COSMOS

- **XP-302M-R-A-1**
- **XP-302M-R-B-1**
- **XP-302M-R-C-1**
- **XP-302M-R-A-2**
- **XP-302M-R-B-2**
- **XP-302M-R-C-2**

Multi-gas Detector Instruction Manual

This instruction manual applies to the six models listed to the left.

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

Note: Refer to page 2 for information on explosive-proof application.

Model designation

XP-302M-R-A/B/C-1/2

A/B/C denotes target gases

- A: Oxygen (O2), combustible gas (COMB), hydrogen sulfide (H2S), and carbon monoxide (CO)
- B: Oxygen (O2), combustible gas (COMB), and hydrogen sulfide (H2S)
- C: Oxygen (O2), combustible gas (COMB), and carbon monoxide (CO)

1/2 denotes accessory

- 1: Gas sampling tube (1m) with probe nozzle
- 2: Gas sampling tube (8m) with sampling float

NEW COSMOS ELECTRIC CO.,LTD.

XP-302M-RET(00)
July 2018

Table of Contents

Package Contents

This product is packed and shipped with the utmost care. If any items are missing or damaged, please contact New Cosmos or its distributor for replacement.

XP-302M-R multi-gas portable suction type detector with carry case and shoulder strap (Refer to Model designation on cover page.)	1
For XP-302M-R-A/B/C-1, Gas sampling tube (1m) with drain filter and probe nozzle For XP-302M-R-A/B/C-2, Gas sampling tube (8m) with sampling float and storage case	1
For XP-302M-R-A/B/C-1, Replacement filter elements (FE-2) x 2pcs For XP-302M-R-A/B/C-2, Replacement filter elements (FE-2) x 10pcs (Pre-installed in a pocket holder on the carry case's rear.)	1
Panasonic alkaline AA battery (LR6)	4
Instruction manual (this document)	1
Inspection certificate	1

Optional (sold separately)

Alarm unit (AL-302M-R-8) with communication cable (8m)	1
Data logger kit (XP302ML) * with software (CD-R) and USB cable (1.8m)	1
AC adaptor (AD-1) 100-240 VAC, 50/60 Hz (For use in a non-hazardous area)	1

*To use the XP302ML data logger kit, a Windows personal computer is required. For compatible Windows versions and hardware requirements, contact New Cosmos or its representative or refer to the XP302ML's instruction manual.

1. Introduction

Thank you for purchasing the New Cosmos multi-gas detector XP-302M-R series. Prior to use, please read this instruction manual to ensure safe and reliable operation, and to prevent accidents. This gas detector can measure 3 or 4 gases, such as oxygen (O2), combustible gas (COMB), hydrogen sulfide (H2S) and carbon monoxide (CO) while simultaneously displaying all gas concentrations. If gas concentrations reach a preset level, the detector alerts the user via audible and visual alarms, thus helping prevent incidents such as low oxygen, gas poisoning and explosion.
Carefully read this manual regardless of your experience with gas detectors. Do not use the product for other than the intended purpose or in a manner not described in this manual.

Explosion-proof Requirements

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

Gas detector
Explosion proof: Ex ibd IIB T3 X
Power source: 3.0 VDC, 0.35 A (Panasonic alkalin battery, LR6, 1.5 V x 4 pcs)
2.5 VDC, 0.13A for combustible gas sensor
Operating temperature: -20 to 40ºC
Conditions of use

- Do not replace the batteries in a hazardous area.
- Only use the detector while installed in its dedicated carry case.
- Do not use the USB or AC adaptor in a hazadous area.
- To prevent accidents from electrostatic charges, wear anti-static clothing, conductive footwear (antistatic work shoes), and have a conductive work floor (resistance: 10M Ohm or less).
- Do not use this product for measuring the oxygen concentration other than in a mixture of air and conbustible gas, or in a mixture of vapor and toxic gas.

Optional alarm unit
Explosion proof: Ex ib IIB T3
Power source: 3.0 VDC, 0.2 A (Panasonic alkalin battery, LR6, 1.5 V x 2 pcs)
Operating temperature: -20 to 40ºC
Conditions of use

- Do not replace the batteries in a hazardous area.
- Only use the alarm unit while installed in its dedicated protective case.
- Do not use the USB or AC adaptor in a hazadous area.
- To prevent accidents from electrostatic charges, wear anti-static clothing, conductive footwear (antistatic work shoes), and have a conductive work floor (resistance: 10M Ohm or less).

1. Introduction

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

Carefully read this manual prior to use.
Follow the precautions below to ensure safe operation.

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

WARNING

- Zero adjustment (zeroing) starts automatically when the detector is turned on. Make sure to 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 any gas inlet and outlet. If blocked, accurate detection is not possible.
- Keep the filter elements at the drain filter clean and dry. If the filter elements are dirty or wet, proper gas detection is not possible.
- The recommended sensor replacement cycle is one year. After the one year period the sensor may fail to provide accurate detection.
- When the alarm unit detects an abnormality (e.g. not being connected with the detector), its green operation light flashes.
- When there is a communication error with the detector, the alarm unit repeatedly beeps twice for 5 minutes then ceases operation. When the battery is drained, the alarm unit gives a steady tone for 5 minutes then ceases operation.
- Do not block the speaker. If blocked, the audible alarm will be muffled.
- Only use the specified batteries to maintain the product's intrinsically safe characteristics (page 38 "Battery Replacement").
- This product is safety equipment. Perform a routine check before use (page 39 "Routine Check").

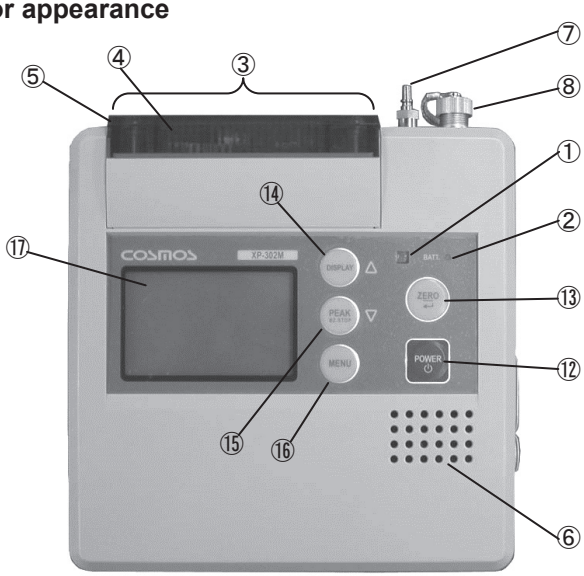
1. Introduction

⚠ CAUTION

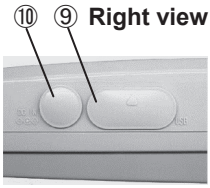
- If this product is to be unused for an extended period of time, the battery level must be checked periodically (monthly). Replace the batteries if the battery level is low. Failure to do so may cause them to leak, which will lead to product failure.
- This product is an intrinsically safe device (combustible gas sensor employs a flameproof enclosure). 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.
- Do not leave the product in high temperature and/or high humidity conditions for a long period of time. Doing so may impair the performance of the product.
- 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 sensors.
- 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 checked for abnormalities before use.
- This detector may detect gases or solvent vapors that are not target gases. Keep the environment you are using the detector in into consideration.
- Do not use the product in a place or near a place where silicone sealant/vapor may be present. Doing so may compromise the performance of the product.
- Detecting high concentrations of sulfur dioxide or chlorine may shorten the sensor life or increase errors.
- Because the oxygen sensor has pressure dependence. Make necessary pressure adjustments when using the detector at a place other than sea-level, such as at high altitude.
- Keep the detector away from wireless devices while in use. Failure to do so may cause a false alarm or fluctuations in the reading due to radio wave interference.
- The gas sensors contain harmful substances. For disposal, return them to New Cosmos or treat them as industrial waste.
- This product can be considered drip-proof when in its carry case. However, exposure to water splash is not recommended.

2. Unit Dimensions and Components

Exterior appearance

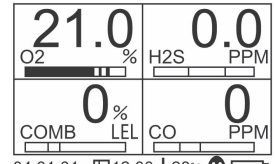
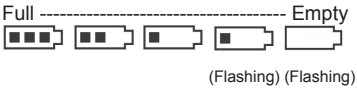


Rear view



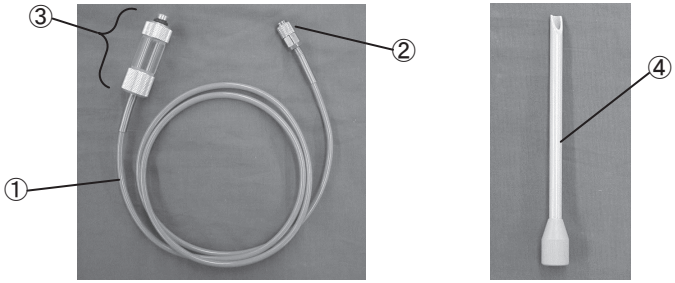
Item	Component	Description/Function
1	Light sensor	Turns on/off the LCD backlight depending on the ambient brightness. The backlight is lit while connected with an optional AC adaptor.
2	BATT. light	Flashes when the battery level is low.
3	Sensor unit	Houses up to four gas sensors. Combustible gas sensor employs a flameproof enclosure.
4	Alarm light	Flashes when a gas alarm activates.
5	Gas outlet	Discharges the sampled gas.
6	Speaker	Opening for audio.
7	Gas inlet	Connects a gas sampling tube.

