



# INSTRUCTION MANUAL FOR RIKEN PORTABLE OXYGEN MONITOR MODEL OX-07 Type A

## Safety Precautions

- Read and understand the instructions in this manual before operating this detector.
- Keep manual accessible all the time.
- Follow all the instruction in this manual.
- We do not assume liability for any accident or damage caused by the operation of this gas detector, and our warranty is limited to the replacement of parts or complete unit.
- Be sure to perform daily and 6 months regular inspections since this is a safety instrument.
- If this detector founds defective, contact authorized distributors, dealers or representative appointed by Riken Keiki Co., Ltd.

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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.
- 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 disassemble the sensor since there is an electrolyte inside. If your finger touches the electrolyte, wash your finger with water immediately.

** 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 +50degreeC. 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.
- 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]

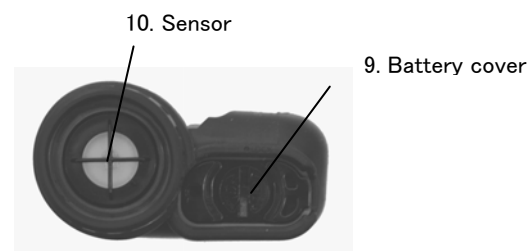


1. LCD display : Indicates gas detection results and various information.
2. Air button : Adjusts readings when a fresh air adjustment is performed. Changes a parameter setting when a parameter is available for adjustment in display mode or setup mode.
3. Target gas window : Window to see the target 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]



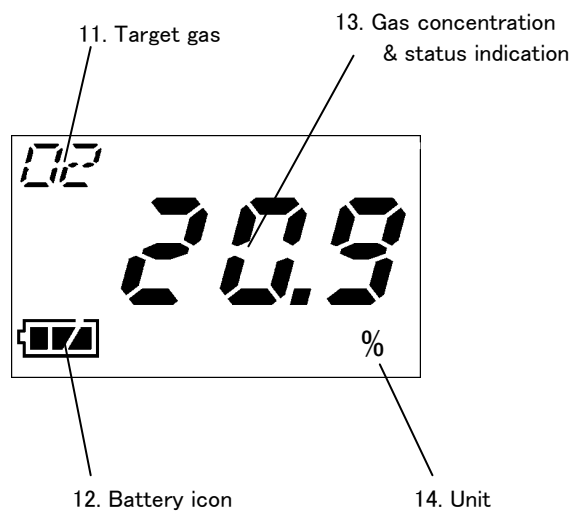
## [Bottom view]



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

**[LCD display]**

– Measuring mode –



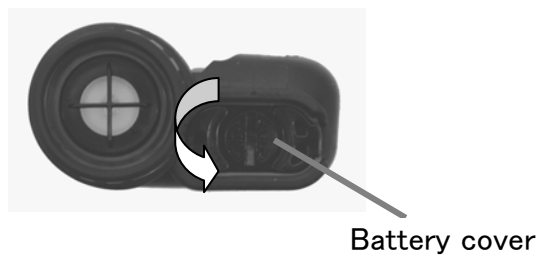
11. Target gas :            Displays the name of target gas.
12. Battery icon :        Shows remaining battery life.
13. Gas concentration :   The target gas concentration and the status of this unit is  
& status indication    displayed.
14. Unit :                Indicates the unit of gas concentration.

## 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.

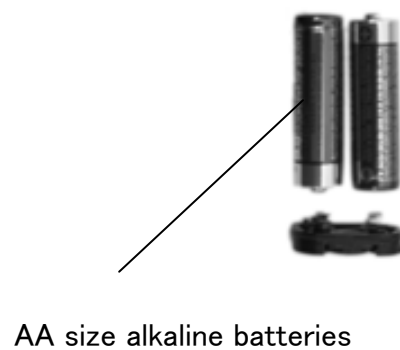
[Opening the battery cover]



[Direction of battery mounting]



[Closing the battery cover]



