



# Portable Oxygen Monitor OX-07 (Type A) Operating Manual

## Request for the Customers

- Read and understand this operating manual before using this gas monitor.
- Use it in accordance with this operating manual.
- Regardless of warranty period, we shall not make any indemnification for accidents and damage caused by using this gas monitor.  
Make sure to read the warranty policy specified on the warranty.
- Because this is a safety unit, a regular maintenance for every six months and daily maintenance must be performed.
- If any abnormality is found in the gas monitor, notify it to RIKEN KEIKI immediately.  
(Visit our Web site to find your nearest RIKEN KEIKI office.)

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## Safety information

The Portable Oxygen Monitor Model OX-07 is a monitor designed to provide continuous exposure monitoring of Oxygen(O<sub>2</sub>) in hazardous environments.

### Specification for safety

• Ex ia II C T4 Ga

•  II 1 G Ex ia II C T4 Ga

• Ambient temperature range for use : -20°C to +50°C

### Electrical data

• Powered by two AA size Alkaline batteries,  
model LR-6 by Toshiba.

### Certificate numbers

• IECEx Certificate number : IECExKEM08.0022  
• ATEX Certificate number : KEMA08ATEX0126

### List of standards

• IEC 60079-0:2011	• EN60079-0:2012
• IEC 60079-11:2011	• EN60079-11:2012
• IEC 60079-26:2006	• EN60079-26:2007

### WARNING

- Do not replace batteries in hazardous location.
- Do not replace O<sub>2</sub> sensor in hazardous location.
- Do not replace Extension Cable in hazardous location.
- Do not attempt to disassemble or alter the instrument.

INST. No. ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○  
          A  B   C          D          E

A: Manufacturing year (0-9)  
B: Manufacturing month (1-9,XYZ for Oct.-Dec.)  
C: Manufacturing lot  
D: Serial number  
E: Code of factory



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## INTRODUCTION

Using an advanced microprocessor controlled detection system, the OX-07 Oxygen Monitor detects the Oxygen (O<sub>2</sub>) content to prevent the accident caused by oxygen deficiency.

This manual is a guide to operation of the OX-07. Reading of this manual is requested not only for first user but also for experienced staff.

This manual contains the following headings to ensure safe and effective operation.



Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury or serious damage to the product.

This signal word is to be limited to the most extreme situation.



Indicates a potentially hazardous situation which, if not avoided, could result serious injury to the human body or object.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or some damage to the human body or objects. It may also be used to alert against unsafe practices.



This means “ADVICE” regarding operation.

## Cautions for the safety

### **WARNING**

- Perform gas calibration at proper interval.
- Do not use unspecified batteries.
- Check battery capacity before operation.
- Ensure that sensor is exposed to ambient air. If not, correct detection cannot be performed.
- Do not modify or change the circuit or structure, etc.
- Do not disassemble the sensor since there is an electrolyte inside. If your finger touches the electrolyte, wash your finger with water immediately.
- If the button is pushed randomly, each setting may be changed and alarm may not be activated correctly. Do not operate the button other than as per instructions.
- Do not drop this monitor into fire.
- Do not remodel or alter circuit, structures etc.
- Do not use or store the unit in high temperature, high humidity or high pressurized condition exceeding the operating conditions specified in the specifications. Correct measurement may not be performed.

### **CAUTION**

- Do not push sensor and buzzer window with pointed article.  
This may cause defect or damage and correct detection cannot be performed.
- Do not pour water on this monitor or immerse in water.
- Do not give high impact or shock, since this is precision instrument.
- Operating temperature range of this monitor is  $-20$  to  $+50$  degreeC. The reading may be affected by the sudden change of temperature if the monitor is used under such conditions.
- Remove the battery if the monitor is not used for a long period.

## Cautions relating to explosion proof

### **WARNING**

- Do not remodel or alter circuit/structures.
- Replace batteries in non-hazardous area.
- When using this gas monitor in a hazardous area, take the following countermeasures for preventing dangers resulting from electrostatic charges.
  - ① Wear anti-static clothes and conductive shoes (anti-static work shoes).
  - ② For indoor use, use the gas monitor while standing on a conductive work floor (with a leakage resistance of  $10\text{ M}\Omega$  or less).
- Do not use this monitor except for the measurement of air and for oxygen content measurement of gas mixtures.

