

This product is an oxygen detector that complies with JIS T 8201:2010

Digital Oxygen Indicator

Instruction Manual

- XO-326IIsA
- XO-326IIsB
- XO-326IIsC

This instruction manual is for the three models listed to the left.

- Keep this manual for easy reference.
- Carefully read this manual prior to use.

NEW COSMOS ELECTRIC CO., LTD.

Document No.: XO-326IIT

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Package Contents

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

Item	Quantity
Digital oxygen indicator with leather case	1
Shoulder strap	1
Replacement filter element (FE-2) 2 pcs/set	1 set
Panasonic alkaline AA battery (LR6X)	2
Instruction manual (this document)	1

Optional Items (sold separately)

Item	Description
5m extension cable (LC-3-5) with storage case	Used to extend the length of the cable

1. Introduction

Thank you for purchasing the New Cosmos XO-326II series digital oxygen indicator (product, detector, or unit). Prior to use, please read this instruction manual carefully to ensure safe and reliable operation.

This product measures the concentration of oxygen while working in pits, manholes, wastewater treatment tanks, basement, tanks, etc. If the gas concentration drops to a preset level, the unit issues visual and audible alarms by means of beeping sounds and a red blinking light to prevent accidents due to low oxygen levels.

Carefully read this manual, regardless of your experience with gas detectors. Do not use this product for any purposes other than those intended or described in this manual.

Explosion-proof Requirements (Japan)

Follow the conditions below to comply with the explosion-proof requirements.

Explosion-proof: Ex ia IIC T3 Ga
Power Source: 3.0 VDC alkaline AA battery x 2 pcs
Batteries to use: Toshiba alkaline AA battery LR6 x 2 pcs,
Panasonic alkaline AA battery LR6X x 2 pcs, or
Duracell alkaline AA battery MN1500 x 2 pcs

Ambient temperature: -20°C to +50°C

Conditions of Use

- This product should not be used in a hazardous area outside of Japan.
- Do not replace the batteries/sensor/filter element in a hazardous area.
- Only use the product while installed in its dedicated leather case.
- To prevent accidents from electrostatic charges, wear anti-static clothing and conductive footwear (anti-static work shoes), and maintain a conductive work floor (resistance: 10M Ohm or less).
- Do not use this product for measuring the oxygen concentration in any mixture other than a mixture of air and combustible gas or a mixture of vapor and toxic gas.
- Only use specified batteries.

Symbols Used in this Manual

This manual uses DANGER, WARNING, CAUTION and NOTE symbols to draw attention to procedures, materials, methods, and processes, which require particular attention.

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

Safety Precautions

- Use this product in accordance with the applicable laws and regulations.
- To ensure safe operation, follow the precautions below.



DANGER ▪ When a gas alarm activates, immediately take all the measures necessary to prevent an explosion.



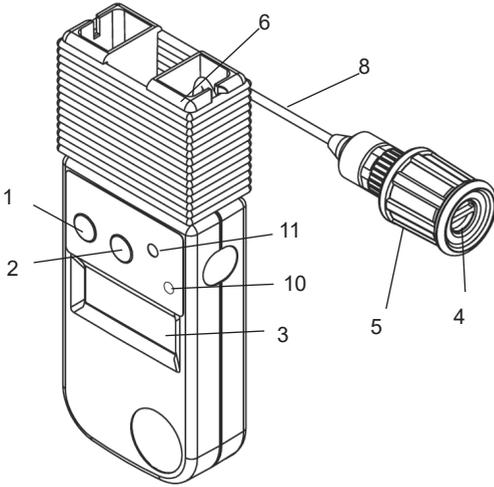
- WARNING** ▪ Air adjustment (zeroing) starts automatically when the detector is turned on. Turn on the detector in clean air. Failure to do so may cause incorrect air adjustment, which will then lead to inaccurate measurements being displayed.
- Do not block the gas detection port. If blocked, correct detection is not possible.
 - Keep the filter element at the gas detection port clean and dry. If the filter element is dirty or wet, proper gas detection is not possible.
 - Do not block the audio opening. If blocked, the audible alarm will be muffled.
 - The recommended sensor replacement cycle is one year. The sensor may fail to provide accurate detection after one year; therefore, it should be replaced.

