	3
4. Dimensions, Part Names and Functions	4
4-1. External Dimensions, Part Names and Functions	4
4-2. Part Names and Functions	5
5. Installation Instructions.....	6
6. Wiring	9
6-1. Assembling of Pin Terminals and Insulation Caps	10
6-2. Connecting and Disconnecting to Terminal Block.....	11
6-2-1. Terminal Block for Power Source	11
6-2-2. Terminal Block for External Output.....	11
6-3. Banding Band.....	11
7. Operating Procedure	12
7-1. Before Use	12
7-2. Operating Procedure.....	12
7-3. Operation and Function.....	14
7-3-1. LCD	14
7-3-2. Status of Normal Operation	14
7-3-3. Full Scale and Alarm Set Value	15
7-3-4. Displaying Peak Value and Reset	15
7-3-5. Performance of Gas Alarm	15
7-4. User Mode.....	16
7-4-1. Operation of User Mode	16
7-4-2. Switching the Maintenance Function ON and OFF [Mode Number 1].....	16
7-4-3. Zero Adjustment [Mode Number 2]	17
7-4-4. Span Adjustment [Mode Number 3]	17
7-4-5. Alarm Test [Mode Number 4].....	18
7-4-6. Alarm History [Mode Number 5]	18
7-4-7. Clock Setting [Mode Number 6]	20
7-5. Maker Mode	21
8. Maintenance Check.....	23
8-1. Inspection Contents and Frequency	23
8-2. Replacement of Backup Battery and Clock Battery	25
9. Troubleshooting.....	27
10. Specifications.....	29
11. Warranty	30
12. Detection Principle	31
13. Glossary	32

1. Introduction

Thank you for purchasing the KS-7D Carbon Monoxide Detector.


The KS-7D Carbon Monoxide Detector detects the leakage of carbon monoxide, which is toxic and combustible gas, in indoor office, laboratories, clean room, etc. in non-hazardous area. It displays the gas concentration and outputs as an analog signal to the external device.


It is useful to monitor the carbon monoxide concentration, as the alarm lamp, buzzer and alarm relays will be activated when it reaches the alarm set value.


Read this Instruction Manual thoroughly before installing and using the Carbon Monoxide Detector for proper operation.

SYMBOLS

The following symbols are used for safety purposes.

 **DANGER** : Indicates hazardous situation that may result in serious injury or death, if not avoided.

 **WARNING** : Indicates potentially hazardous situation that may result in serious injury or death, if not avoided.

 **CAUTION** : Indicates potentially hazardous situation that may result in minor injury or physical damage, if not avoided.

NOTE : Indicates operational advices.

2. Safe Operation

Read the following instructions thoroughly for proper operation. Ensure to install and operate the Carbon Monoxide Detector in accordance with applicable laws and regulations..

WARNING

- If the gas alarm is activated, take all necessary precautions immediately.
- This Carbon Monoxide Detector is not explosion-proof structure. Install in a non-hazardous location.
- Make sure to fix the detector cover with cover fixation screws. Otherwise, it cannot detect properly.

CAUTION

- Do not disassemble, alter, or change the structure or electric circuits of the Carbon Monoxide Detector. It may affect its performance.
- The Carbon Monoxide Detector is not drip-proof structure. Keep liquids away from the Carbon Monoxide Detector.
- Use the Carbon Monoxide Detector in accordance with applicable laws and regulations.
- By the sensor structure, the mounting position of the Carbon Monoxide Detector is specified. Make sure to install the Carbon Monoxide Detector in accordance with “5. *Installation Instructions*” on page 6.
- By the sensor structure, when a sensor is not stored accordance with the instructions on package, the sensor output may decrease temporarily for one week after installation. This phenomenon will be recovered to the normal output within one hour and then it will operate normally. (It may take 2 hours if the storage period is long.)
- For use of analog outputs of the Carbon Monoxide Detector to the concentration display of upper monitoring software, process the software of zero suppression. The analog output resolution of the Carbon Monoxide Detector is 250 to 400 (depending on the full scale setting). Because of the difference in resolution of upper monitoring software or difference in concentration digit, and changes in connected impedance, some errors may be observed in the concentration indicator. Set the error threshold to 1.0mA for analog output.

NOTE Operation at Power Failure

In case of electric power failure during operation, the Carbon Monoxide Detector will stop operation unless the backup battery level is enough. In such case, if the Main Power Switch is not turned off, it will be restarted automatically when the power is restored.

If the backup battery is empty, replace with a new battery to avoid causing leakage. When the empty backup battery is expected to remain for a certain period of time due to planned outage, remove the backup battery beforehand. (Refer to “8-2. *Replacement of Backup Battery and Clock Battery*” on page 23.) It can operate normally without backup battery.

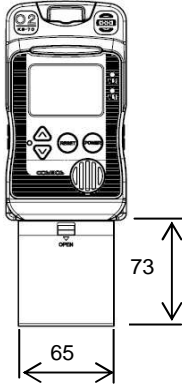
3. Contents in the Package and Options

The following items are enclosed with the KS-7D Carbon Monoxide Detector. Carefully check that all items listed below are included before use. If any items are broken or missing, contact your New Cosmos representative.

Standard Accessories

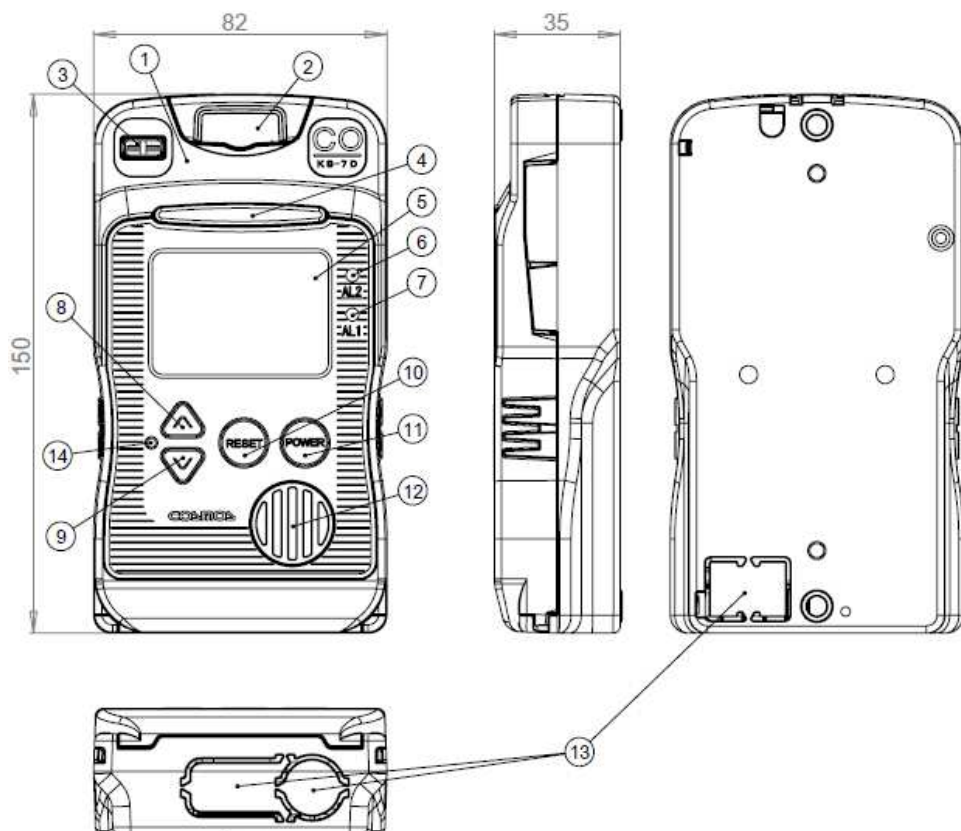
Items	Qty	Reference
Detector	1	Model KS-7D
Mounting Screw	2	M4 x 12 with spring washer, to mount the Detector
Banding Band	1	To bundle the electric wire
Pin Terminal	9	For clamping connection to the terminal block
Insulation Cap	9	For electrical insulation by inserting to crimping terminal
Instruction Manual	1	
Installation Manual	1	(select review of instruction manual)
Inspection Report	1	

Options (sold separately)

Item	Model	Description
<p>Battery Unit</p> <p>(Battery: 4 x AA size alkaline dry cell)</p> 	KS-7 x B	<ul style="list-style-type: none"> The setting of the Carbon Monoxide Detector can be changed to operate on AA size alkaline batteries by installing the Battery Unit. Differences from DC specification. <ol style="list-style-type: none"> 1) Analog output will be "0 mA" (no output) 2) External contact will not function 3) The status lamp will not light up at normal operation, and it will start flashing in case of alarming. Continuous operating time: Approx. 8800 hours (at 20 degrees C, without alarm, backlight OFF)