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# 1.DESIGNATION

## [Front view]

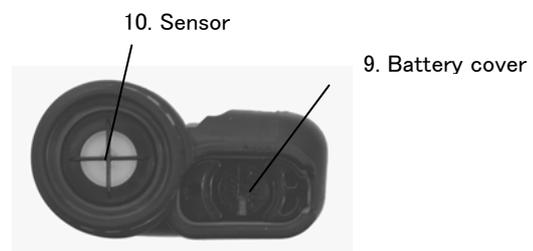


1. LCD display : Indicates gas detection results and various information.
2. Air button : Adjusts readings when a fresh air adjustment is performed. Changes a parameter setting when a parameter is available for adjustment in display mode or setup mode.
3. Target gas window : Window to see the target gas described by the sensor.
4. Alarm light : Flashes when the unit reaches warning conditions.
5. POWER button : Turns the unit on and off. Determines a parameter in setup mode.
6. DISP button : Enters setup mode. Changes a parameter setting in setup mode.
7. Buzzer : Sounds for gas alarms, unit malfunctions and dead battery alarm.

## [Rear view]



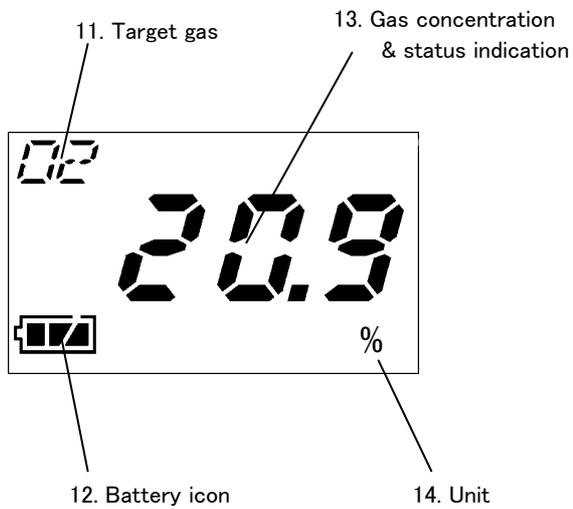
## [Bottom view]



8. Threaded holes : These are used to mount the alligator clip or the optional belt clip (Option).
9. Battery cover : The cover for battery compartment.
10. Sensor : Oxygen sensor is mounted here.

**[LCD display]**

– Measuring mode –



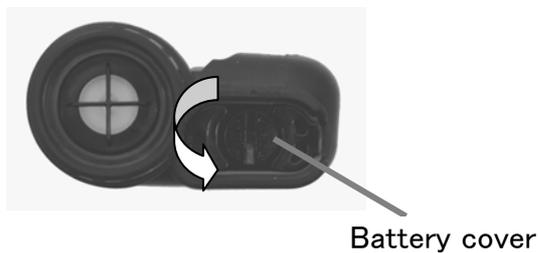
- 11. Target gas :            Displays the name of target gas.
- 12. Battery icon :        Shows remaining battery life.
- 13. Gas concentration :   The target gas concentration and the status of this unit is  
   & status indication    displayed.
- 14. Unit :                    Indicates the unit of gas concentration.

## 2. PREPARATION

### 2-1. Mounting/Replacing the batteries

- 1) Verify that the unit is off.
- 2) Rotate the fastener in the battery cover a quarter turn counterclockwise and lift up the end of the battery cover to remove it. A coin may be used to rotate the fastener.
- 3) Carefully install the new AA alkaline batteries. Follow the battery diaphragm inside the battery compartment.
- 4) Reinstall the battery cover.

[Opening the battery cover]



[Direction of battery mounting]



[Closing the battery cover]



AA size alkaline batteries



**WARNING**

Do not remove the battery with power on.  
Battery replacement shall be done at power off condition.



**CAUTION**

Take care not to mistake direction of battery polarity.

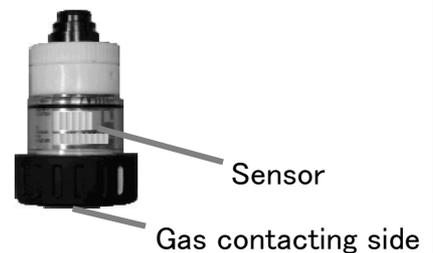
## 2-2. Mounting/Replacing the sensor

When replacing the sensor, take care for the following points.