**CAUTION**

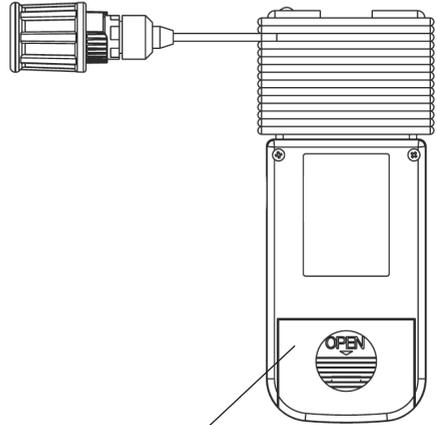
- If this product is to be unused or stored for an extended period of time, the batteries must be removed. Leaving them inside while the product is unused or stored for an extended period of time will drain them and cause them to leak, which will lead to product failure.
- Check the battery level periodically (approximately once a month) even if the product remains unused for an extended period of time. Replace the batteries, as leakage of the electrode may occur when the battery level is low.
- This product is explosion-proof. Do not disassemble, modify, or alter the structure of this unit or its electrical circuits. Doing so may impair the performance of the explosion-proof characteristics.
- This product is not drip-proof. Keep away from water.
- Avoid using the product outside the specified operating temperature/humidity range. Also avoid exposing the product to abrupt temperature/humidity changes. Failure to do so may impair the performance of the product.
- Avoid rapid changes in pressure. Failure to do so may impair the sensor performance or damage the sensor.
- Avoid strong mechanical shock, impact or vibration to the product by dropping or bumping. Failure to do so may impair the performance of the product.
- If condensation is present on the product, remove it and make sure the unit is completely dry and has been checked for abnormalities before use.
- Only use the specified batteries. The use of any unspecified battery may impair the product's explosion-proof performance.
- The oxygen sensor has pressure dependence. Therefore, make necessary pressure adjustments when using the product at a place other than at sea-level, such as at high altitudes. (Page 20)
- Prevent the oxygen sensor being submerged in water when using it in a manhole, etc. A submerged sensor cannot provide gas detection.
- The gas sensor contains harmful substances. For disposal, return the used sensor to New Cosmos or treat as industrial waste.
- Due to the battery's characteristics, the battery life will be shorter when used at low temperatures than when used at room temperature.
- Keep the product away from wireless devices while in use. Failure to do so may cause fluctuations in the reading or a fault alarm due to radio wave interference.

2. Unit and Components

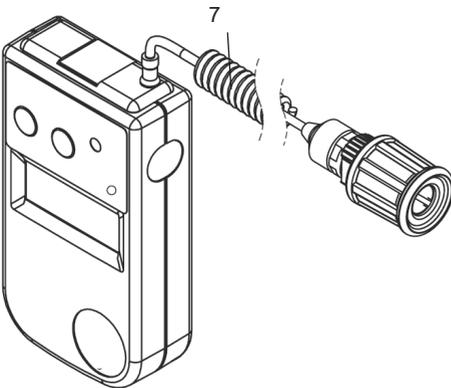
XO-326IIs



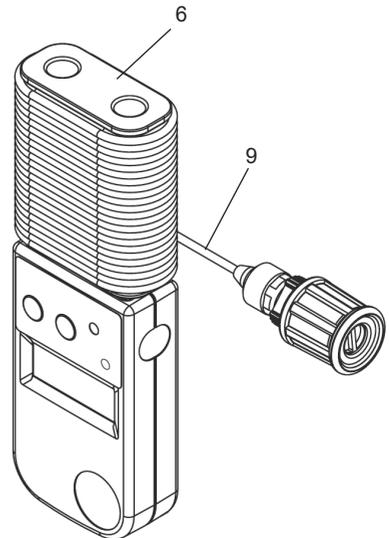
XO-326IIsA



12



XO-326IIsB



XO-326IIsC

Item	Component	Function
1	POWER button	Press to turn the unit on/off
2	AIR ADJ button	Press and hold to perform air adjustment (21.0% adjustment)
3	LCD 	Displays gas concentration, battery level, error code, etc. (a) Battery level High Low Replace  (b) Gas concentration and error code (c) Unit of measurement
4	Gas detection port	Gas inlet to the sensor
5	Sensor unit	Houses an oxygen sensor
6	Spool	Spool for winding and storing the cable
7	1 m cable (curl cord type)	Extension cable (for XO-326IIIsB)
8	5 m cable	Extension cable (for XO-326IIIsA)
9	10 m cable	Extension cable (for XO-326IIIsC)
10	Alarm LED	Blinks red when a gas alarm is detected
11	Audio opening	Opening for audio
12	Battery cover	Open/close for battery replacement

Leather Case



Item	Component	Function
1	Shoulder strap bracket	Attaches the shoulder strap
2	Sensor pocket	Stores a sensor unit
3	Side pocket	Stores a quick start guide

3. Operating Procedure

WARNING Perform a routine check prior to use (page 16).