4. Dimensions, Part Names and Functions

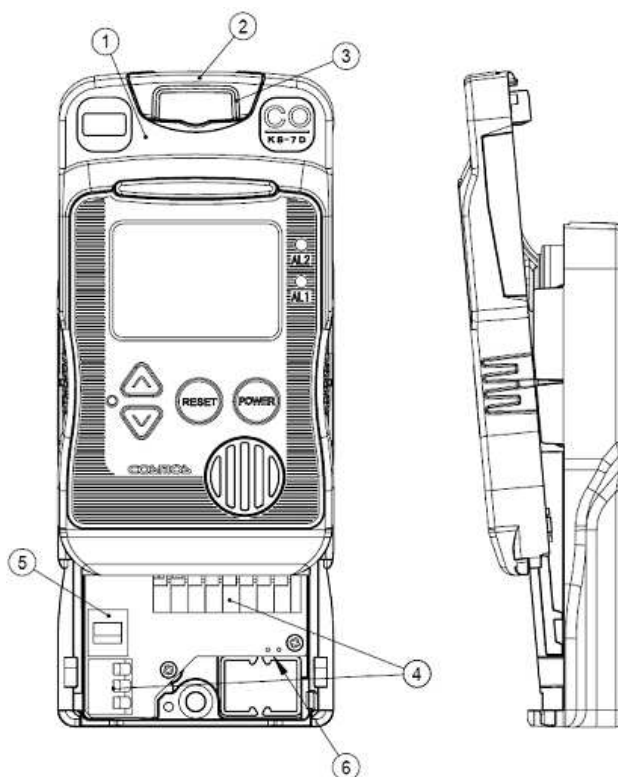
4-1. External Dimensions, Part Names and Functions



No.	Name	Function
1	Detector Cover	Slide upward to operate the Main Power Switch and for external wiring. Keep the cover closed under normal use.
2	Screw Cover	Covering the mounting screws of the Carbon Monoxide Detector and fixation screws of detector cover. Keep open for installation and deinstallation, and close for normal operation.
3	Gas Detection Port	Detects gas by Carbon Monoxide sensor inside.
4	Status Lamp	Indicates operating condition with lamp. GREEN lamp lights up at normal operation, ORANGE lamp flashes at 1 st stage alarm, RED lamp flashes at 2 nd stage alarm.
5	LCD	Displays the Carbon Monoxide concentration and information.
6	2 nd Stage Alarm Lamp	Flashes in RED for 2 nd stage alarm. Press the Reset Switch to turn ON the lamp.
7	1 st Stage Alarm Lamp	Flashes in ORANGE for 1 st stage alarm. Press the Reset Switch to turn ON the lamp.
8	UP Switch	During normal operation, press to display upper limit peak value of Carbon Monoxide concentration after power activation on LCD. Also to use for setting by a combination of each switch.
9	DOWN Switch	During normal operation, press to display lower limit peak value of Carbon Monoxide concentration after power activation on LCD. Also to use for setting by a combination of each switch.
10	Reset Switch	During normal operation, press to display the full scale and alarm set value. When the sound or buzzer is on, press to stop the sound or buzzer.

11	Power Switch	Press and hold to turn ON/OFF the power.
12	Buzzer Hole	To sound an alarm.
13	Cable Inlet	Connect to external wiring. Use by cutting with nipper.
14	Maintenance Switch	Use for setting.

4-2. Part Names and Functions



No.	Name	Function
1	Detector Cover	Slide upward to operate the Main Power Switch and for external wiring. Keep the cover closed under normal use.
2	Screw Cover	Covering the mounting screws of the Carbon Monoxide Detector or fixation screws of detector cover. Keep open for installation and deinstallation, and close for normal operation.
3	Cover Fixation Screw	To fix the detector cover (inside the screw cover)
4	Terminal Box	Connect with the external wiring.
5	Main Power Switch	Turn ON/OFF the Main Power Switch.
6	Battery Unit Connector	Connect KS-7 x B Battery Unit (optional). It is located on the back of the circuit board.

5. Installation Instructions



WARNING

This Carbon Monoxide Detector is not explosion-proof structure.
Install in a non-hazardous location.

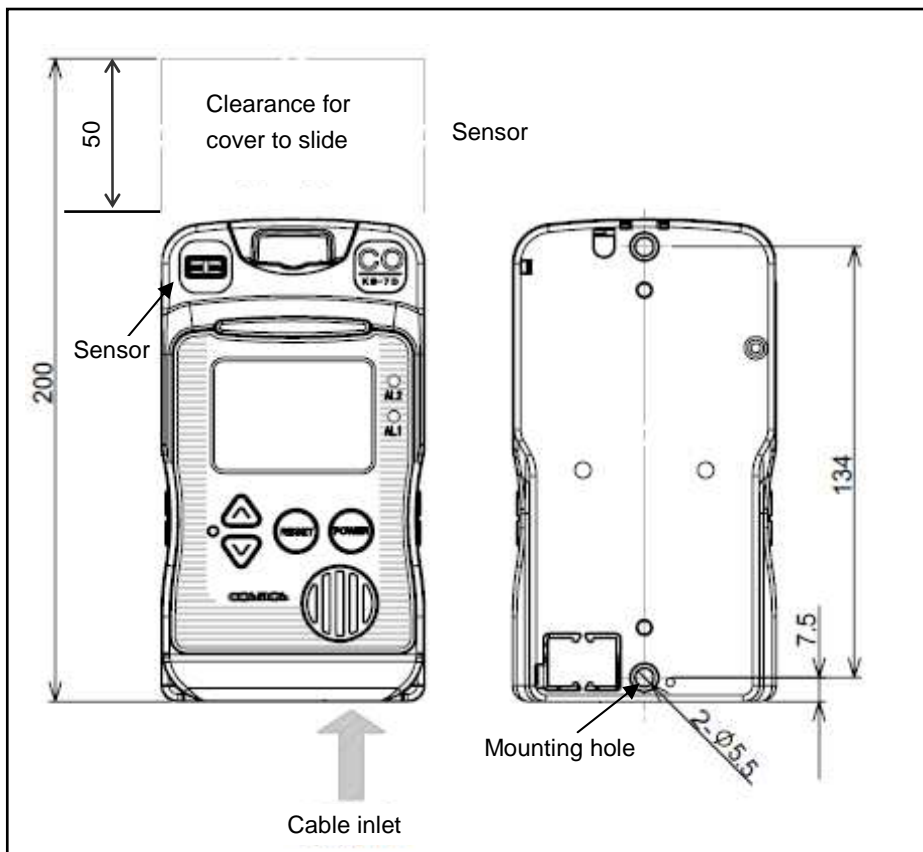


CAUTION

- Handle with care to avoid damaging the Carbon Monoxide Detector caused by dropping or hitting. It may affect the detection performance.
- Do not install the Carbon Monoxide Detector in locations listed below.
 - Outdoor or places where it may be exposed to direct water.
 - Places where the ambient condition is out of the following range.
 - Temperature: between -50 and +40 degrees C (without rapid temperature changes)
 - Humidity: between 30 and 85% RH (non condensing).
 - Places where corrosive gas may exist.
 - Places where it is susceptible to impact or vibration.
 - Places where high-frequency or magnetism is generated.
 - Places where electrical noise is generated.
- Install in a location where the maintenance can be performed easily.
- Installation position of sensor should be upward in a vertical direction. If it is installed upside-down or sideways, it may not detect properly.
- Installation height should be 75 to 150 cm from the floor to the sensor, in a places without obstruction to detect gas.
- Make sure to fix the Detector Cover with cover fixation screws. Otherwise, it cannot detect properly.

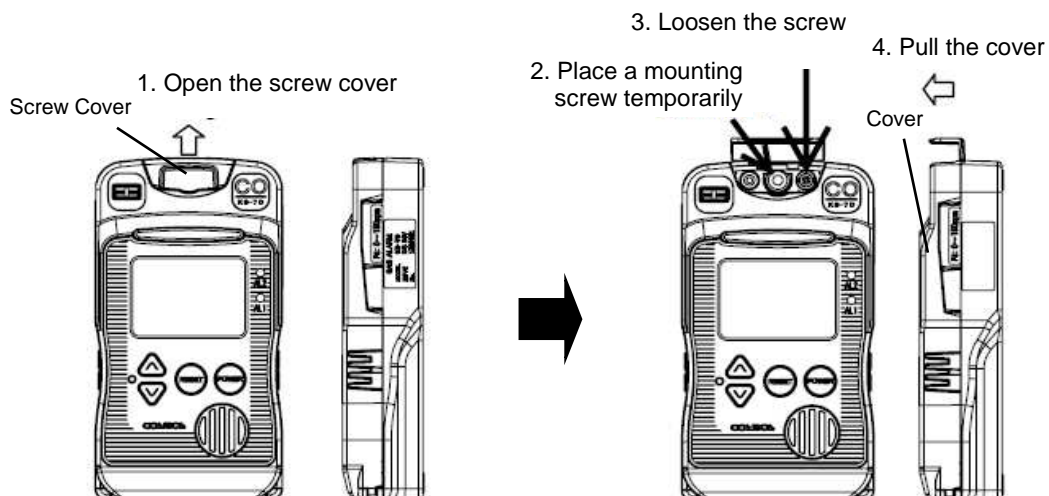
NOTE

- Leave a space at least 30 mm of clearance from side to side for replace.
- Leave a space at least 200 mm of clearance from the bottom and 50mm from the top for sliding the detector cover.
- Create a space for cabling under the Carbon Monoxide Detector.