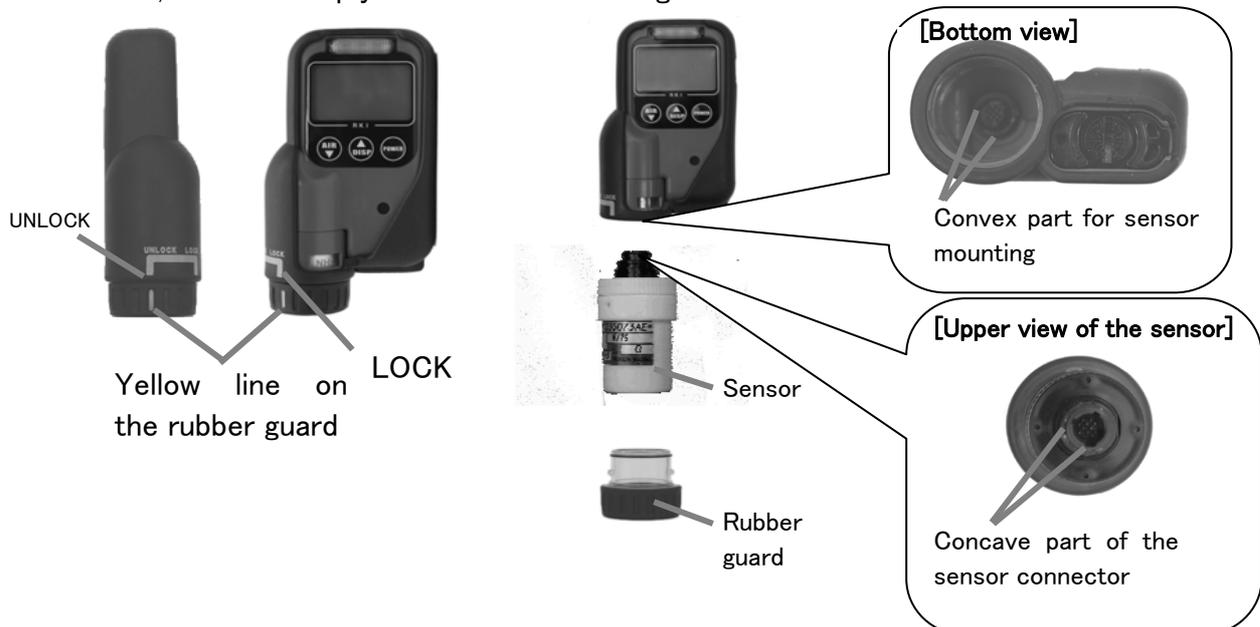
### CAUTION

- After replacement of the sensor, be sure to perform the sensor calibration. If not, the reading may be deviated.
- If the unit is not used for a long period, be sure to perform the sensor calibration before use.
- Replace the sensor if you can no longer perform AIR calibration or when the reading is unstable.
- Sensor replacement shall be done at power off condition.



### [Replacing the sensor]

- 1) Verify that the unit is off.
- 2) Turn the rubber guard on the sensor retainer counterclockwise until yellow line on the rubber guard will indicate the proper amount of rotation by lining up with a yellow line on the instrument body that indicates "UNLOCK".
- 3) Pull the sensor retainer away from the instrument body.
- 4) Pull the old sensor out from the sensor retainer.
- 5) Replace the sensor with new one. In this case, match up the concave part of sensor connector with the convex part of sensor mounting.
- 6) Align the yellow line on the sensor retainer's rubber guard with the "UNLOCK" line on the case, insert it deeply and turn the rubber guard to the "LOCK" line.



### 2-3. Power ON/OFF

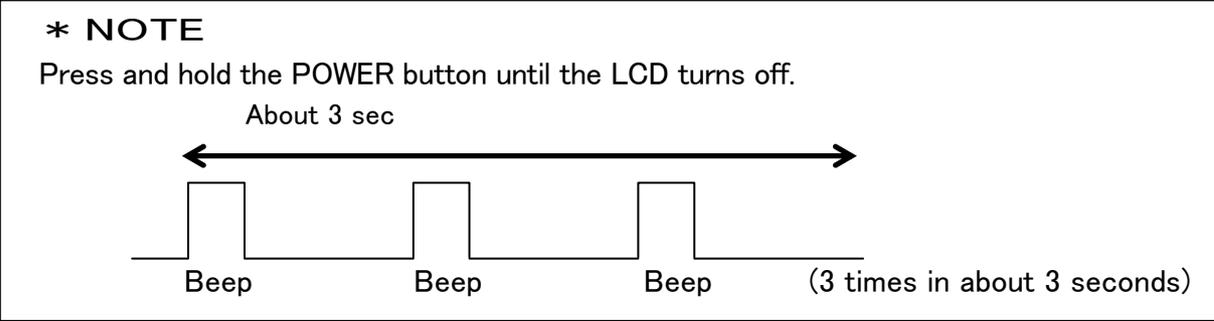
Press and briefly hold the POWER button for about one second to turn on the OX-07.