1. Battery installation

Units are shipped without batteries. Remove the battery cover and then install the two supplied batteries. See “Battery Replacement” on pages 13 and 14 for the procedure.

2. Power on

WARNING Air adjustment starts automatically when the product is turned on. Ensure that the air adjustment is done in clean air. If the air adjustment is done in a gas atmosphere, inaccurate gas concentration will be indicated.

Press and hold the POWER button for 3 seconds. A countdown will start with “on.3”, “on.2” and “on.1” being displayed in sequence. Next, the <1st stage gas alarm set value> and <2nd stage gas alarm set value> screens will be displayed in sequence, followed by air adjustment. When the air adjustment is completed, the <gas concentration> screen will be displayed. The power-on process will be completed within 10 seconds.

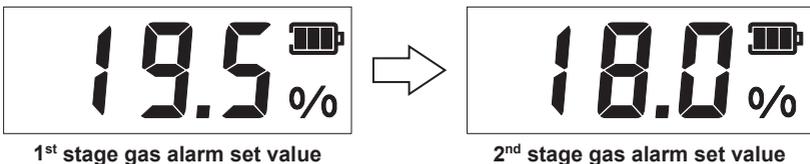
Countdown



NOTE The LCD backlight will automatically turn on when the POWER or AIR ADJ button is pressed, which will automatically turn off 5 seconds later.

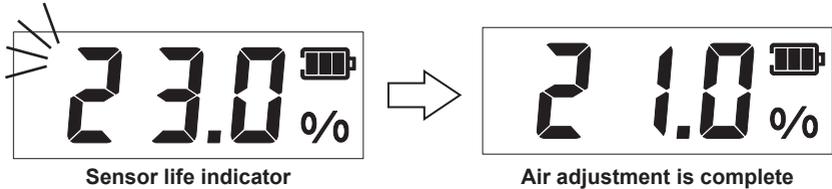
Gas alarm set values

The unit displays the 1st stage gas alarm set value and then 2nd stage gas alarm set value.



Air adjustment (21% adjustment)

When the blinking gas concentration value (sensor life indicator) changes to "21.0%", it means that air adjustment is complete and the unit is ready for detection.



NOTE

Check that "23.0%" (sensor life indicator) blinks during air adjustment. As the sensor gets closer to the end of its life, the value will become smaller. Replace the sensor with a new one before it reaches "21.0%". ("Consumable Parts" on page 16.)

3. Detection



WARNING

- Do not cover the gas detection port with any fabric, mud, water, etc. If blocked, correct detection is not possible.
- Keep the filter element at the gas detection port clean and dry. If the filter element is dirty or wet, proper gas detection is not possible.
- Avoid strong mechanical shock, impact, or vibration to the product by dropping or bumping. Failure to do so may impair the performance of the product.
- Do not block the audio opening. If blocked, the audible alarm will be muffled.



CAUTION

- A significant change in work environment (e.g., temperature or humidity change) may cause a zero drift (deviation from 21.0vol% point). In this case, press and hold the AIR ADJ button to perform air adjustment in clean air.

NOTE

- When winding/unwinding the cable around/from the spool, be careful not to twist or damage it.
- If 1st and 2nd stage gas alarms simultaneously activate, the 2nd stage gas alarm will be prioritized over the 1st stage gas alarm.
- When the gas concentration exceeds the service range, the upper limit of the service range and "OL" (over range) will be displayed alternately.

1st stage and 2nd stage gas alarm operation

When the gas concentration exceeds the 1st or 2nd stage gas alarm set value, the unit will start beeping, and the gas concentration value and alarm LED will blink.



1st stage gas alarm



2nd stage gas alarm

NOTE

- The unit beeps faster and the alarm LED blinks faster during the 2nd stage gas alarm than they do during the 1st stage gas alarm.
- The LCD backlight lights up while a gas alarm is active.