**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.

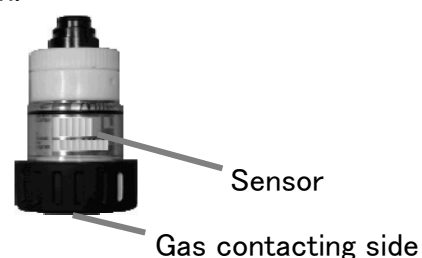
## 2-2. Mounting/Replacing the sensor

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



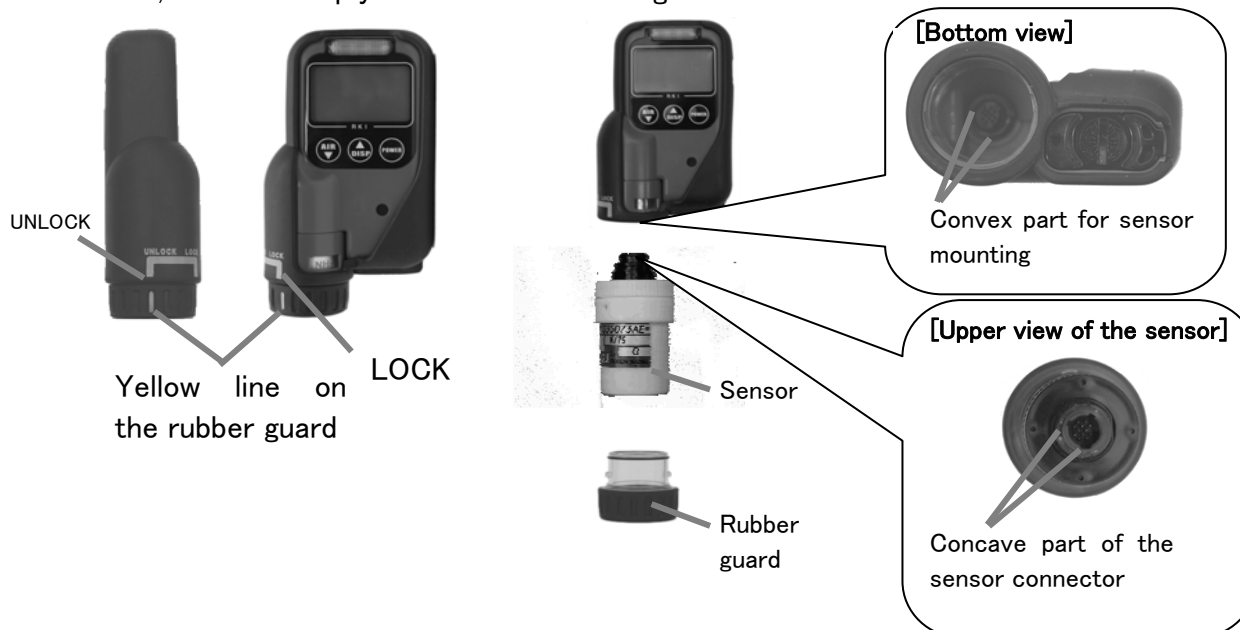
### CAUTION

- 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)