**\* NOTE**  
Press and hold the POWER button until you hear a beep.

**! DANGER**  
Be sure to perform a fresh AIR adjustment before using the OX-07. (See section 3-2)



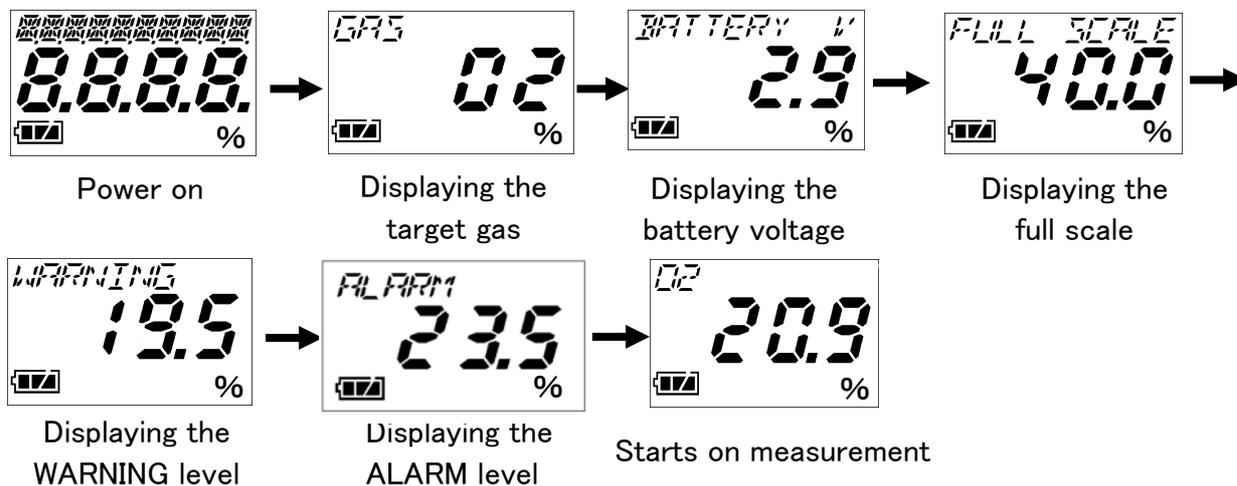
In any mode, the power is turned off by pressing and holding the POWER button for about 3 seconds.



## 3. OPERATION

### 3-1. Start-up procedure

When the OX-07 is turned on, it enters measuring mode automatically. The concentration of the target gas is displayed on the LCD.



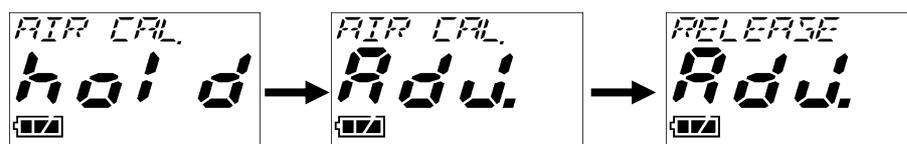
#### \* NOTE

The operating temperature range of this unit is -20 to +50degreeC. However, oxygen concentration reading may fluctuate if the ambient temperature changes suddenly.

### 3-2. Performing a fresh air adjustment

Before using the OX-07, set the fresh air reading. Performing this adjustment ensures accurate gas readings in the monitoring environment.

- 1) Find a fresh air environment, an environment of normal oxygen content is 20.9%.
- 2) With the unit on and in measuring mode, press and hold the AIR button. The LCD displays “hold” prompting you to hold the AIR button.
- 3) After a moment, the LCD indicates “Adj”. Continue to hold the AIR button.
- 4) Release the AIR button when the LCD displays “RELEASE” in the upper left corner.
- 5) About 2 seconds later, the LCD indicates “FINISH” in the upper left corner and returns to measuring mode, showing that the fresh air adjustment has been completed automatically.



**\* NOTE**

- Fresh air adjustment can be performed even in gas alarm condition.
- When AIR adjustment error is issued, the LCD displays “AIR CAL FAIL”. Release the air cal failure alarm according to the following steps.
  - 1) Press and hold “AIR” button for about 3 seconds.
  - 2) Release the “AIR” button when the LCD displays “RELEASE” in the upper left corner.
  - 3) About 4 seconds later, AIR CAL(Air adjustment) is cancelled, the LCD displays “FINISH” and indicates the concentration before the adjustment.



Continue to hold the AIR button

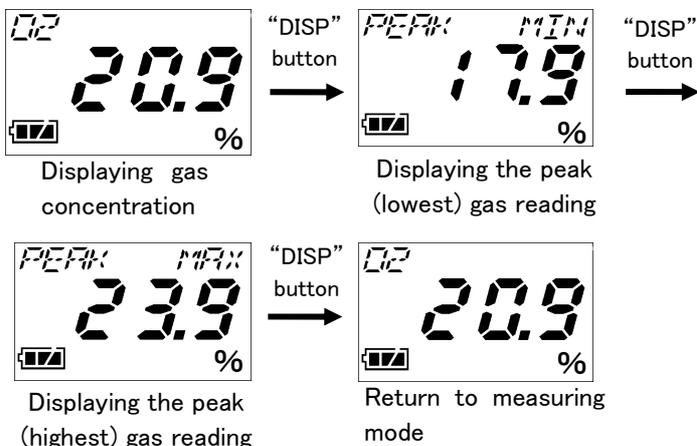
Release the AIR button

 **DANGER**

Perform air adjustment in the fresh air atmosphere under the similar pressure, temperature and humidity conditions to the operating environment.  
If the air adjustment is done at detection place (where oxygen deficiency may occur), the correct gas detection cannot be performed and oxygen deficiency accident may take place.