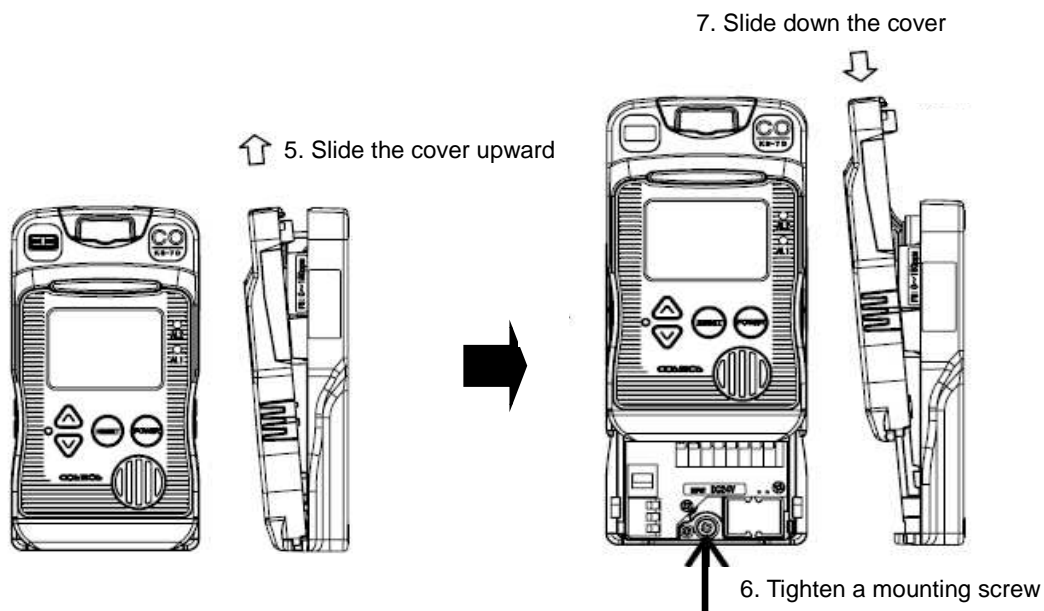


- Install the Carbon Monoxide Detector with M4 internal thread of mounting screws (2-point, pitch 134) according to the following procedure.

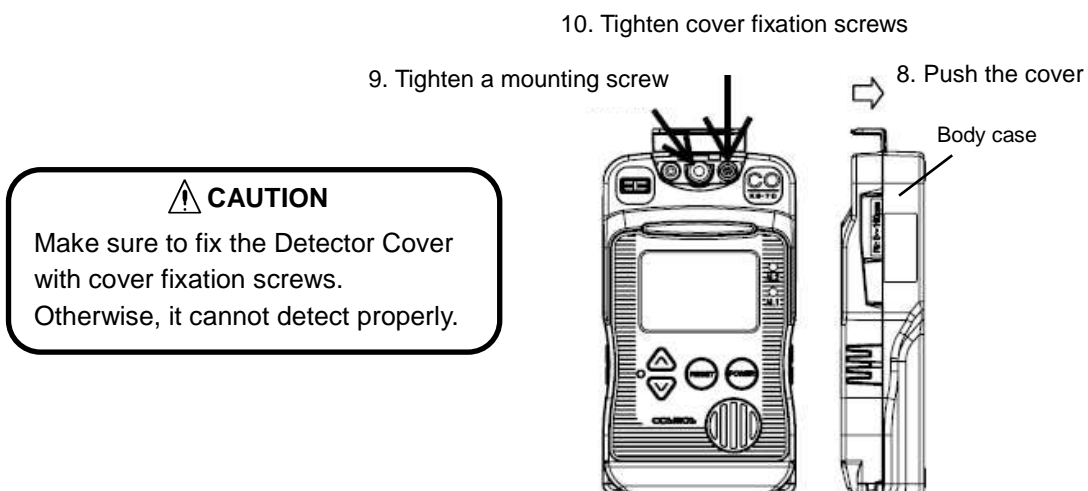
1. Open the screw cover
2. Place a provided mounting screw temporarily (Upper side)
3. Loosen the cover fixation screws
4. Pull the detector cover



5. Slide the cover upward (Open)
6. Tighten the provided mounting screw (Bottom side)
7. Slide down the cover (Close)



8. Push the cover to the body case
9. Tighten a provided mounting screw (Upper side)
10. Fix the detector cover with cover fixation screw
11. Close the screw cover



6. Wiring

⚠ WARNING

- Make sure to turn OFF the power supply before starting the wiring work for electric shock prevention.
- Close the detector cover after the wiring to prevent electric shock.

⚠ CAUTION

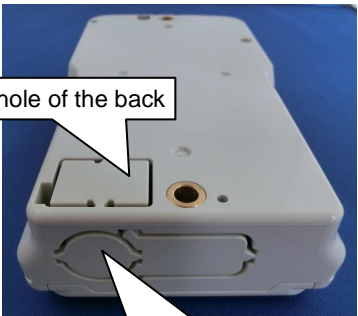
- New Cosmos does not accept any liability whatsoever for any resulting damage for controlling the interlock by applying the Carbon Monoxide concentration output (analog output, alarm relay output).
- Pay attention to the terminal marking on terminal block for connection.
- Keep the connection cable away from the electrical power line.
- The analog output of the KS-7D Carbon Monoxide Detector is not insulated from the power supply. When using the KS-7D Carbon Monoxide Detector with other equipment, provide electrical insulation to prevent sneak current.

- The wiring slot is located by knockout hole on the back and bottom side. Cut and open the wiring slot with nipper.
- Use shielded cables (0.5 to 1.25 mm²) within 500m and outside diameter of 10.5mm or less.

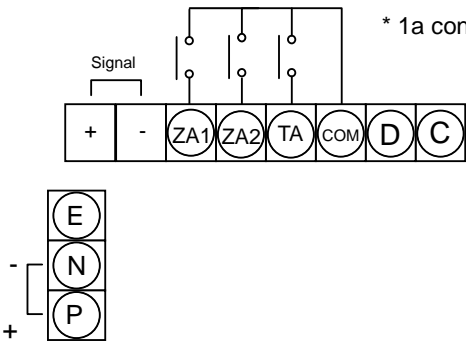
NOTE

- To connect with the KS-7xB Battery Unit, read the instruction manual for Battery Unit.

Knockout hole of the back



Knockout hole on the bottom



* 1a contact wiring diagram

P	+	Power source 24V DC
N	-	
E	Earth ground	
Signal	+	Analog output
	-	4 to 20mA DC
ZA1	1 st alarm contact (non-voltage 1a or 1b)	
ZA2	2 nd alarm contact (non-voltage 1a or 1b)	
TA	Malfunction contact (non-voltage 1a or 1b)	
COM	Common	
D	Non-use	
C		

6-1. Assembling of Pin Terminals and Insulation Caps

Recommended Parts

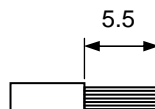
Names	Model (manufacturer)	Reference
Electric Cable	-	Shielded cable (0.5 to 1.25mm ²) 10.5mm or less in outer diameter
Pin Terminal	TC1.25-16 (NICHIFU)	Included with shipment (for twisted wire 0.25 to 1.65mm ²)
Insulation Cap	VC1.25 (NICHIFU)	Included with shipment
Crimp Tool	NH1 (NICHIFU)	Nominal size compatible terminal 1.25 for uninsulated terminal

Terminal Block (reference)

Use	Model (manufacturer)	Reference
Power Terminal Block	ML-1400-S1L-3P (SATO PARTS)	Fit diameter: 0.65mm to 1.6mm
External Output Cable	FFKDSA1/H1-5, 08-8 (PHOENIX CONTACT)	Fit diameter: 0.2mm to 1.5mm

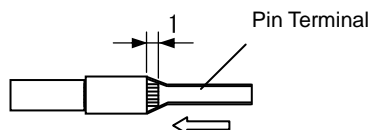
1. Wire Strip

The recommended dimension of the end of stripped wire for assembling pin terminal is 5.5mm.



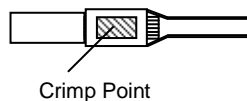
2. Pin Terminal

Attach the pin terminal to the stripped wire.
Push until the core of stripped wire is viewed 1mm from the center of pin terminal.



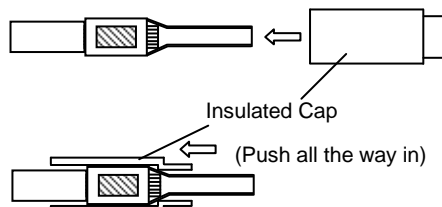
3. Pin Terminal Crimp

Crimp the center point of pin terminal.



4. Insulated Cap

Insert the insulated cap from the top of crimp pin terminal.



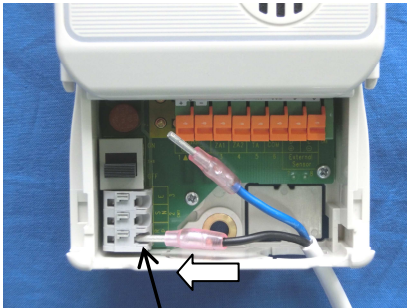
NOTE

Insert the insulated cap all the way into the pin terminal. Otherwise, it may cause disconnection due to the short length of insertion.