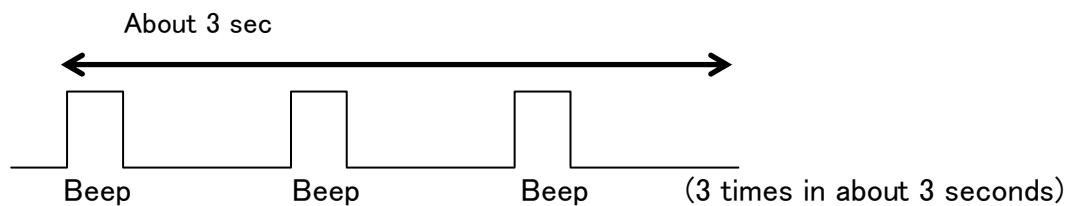


POWER button

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

### \* NOTE

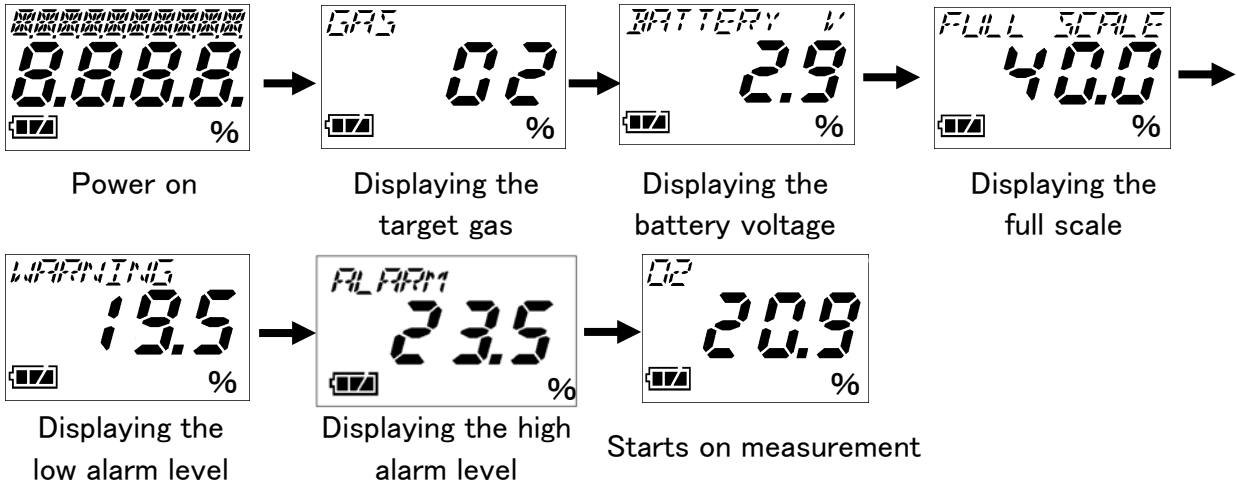
Press and hold the POWER button until the LCD turns off.



## 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

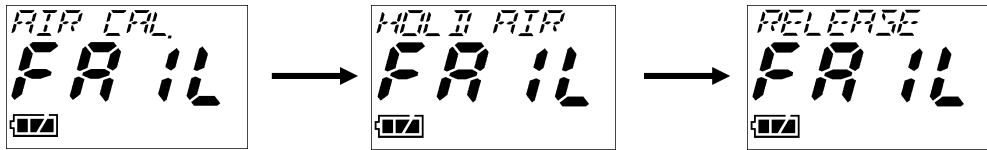
Before using the OX-07, set the fresh air reading. Performing this adjustment ensures accurate gas readings in the monitoring environment.

- 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**

- 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 5 seconds later, AIR CAL(Air adjustment) is cancelled, the LCD displays “FINISH” and indicates the concentration before the adjustment.
- Fresh air adjustment can be performed even in gas alarm condition.



Continue to hold the AIR button

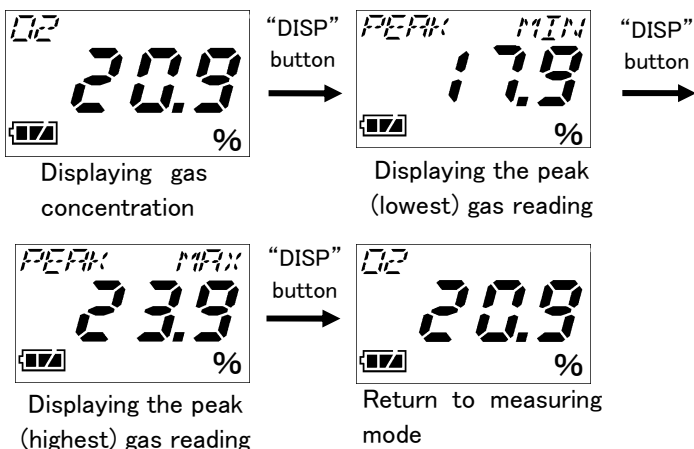
Release the AIR button

**⚠ 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**

- Gas concentration display  
Indicates current gas concentration.
- Displaying the peak (highest) reading  
Indicates the highest gas reading since the unit was turned on.
- Displaying the peak (lowest) reading  
Indicates the lowest gas reading since the unit was turned on.

You can also change the display mode by pressing the “AIR” button in displaying the peak gas reading as following.

**\* NOTE**

- If you do not press a button for about 20 seconds while in display mode, the unit will return to measuring mode automatically and the backlight will turn off 20 seconds after the last button was pressed.
- When any of three control buttons are pressed, the LCD backlight comes on.
- The unit can be turned off by pressing and holding the “POWER” button for about 3 seconds in any display mode.

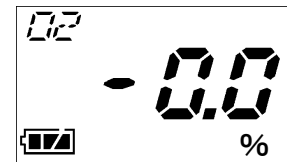
 **WARNING**

- Do not use the unit by pointing the gas detecting face of the sensor upward for a long time. Correct measurement may not be performed.
- 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.