**3-3. Changing the display in measuring mode**

You can change the display mode by pressing the “DISP” button in measuring mode as follows:

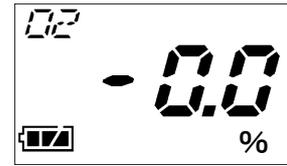




**\* NOTE**

About minus sign

- If the gas reading in measuring mode falls more than 2% of full scale below zero, the LCD displays “-“ (minus sign) in front of the single figures of LCD.



Displays minus sign

### 3-4. Wearing the unit

The unit can be used by attaching the standard alligator clip or optional belt clip.

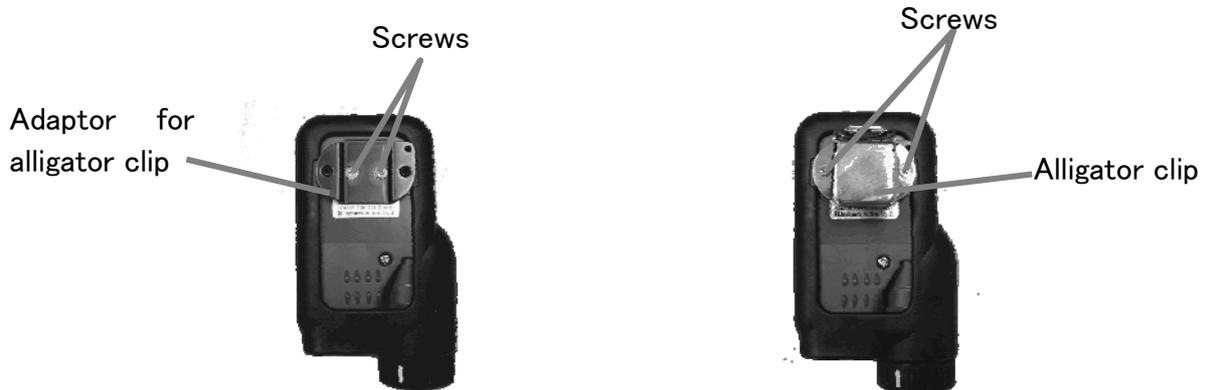


**WARNING**

Ensure that sensor is exposed to ambient air. If not, correct detection cannot be performed and it may be linked to an accident.

#### [Mounting be alligator clip]

- 1) Screw down the adaptor for alligator clip on the back of the case (2 points)
- 2) Fix the alligator to the adaptor with 2 screws.
- 3) Adjust the direction of alligator clip with the teeth in the alligator clip's jaws opened.



#### [Mounting the belt clip]

Screw down the belt clip on the back of the case (2 points).



## 4. ALARMS

### 4-1. Types and patterns of gas alarm

The OX-07 will sound an alarm, flash its alarm lights and vibrate when the oxygen concentration reaches to warning/alarm level.

**【for Japanese specification】**

Gas alarm types : Low alarm (WARNING), Low-Low alarm (ALARM), Over range alarm (OVER)

Alarm patterns : Pattern "A", pattern "B"

Alarm actions : Buzzer, light, vibration, LCD (flashing, back light on)

Alarm types	Target gas	Alarm pattern
	O <sub>2</sub>	
Low alarm(WARNING)	18.0vol%	Pattern A
Low-Low alarm(ALARM)	18.0vol%	Pattern B
Over range alarm(OVER)	40.0vol%	Pattern B *1

**【for Overseas specification】**

Gas alarm types : Low alarm (WARNING), High alarm (ALARM), Over range alarm (OVER)

Alarm patterns : Pattern "A", pattern "B"

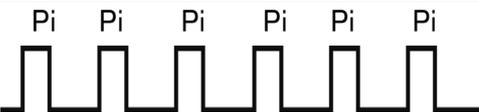
Alarm actions : Buzzer, light, vibration, LCD (flashing, back light on)

Alarm types	Target gas	Alarm pattern
	O <sub>2</sub>	
Low alarm (WARNING)	19.5vol%	Pattern A
High alarm (ALARM)	23.5vol%	Pattern B
Over range alarm (OVER)	40.0vol%	Pattern B *1

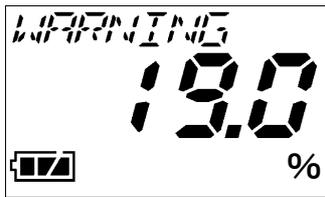
\*1. Actions of buzzer, light and vibration are same as for ALARM.