2. Unit Dimensions and Components

Item	Component		Description/Function
8	Alarm unit connector with screw cap		Connects an optional alarm unit.
9	USB cover		Covers the USB cable port.
10	DC jack cover		Covers the DC jack.
11	Battery cover		For battery replacement.
12		POWER button	Turns the unit on/off.
13		ZERO button	Performs a zero adjustment.
		↵ button	Functions as “Enter” key when in the setting mode.
14		DISPLAY button	Switches the gas concentrations display format.
		▲ (Up) button	Selects item or increases the parameter value.
15		PEAK button	Activates/deactivates the peak hold function.
		BZ.STOP button	Mutes the alarm sound.
		▼ (Down) button	Selects item or decreases the parameter value.
16		MENU button	For settings.
17	LCD		Displays gas concentrations, parameter values, and status messages/icons.
	  When the AC adapter is connected, the plug icon is displayed		a. Battery level  When the AC adaptor is connected to the detector, battery level and plug icons are alternately displayed. b. Pump flow rate  c. Internal intake temperature Because the temperature sensor is installed inside the detector, the unit’s internal intake temperature is different from the ambient temperature. d. Time with clock icon e. Date

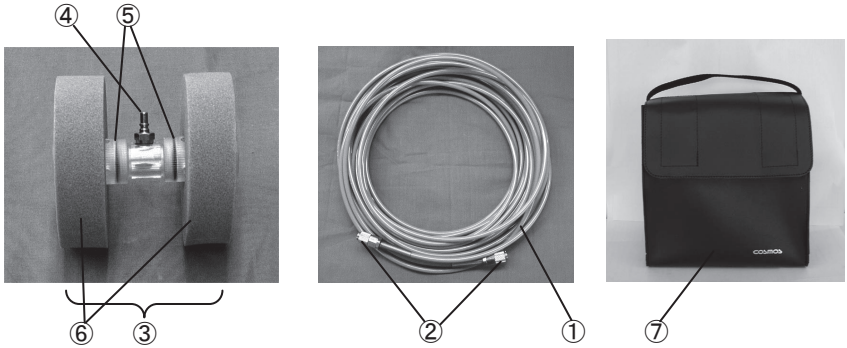
2. Unit Dimensions and Components

Gas sampling tube (1m)



Item	Component	Description/Function
1	Gas sampling tube (1m)	Conveys gas to the gas detector.
2	Coupler	Connects to the gas detector.
3	Drain filter	Prevents water and dust from entering the gas detector, and houses a filter element (FE-2).
4	Probe nozzle	Extension for the gas suction inlet.

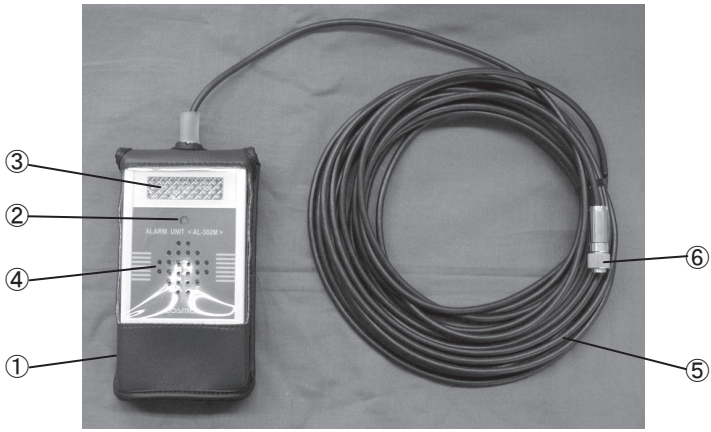
Gas sampling tube (8m)



Item	Component	Description/Function
1	Gas sampling tube (8m)	Conveys gas to the gas detector.
2	Coupler (2 places)	Connects to the gas detector and sampling float.
3	Sampling float	Assembly consists of items 4, 5, and 6.
4	Connection port	Connects to the gas sampling tube.
5	Drain filter (2 places)	Prevents water and dust from entering the gas detector, and houses a filter element (FE-2).
6	Float (2 places)	Prevents the gas sampling inlet ports from being submerged under water.
7	Storage case	Storage for gas sampling tube and sampling float.

2. Unit Dimensions and Components

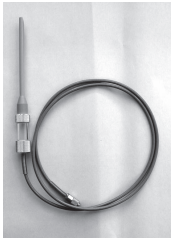
Optional alarm unit



Item	Component	Description/Function
1	Protective case	Houses the alarm unit.
2	Green operation light	Indicates the operation status of the alarm unit. Lit when the alarm unit is on. Flashing when a gas detector fault or a communication error is detected, or to notify a battery replacement is needed.
3	Red alarm light	Indicates the alarm status Flashing indicates gas alarm is present. Off indicates no gas alarm is present.
4	Speaker	Generates the following warning sounds: In the event of a gas alarm, - 1st stage gas alarm: Chirping. - 2nd stage gas alarm: Rapid chirping (louder siren) In the event of a device error alarm, - Gas detector fault/error detected: 2-repeating beeps till fault/error is cleared. - Communication error detected: 2-repeating beeps for 5 minutes. - Replace-battery notification: Pulse-beeps for 10 seconds. - Battery empty alarm: Steady tone for 5 minutes.
5	Communication cable (8m)	Connects the gas detector to the alarm unit.
6	Connector	Connects the communication cable to the gas detector.

3. Operation

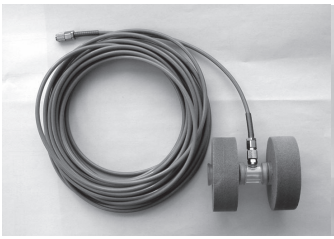
Carry Case Usage



Gas sampling tube (1m)

Gas sampling tube and probe nozzle can be stored in the pocket holder on the rear of the carry case.

The gas detector can be operated with the gas sampling tube spooled and stored inside the carry case and the drain filter affixed to the side of case.



Gas sampling tube (8m)

Storage case

Gas sampling tube (8m) can be stored in the storage case for transportation. It is possible to carry the storage case by looping its strap through the carry case's shoulder strap.

The gas detector can be held horizontally by looping the shoulder strap over the neck and adjusting the strap.

Optional alarm unit can also be stored in the storage case.

3. Operation

Preparation

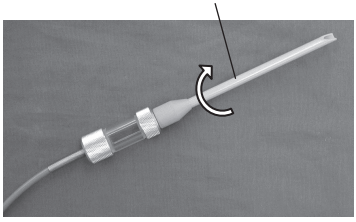
(Connecting gas sampling tube (1m/8m), alarm unit, and AC adaptor)

> ⚠ **WARNING** Firmly connect all connectors and tube to ensure proper gas detection.

■ Connect the gas sampling tube (1m)

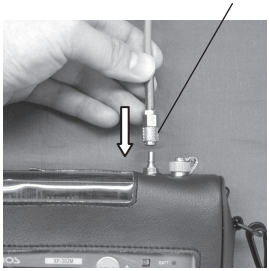
1. Screw the probe nozzle into the drain filter.
2. Press the gas sampling tube's coupler onto the gas detector's gas inlet until it clicks.
   To remove the coupler from the gas inlet, pull the sleeve up to unlock and release the coupler.

Screw in the probe nozzle to engage the drain filter threads.



Screw probe nozzle into drain filter

Sleeve

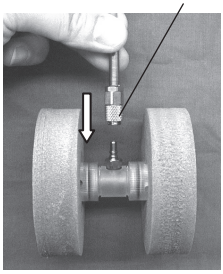


Press coupler onto gas inlet

■ Connect the gas sampling tube (8m)

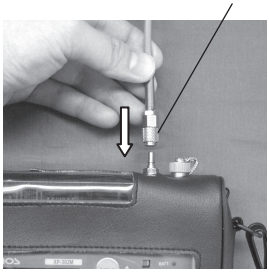
1. Press the gas sampling tube's coupler onto sampling float's connection port until it clicks.
2. Press the coupler at the other end of the gas sampling tube, onto the detector's gas inlet until it clicks.
   To remove the coupler from the detector's gas inlet or sampling float's connection port, pull the sleeve up to unlock and release the coupler.