6-2. Connecting and Disconnecting to Terminal Block

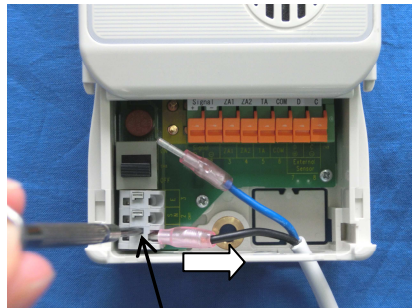
6-2-1. Terminal Block for Power Source

(To connect)



Insert the pin terminal to electric inlet hole.

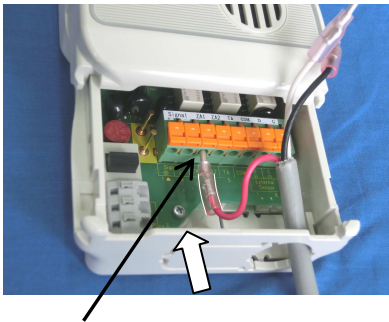
(To disconnect)



Press the release button with a precision screwdriver (recommended chip thickness: 2.6mm) and pull the pin terminal.

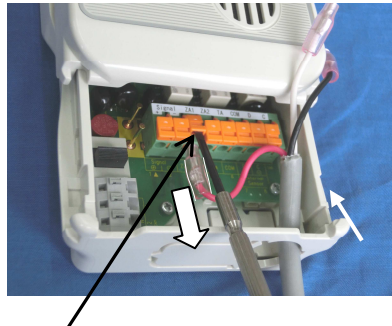
6-2-2. Terminal Block for External Output

(To connect)



Insert the pin terminal to electric inlet hole.

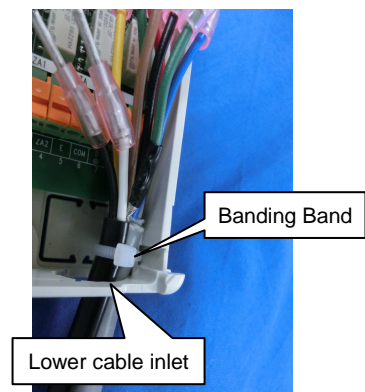
(To disconnect)



Press the release button with a precision screwdriver (recommended chip thickness: 3mm) and pull the pin terminal.

6-3. Banding Band

It has a place to thread a banding band near the cable inlet inside the case for bundling cables (see figure at right). At first, through the banding band, form a ring, through the cables in the circle before wiring, and bundle the cables at the end.



7. Operating Procedure

7-1. Before Use

WARNING

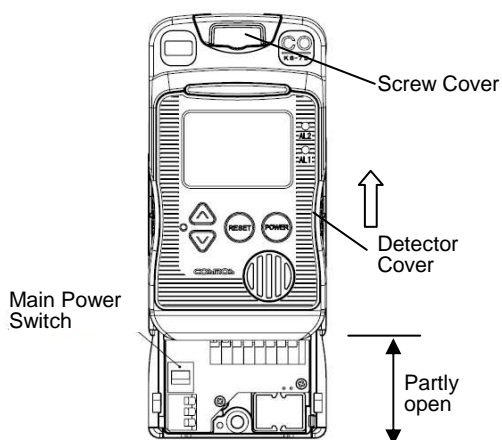
- Before supplying the power, confirm the power specification of the equipment and the power supply voltage.
 - 24V DC +/-10%

CAUTION

- Before turning ON the power, make sure all the connections of each part are correct, in reference to “6. Wiring” on page 9 or separate delivery specifications if it is provided.
- By the sensor structure, when a sensor is not stored accordance with the instructions on package, the sensor output may decrease temporarily for one week after installation. This phenomenon will be recovered to the normal output within one hour and then it will operate normally. (It may take 2 hours if the storage period is long.)
- Make sure there is no gas around (clean air) before use.
- If the sensor is not stabilized, the external contact may function after warm-up operation. Release the interlock of external device as needed.
- During the warm-up operation, the analog signal output will be fixed at 4 mA and the external contact does not function.

7-2. Operating Procedure

- Follow the steps 1, 3, 4, 5 of “5. Installation Instructions” on page 6 to slide and open the cover partly.
 - Open the screw cover.
 - Loosen the cover fixation screws.
 - Pull the detector cover.
 - Slide the cover upward. (Open)
- Turn ON the Main Power Switch (up).

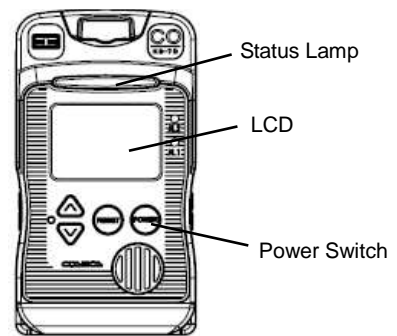


- 3) Follow the steps 7, 8, 10 of “5. Installation instructions” on page 6 to close the cover and screw on.
7. Slide down the cover. (Close)
8. Push the cover to the body case.
10. Fix the detector cover with cover fixation screw.

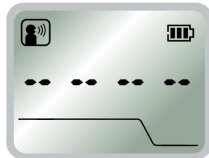


CAUTION

Make sure to fix the Detector Cover with cover fixation screws.
Otherwise, it cannot detect properly.



- 4) Press the Power Switch for 3 seconds. (pip, beep)
The status lamp flashes in green and “- - -” is displayed on LCD to start warm-up operation (for 90 seconds).



Warm-up Operation



Normal Operation

- 5) After the warm-up operation, the status lamp lights up in green, gas concentration displays on LCD, and starts normal operation.



CAUTION

If the power is on and the carbon monoxide concentration indicates negative, turn off the power once, and turn on again after one hour (when the sensor is stabilized).

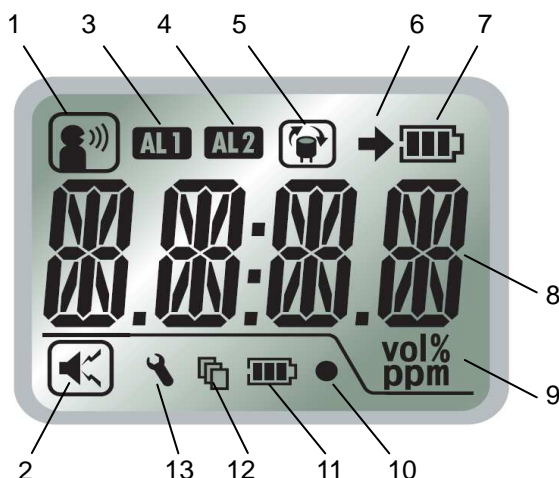
- 6) Conduct an alarm test. (See “7-4-5. Alarm Test” on page 18.)
Check the alarm activation.
- 7) To turn OFF the power, press the Power Switch for 3 seconds to stop the operation, and turn off the Main Power Switch.

NOTE

When turning off the power switch, the backup power function will not activate.
If turning off the Main Power Switch without turning off the power switch, backup power will function.

7-3. Operation and Function

7-3-1. LCD



No.	Name	Description
1	Voice Alarm	Indicates voice alarm is ON (Japanese only)
2	Buzzer Alarm	Indicates buzzer alarm is ON
3	1 st Stage Alarm	Will be displayed at 1 st stage alarm
4	2 nd Stage Alarm	Will be displayed at 2 nd stage alarm
5	Sensor Replacement	Will be displayed to indicate the time for sensor replacement
6	Backup Battery	Will be displayed while operating on backup battery
7	Remaining Backup Battery Level	Indicates the remaining backup battery level at electric power failure
8	Concentration/Information	Indicates the gas concentration, error, etc.
9	Concentration Unit	A unit of gas concentration
10	Clock Battery Level	Indicates the clock battery level is low
11	Remaining Battery Unit Level	Remaining battery level of optional Battery Unit KS-7xB (Needs to be set)
12	Alarm History	Indicates when the alarm history is displayed
13	Maintenance Function	Indicates when the maintenance function is ON

7-3-2. Status of Normal Operation

The status lamp lights up in green, the gas concentration is displayed on LCD, and the alarm lamp is off at the normal operation.

NOTE

The differences of operating on back-up battery or KS-7xB Battery Unit (optional) from DC specification are as below.

- Status lamp will not light up at the normal operation and it will start flashing in case of alarming.
- Analog output will be "0 mA" (no output).
- External contact will not function.
- The alarm sound will be softer.