Only the display screen is different (see next page).

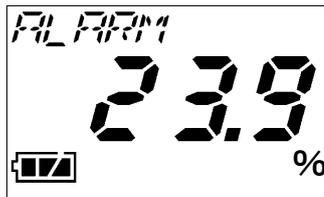
#### Actions of alarm lights, buzzer sound and vibration

Alarm pattern	Pattern A (Intermittent : Once per second)	Pattern B (Intermittent : Twice per second)
Buzzer sound (Pulsing tone)		
Alarm lights		
Vibration		

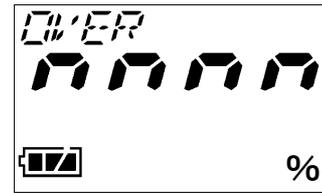
### [Examples of LCD indication]



WARNING  
(Gas reading flashes)



ALARM  
(Gas reading flashes)



OVER  
(Gas reading replaced by  
blinking brackets)

#### \* NOTE

If alarm is issued, the LCD changes to alarm indication automatically.

## 4-2. Resetting gas alarms

To reset a gas alarm or trouble alarm, press and release the “POWER” button.

Alarms to be able to reset

- Gas alarm
- Calibration failure

Alarms unable to reset

Following alarms cannot be reset unless you turn off the unit

- System failure
- Dead battery alarm
- Sensor failure

#### \* NOTE

The alarm pattern of this unit is a latched mode. Even though the gas concentration may have returned to normal or may have increased above the low alarm point or may have fallen below the high alarm point, the alarm indications will continue until you have reset the alarm using the “POWER” button.

## 4-3. Responding to gas alarms

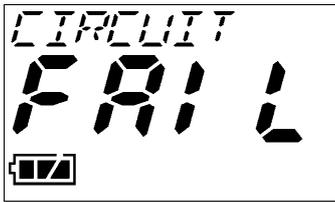
Gas alarm is set at safety level. However, sudden release of gas will exceed the safety level and reach to dangerous level within a short time. If the alarm is activated, leave from that area immediately and ventilate there. Also, stop the leaking source immediately, if the gas leak is identified.



If oxygen gas alarm is activated, ventilate with fresh air or escape to the fresh atmosphere immediately. It may lead to dangers because oxygen-deficient air or other gases may blow out.

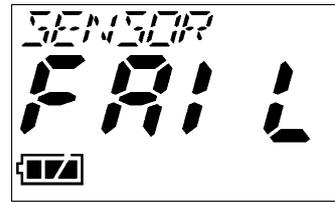
#### 4-4. Other alarms

##### System failure



- Buzzer sounds
- Alarm light flashes
- Gas reading replaced by CIRCUIT FAIL
- Back light turns on

##### Sensor failure



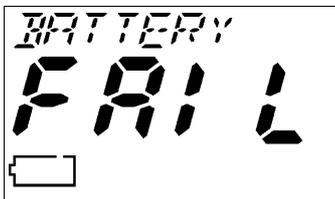
- Buzzer sounds
- Alarm light flashes
- Gas reading replaced by SENSOR FAIL
- Back light turns on

##### \* NOTE

- Sensor failure may be activated at the time of AIR cal. To reset an alarm, press "POWER" button. In this case, AIR cal is not performed.
- If the sensor failure would be activated except for system failure, low battery alarm or at the time of AIR cal. Only power off operation can be performed. When sensor failure or system failure has been occurred, turn off the power and contact our authorized agent.

#### 4-5. Responding to dead battery alarm

##### Dead battery alarm



- Buzzer sounds
- Alarm light flashes
- Battery icon flashes
- Gas reading replaced by BATTERY FAIL
- Back light turns on

##### \* NOTE

The standard of the bar in battery icon is as follows

-  : Enough remaining
-  : Battery capacity has been decreased.
-  : Change the battery as soon as possible

##### WARNING

The unit is not operational as a gas monitor. Change the battery as soon as possible when a low battery warning occurs.

## 5. MAINTENANCE AND CHECK

Perform following checks to maintain the reliability and correct functions.



### **WARNING**

If you find abnormality to this unit, contact our authorized agent.

### **5-1. Daily check**

Check that unit housing, display, switches and lights are not dirty or damaged. Also check battery voltage, actions of buzzer, lights and vibration when turning power on.