Sleeve



Press coupler onto connection port

Sleeve



Press coupler onto gas inlet

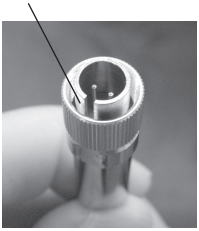
3. Operation

■ Connect the optional alarm unit

1. Install two batteries (page 38).
2. Rotate the screw cap counterclockwise to remove it from the alarm unit connector.
3. Align the communication cable's connector to the alarm unit connector. Rotate the sleeve clockwise to engage the threads, and tighten firmly.

Alarm unit connector with its cap

Groove in communication cable's connector

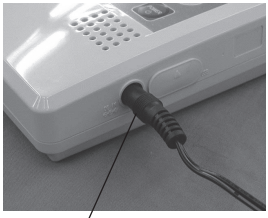


Sleeve

■ Connect the optional AC adaptor (in case of using 100 VAC, 50/60Hz power supply unit)

⚠ WARNING Do not use the AC adaptor in a hazardous area.

Remove the DC jack cover from the detector, and insert the AC adaptor plug. Plug in the AC adaptor to a wall outlet. (To use batteries, refer to page 38 for battery installation.)



AC adaptor plug

NOTE

- When operating the detector using only the AC adaptor (no batteries), the battery-full icon and plug icon are alternately displayed. When the detector is turned off then the AC adaptor is disconnected, the detector's internal clock will stop in about an hour. Install batteries as required.
- To prevent battery leakage, batteries need to be replaced with new ones when their level is low, even if an AC adaptor is connected.
- Do not connect/disconnect the AC adaptor plug to/from the detector while the detector is on. Switching power between batteries and AC adaptor needs to be done while the detector is off. Not doing so may turn off the detector.

3. Operation

Operation Procedure

WARNING Always perform a routine check (page 39) before use.

STEPS

Preparation | **1.** Power on ▶ Warm-up ▶ Gas concentrations screen | **2.** Detection | **3.** Power off

1. Power on -> Warm-up -> Gas concentrations screen

WARNING Zero adjustment (zeroing) starts automatically when the detector is turned on. Make sure to turn on the detector while its probe nozzle or sampling float is in clean air to prevent incorrect zero adjustment. Incorrect zero adjustment will cause inaccurate measurements to be displayed.

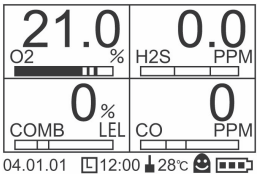
NOTE If an error message is displayed, refer to 4. “Notifications/Error Messages on Display” on page 34 for solution.

(1) Press and hold the POWER button for 2 seconds. The detector gives a two tone beep as it powers on.
(2) Message “Warming-up” is displayed on the LCD.
When the alarm unit is connected, communication will automatically start and the message “Alarm unit connected” will be displayed on the LCD.
(3) The detector gives a long beep within one minute, and the gas concentrations screen will be displayed.

2. Detection

The detector is ready for use when the gas concentrations screen is displayed.

→ Page 14 “Gas Concentrations Screen”
→ Page 15 “Gas Alarm”



Gas concentrations screen

⚠ WARNING If a reading exceeds the full scale value, move the detector to clean air area immediately. Continued use in contaminated air will lead to improper gas detection and/or may result in increased time for the reading to return to zero.

⚠ CAUTION A significant change in work environment (e.g. temperature or humidity change) may cause a zero drift (deviation from 0%LEL, 0ppm or 21.0vol%). To clear this, press and hold the ZERO button for two seconds to perform zero adjustment (zeroing) in clean air.

NOTE An activated carbon filter is installed inside the CO sensor for the purpose of removing alcohol or interference gases like H_2S. Replace it with a new one, as required (page 36).

3. Power off

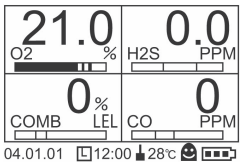
⚠ CAUTION
- Before turning off the detector, ensure that all the readings become zero in clean air by placing its probe nozzle and sampling tube in clean air.
- If the detector is exposed to a high humidity, operate the detector for more than 5 minutes in clean air, then turn off the detector.

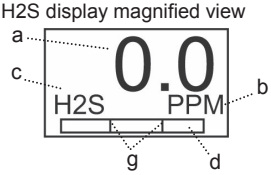
(1) Press and hold the POWER button.
(2) A countdown starts from “3”, “2”, and “1” being displayed in sequence along with a beep for each. After the detector gives off a long beep with “0” being displayed, the LCD will turn off then the detector will turn off.

Gas Concentrations Screen

This detector can simultaneously display three or four gas concentrations on its LCD. There are three display format options. Each press of the DISPLAY button will change the display format. From the display setting screen (page 30), it is possible to select the format of the first screen shown when the gas detector turns on.

Standard





Range displayed on bar graph
O2: 0-25vol%
H2S: 0-30ppm
COMB: 0-100%LEL
CO: 0-150ppm

a. Detected gas concentration

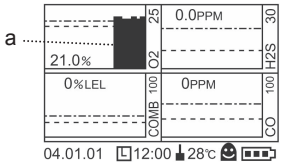
b. Unit of gas concentration (ppm, vol%, or %LEL)

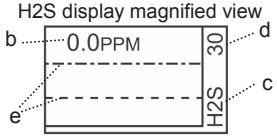
c. Gas type

d. Gas concentration on bar graph display

g. Left and right vertical lines represent low and high alarm set values respectively.

Trend graph





a. The highest concentration detected per minute (peak value per minute) is displayed. The last 54 peak values are displayed in trend graph.
For oxygen, the lowest concentrations are used as peak values.

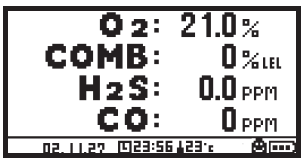
b. Gas concentration value and unit

c. Gas type

d. Full scale value

e. Upper and lower horizontal lines represent high and low alarm set values respectively.

Text



Gases in chemical symbol and their concentrations are displayed.

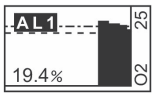
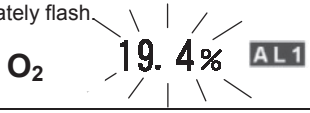
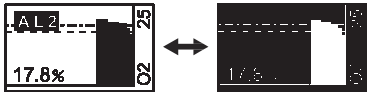
- When the gas concentration exceeds the service range,"— — —" and full scale value will be alternately displayed for gas concentration.
- If gas detection becomes impossible due to a sensor error, etc., the display for the sensor in question will be blacked out.

Gas Alarm

When the gas concentration exceeds the gas alarm set value, a gas alarm will activate. Detailed gas alarm operation is given in the table below. Refer to page 8 for the alarm unit's operation when an alarm is active. When the gas concentration falls below the gas alarm set value, the gas alarm will automatically deactivate (automatic reset). Press the BZ.STOP button for 0.5 seconds to mute the audio alarm. However, if a new alarm arises, the unit will start chirping.

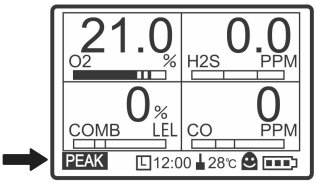
NOTE If the O2 concentration exceeds the higher limit or it falls below the lower limit, when the O2 mode is set to "High-Low" (page 26), the detector will skip the 1st stage alarm and perform as described for the 2nd stage alarm in the table below.

Typical oxygen gas alarm operation (1st stage gas alarm: 19.5% and 2nd stage gas alarm: 18.0%)

		LCD	Audio alarm	Red alarm light
1st stage alarm	Standard	"AL1" flashes 	Chirping	3 flashing LEDs synchronize to the audio alarm.
	Trend graph	"AL1" flashes 		
	Text	"AL1" and "concentration value" alternately flash. 		
2nd stage alarm	Standard	"AL2" and the display alternately flash 	Rapid chirping (louder siren)	
	Trend graph	"AL2" and the display alternately flash 		
	Text	"AL2" and the display alternately flash 		

Peak Hold

Once the peak hold function is activated, the new peak value will be updated and maintained on the LCD even if the actual gas concentration falls below that value. For combustible gas (COMB), hydrogen sulfide (H2S) and carbon monoxide (CO), the highest marked concentration will be maintained as its peak value. For oxygen (O2), the lowest marked concentration will be maintained as its peak value by default.

Activate peak hold	Press the PEAK button for more than 3 seconds.	Flashing "PEAK" icon will replace the date at the bottom left of the LCD. The peak values will be displayed.  Gas concentrations screen
Deactivate peak hold	Press the PEAK button for more than 2 seconds.	Returns to the normal gas concentrations screen and the peak values will be cleared.