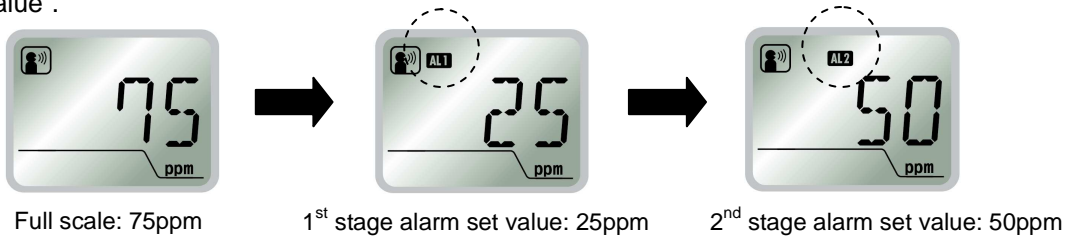
Switches

	Power Switch
	Reset Switch
	UP Switch
	DOWN Switch
	Maintenance Switch

7-3-3. Full Scale and Alarm Set Value

Press the Reset Switch. (Beep)

It will be displayed in order of “full scale concentration”, “1st stage alarm set value”, and “2nd stage alarm set value”.



7-3-4. Displaying Peak Value and Reset

- Press the DOWN Switch (Beep). “The lowest peak value after power activation” and “PEAK” will be displayed alternately.



- To return to normal mode, press the Reset Switch (beep). After displaying “full scale and alarm point”, it returns to the normal gas concentration display.
- To reset the peak value, press the UP and DOWN Switches at the same time. The peak values are reset and it returns to the normal gas concentration display.

7-3-5. Performance of Gas Alarm

- When the carbon monoxide concentration reaches the alarm set value, the alarm lamp flashes and the status lamp will flash with buzzer sound.

NOTE

Silence the alarm sound: Push the Reset Switch during gas alarm to stop the alarm sound. The alarm lamp will stop flashing and stay lit.

- This Carbon Monoxide Detector standardizes on the “latching” type. The modification for “non-latching” is available upon request. The hysteresis of alarm is 2ppm. The alarm does not recover until the concentration exceeds its difference value between hysteresis and alarm set value. (ex. 47ppm or less, if the alarm set value is 50ppm.)

NOTE

Release the alarm contact: Push the Reset Switch while the concentration is out of alarm set value. The alarm contact will be released and alarm lamp will be off.

< Performance of 1st Stage Alarm >

- AL1 alarm lamp flashes in ORANGE and the status lamp flashes in ORANGE.
- Alarm sounds “beep, beep, beep...”
- ZC and ZA1 of alarm contact are closed.

< Performance of 2nd Stage Alarm >

- AL2 alarm lamp flashes in RED and the status lamp flashes in RED.
(AL1 alarm lamp remains flashing in ORANGE at the 1st stage alarm.)
- Alarm sounds “pi, pi, pi...”
- ZC and ZA2 of alarm contact are closed. (ZC and ZA1 remain closed at 1st stage alarm.)

7-4. User Mode

NOTE

- In User Mode, the gas detection, alarm activation, analog output, and contact output will function the same way as in normal mode, but the buzzer stop and silence the alarm sound will not operate.
- Make sure to return to normal mode after user mode.

7-4-1. Operation of User Mode

- To enter user mode, press the Maintenance Switch (beep) when the power is ON.
“1” (mode number) and “MT” (abbreviation) will be displayed alternately.



NOTE

To press the Maintenance Switch, use an unpointed thin stick such as a precision screwdriver.

- To change the mode number, press the UP and DOWN Switches.
- To select the mode number displayed on LCD, press the Maintenance Switch.
To return without selecting the mode, press the Reset Switch.
- To execute in each mode, press the Maintenance Switch for 3 seconds.
- To return to “Normal Mode”, press the Reset Switch for 5 seconds.

Mode	Mode No.	Abbreviation
Switching Maintenance Function ON/OFF	1	MT
Zero Adjustment	2	0.0 vol%
Span Adjustment	3	21.0 vol%
Alarm Test	4	AL T
Alarm History	5	AL H
Clock Setting	6	DATE

7-4-2. Switching the Maintenance Function ON and OFF [Mode Number 1]

⚠ WARNING

- When the maintenance function is ON, external contact and alarm sound will not function. Make sure to switch OFF the Maintenance Function for the normal operation.

- 1) In user mode, select Mode Number “1”.
“MT” and “1” (mode number 1) will be displayed alternately.



- 2) Press the Maintenance Switch. (Beep)
“OFF” will flash.



- 3) Press the UP Switch (beep).
“ON” will flash.



- 4) Press the Maintenance Switch for 3 seconds (beep, beep, pi, pi) <Select> Maintenance icon is displayed, and “1” and “MT” will be displayed alternately.



NOTE

When the maintenance function remains ON and returns to the normal operation, maintenance icon will stay displaying and “concentration value” and “- - - -” will be displayed alternately.



- 5) To switch OFF the maintenance mode, follow the above 1 to 4 steps and change to “OFF” from "ON". Confirm the maintenance icon is disappeared.

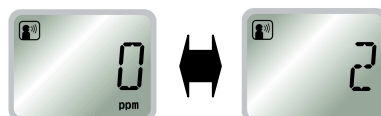


7-4-3. Zero Adjustment [Mode Number 2]

CAUTION

- Make sure there is no gas around (in clean air) before performing zero adjustment.
- If zero adjustment is not performed correctly, it cannot detect properly.

- 1) In user mode, press the UP Switch (beep) to select “Mode Number 2”. “0ppm” and “2” (mode number) will be displayed alternately.

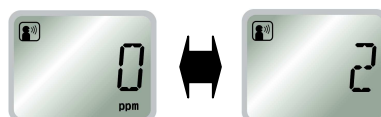


- 2) Press the Maintenance Switch (beep)
The current carbon monoxide concentration (ppm) will be displayed.



(When the concentration is 3ppm)

- 3) Confirm there is no gas around and press the Maintenance Switch for 3 seconds (beep, beep, pi, pi). <Execute>
“2” (mode number) and “0ppm” will be displayed alternately, and zero adjustment is complete.



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

CAUTION

- Contact your New Cosmos representative for span adjustment.
- Do not use this mode. It cannot detect properly with the wrong adjustment.

In user mode, press the UP Switch (beep) to select “Mode Number 3”.

The span adjustment concentration (ppm) and “3” (mode number) will be displayed alternately.



(When the span adjustment concentration is 250ppm)

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

- When the alarm test is performed, the concentration of alarm test will be indicated on LCD, and appropriate analog output and alarm output (external contact, alarm sound, alarm lamp) will activate. This will allow checking the alarm activation.

NOTE

If the maintenance function is ON, external contact and alarm sound will not activate (alarm lamp and analog output will activate).

⚠ CAUTION

Alarm test activates the external contact of KS-7D. If this external contact output is used for the external interlocking control device, make sure to conduct an inspection of gas detection system before interlock release operation.

- In user mode, press the UP Switch (beep) to select "Mode Number 4".
"AL T" and "4" (mode number) will be displayed alternately.



- Press the Maintenance Switch. (Beep)
The current alarm test concentration value (vol%) will be displayed.



(If the test concentration value is 75ppm)

- Press the UP and DOWN Switches to change the alarm test concentration value.



(When the test concentration value is changed to 150ppm)

NOTE

Increase and decrease concentration value with the UP and DOWN Switches. Keep pressing the switch and the value will change continuously.

- Press the Maintenance Switch for 3 seconds. (Beep, beep) The alarm test will be performed.
- Press the Reset Switch (beep) to release the alarm test and the current alarm test concentration will be displayed.
- To change the set value, repeat the procedure from 3) to 5).
- Press the Reset Switch for 5 seconds to return to normal mode.

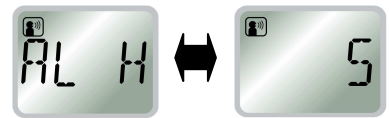


(When the test concentration is set to 150ppm)

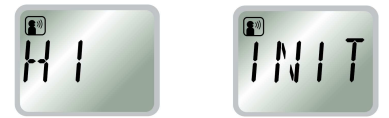
7-4-6. Alarm History [Mode Number 5]

- Latest 10 alarm history will be displayed (automatically updated).
- The alarm history is displayed in order of alarm peak value (vol%), year/month/day/time of the start and end of alarm.
- Press the Reset Switch to return.

- 1) In user mode, press the UP Switch (beep) to select "Mode Number 5".
"AL H" and "5" (mode number) will be displayed alternately.



- 2) Press the Maintenance Switch (beep). The latest alarm history number "H1" will be displayed. If there is no alarm history, "INIT" will be displayed.



(No alarm history)

- 3) Press the UP Switch (beep) and select the history number from H1 to H10.

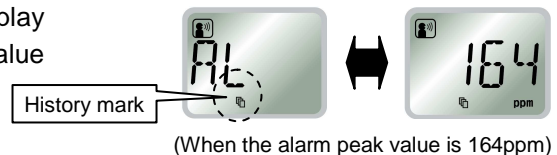


(History number "H1")

NOTE

- Each time the UP Switch is pressed, the display will switch in order of H1, H2 ... H10, INIT.
- To delete the history, select "INIT" and press the Maintenance Switch for 3 seconds. (pi, beep, pi, pi)

- 4) Press the Maintenance Switch (beep) to display the history mark, "AL" and "the alarm peak value vol% of the selected number" alternately.