**\* 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

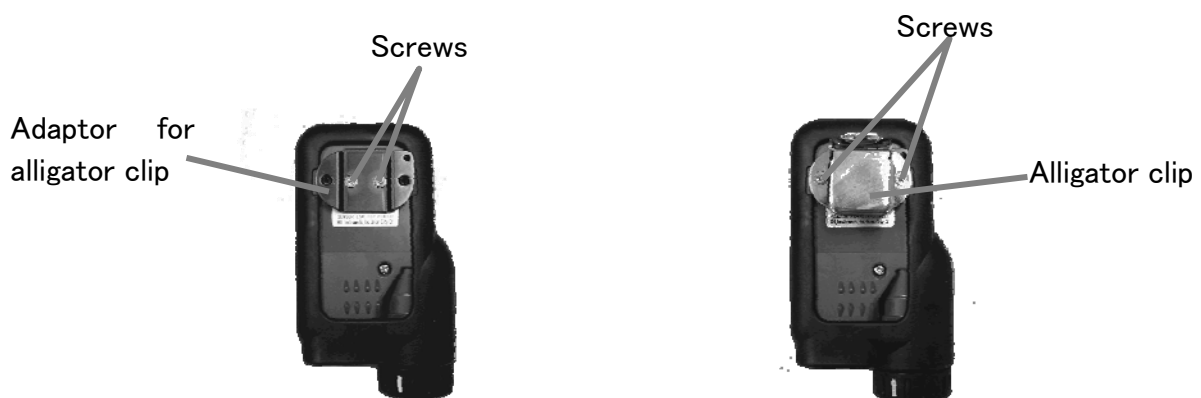
The unit can be used by attaching the standard alligator clip or optional belt clip.

 **WARNING**

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

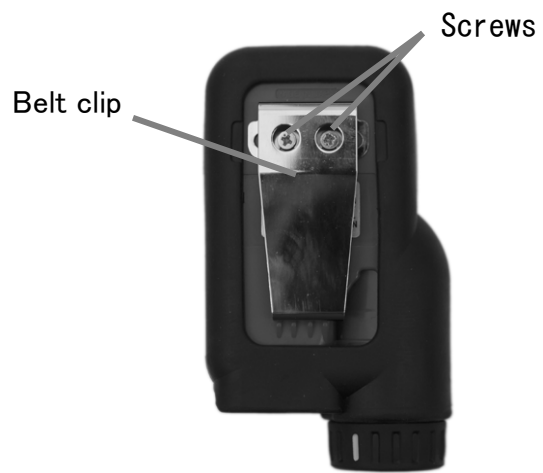
#### [Mounting be alligator clip]

- Screw down the adaptor for alligator clip on the back of the case (2 points)
- Fix the alligator to the adaptor with 2 screws.
- 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.

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

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


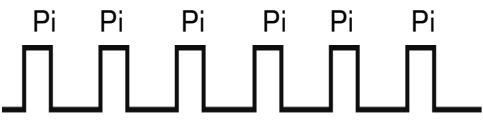




Alarm actions : Buzzer, light, vibration, LCD (flashing, back light on)

Alarm types	Target gas	Alarm pattern
	O2	
Low alarm (WARNING)	19.5%vol	Pattern A
High alarm (ALARM)	23.5%vol	Pattern B
Over range alarm (OVER)	40.0%vol	Pattern B *1

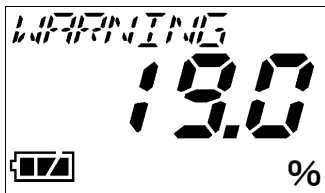
\*1. Actions of buzzer, light and vibration are same as for high alarm.

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

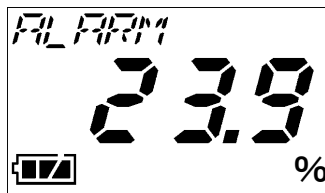
Actions of alarm lights, buzzer sound and vibration

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

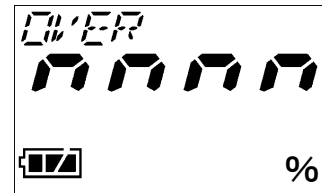
[Examples of LCD indication]



Low alarm  
(Gas reading flashes)



High alarm  
(Gas reading flashes)



Over range  
(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
- Clock failure when you turn on the unit

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”

## 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.

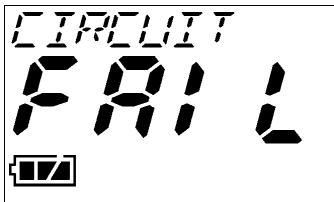


If oxygen gas alarm is activated, ventilate with fresh air or escape to the fresh atmosphere immediately.