NOTE The peak hold function will be canceled each time the unit is turned off.

Automatic Backlight and Backlight Timeout

- Automatic backlight

  The LCD backlight is turned on/off depending on ambient light.

- Backlight timeout

  The LCD backlight will automatically turn off when it times out or in bright light. Refer to page 30 for the backlight timeout setting procedure.

Settable time	Description
[———] minutes	Backlight remains on until in bright light.
0 to 10 min. 5-min.increments (e.g. 5 min. 10 min.)	Backlight will turn off when the preset time (minutes) passes.
10 to 60 min. 10-min.increments (e.g. 20 min. 30 min. ….60 min.)	
60 to 600 min. 30-min.increments (e.g. 90 min. 120 min…..600 min)	

NOTE The LCD backlight is lit while connected with an optional AC adaptor.

Functions and Settings

The MENU screen allows the user to set or activate functions.
To access the MENU screen, press the MENU button.

Menu screen

Item	Function and setting details		Reference
Alarm Test	Operation test for alarm light and audio alarm. Additionally, the alarm volume can be adjusted.		Page 18
Data logging	Logging of detection data (date and time, gas concentration and temperature) at a preset interval. This mode allows the following operations. • Start data logging • Stop data logging • Clear log data • Change logging interval		Pages 19-23
Settings	Alarm set values (*)	Set the alarm set values of the target gases.	Page 24
	Clock setting	Set the time and date.	Page 25
	O2 mode setting (*)	Select the mode for oxygen gas alarm and peak hold.	Page 26
	Span adjustment (*)	Incorrect span adjustment will make accurate gas detection impossible, leading to a dangerous situation. Span adjustment must be performed by an authorized safety manager only. Request us for span adjustment.	N/A
	Volume/Mute	Adjust the alarm volume and operation tone. Set the mute mode to on/off.	Pages 27-28
	LCD contrast	Adjust the display contrast.	Page 29
	Display	Switch the language (English or Japanese). Select the gas concentrations display format. Set the backlight timeout.	Page 30
	Safety lock	Lock the three items marked with (*) to prevent changes from unauthorized access personnel. Must be unlocked to make changes on them. Locked by default.	Pages 31-33

Functions and Settings: Alarm Test

(1) Press the MENU button to access the MENU screen.

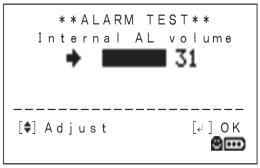
(2) “Alarm test” is selected. Press the ↵ button to confirm the selection.

Menu screen

(3) The ALARM TEST screen is displayed. The light and audio alarm start flashing and chirping.

NOTE

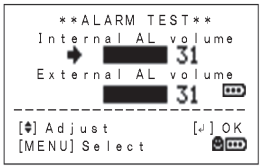
If the mute mode is active, the unit will prompt “Mute mode is active. Exit Mute mode?” To continue the alarm test, select “Yes” by pressing the ↵ button. The light and audio alarm start flashing and chirping.



Alarm test screen

When the alarm unit is connected

Press the MENU button to select “External AL volume”. Alarm sound will be produced only by the alarm unit.



Alarm test screen when alarm unit is connected

(4) Press the ▲ or ▼ button to adjust the alarm volume.

WARNING Volume adjustments made here are applied to audio gas alarm.

(5) Press the ↵ button to end the alarm test. The screen will return to the gas concentrations screen.

Functions and Settings: Data Logging

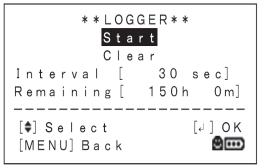
(1) Press the MENU button to access the MENU screen.

(2) Press the ▲ or ▼ button to select “Data logging”. Press the ↵ button to confirm the selection.

Menu screen

(3) The LOGGER screen will be displayed. Press the ▲ or ▼ button to select the desired item. Press the ↵ button to confirm the selection.

Item	Description
Start	Start data logging (page 20)
Stop (not selectable)	Stop data logging (page 21)
Clear	Delete log data (page 22)
Interval	Set the interval between logs (page 23)



Logger screen

WARNING Do not connect/disconnect the USB cable to/from the detector in a hazardous area.

NOTE

When using the product for the first time
Format to clear all data logs (page 22).
Data logging is not available when flashing “00.01.01L00:00” is displayed or the clock is stopped. Set the clock (page 25).

NOTE

To read logs, a personal commuter (page 1) and an XP302ML data logger kit (optional) are necessary. All logs are CSV files which can be opened by spreadsheet software (e.g. MS® Excel).

■ Start data logging

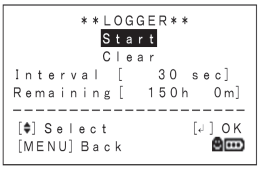
(1) Go to the LOGGER screen by taking steps (1) and (2) on page 19.

NOTE

Start – Value is instantly logged at every set interval.

Interval – Logging interval. To change the logging interval, refer to page 23.

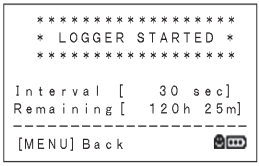
Remaining – Time left for data logging. Data logging will automatically stop when timer reaches zero.



Logger screen

(2) “Start” is highlighted (selected). Press the ↵ button to confirm the selection.

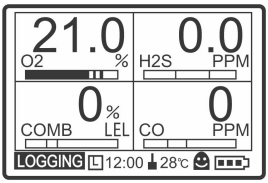
(3) Message “LOGGER STARTED” will be displayed indicating that data logging has begun.



Logger started screen

(4) Press the MENU button to return to the gas concentrations screen.

While data logging is in progress, the flashing “LOGGING” icon replaces the date at the bottom left of the LCD.



Gas concentrations screen

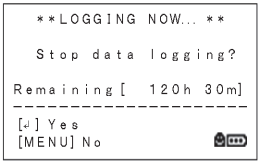
NOTE

Refer to 4. “Notifications/Error Messages on Display” (page 34), if one of the following messages is displayed on the LCD.

At start of data logging:
“Cannot start data logging. Set the clock.”
Displayed while data logging is in progress:
“**LOGGER STOPPED** Memory full. Data logging stopped”,
“**LOGGER STOPPED** Memory fail. Data logging stopped”

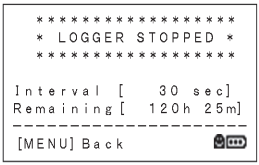
■ Stop data logging

(1) Go to the LOGGING NOW screen by taking steps (1) and (2) on page 19.



Logging now screen

(2) Press the ↵ button. The data logging in progress will stop and the message “LOGGER STOPPED” will be displayed.



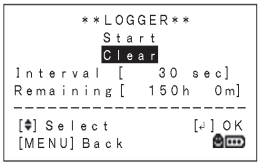
Logger stopped screen

(3) Press the MENU button to return to the gas concentrations screen.

■ Clear log data

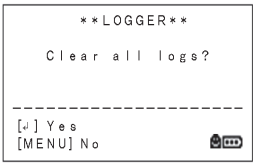
(1) Go to the LOGGER screen by taking steps (1) and (2) on page 19.

(2) Press the ▲ or ▼ button to select “Clear”. Press the ↵ button to confirm the selection.



Logger screen

(3) You will be prompted “Clear all logs?”

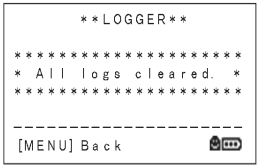


Clear all logs screen

(4) Press the ↵ button to clear all the logs. After all logs have been cleared, the message “All logs cleared” will be displayed.

NOTE

Before clearing!
Because the logs will be deleted, save them in your personal computer by using XP302ML data logger kit as needed.



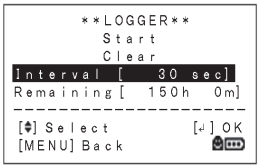
All log cleared screen

(5) Press the MENU button to return to the gas concentrations screen.

■ Change logging interval

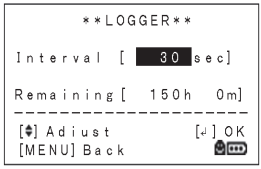
(1) Go to the LOGGER screen by taking steps (1) and (2) on page 19.

(2) Press the ▲ or ▼ button to select “Interval”. Press the ↵ button to confirm the selection.



Logger screen

(3) The screen for setting the logging interval will be displayed. Press the ▲ or ▼ button to change the interval parameters.
“Remaining” is the time left for logging time. If the interval is set to 30 sec., the remaining time is up to 150 hours, and if set to 300 sec., the remaining time is up to 1,500 hours.