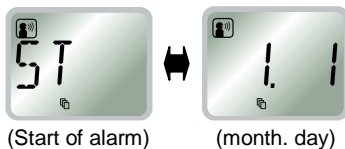
(When the alarm peak value is 164ppm)

- 5) Each time the DOWN Switch is pressed, the display will switch in order of year, month/day, and time of the start and end of alarm.



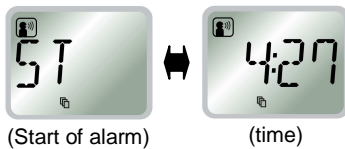
(Start of alarm)

(year)



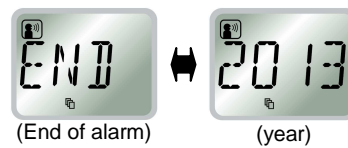
(Start of alarm)

(month. day)



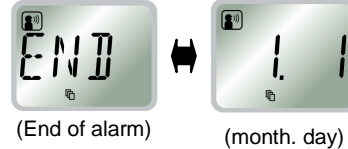
(Start of alarm)

(time)



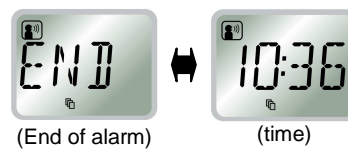
(End of alarm)

(year)



(End of alarm)

(month. day)



(End of alarm)

(time)

- 6) Press the Reset Switch (beep) and the alarm history number "H*" will be displayed.
To indicate the other alarm history, repeat the procedure from 3) to 5).



(Alarm history number is H1)

- * To delete the alarm history, select "INIT" in procedure 3) and press the Maintenance Switch for 3 seconds.

(Pi, beep, pi, pi) <Deleted>



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

Clock function is used for recording the alarm history.

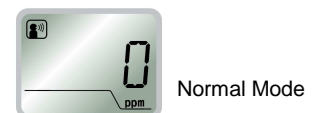
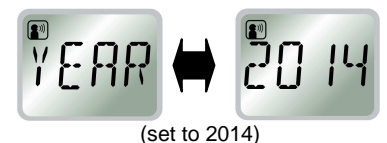
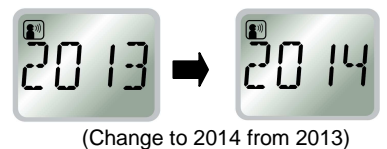
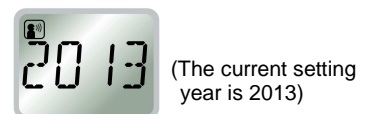
- 1) In user mode, press the UP Switch (beep) to select "Mode Number 6".
"DATE" and "6" (mode number) will be displayed alternately.
- 2) Press the Maintenance Switch (beep). "YEAR" and "****" (year) will be displayed alternately.
- 3) Select the item to change with the UP Switch. The item and the current set value will be displayed.

NOTE

Each time the UP Switch is pressed, the display will switch in order of "YEAR", "MON" (month), "DAY", "HOUR" and "MIN" (minute).

<< When Select "YEAR" >>

- 4) Press the Maintenance Switch (beep). The current setting year will be displayed.
- 5) Change the setting with the UP and DOWN Switches.
- 6) Press the Maintenance Switch for 3 seconds.
(Pi, beep, pi, pi)
"YEAR" and setting year will be displayed alternately.
- 7) To change the other items, repeat procedure from 3) to 6).
- 8) Press the Reset Switch for 5 seconds (pi, beep) to return to normal mode.



7-5. Maker Mode

WARNING

- A wrong setting may change specifications of the Carbon Monoxide Detector. Never operate other than the described in this instruction manual.
- The administrator should change the setting with responsibility.
- The Carbon Monoxide Detector does not work in maker mode. After the maker mode operation, make sure to turn off the power once, and restart in normal mode before use.

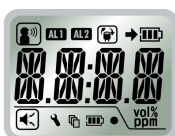
1) Shift to Maker Mode

When the power is OFF, keep pressing the UP and DOWN Switches and press the Power Switch for 3 seconds at the same time (beep, beep).

The following will be displayed and “775” will flash. <Shift to Maker Mode>



Software Version Number
(Ex. Version No. 1.00)



All segments of LCD
turn on



Password “775” flashes.
<Shift to Maker Mode>

Maintenance
Switch

Main Power Switch



NOTE

It can be operated with the Battery Unit when the Main Power Switch is OFF.

WARNING

Make sure “777” is displayed before move on to the next step. If the setting is incorrect, the specifications will be changed.

2) Press the Maintenance Switch. (Bleep)

“AL1” and LED will light up.



3) Press the UP Switch (bleep) to select the alarm set value to change.

NOTE

Each time the UP Switch is pressed, the display of “AL 1” 1st stage alarm and “AL 2” 2nd stage alarm will switch.



1st Stage Alarm



2nd Stage Alarm

4) Press the Maintenance Switch (bleep).

“Current Alarm Set Value” will be displayed.



Current alarm set value
Ex) AL1 is 50ppm

- 5) Change the alarm set value with the UP and DOWN Switches.



Change AL1 to 25ppm

- 6) Press the Maintenance Switch for 3 seconds. (Bleep, beep, pi, pi)
The alarm set value is fixed and back to the display of "AL 1" or "AL 2".



AL1

NOTE

If the alarm set value cannot be changed, the alarm will sound and the alarm set value will remain displayed. In this case, press the Power Switch for 3 seconds to turn OFF the power and restart from the beginning. If it still cannot be changed, contact your New Cosmos representative for repair.

- 7) To continue the changes, repeat from 3) to 6).
- 8) Press the Power Switch for 3 seconds and turn OFF the power to finish.
- 9) Press the Power Switch for 3 seconds and turn ON the power to start in normal mode, and confirm the alarm set value. (See "7-3-3. Full Scale and Alarm Set Value" on page 15.)

8. Maintenance Check

- The daily inspection should be performed by the user.
- The periodic inspection should be performed regularly once a month or once a year by the user or New Cosmos.

ATTENTION

Span adjustment of gas sensor is extremely important to ensure the reliability of the Carbon Monoxide Detector. We highly recommend periodic sensor adjustment.

8-1. Inspection Contents and Frequency

Inspection Contents	Start-up	Expanded/ Relocation	Periodic Inspection		Daily Inspection
			Monthly	Annually	
1) Concentration Display	✓	✓			✓
2) Remaining Backup Battery Level	✓	✓		✓ ^{*1}	✓
3) Alarm Test	✓	✓	✓		
4) Zero Adjustment ^{*2}	✓	✓	✓		
5) Span Adjustment (gas calibration)				✓	
5) Gas Sensor Replacement				✓ (3-year ^{*3})	

*1: Regardless of the remaining battery level, replace battery every 3 years.


*2: Make sure there is no gas around before performing zero adjustment.

*3: Replace a sensor after 3 years from the date of purchase. Contact your New Cosmos representative for sensor replacement.

1) Concentration Display

- Confirm that the Carbon Monoxide concentration is displayed on LCD and the Carbon Monoxide Detector is operating properly.

2) Remaining Backup Battery Level

- Confirm the remaining backup battery level on LCD. If  is indicated (operating time is 70 hours or less), it is recommended to replace the backup battery.
- A new backup battery can be used for about 350 hours continuously (at 20 degrees C, without alarm, backlight is off).

NOTE

- When the remaining battery level indicates the flashing frame only, it will not perform backup. Even when there is no problem in normal operation, replace or remove the backup battery to avoid the possibility of battery leakage.
- Gas alarm during backup operation will consume backup battery. In this case, we recommend battery replacement.
- Even when the backup battery is unused, replace every 3 years to avoid the possibility of battery leakage. (Replace a clock battery every 10 years regardless of the remaining battery level.)
- Refer to “8-2. Replacement of Backup Battery and Clock Battery” on page 26 for replacing a battery.

3) Alarm Test

- Refer to “7-4-5. Alarm Test” on page 18 and confirm the alarm activates properly.

CAUTION

The alarm test activates the external contact of KS-7D. If this external contact output is used for the external interlocking control device, make sure to conduct an inspection of gas detection system before releasing the interlock.

4) Zero Adjustment

- Check the concentration display is indicating 0ppm without any gas around.
If it is not indicating 0 ppm, perform zero adjustment (see “7-4-3. Zero Adjustment” on page 17).

5) Span Adjustment (Gas Calibration)

- To maintain the gas sensor performance, conduct a span adjustment at least once a year.

CAUTION

- Contact your New Cosmos representative for span adjustment (fee-based).
- Do not use this mode. It cannot detect properly with the wrong adjustment.

6) Gas Sensor Replacement

- The recommended replacement cycle is 3 years under the normal use condition. However, if any abnormality, such as the significantly decrease of sensor sensitivity, is confirmed by a periodic inspection, it needs to be replaced.