4. Power off

Press and hold the POWER button for 3 seconds.

“oFF” will be displayed and then the unit will turn off with one beep and one blink of the alarm LED.



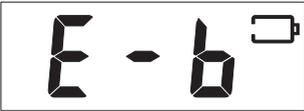
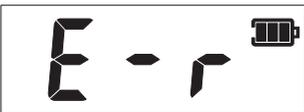
CAUTION

Do not remove the batteries immediately after the unit is turned off. Wait for more than 3 seconds after turning the unit off, then remove the batteries from the unit. Data writing automatically starts when the unit is turned off. If the batteries are removed while data writing, the data may become corrupted, which will then require a repair.

4. Error Codes

If an abnormality occurs in the unit, the corresponding error code will be displayed on the LCD, the unit will start beeping, and the alarm LED will start blinking red. The table below lists major error codes. If an error occurs, take necessary actions according to the displayed error code.

When no error code is displayed, but the button or display does not function, remove the batteries, put them back, and turn on the unit. If the unit does not reset to normal, contact New Cosmos or your New Cosmos representative for repair.

Error Condition	Error Code	Cause and Action
Air adjustment error		<p>Incomplete air adjustment or sensor error.</p> <p>Press and hold the AIR ADJ button in clean air to perform air adjustment. If the error code is still present after performing the air adjustment a few times, contact us for repair.</p>
Battery depleted		<p>Battery is drained.</p> <p>Replace the batteries with new ones. ("Battery Replacement" on page 13)</p>
Device error		<p>Device internal error.</p> <p>Turn off the unit. After more than 3 seconds, remove the batteries, put them back, and turn on the unit. If the unit does not reset to normal after that, contact us for repair.</p>

5. Consumable Replacement

5.1. Filter Element Replacement

Replace the filter element with a new one if it is dirty or wet.



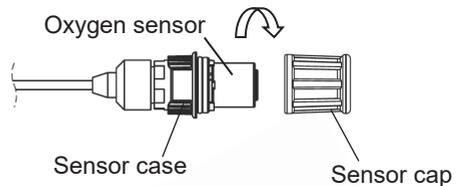
CAUTION

- Ensure that the filter element is aligned and installed correctly. Misalignment may compromise gas detection and waterproof performance.
- Ensure that the sensor cap is installed securely. A loose sensor cap may cause water ingress into the unit, resulting in device failure.
- Call for repair if water is observed inside the unit. Proper gas detection is not possible if water is present inside.

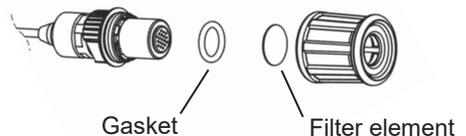
NOTE

- Do not push or poke the filter element with a finger or any such object. Deformation or breakage of the filter element may compromise its waterproof or dustproof function.

1) Rotate the sensor cap counterclockwise to remove.



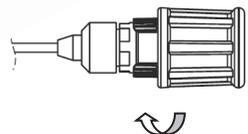
2) Remove the gasket (O-ring).



3) Replace the filter element (FE-2) with a new one.

4) Install the gasket.

5) Rotate the sensor cap clockwise to install.



5.2. Battery Replacement



WARNING

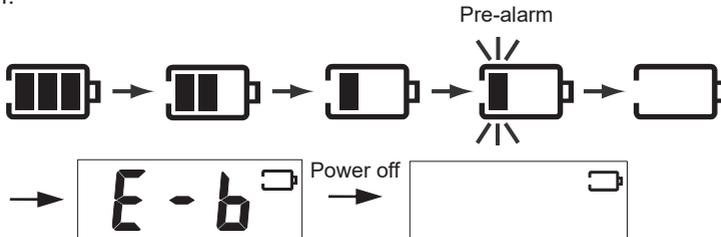
- Do not replace the batteries in a hazardous area.
- Only use specified batteries (Toshiba alkaline AA battery LR6, Panasonic alkaline AA battery LR6X, or Duracell alkaline AA battery MN1500). The use of unspecified batteries may impair the product's explosion-proof performance.



CAUTION

- Do not replace the batteries while the unit is on.
- Data writing will start immediately after the unit is turned off. Removing power during data writing may cause data corruption, which will require a repair. After turning off the unit, wait for more than 3 seconds before starting battery replacement.