### **5-2. AIR calibration (Fresh air adjustment)**

Perform AIR calibration after power on. Also perform AIR calibration in fresh atmosphere if O<sub>2</sub> reading is not 20.9%. (See section 3-2)

### **5-3. Replacing batteries**

Replace the battery if battery voltage decreases during operation. (See section 2-1)

### **5-4. Gas calibration**

It is required to perform gas calibration at minimum every 6 months. To calibrate the unit, you will need the calibration kit. Ask our authorized agent for gas calibration kit.

## 6. SCRAP THE PRODUCT

As a harmful substances or materials for environment are not used in this unit itself, treat it as industrial waste (Non-flammable material) according to the local rule. Regarding the oxygen sensor, contact our nearest agent or RIKEN KEIKI CO., LTD.

## 7. TROUBLESHOOTING

Symptoms	Probable causes	Recommended action
The unit will not turn on	Batteries may need to be replaced.	Refer to section. <2-1 Mounting /replacing the batteries>
	Battery polarity may be wrong.	
	Holding time for POWER button may be too short.	Press and hold POWER button for about 1 sec until it shows display.
	Battery cover may be loose.	Verify that the battery cover is attached.
“CIRCUIT FAIL” is displayed on the LCD	A circuit failure has occurred.	Contact our nearest agent to repair.
“SENSOR FAIL” is displayed on the LCD	The O2 sensor may need replacement.	Replace the sensor with new one.
“AIR CAL. FAIL” displays during fresh air adjustment	Fresh air is not supplied to the unit.	Supply fresh air.
	The O2 sensor may need replacement.	Replace the sensor with new one.
“BATTERY FAIL” is displayed on the LCD	Decrease of battery voltage.	Turn off the unit and replace batteries with new ones at non-hazardous area.

## 8. SPECIFICATIONS

### 8-1. Specifications

【Japanese specifications】

Model	OX-07
Type	Type A
Detectable gas	Oxygen
Detection principle	Galvanic cell
Measuring range	0~40vol% (Resolution : 0.1vol%)
Low alarm	18.0vol%
Low-Low alarm	18.0vol%
Over alarm	40.0vol%
Various indications	Battery icon
Indicate accuracy (under an identical condition)	Within $\pm 0.7\text{vol}\%$
Response time (under an identical condition)	Within 20 seconds(T90)
Gas alarm indication	Flashing light/Intermittent buzzer/Gas reading flashes/ Vibration
Gas alarm action	Latching-mode
Trouble alarm・Self diagnosis	System failure/Sensor failure/Low battery/ Calibration error
Trouble alarm indication	Flashing light/Intermittent buzzer/Content display
Trouble alarm action	Latching mode
Detection method	Diffusion method
Gas concentration display	LCD digital display
Power supply	Alkaline batteries (Size AA) × 2 pcs.
Continuous operation time	About 5000 hours (no alarm・no light at 25°C)
Explosion-proof structure	Intrinsically safe
Explosion-proof grade	Exia II CT3X (TIIS<Japan>)
Operating temperature and humidity	-20~50°C, below 95%RH (non-condensing)
Various functions	LCD backlight/Peak hold display
Outer dimension and Weight	Approx. 66(W) × 114(H) × 33(D)mm (Projection excluding) Approx. 230g (Excluding clip)

【Overseas specifications】

Model	OX-07
Type	Type A
Detectable gas	Oxygen
Detection principle	Galvanic cell
Measuring range	0~40vol% (Resolution : 0.1vol%)
Low alarm	19.5vol%
High alarm	23.5vol%
Over alarm	40.0vol%
Various indications	Battery icon
Indicate accuracy (under an identical condition)	Within $\pm 0.7\text{vol}\%$
Response time (under an identical condition)	Within 20 seconds(T90)
Gas alarm indication	Flashing light/Intermittent buzzer/Gas reading flashes/ Vibration
Gas alarm action	Latching-mode
Trouble alarm・Self diagnosis	System failure/Sensor failure/Low battery/ Calibration error
Trouble alarm indication	Flashing light/Intermittent buzzer/Content display
Trouble alarm action	Latching mode
Detection method	Diffusion method
Gas concentration display	LCD digital display
Power supply	Alkaline batteries (Size AA) × 2 pcs.
Continuous operation time	About 5000 hours (no alarm・no light at 25°C)
Explosion-proof structure	Intrinsically safe
Explosion-proof grade	II 1GExia II CT4Ga (ATEX/IECEX<KEMA>)
Operating temperature and humidity	-20~50°C, below 95%RH (non-condensing)
Various functions	LCD backlight/Peak hold display
Outer dimension and Weight	Approx. 66(W) × 114(H) × 33(D)mm (Projection excluding) Approx. 230g (Excluding clip)