NOTE

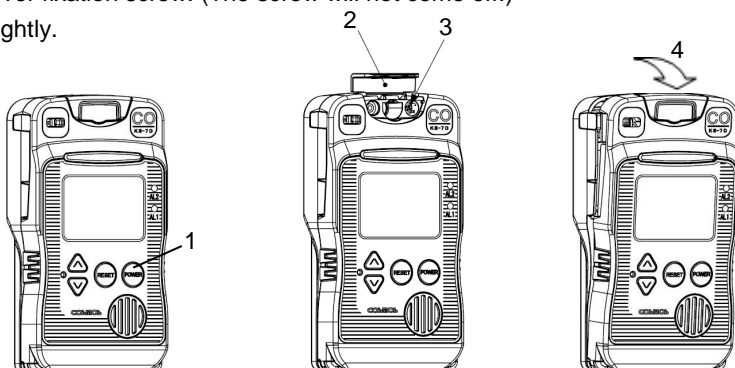
- Even if it is not in use for a long period of time, replace a sensor within 3 years from the date of purchase. Contact your New Cosmos representative for sensor replacement (fee-based).
- This device counts every one hour when the power is on. As the accumulated time reaches three years, the buzzer will sound and “Sensor Replacement” will be displayed on LCD.

8-2. Replacement of Backup Battery and Clock Battery

CAUTION

- Make sure to use “CR2 lithium battery” for backup battery.
- Make sure to use “CR2032 lithium battery” for clock battery.

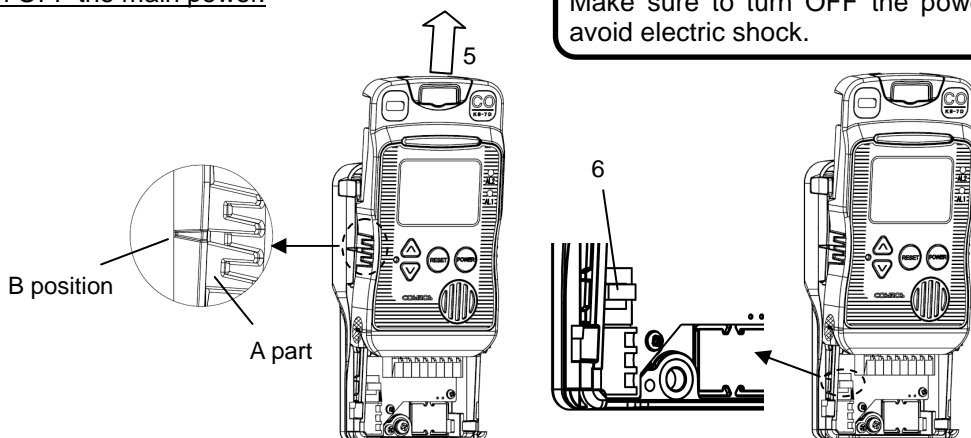
1. Press and hold the Power Switch for 3 seconds to turn OFF the power.
2. Open the Screw Cover.
3. Loosen the cover fixation screw. (The screw will not come off.)
4. Pull the cover lightly.




5. Hold the A part, and slide up to the B position.
6. Turn OFF the main power.

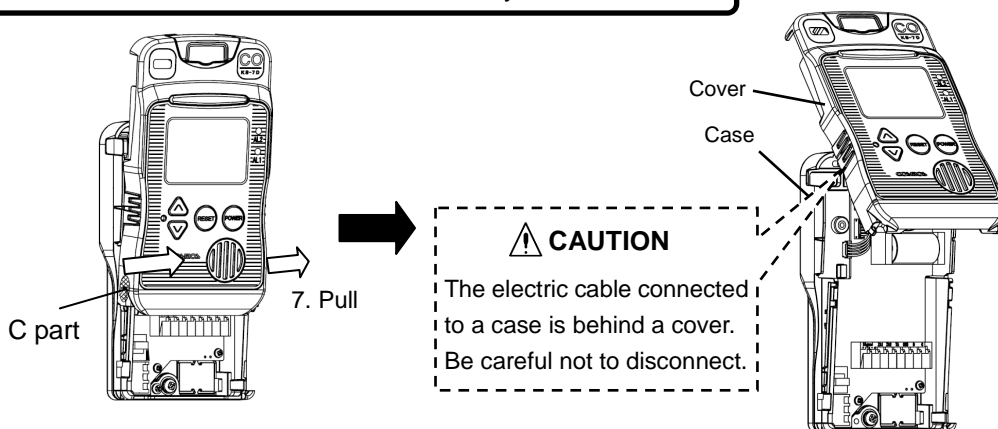
CAUTION

Make sure to turn OFF the power to avoid electric shock.

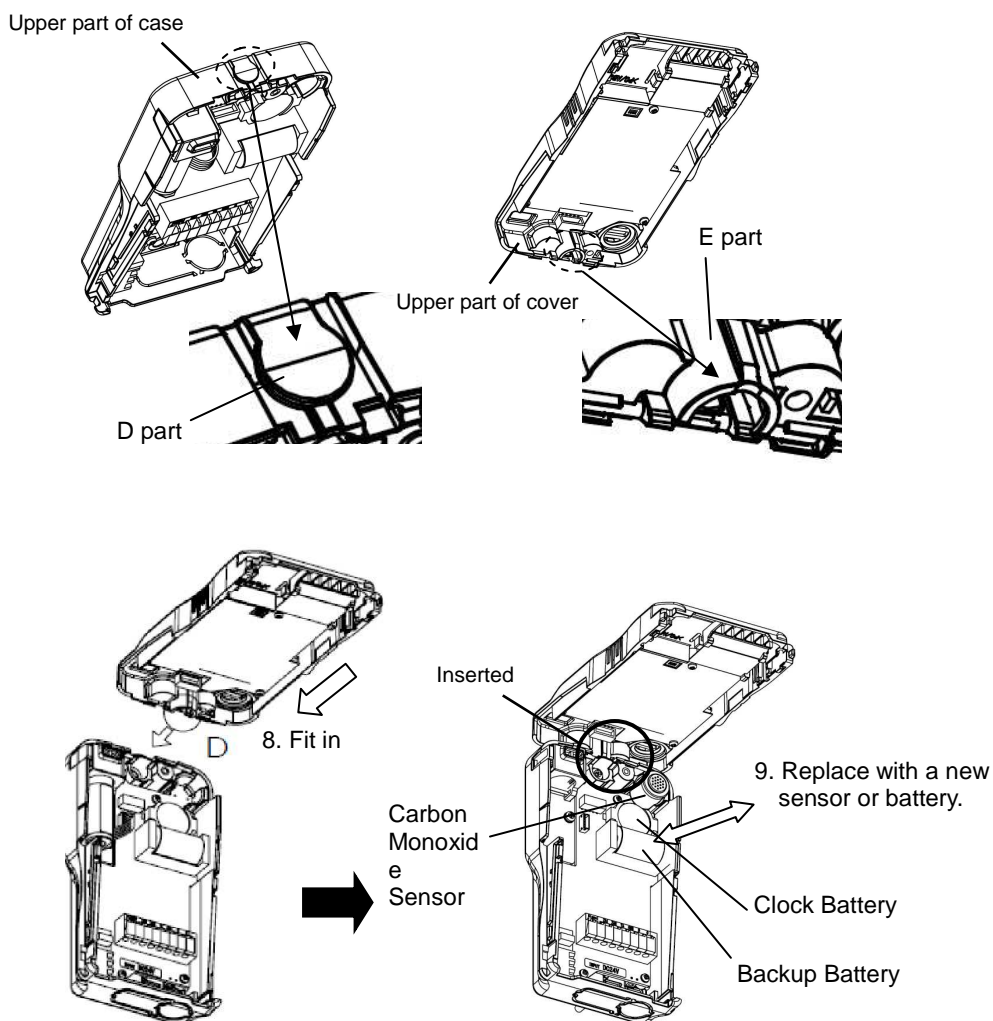


7. Hold the C part (both sides), and pull to detach from case.

 **CAUTION** Cover and case are connected by an electric cable.



8. Place a cover at the top portion of case. (Fit the E part of cover into the D part of case.)



9. Replace with a new Carbon Monoxide sensor, backup battery or clock battery.

CAUTION Insert a battery with correct polarity as printed on battery holder.

10. Pull up the C part of cover from the case (reverse procedure of 8), and fit the A part of cover into the B position of case (refer to procedure 5).
11. Turn ON the main power.
12. Slide the A part of cover down to the bottom (reverse procedure of 5).
13. Press the cover to open the screw cover, and tighten the cover fixation screws.

CAUTION

Make sure to tighten the cover fixation screw after the cover is attached. Otherwise, it cannot detect properly.

14. Close the Screw Cover.

9. Troubleshooting

Before requesting repairs, please check the following items.