Logging interval screen

Settable data logging interval increments	
0.5 sec.	
1 sec. to 10 sec. :	every 1 sec.
10 sec. to 60 sec. :	every 10 sec.
60 sec. to 600 sec. :	every 60 sec.
600 sec. to 3,600 sec. :	every 600 sec.

(4) Press the ↵ button to confirm the setting. The screen will return to the gas concentrations screen.

Functions and Settings: Alarm Set Values

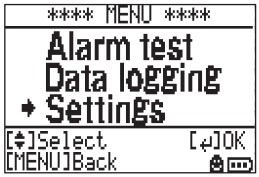
Before changing the alarm set values, the safety lock needs to be deactivated (page 32).

WARNING Alarm set values are very important for gas detection. Any changes to them must be performed by an authorized safety manager. Once completed, confirm that all the set values are correct.

NOTE Alarm set values screen always displays four settable gas types. In 3 gas models, 4 gases are displayed, the 4th gas is settable but not functional, and any changes to set values for the 4th gas are invalid.

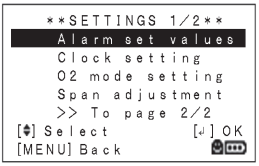
(1) Press the MENU button to access the MENU screen.

(2) Press the ▲ or ▼ button to select “Settings”. Press the ↵ button to confirm the selection.



Menu screen

(3) The SETTINGS 1/2 screen will be displayed with “Alarm set values” highlighted (selected). Press the ↵ button to confirm the selection.

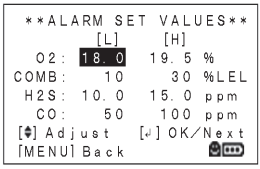


Settings 1/2 screen

(4) The alarm set values screen will be displayed. Press the ↵ button to select the parameter you want to change.

(5) Increase or decrease the parameter value by pressing the ▲ or ▼ button. Holding the button will continuously increase/decrease the parameter.

Settable range
O2: 18-25vol% COMB: 5-60%LEL
H2S: 1.5-30ppm CO: 15-150ppm



Alarm set values screen

(6) Press the ↵ button to confirm the change, and move the cursor to the next item.

(7) Press the MENU button to return to the gas concentrations screen.

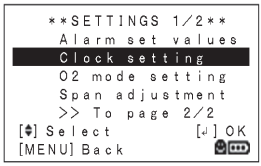
Functions and Settings: Clock

(1) Press the MENU button to access the MENU screen.

(2) Press the ▲ or ▼ button to select “Settings”.
Press the ↵ button to confirm the selection.

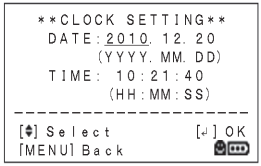
Menu screen

(3) The SETTINGS 1/2 screen will be displayed. Press the ▲ or ▼ button to select “Clock setting”.
Press the ↵ button to confirm the selection.



Settings 1/2 screen

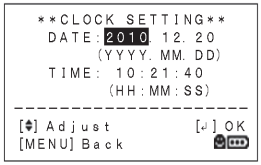
(4) The CLOCK SETTING screen will be displayed. Press the ▲or ▼ button to select the parameter you want to change. Press the ↵ button to confirm the selection. The selected item is highlighted black.



Clock setting screen

(5) Increase or decrease the parameter value by pressing the ▲ or ▼ button.

(6) Press the ↵ button to confirm the change.



Clock setting screen

(7) Press the MENU button to return to the gas concentrations screen.

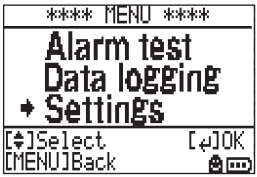
Functions and Settings: O2 Mode Setting

Before changing the O2 mode, the safety lock needs to be deactivated (page 32).

WARNING O2 mode setting must be performed by an authorized safety manager. Set the O2 mode to “Low-Low ↓ Peak” to monitor oxygen deficiency.

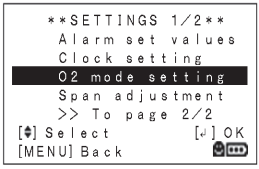
(1) Press the MENU button to access the MENU screen.

(2) Press the ▲ or ▼ button to select “Settings”. Press the ↵ button to confirm the selection.



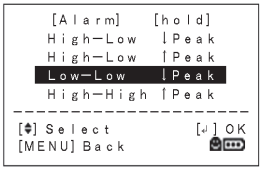
Menu screen

(3) The SETTINGS 1/2 screen will be displayed. Press the ▲ or ▼ button to select “O2 mode setting”. Press the ↵ button to confirm the selection.



Settings 1/2 screen

(4) The O2 mode setting screen will be displayed. Press the ▲ or ▼ button to select the desired O2 mode.



O2 mode setting screen

O2 mode	Alarm setting	Peak hold
High-Low ↓Peak	1st stage gas alarm: Low concentration alarm 2nd stage gas alarm: High concentration alarm	Lowest value is maintained
High-Low ↑ Peak	1st stage gas alarm: Low concentration alarm 2nd stage gas alarm: High concentration alarm	Highest value is maintained
Low-Low ↓ Peak	1st stage gas alarm: Low concentration alarm 2nd stage gas alarm: Low concentration alarm	Lowest value is maintained
High-High ↑ Peak	1st stage gas alarm: High concentration alarm 2nd stage gas alarm: High concentration alarm	Highest value is maintained

(5) Press the ↵ button to confirm the selection. The screen will return to the ALARM SET VALUES screen.

Functions and Settings: Volume/Mute

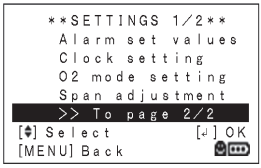
WARNING The volume level for the audio alarm must be changed by an authorized safety manager only. After changing the volume setting, perform an alarm test for confirmation.

(1) Press the MENU button to access the MENU screen.

(2) Press the ▲ or ▼ button to select “Settings”. Press the ↵ button to confirm the selection.

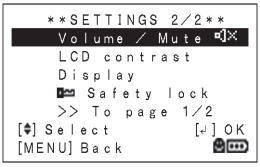
Menu screen

(3) The SETTINGS 1/2 screen will be displayed. Press the ▲ or ▼ button to select “To page 2/2”. Press the ↵ button to confirm the selection.



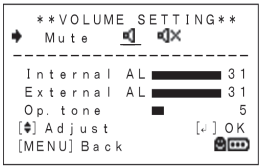
Settings 1/2 screen

(4) The SETTINGS 2/2 screen will be displayed with “Volume/Mute” highlighted (selected). Press the ↵ button to confirm the selection.



Settings 2/2 screen

(5) The VOLUME SETTING screen will be displayed. Press the ▲ or ▼ button to select the item you want to change. Press the ↵ button to confirm the selection.



Volume setting screen

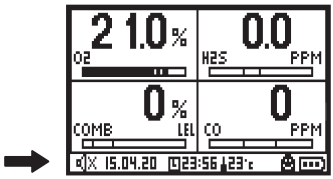
Item	Setting details
Mute	Turns on/off the mute mode. All sounds are muted while this mode is active. Mute mode is inactive Mute mode is active.
Internal AL	Adjusts the gas detector's alarm volume during a gas alarm.
External AL	Adjusts the alarm unit's alarm volume during a gas alarm.
Op. tone (Operation tone)	Adjusts button operation volume and the audio signal when an error message is displayed.

Mute mode: The speaker icon is underlined depending on which mode is active.
Internal AL, External AL and Op. tone: The corresponding graph bar is in **bold** while selected.

(6) Press the ▲ or ▼ button to adjust the alarm volume, or turn on/off the mute mode.

(7) Press the ↵ button to confirm the change.

(8) Press the MENU button to return to the gas concentrations screen.
When the mute mode is active, the icon flashes in the bottom left corner of the screen.



Gas concentrations screen

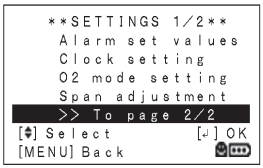
Functions and Settings: LCD Contrast

(1) Press the MENU button to access the MENU screen.

(2) Press the ▲ or ▼ button to select “Settings”. Press the ↵ button to confirm the selection.

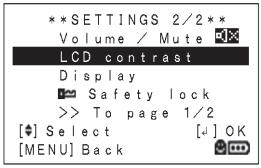
Menu screen

(3) The SETTINGS 1/2 screen will be displayed. Press the ▲ or ▼ button to select “To page 2/2”. Press the ↵ button to confirm the selection.



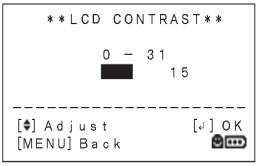
Settings 1/2 screen

(4) The SETTINGS 2/2 screen will be displayed. Press the ▲ or ▼ button to select “LCD contrast”. Press the ↵ button to confirm the selection.