As the battery decreases, the battery icon will change as shown in the figure below (indicator blocks vanish one by one). Before the unit becomes unusable, the last block will start blinking, and the unit will start chirping at 10-second intervals (pre-alarm). When the battery is depleted, the error code “E-b” will be displayed on the LCD, the unit will beep, and will not detect gas any longer. Beeping stops when the unit is turned off.

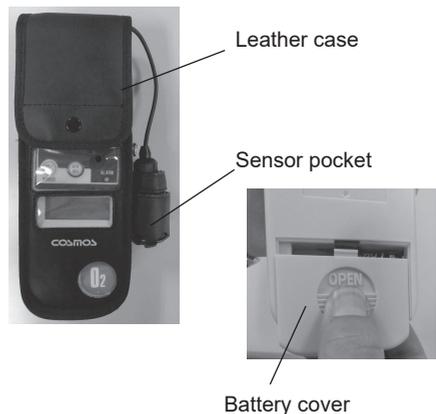


NOTE

- Only use new batteries of the same type for replacement.
- Replace both batteries at the same time.

1) Remove the sensor unit from the sensor pocket, and then remove the oxygen indicator from the leather case.

2) Press the “OPEN” marking on the battery cover and slide down to open it.



3) Pull the red ribbon to remove the batteries from the battery compartment.

NOTE

Shift the red ribbon to the right and pull it to remove the batteries.



WARNING

Install the batteries in the correct orientation. Incorrect orientation may cause them to leak or discharge, leading to device failure or shorter operating time.

4) Match the battery polarity to the marking inside the compartment and insert two new batteries so that the red ribbon is under them.

5) Slide up the battery cover into place and close it.

6) Place the oxygen indicator into the leather case. Place the sensor unit into sensor pocket.

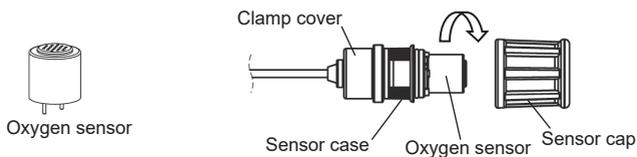
5.3. Sensor Replacement



CAUTION

- Ensure that the sensor is installed correctly. Incorrect installation may impair the product performance.
- Only hold the sensor case when rotating the sensor cap. Failure to do so (e.g., to hold the clamp cover) may damage the sensor case.

1) While holding the sensor case with your fingers, rotate the sensor cap counterclockwise to remove it.



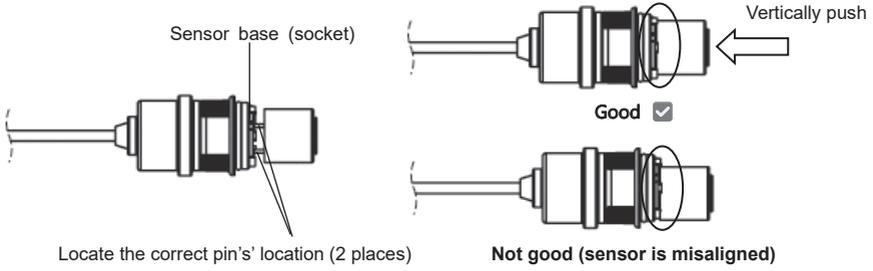
2) Pinch the head of the sensor and slowly pull to remove the sensor from the case.



3) Install a new oxygen sensor into the sensor base as follows:

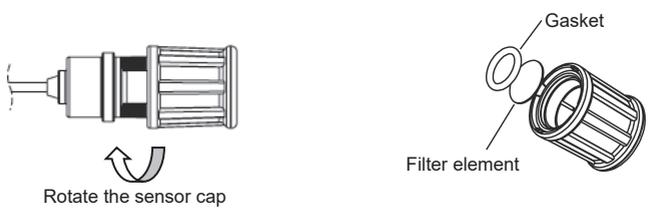
Align the sensor's connector pins (2 places) into their corresponding holes on the sensor base. Push the sensor top until the sensor bottom makes contact with the sensor base. (The oxygen sensor uses asymmetrical arrangement of its connector pins to prevent incorrect mating.)

WARNING When installing an oxygen sensor, ensure that the sensor's connector pins are vertically inserted into the socket. Tilted insertion may damage the socket.