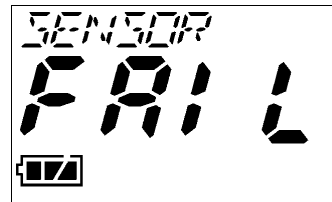
## 4-4. Other alarms

## System failure



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

## Sensor failure



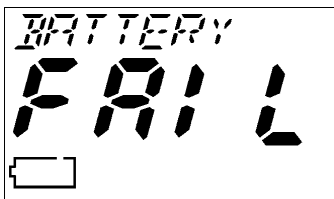
- Buzzer sounds
- Alarm light flashes
- Gas reading replaced by SENSOR FAIL
- Back light turns on

**\* 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 turnig power on.

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

Perform AIR calibration after power on. Also perform AIR calibration in fresh atmosphere if O2 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.
“SENSOR 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.
“FAIL (battery icon)” is displayed on the LCD	Decrease of battery voltage.	Turn off the unit and replace batteries with new ones at non-hazardous area.
Alarm does not stop even though the gas reading increases above preset alarm point	MODE (alarm reset) switch is not pressed.	This unit has a latching mode function. Press the MODE button after the alarm condition has been cleared.

## 8. SPECIFICATIONS

### 8-1. Specifications

Model	OX-07
Type	Type A
Measurable gas	Oxygen (O <sub>2</sub> )
Detection principle	Galvanic cell
Measuring range (Resolution)	0-40.0%vol (0.1%vol)
Preset alarm level	Low alarm : 19.5%vol High alarm : 23.5%vol OVER range : 40.0%vol
Trouble alarm	Sensor disconnection, low battery, circuit failure, calibration range error
Alarm indication	Gas alarms : Alarm light flashes, pulsing tone, gas reading flashes, vibration Trouble alarm : Alarm light flashes, pulsing tone, gas reading replaced by FAIL
Type of alarm	Latching mode (reset an alarm by pressing POWER button after the gas reading returns normal)
Detection method	Diffusion sampling
Display	Digital LCD
Power source	AA size alkaline batteries (2 pcs)
Continuous operation	Up to 5000 hours (at 25degreeC, no alarm, no backlight)
Explosion proof	Intrinsically safe Exia II CT3
Approval No.	TC18099 in Japan
Operation temp. & humidity	-20degreeC to +50degreeC, below 95%R.H. (non-condensing)
Function	•Manual backlight LCD (automatically lit during alarm) •PEAK hold function (lowest reading and highest reading)
Dimension & weight	Approx. 60(W) x 114(H) x 33(D)mm, Approx. 230g(with battery and rubber protector)

### 8-2. Standard accessories

- AA size alkaline batteries 2pcs (built-in the unit)
- Rubber protector
- Alligator clip (with adaptor 1pce/screws 4pcs)
- Hand strap
- Operation manual