Settings 2/2 screen

(5) The LCD CONTRAST screen will be displayed. Press the ▲ or ▼ button to adjust the LCD contrast. Press the ↵ button to confirm the adjustment.



LCD contrast screen

(6) Press the ↵ button for confirmation. The screen will return to the gas concentrations screen.

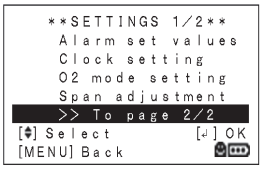
Functions and Settings: Display

(1) Press the MENU button to access the MENU screen.

(2) Press the ▲ or ▼ button to select “Settings”. Press the ↵ button to confirm the selection.

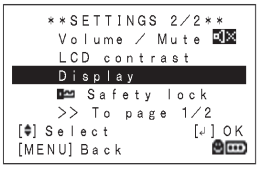
Menu screen

(3) The SETTINGS 1/2 screen will be displayed. Press the ▲ or ▼ button to select “To page 2/2”. Press the ↵ button to confirm the selection.



Settings 1/2 screen

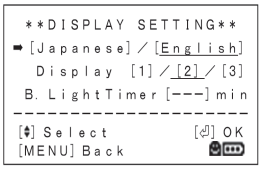
(4) The SETTINGS 2/2 screen will be displayed. Press the ▲ or ▼ button to select “Display”. Press the ↵ button to confirm the selection.



Settings 2/2 screen

(5) The DISPLAY SETTING screen will be displayed. Press the ▲ or ▼ button to select the item you want to change. Press the ↵ button to confirm the selection.

Refer to page 16 for more information on the backlight timeout.



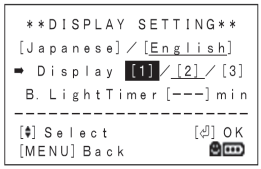
Display setting screen

Display setting

Item	Description
Japanese/English	Selects the language between Japanese and English.
Display [1]/ [2]/ [3]	Selects the gas concentrations display format: 1: Standard display 2: Text display 3: Trend graph display
B.LightTimer	Sets the backlight timeout.

(6) Press the ▲ or ▼ button to change the setting.

(7) Press the ↵ button for confirmation. Press the MENU button to return to the gas concentrations screen.



Display setting screen

Functions and Settings: Safety Lock

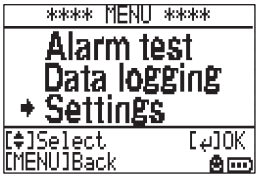
WARNING The safety lock is very important. Unlocking must only be done by an authorized safety manager.

It is possible to lock the following three functions (alarm set values, O2 mode setting, and span adjustment) by activating the safety lock. Once locked, these functions cannot be adjusted. To change these settings, it is necessary to deactivate the safety lock.

■ Activate the safety lock

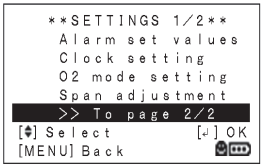
(1) Press the MENU button to access the MENU screen.

(2) Press the ▲ or ▼ button to select “Settings”. Press the ↵ button to confirm the selection.



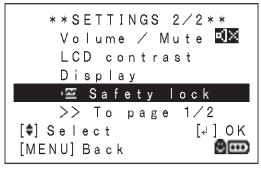
Menu screen

(3) The SETTINGS 1/2 screen will be displayed. Press the ▲ or ▼ button to select “To page 2/2”. Press the ↵ button to confirm the selection.



Settings 1/2 screen

(4) The SETTINGS 2/2 screen will be displayed. Press the ▲ or ▼ button to select “Safety lock”. Press the ↵ button to confirm the selection.



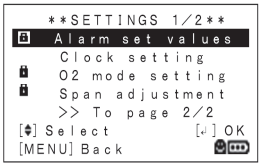
Settings 2/2 screen

(5) Press the ▲ or ▼ button to select “Lock”.

Unlock selected

Lock selected

(6) Press the ↵ button for confirmation. The safety lock will activate (locked) and the lock icons will appear to the left of the three locked functions.
Pressing the MENU button instead of the ↵ button returns the screen to the gas concentrations screen with the lock remaining inactive (unlocked).



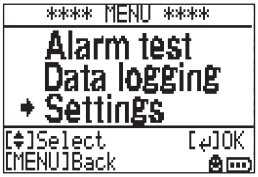
Safety lock activated (Locked)

(7) Press the MENU button to return to the gas concentrations screen.

■ Deactivate the safety lock

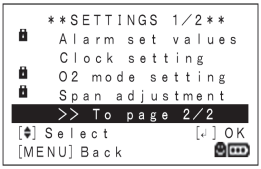
(1) Press the MENU button to access the MENU screen.

(2) Press the ▲ or ▼ button to select “Settings”. Press the ↵ button to confirm the selection.



Menu screen

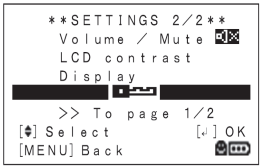
(3) The SETTINGS 1/2 screen will be displayed. Press the ▲ or ▼ button to select “To page 2/2”. Press the ↵ button to confirm the selection.



Settings 1/2 screen

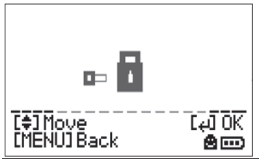
(4) The SETTINGS 2/2 screen will be displayed. Press the ▲ or ▼ button to select the key icon. Press the ↵ button to confirm the selection.

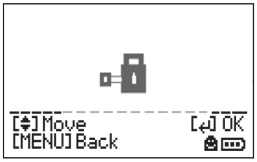
This key icon is invisible while the safety lock is active (locked). Press the ▲ or ▼ button to select it, key icon will become visible.



Settings 2/2 screen

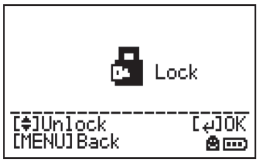
(5) Press the ▲ or▼ button a few times to move the key closer to the keyhole. When the key reaches the keyhole, press the ↵ button for confirmation.



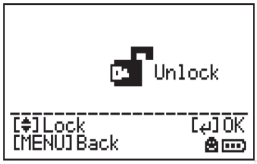


Key reaches the keyhole

(6) Press the ▲ or ▼ button to select “Unlock”.

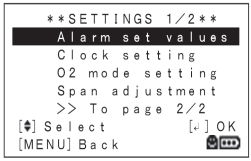


Safety lock activated (Locked)



Safety lock deactivated (Unlocked)

(7) Press the ↵ button for confirmation. The safety lock will deactivate and the lock icons will disappear. Pressing the MENU button instead of the ↵ button returns the screen to the gas concentrations screen with the lock remaining active (locked).



Safety lock deactivated (Unlocked)

(8) Press the MENU button to return to the gas concentrations screen.

4. Notifications/Error Messages on Display

If an error is detected, the corresponding notification/error message will be displayed on the LCD accompanied by beeping. The table below lists major notifications and messages. If a notification or error message is displayed on the LCD, follow the instruction displayed.
(Refer to page 8 for the optional alarm unit's operation in the event of an error.)
If no notification/error message is displayed but buttons or display do not function, remove the batteries, reinstall them, and power cycle the unit. If normal operation does not resume, contact New Cosmos or your New Cosmos representative for repair.

● Notifications

Notification on display	Solution
O2 sensor life expired. Replace O2 sensor.	The oxygen sensor's life has expired. If the sensor is continued to be used, improper gas detection will result. Immediately call for sensor replacement.
LOGGER STOPPED Memory full. Data logging stopped.	Log memory is full. Use an XP302ML data logger kit (sold separately) to save the log data in a pc. Refer to page 22 for log clearance procedure. Once all logs are cleared, data logging can be resumed.
LOGGER Cannot start data logging. Set the clock.	Because the clock has stopped, data logging cannot start. Adjust the clock (page 25), then restart data logging.

● Error messages

Error message on display	Solution
Zero Adj. Fail	Operate the detector in clean air for approx.10 minutes, then press the ZERO button for 2 seconds for zero adjustment. If the unit does not reset to normal, power cycle the unit. If normal operation does not resume, contact us for repair.
** [E10] ** SENSOR ERROR	
** [E01] ** RTC ERROR	RTC (Clock IC) fails. Contact us for repair.
SENSOR ERROR Operate using remaining active sensors?	- Pressing the ZERO button for 2 seconds starts zero adjustment on the active sensors. When the zero adjustment is completed, the screen returns to the gas concentrations screen. - Pressing the MENU button returns to gas monitoring mode while keeping sensor error. Keep operating the unit in clean air for approx.10 minutes. If the unit does not return to normal, power cycle the unit. If normal operation does not resume, contact us for repair.
Pump stopped. Low flow rate Check sampling tube and filters.	Possible twisted/bent gas sampling tube, water intake, or probe nozzle tip blockage. Remove any water from inside the unit (page 35). Remove the cause (straighten the tube, remove water, and remove any blockage in the nozzle tip). Press the ZERO button for 2 seconds to reset the unit. If the unit does not reset to normal or water is present in the gas sampling tube or gas detector, contact us for repair.
LOGGER STOPPED Memory fail. Data logging stopped.	Abnormality with the log memory is detected. All the logs need to be cleared (formatting) before use after delivery (page22). Clear all log data. If normal operation does not resume, contact us for repair.