CAUTION Install the oxygen sensor correctly. When the locations of the connector pins are reversed, the sensor cap cannot be installed correctly. Forced installation of the sensor cap may break the pins. If the pins are reversely connected, reinstall the sensor by switching the pin locations.

4) Rotate the sensor cap clockwise to install into the sensor case.



CAUTION

- Just after the sensor installation, the sensor output is not stable. Allow the sensor to stabilize for more than 30 minutes after installation.
- If the filter element and gasket come off the sensor cap, reinstall them as per "Filter Element Replacement" on page 12.

6. Maintenance

This product is a precision instrument. Please perform the periodical checks and inspections below to maintain the product's optimal performance and ensure safety. In the event of a failure to follow the safety precautions (pages 3 and 4)—such as impact shock from dropping or water ingress inside the product—or use in conditions outside the specifications (page 19), such as usage in temperature/humidity exceeding the specified range, please contact New Cosmos or your New Cosmos representative for inspection (fees may apply). A comprehensive description of the current situation would be appreciated when you contact us.



WARNING

- The recommended replacement cycle for oxygen sensors is one year from the date of purchase. Replace the sensor with a new one annually.
- For information on the oxygen sensor, read the instructions provided with the sensor package.

6.1. Routine Check

Check Item	Description
Alarm function	Prepare a test gas that slightly exceeds the alarm set value. Let the detector sample the test gas and check for alarm operation. Check whether the reading changes. Check whether the alarm LED blinks red and audio alarm begins when the reading reaches the alarm set value. If the reading does not change properly, the alarm LED does not blink, or the audio alarm does not sound, contact New Cosmos or your New Cosmos representative for repair.
Filter element	Check that the filter element inside the sensor head is clean and dry. Replace it with a new one if it is dirty or wet (page 12).
Battery level	Check the battery level indicator at the top-right corner of the LCD. If the battery level is low, replace the batteries with new ones (pages 13 and 14).

6.2. Annual Inspection

Contact New Cosmos or your New Cosmos representative to perform a periodic inspection at least once a year to maintain product accuracy.

6.3. Consumable Parts

Part Name	Model	Remarks
Replacement filter element (10 pcs)	FE-2-10	For XO-326II
Replacement oxygen sensor	OS-3M-L	For XO-326II

* The warranty period for consumable parts is one year from the date of purchase. The warranty terms and conditions are the same as the ones for the gas detector.

7. Troubleshooting

Before contacting us for service repair, perform basic troubleshooting using the table below. If the product locks up, turn off the unit. After more than 3 seconds, remove all batteries. After a few minutes, put the batteries back in and turn on the product.



CAUTION

Do not remove the batteries immediately after the unit is turned off. Wait for more than 3 seconds after turning the unit off, then remove the batteries from the unit. Data writing automatically starts when the unit is turned off. If the batteries are removed while data writing, the data may become corrupted, which will then require a repair.

Symptom	Cause	Action	Reference
Pressing the power button does not turn on the power	Battery orientation incorrect	Remove batteries and reinsert them in the correct orientation	“Battery Replacement” on pages 13 and 14
	Battery depleted	Replace batteries	
Error code appears	See “Error Codes” on page 11		

8. Warranty

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

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

Warranty Scope

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

Warranty Exclusions

The following will be repaired at the cost of customer even during the warranty period.

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

This product is a precision instrument. In order to ensure the reliability of the product, it is vital to perform routine checks and annual inspections. It is highly recommended that a maintenance contract with your New Cosmos representative be made for annual inspections.

If you have any questions about the routine check, please contact New Cosmos or your New Cosmos representative.

For repair, please contact New Cosmos or your New Cosmos representative (freight costs apply).