Symptom	Cause	Solution	Reference
The status lamp (green) does not light up by turning ON the power	Either of the Main Power Switch or Power Switch is OFF	Turn ON the Main Power Switch or Power Switch	7-2. Operating Procedure (page 12)
	Loose connection	Check the connection and reconnect terminals	6. Wiring (page 9)
	The power is not supplied	Provide a power supply	7-1. Before Use (page 12)
	Battery Unit KS-7xB (optional) is connected	The status lamp (green) does not light up when operating on Battery Unit KS-7xB (optional)	
Maintenance icon is on LCD, and the concentration value and “_ _ _ _” are displaying alternately	Maintenance Function is left ON	Switch OFF the Maintenance Function	7-4-2. Switching the Maintenance Function ON and OFF (page 16)
Alarm does not sound	Maintenance Function is left ON	Switch OFF the Maintenance Function	7-4-2. Switching the Maintenance Function ON and OFF (page 16)
	Alarm set value is incorrect	Check the alarm set value	7-3-3. Full Scale and Alarm Set Value (page 15)
Alarm contact does not function	Maintenance Function is left ON	Switch OFF the Maintenance Function	7-4-2. Switching the Maintenance Function ON and OFF (page 16)
	Loose connection	Check the connection and reconnect terminals	6. Wiring (page 9)
	Alarm set value is incorrect	Check the alarm set value	7-3-3. Full Scale and Alarm Set Value (page 15)

Symptom	Cause	Solution	Reference
<ul style="list-style-type: none"> ▪ Sensor Replacement icon is on LCD ▪ Buzzer sound every one minute 	The accumulated time with the power on reaches one year and informing the time for sensor replacement.	<p>Replace with a new sensor.</p> <p>The buzzer will stop for one hour by pressing the Reset Switch.</p>	8-1. 6) Gas Sensor Replacement (page 24)
<ul style="list-style-type: none"> ▪ The status lamp blinks in green and red alternately ▪ “E-E1”, “E-E2” or “E-E3” is displayed on LCD ▪ Buzzer sounds ▪ Malfunction contact is activated ▪ Analog output is less than 0.9mA 	Internal Error	<p>Press the Power Switch for 3 seconds to turn OFF the power once and turn ON after a few minutes.</p> <p>If it still does not work properly, contact your New Cosmos representative for repair.</p>	7-2. Operating Procedure (page 12)
<ul style="list-style-type: none"> ▪ “E-S1” or “E-S3” is displayed on LCD ▪ Analog output is less than 0.9mA 	Sensor Error	<p>If “E-S3” is displayed within one week from the installation and it recovers within one hour, it will be able to operate normally. Otherwise, request for repair.</p>	2. Safe Operation (page 2)
<ul style="list-style-type: none"> ▪ “E-B” is displayed on LCD ▪ Buzzer sounds 	Run out of backup battery	<p>Replace a backup battery.</p> <p>The buzzer will stop for one hour by pressing the Reset Switch.</p>	8-2. Replacement of Backup Battery and Clock Battery (page 25)
Troubles other than the above symptoms	Possibility of microcomputer malfunction due to noise.	<p>Turn OFF the power and remove the backup battery once, and place the battery back again.</p> <p>If it still does not work properly, contact your New Cosmos representative for repair.</p>	<p>7-2. Operating Procedure (page 12)</p> <p>8-2. Replacement of Backup Battery and Clock Battery (page 25)</p>

10. Specifications

Detection Principle	Electrochemical Cell
Sampling Method	Diffusion Type
Target Gas	Carbon Monoxide
Detection Range	0 to 75ppm, 0 to 150ppm, 0 to 250ppm or 0 to 400ppm (Service range: Full Scale to 1000ppm)
Gas Concentration Display	4-digit digital LCD, solution 1ppm (with backlight)
Alarm Set Value	F.S.75ppm: 25/50ppm, F.S.150ppm: 50/100ppm, F.S.250ppm: 50/150ppm, F.S.400ppm: 50/150ppm
Indication Accuracy ^{*1}	Within +/- 30% of alarm set value
Alarm Delay	Within 60 seconds to activate alarm with test gas. Test gas concentration: 40ppm for F.S.75ppm, 80ppm for other
Alarm Output	<ul style="list-style-type: none"> During gas alarm (1st and 2nd): Alarm lamp blinks (lights off when the buzzer stops), status lamp flashes, and buzzer sounds Alarm action: Latching (standard) or non-latching
External Output	<ul style="list-style-type: none"> Gas concentration analog output ^{*2}: 4-20mA DC (in common with the negative of power source) (The current sensing resistor must be less than 300 ohms including interconnection resistance) Gas alarm contact (1st and 2nd): 1a non-voltage contact/ latching (standard) or non-latching (Rated load: 125V AC 0.5A, 30V DC 2A, resistance load) Malfunction contact: 1a non-voltage contact/non-latching (Rated load: 125V AC 0.5A, 30V DC 2A, resistance load)
Explosion-proof	Non-explosion-proof
Other Functions	Maintenance function (deactivate gas alarm contact and alarm sound), alarm sound stop function, backup function at electric power failure.
Applicable Cable	Shielded cable for control (0.5 to 1.25mm ² , less than 10.5mm in outside diameter)
Cable Length	Within 500mm
Operating Temperature/ Humidity Range	-5 to +40 degrees C (without rapid temperature change) 30 to 85%RH (non condensing)
Power Source	24V DC +/-10%
Power Consumption	24V DC: 1W at normal operation, 3W at alarm
Dimensions	82 (W) x 150 (H) x 35 (D) mm (excluding protrusions)
Weight	Approx. 300g
Mounting Method	Wall mount type (indoor)
Body Color	DIC546 1/2

*1: Under the same measurement condition.

*2: Output of concentration in detection range.

11. Warranty

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

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

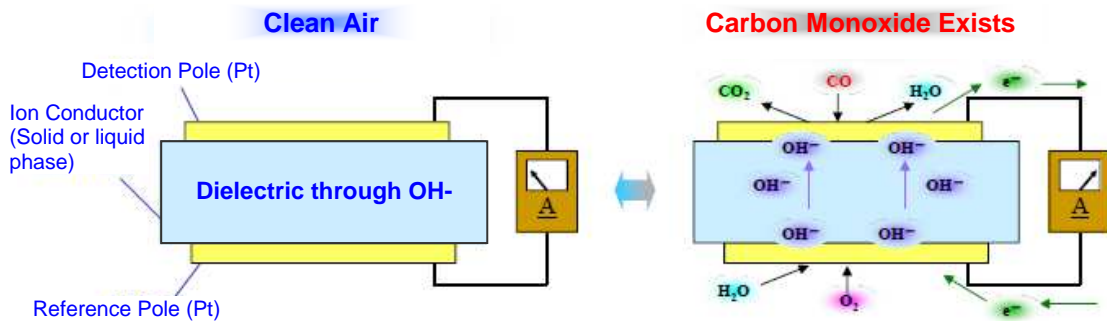
New Cosmos warrants to the original purchaser and no other person or entity (the customer) that the gas detection product supplied by New Cosmos shall be free from defects in materials and workmanship for a period of one (1) year from the date of purchase. This warranty does not include consumables,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

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

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

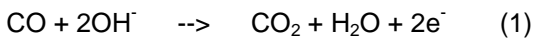
12. Detection Principle

- Electrochemical Cell

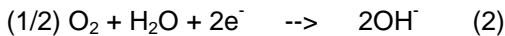


Sensor Element Configuration and Electrode Equation

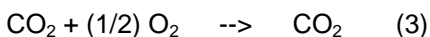
Sensor is made up of noble metal catalyzed detection pole, reference pole and ion conductor. When the CO exists, the reaction of equation (1) with water vapor in the air on catalyst will occur.



When connecting a detection pole electrically to a reaction pole, ion (OH⁻) will be generated at detection pole, and reach the reference pole through the ion conductor. Electrons will be also generated at the same time and reach the reference pole through the external electric lead, and a reaction of equation (2) with oxygen in the air will occur at a reference pole.



Therefore, this gas sensor can be regarded as a battery of gas active material which is made up of the full cell reaction indicated in equation (3) which is composed of equation (1) and (2).



For using this as a gas sensor, connect a detection pole to a reference pole electrically and measure the short-circuit current.

13. Glossary

Gas Detector:	A unit that detects gas concentration and converts it to electric signals.
Diffusion Type:	A method that detects gas by utilizing gas convection and diffusion.
Target Gas:	A gas that is indicated and sets off an alarm when detected.
Detection Range:	Range of gas concentration that can be indicated and set off an alarm.
Service Range:	Range to indicate the value of outside the detection range as a guideline.
Alarm Set Value:	A preset value for the alarm to go off when gas concentration reaches a certain level.
Alarm Accuracy:	Difference between the preset alarm value and gas concentration when an alarm actually occurs or as the percentage of the difference compared to the preset alarm value.
Response Time:	Time it takes for an alarm to go off after the detector is exposed to a gas with a concentration higher (lower) than the preset alarm value.
Operating Temperature Range:	Range of temperatures where the equipment can perform its functions.
Maintenance and inspections:	Work that guarantees the equipment will perform its required functions.

Manual Revision History

Edition No.	Date	Revisions
GAE-053-00	July 2014	0



NEW COSMOS ELECTRIC CO., LTD.

Head Office

New Cosmos Electric Co., Ltd.
2-5-4 Mitsuya-naka Yodogawa-ku
Osaka 532-0036, Japan
Phone 81-6-6309-1505
Fax 81-6-6308-0371

Tokyo Branch

New Cosmos Electric Co., Ltd.
2-6-2, Hamamatsu-cho, Minato-ku
Tokyo 105-0013 Japan
Phone 81-3-5403-2715
Fax 81-3-5403-2710

Email e-info@new-cosmos.co.jp
URL : <http://www.new-cosmos.co.jp/en/>