5. Consumable Replacement

Filter Element Replacement

Replace the filter elements with new ones if they are dirty or wet. If water is present inside the drain filter or filter case, remove the water and clean the drain filter or filter case.

⚠ WARNING If water enters the gas sampling tube or gas detector, proper gas detection is not possible. Contact us for repair.

NOTE Do not to damage or strike the filter elements with a finger etc. Damaged filters may impair their waterproof performance.

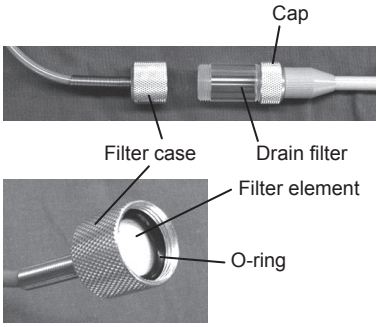
■ When using the gas sampling tube (1m)

(1) Remove the filter case from the drain filter.

(2) Remove the O-ring from the filter case by using a small screwdriver, etc.

(3) Replace the filter element with a new one. Install the filter case to the drain filter.

If required, remove the cap from the probe nozzle side and clean and dry the inside of the drain filter and the cap with a dry cloth.



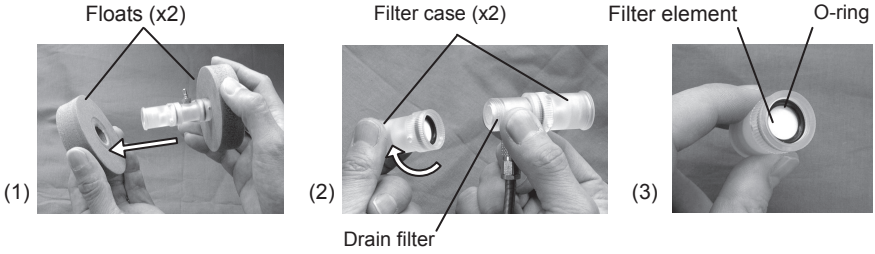
■ When using the gas sampling tube (8m)

(1) Pull and remove the two floats from the drain filter.

(2) Rotate the filter case (2 places) counterclockwise to separate it from the drain filter.

(3) Remove the O-ring from each filter case by using a small screwdriver, etc. If water is present inside the case, remove it with a dry cloth, etc.

(4) Replace each filter element (2 places) with a new one. Reassemble the floats and drain filter.



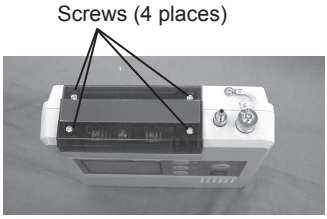
Activated Carbon Filter Replacement

WARNING Do not replace the activated carbon filter in a hazardous area.

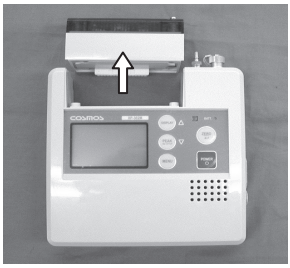
NOTE An activated carbon filter is installed inside the CO sensor for the purpose of removing alcohol or interference gases like H2S. Replace it with a new one, as required.

(1) Turn off the gas detector.

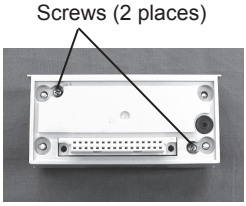
(2) Loosen the four screws from the sensor unit.



(3) Pull and remove the sensor unit from the detector.



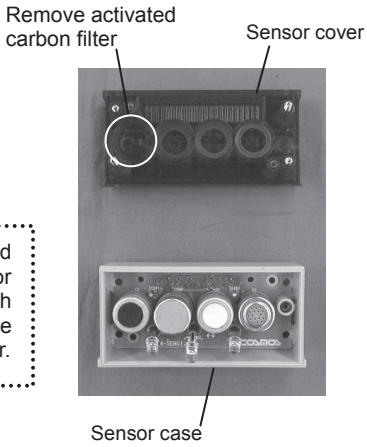
(4) Loosen the two screws from the bottom of the sensor unit.



(5) Place the sensor unit with the sensor cover (red) facing down. Pull to separate the sensor case from the sensor cover.

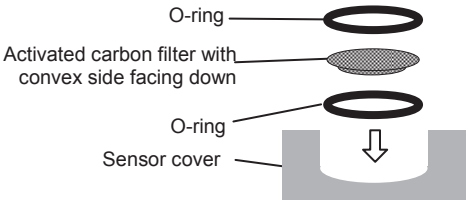
(6) Remove the activated carbon filter and two O-rings from the sensor cover.

(7) Replace the activated carbon filter with a new one. Install the new activated carbon filter and the two O-rings in the order shown in the drawing below. Place the activated carbon filter convex side facing down.

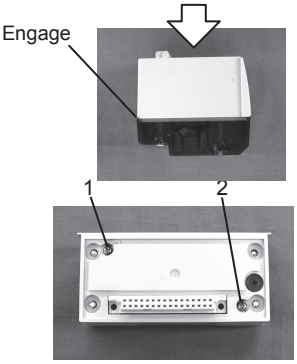


NOTE

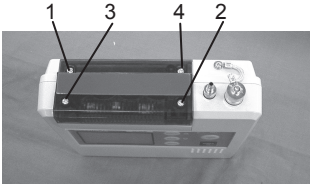
Activated carbon filter is fragile and easily crumbles. Do not push or poke the filter into place (e.g. with finger, pen). Doing so may cause deformation or breakage of the filter.



(8) Align the sensor case in the sensor cover. Tighten the two screws alternately and evenly to secure the sensor case to the sensor cover.



(9) Insert the sensor unit in the gas detector. Slowly and evenly tighten the four screws in “X” pattern in the order shown in the photo to the right.



5. Consumable Replacement

Battery Replacement

When the battery level becomes low, the BATT. light flashes and the gas detector beeps. If battery level drops further and nears empty, the “Battery empty” message is displayed then the gas detector automatically turns off. When the battery level is low, replacement is recommended before they become empty.

WARNING Do not replace the batteries in a hazardous area.

NOTE

Replacement batteries should be exactly the same.
Replace all four batteries at the same time.

(1) Rotate the battery cover lock’s handle on the rear to the ”FREE” position.
(2) Remove the battery cover from the unit. Replace all four batteries with new ones (alkaline AA batteries). Battery orientation is marked inside the battery compartment.
(3) Affix the battery cover in place. Rotate the battery cover lock’s handle to the “LOCK” position. Confirm that the batter cover is firmly closed.

Battery cover lock’s handle Battery cover

Battery Replacement for Optional Alarm Unit

When the battery level becomes low, the green operation light flashes and the alarm unit beeps for 10 seconds. When the battery is low, replacement is recommended before they become empty. As the battery level nears empty, the “Alarm Unit, Battery empty” message is displayed on the detector’s LCD, the alarm unit gives a steady tone for 5 minutes, then the green operation light turns off along with the unit.

WARNING Do not replace the batteries in a hazardous area.

NOTE

Replacement batteries should be exactly the same.
Replace both batteries at the same time.

(1) Remove the protective case from the alarm unit.
(2) Loosen the screw on the back of the alarm unit. Remove the battery cover from the unit.
(3) Replace the two batteries with new ones (alkaline AA batteries) in the correct orientation marked inside the battery compartment.
(4) Affix the battery cover in place. Tighten the screw. Install the alarm unit in the protective case.

Screw Battery cover

Battery cover removed

6. Maintenance

This product is precision equipment. The periodic maintenance below is essential to maintain the detector's 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 detector, or use in the conditions outside its Specifications (pages 43 to 45), such as detecting gas concentration exceeding the specified range, or use in temperature/humidity exceeding the specified range, please contact us for inspection (fees apply). Providing a description of the current situation would be appreciated when you contact.

⚠ WARNING The recommended sensor unit replacement cycle is one year. The sensors may fail to provide accurate detection after one year, and should be replaced.