9. Specifications

Model	XO-326IIsA	XO-326IIsB	XO-326IIsC
Cable length	5 m	1 m (Curl cord type)	10 m
Target gas	Oxygen		
Detection principle	Galvanic cell sensor		
Sampling method	Diffusion		
Measuring range (Service range)	0–25.0 vol% (25.1–40.0 %)		
Accuracy *1	+/- 0.5 vol%		
Resolution	0.1 vol%		
Gas alarm set value	1 st stage: 19.5 vol% 2 nd stage: 18.0 vol%		
Response time	Within 20 seconds		
Alarm method	Beeping with blinking red light and LCD (auto-resetting)		
Power source	Toshiba alkaline AA battery LR6 x 2 pcs, Panasonic alkaline AA battery LR6X x 2 pcs, or Duracell alkaline AA battery MN1500 x 2 pcs		
Continuous operation time*2	Approx. 15,000 hours (at 25°C, displaying 21.0 vol%, with backlight off)		
Explosion-proof	Ex ia II C T3 Ga (Japan) Intrinsically safe		
Ingress protection	Equivalent to IP20		
Operating temperature/ humidity ranges	-10°C to +40°C, 30 to 85%RH (No condensation)		
Operating pressure	Atmospheric pressure (800–1100 hPa)		
Dimensions (excluding protrusions)	W66 x H170 x D29 mm	W66 x H120 x D29 mm	W66 x H200 x D29 mm
Mass (including batteries and leather case)	Approx. 340 g	Approx. 265 g	Approx. 410 g

* The above specifications may be subject to change without notice for product improvement.

*1. Under identical measurement conditions.

*2. The operating time (battery life) may vary depending on the environment and conditions of use, storage period, battery manufacturer, etc.

10. Detection Principle

Galvanic cell sensor (oxygen)

The sensor consists of two electrodes, a membrane, and an electrolyte.

The electrodes are two different metals, noble metal (Pt, Ag) and base metal (Pb). The noble metal electrode has contact with air via a Teflon membrane. Connecting load resistance to both electrodes generates a potential difference, which promotes the following reactions:



As a result, the current proportional to the oxygen concentration in the air flows from the noble metal electrode to the base metal electrode via the external circuit. Since the electromotive force changes depending on the temperature, a thermistor is added to compensate for the ambient temperature variations.

This oxygen sensor is affected by atmospheric pressure because of its principle. When the unit is turned on in clean air at a standard atmospheric pressure (1,013hPa), the reading will be automatically adjusted to 21.0vol% and will change in accordance with the atmospheric pressure change, even though the oxygen level does not change.

For example, if the unit is relocated to an elevation of 1,000m above sea level (900hPa), in clean air, the reading will change from 21.0vol% to 18.7vol%.

If the unit is turned on, auto zeroing will start, and the reading will be adjusted to 21.0vol%. To convert this figure to the one at standard atmospheric pressure (1,013hPa), multiply it by the correction factor (900÷1013=0.89) to obtain the corrected oxygen level, 18.7vol% (21.0 x 0.89).

Atmos. Pressure (hPa)	800	850	900	950	960	970	980	990	1000	1010	1013	1020	1030	1040	1050	1100
Correction coefficient	0.79	0.84	0.89	0.94	0.95	0.96	0.97	0.98	0.99	1.00	1.00	1.01	1.02	1.03	1.04	1.09
O ₂ level (vol%)	16.6	17.6	18.7	19.7	19.9	20.1	20.3	20.5	20.7	20.9	21.0	21.1	21.4	21.6	21.8	22.8

11. Glossary

Term	Definition
Target gas	Specific gas to be detected and used to trigger alarms.
Detection range or measuring range	A range of target gas concentrations that can be displayed and can trigger alarms.
Service range	A range of target gas concentrations that the detector can indicate, which are usually outside the Detection Range and used only as reference.
Air adjustment (zero adjustment or zeroing)	To adjust the zero point (or 21.0% for oxygen) in clean air. Clean air: Air free from target or interfering gases, and composed of 20.9–21.0vol% oxygen in dry conditions. Gas atmosphere: Air containing target or interfering gases.
Explosion-proof structure	Structure of an electrical apparatus in order not to become an ignition source in a flammable atmosphere
Intrinsically safe (IS) structure	Structure tested (e.g., via spark test) not to become an ignition source in a flammable atmosphere due to an electrical spark or hot surface during normal operation and fault conditions.
Hazardous area	An area in which an explosive atmosphere is present, or may be expected to be present, in quantities that require special precautions for the construction, installation and use of electrical apparatus.
Non-hazardous area	An area in which an explosive atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.
vol%	Gas concentrations given in terms of percentage of cubic volume.
Operating temperature and humidity ranges	Ambient temperature and humidity ranges in which the gas detection equipment can operate normally.
Ambient temperature	Temperature of the air or other media, in the immediate vicinity of the explosion-protected equipment or component.

Revision History

Document No.	Date	Revision
XO-326II sET	May 2014	00 (initial issue)
XO-326II sET	November 2021	01
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