### 8-3. Optional accessories

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



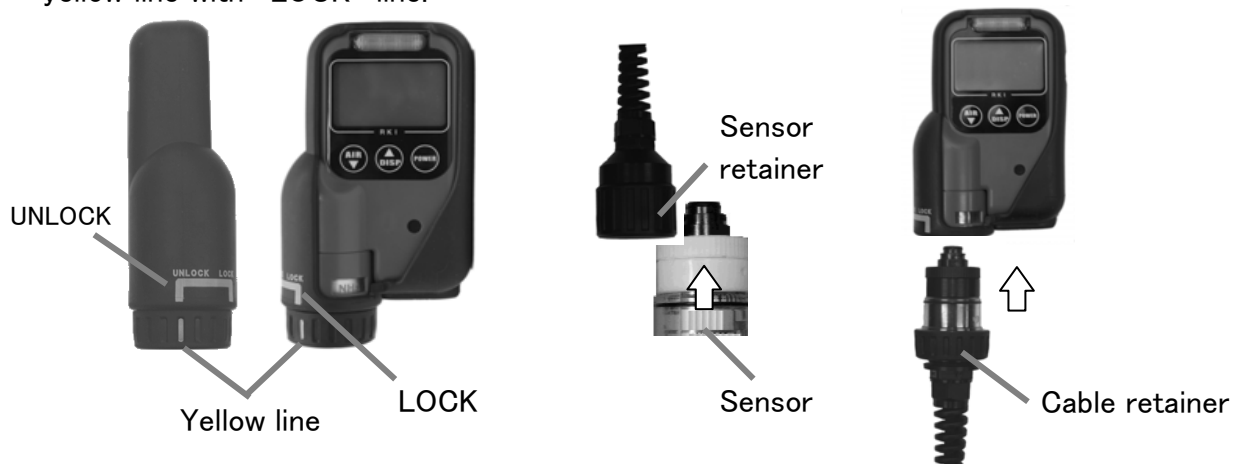
Belt clip



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

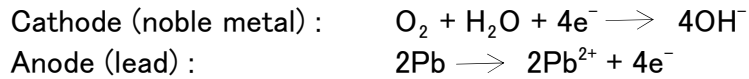
Preset level to actuate an alarm when gas concentration reaches that point.

### Maintenance and check

Work and inspection to maintain the performance of this unit.

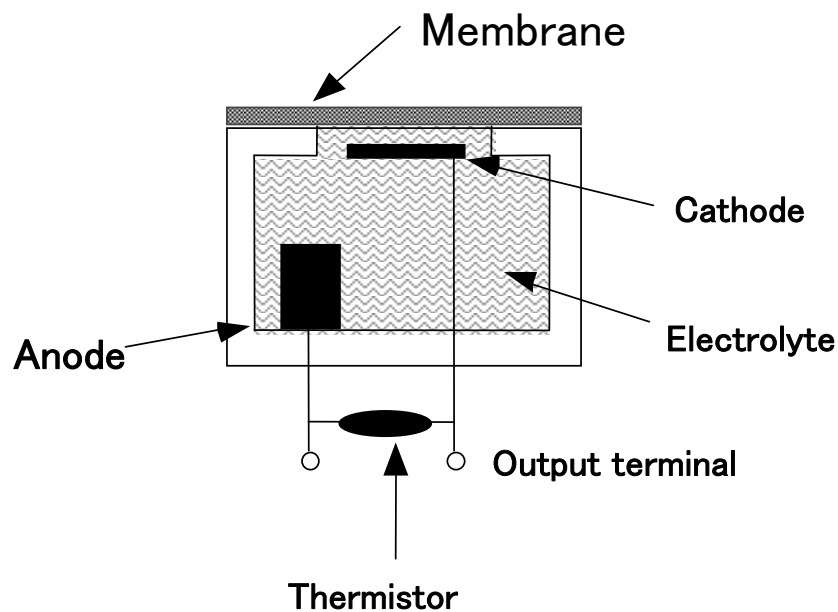
## 10. DETECTION PRINCIPLE

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]



## 11. WARRANTY

RIKEN KEIKI CO., LTD. warrants the Model OX-07. Portable Oxygen Monitor sold by us to be free from defects in materials, workmanship, and performance for a period of one(1) year from the date of shipment from Riken Keiki Co., Ltd. This includes the instrument and the original sensor. Any parts found defective within their warranty period will be repaired or replaced, at our option, free of charge. This warranty does not apply to those items, which by their nature, are subject to deterioration or consumption in normal service, and which must be cleaned, repaired, or replaced on a routine basis. Examples of such items are as follows:

- Filter elements, disks, or sheets
- Batteries

Warranty is voided by abuse including mechanical damage, alteration, rough handling, or repair procedures not in accordance with the instruction manual. This warranty indicates the full extent of our liability, and we are not responsible for removal or replacement cost, local repair costs, transportation cost, or contingent expenses incurred without our prior approval.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY AND ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF Riken Keiki Co. Ltd., INCLUDING BUT NOT LIMITED TO THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL Riken Keiki Co., Ltd., BE LIABLE FOR INDIRECT, INCIDENTAL OR CONSEQUENTIAL LOSS OR DAMAGE OF ANY KIND CONNECTED WITH THE USE OF ITS PRODUCTS OR FAILURE OF ITS PRODUCTS TO FUNCTION OR OPERATE PROPERLY.

This warranty covers instruments and parts sold to users only by authorized distributors, dealers and representatives as appointed by Riken Keiki Co., Ltd.

We do not assume the indemnification for any accident or damage caused by the operation of this gas monitor and our warranty is limited to the replacement of parts or complete goods.