8-2. Standard accessories

Items	Japanese specifications		Overseas specifications
	with 5m cable	Personal	
AA size alkaline batteries 2pcs	○	○	○
Alligator clip (with adaptor 1pce/screws 4pcs)	○	○	○
Hand strap	○	○	○
Carrying case	○	—	—
Extension cable (5m)	○	—	—
Operation manual	○	○	○

### 8-3. Optional accessories

- Belt clip (with 2 screws)
- Extension cable (5m, 10m, 20m, 30m)
- Carrying case



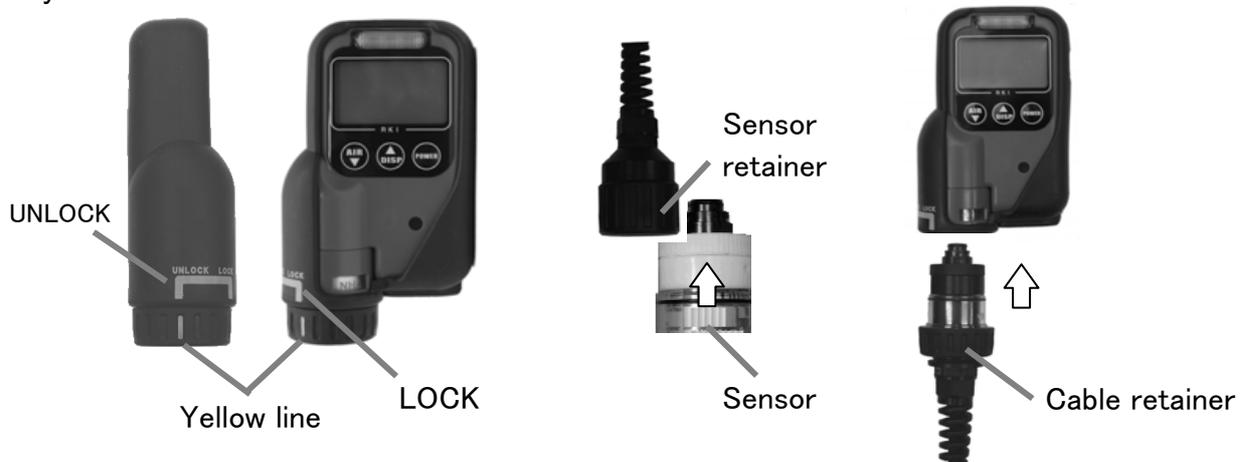
Belt clip



Extension cable

#### [Using the OX-07 with extension cable]

- 1) Verify that the OX-07 is off.
- 2) Take out the sensor from the instrument body.
- 3) Mount the removed sensor to the sensor retainer with the same procedures as sensor mounting. (See section 2-2.)
- 4) Mount the cable retainer to the instrument body as shown below figure, and align the yellow line with "LOCK" line.



#### CAUTION

- When using the OX-07 with extension cable, do not throw sensor part into detection point, but lower down slowly. Avoid impact to the sensor. Sensor may be damaged.
- When intending to measure the oxygen content in manhole, inside device, etc by OX-07 with extension cable, adjust the temperature of the sensor to be the same temperature as measuring point by leaving it there about 10 minutes. Then, pull it up to the ground once, turn on the unit again and perform the fresh air adjustment. After that, lower the sensor down to the detection point and measure oxygen content.

## 9. DEFINITION OF TERMS

### %vol

Gas concentration represented by the unit as a percentage of the total volume.

### Calibration

By using calibration gas, adjust the displayed gas concentration to match the calibration gas concentration.

### PEAK

This is a peak (highest or lowest) gas reading since the last time the unit was turned on.

### Warning/Alarm level set point

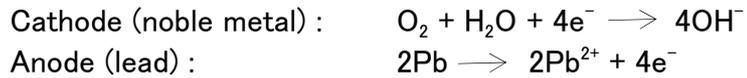
Preset level to actuate an alarm when gas concentration reaches that point.

### Maintenance and check

Work and inspection to maintain the performance of this unit.

## 10. DETECTION PRINCIPLE

By connecting a noble metal and lead immersed in an electrolyte with a lead wire, an electrochemical cell (galvanic cell) is made. A membrane covers the cell and allows oxygen to diffuse into the electrolyte where reduction on the metal electrode and oxidation on the lead electrode occur respectively as shown in the following chemical equation ;



The oxygen reacts in the cell as above equation and produce a current proportional to the oxygen concentration. The current develops a voltage across a thermistor/resistor network. If oxygen concentration decreases, reduction on noble metal electrode decreases and voltage on both sides of thermistor also decreases.

[Structure]