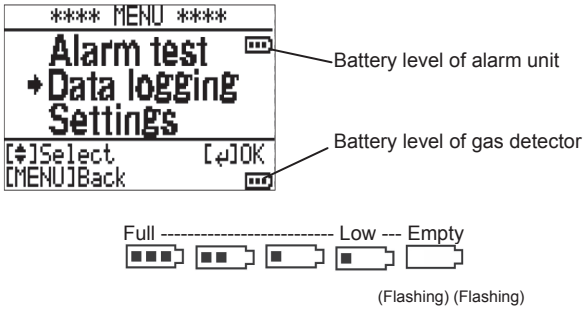
Routine Check

Always perform the following routine check prior to use.

Please contact us for inspection (fees apply) if abnormality is observed.

Check item	Description
Alarm function	Check that the alarm light and audio alarm work properly. (Page 18 "Alarm Test").
Gas sampling tube	Check the gas sampling tube for cracks, bends, or pin holes. Check the gas sampling tube is firmly connected.
Drain filter and filter case when using 1m gas sampling tube	Check that the filter element is clean and dry. Replace the element with a new one if it is dirty or wet. Check that water is not present inside the drain filter, filter case and cap. If water is present, remove it and make sure that the drain filter, filter case and cap are completely dried and cleaned. (Page 35)
Drain filter and filter case when using 8m gas sampling tube	Check that the filter elements (2 places) are clean and dry. Replace the elements with new ones if they are dirty or wet. Check that water is not present inside the drain filter and filter cases (2 places) If water is present, remove it and make sure that drain filter and filter cases are completely dried and cleaned. (Page 35)

6. Maintenance

Check item	Description
Battery level	Check the battery levels of the gas detector and optional alarm unit. The battery level of the gas detector is always displayed at the bottom right corner. To check the battery level of the alarm unit, press the MENU button to access the MENU screen. It will be displayed on the top right of the screen.  If the battery level is low, replace the batteries with new ones. (Page 38)
Date and time	If the date and time is incorrect, adjust it. (Page 25)

Annual/Semiannual Inspection

- Contact New Cosmos or your New Cosmos representative to perform a gas inspection at least once every six months.
- Contact New Cosmos or your New Cosmos representative to perform a periodic inspection at least once a year, including sensor unit replacement.

Spare Parts

Part Name	Part No./Model	Description
Filter element	FE-2	Filter element for drain filter or sampling float x 10 pcs
Activated carbon filter	FE-114	Filter for CO sensor use with 2 O-rings each x 2 pcs
Sensor unit	SU-302M-A/B/C	A/B/C denotes the target gases. A: Oxygen (O2), combustible gas (COMB), hydrogen sulfide (H2S), and carbon monoxide (CO) B: Oxygen (O2), combustible gas (COMB), and hydrogen sulfide (H2S) C: Oxygen (O2), combustible gas (COMB), and carbon monoxide (CO) Note: The combustible gas sensor employs a flameproof enclosure.

7. Troubleshooting

Before requesting repair, please refer to the table below.
If the detector fails to operate, remove the batteries and install them again. Wait a few minutes then turn on the detector.

■ Gas detector

Problem	Cause	Steps	Reference
Pressing the POWER button does not turn on the power.	Battery orientation incorrect.	Remove the batteries and correctly reinstall them.	Battery Replacement Page 38
	Battery depleted.	Replace the batteries.	
BATT. light flashes and the detector pulse beeps. (Replace-battery notification)	Battery low.	Replace the batteries.	
Message “Battery empty” displayed.	Battery depleted.	Replace the batteries.	
No audio.	Unit in Mute mode.	Cancel the mute mode.	Volume/Mute Page 27
	Volume level is set to “0”.	Set the volume level to “1” or larger.	
Cannot detect gas.	Gas sampling tube damaged.	Replace the gas sampling tube.	
	Loose connection.	Disconnect the gas sampling tube and reconnect.	Preparation Pages 10-11
Error message displayed.	Refer to error message table on page 34, and take action accordingly.		

■ Alarm unit

Problem	Cause	Steps	Reference
Connecting the alarm unit to the gas detector and pressing the gas detector’s POWER button does not turn on the green operation light.	Battery orientation incorrect.	Remove the batteries and correctly reinstall them.	Battery Replacement Page 38
	Battery depleted.	Replace the batteries.	
Unit pulse beeps for 10 seconds and the green operation light flashes.	Battery low.	Replace the batteries.	
Unit gives a steady tone for 5 minutes then the green operation light turns off.	Battery depleted.		
Unit repeatedly beeps twice for 5 minutes and the green operation light flashes.	Communication error.	Check for loose connectors. Check for a broken wire in the relay and communication cables.	
	Gas detector’s battery depleted.	Replace the gas detector batteries.	Battery Replacement Page 38
Unit repeatedly beeps twice and the green operation light flashes.	Gas detector fault/ error.	Check the message displayed on the gas detector and take action accordingly.	
No audio.	Volume level is set to “0”.	Set the volume level to “1” or larger.	Volume/Mute Page 27

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.

1. 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.

2. 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.

● Maintenance Check

This product is a precision instrument. Perform daily inspections, and contact us for a periodical inspection at least once a year to ensure safe operation and proper performance of the product.

If you have any questions about daily inspections, please feel free to contact us. Periodic checks will be carried out according to the maintenance service contract. For repair service, please contact us (shipping charge will apply).

9. Specifications

■ Gas detector

Model	XP-302M-R			
Target gas	Combustible gas	Oxygen	Hydrogen sulfide	Carbon monoxide
Detection principle	Catalytic	Galvanic cell	Electrochemical	Electrochemical
Gas sampling method	Suction			
Detection range (Service range)	0-100%LEL (101-110%LEL)	0-25vol% (25.1-50vol%)	0-30ppm (30.1-150ppm)	0-150ppm (151-300ppm)
Reading accuracy*1 (service range excluded)	Within ±5%LEL	Within ±0.5vol%	Within ±1.5ppm	≦100ppm: Within ±10ppm 101-150ppm: Within ±15ppm
Units displayed	1%LEL	0.1vol%	0.1ppm	1ppm
Alarm set values	1st stage alarm: 10%LEL 2nd stage alarm: 30%LEL	1st stage alarm: 19.5vol% 2nd stage alarm: 18vol%	1st stage alarm: 10ppm 2nd stage alarm: 15ppm	1st stage alarm: 50ppm 2nd stage alarm: 100ppm
Alarm accuracy*1 (service range excluded)	≦ 30%LEL: Within ±5%LEL 31-100%LEL: Within ±25% of alarm set value	Within ±1.0vol%	Within ± 3ppm	≦50ppm: Within ±15ppm 51-150ppm: Within ±30% of alarm set value
Response time*2 (using 1m gas sampling tube)	≦ 30 seconds	≦ 20 seconds	≦ 30 seconds	≦ 30 seconds
Response time*2 (using 8m gas sampling tube)	≦ 40 seconds	≦ 40 seconds	≦ 40 seconds	≦ 40 seconds
Gas alarm method	Chirping alarm, flashing red light, and flashing “AL1” or “AL2” on LCD or LCD itself			
Power source	Panasonic alkaline AA battery (LR6) x 4 pcs			
Continuous operation time*3	Minimum 8 hours at 20°C, with no alarm, backlight and data logging off.			
Operating pressure range	Atmospheric pressure (800-1100 hPa)			
Operating temperature and humidity range	-10 to 40ºC, 30 to 90%RH (No condensation)			
Structure/approvals	Drip proof: IP22. For explosion proof specs, refer to page 45.			
Other alarms	Low/empty battery notification (battery level always on display), sensor error, and low flow rate.			

10. Specifications

Functions	・Gas concentration display format switching Standard display: 3 or 4 numeric gas concentrations with their bar graphs, temperature, date and time simultaneously displayed. Trend graph display: The last 54 peak values in trend graph for 3 or 4 gases. Text display: 3 or 4 gases in chemical symbol, temperature, date and time simultaneously displayed. ・Zero adjustment (automatically performed on all gas sensors when the unit turns on. 21% adjustment is done for oxygen sensor. ・Peak hold: Peak concentration values can be displayed. For oxygen, its lowest peak value is displayed. ・Audio alarm stop: Alarm sound can be muted with the BZ.STOP button. ・Automatic backlight: Backlight is turned on/off by light sensor. ・Audio volume adjustment: Alarm volume and button operation tone can be adjusted. ・Alarm test: Function test on audio alarm and alarm light. ・Data logging: Date and time, 3 or 4 gas concentrations, and temperature can be recorded at a preset interval. E.g. 150-hour data logging is possible when the log interval is set to 30 sec.
Dimensions	Approx. (W) 152 × (H) 152 × (D) 42mm (excluding protrusions, without case)
Mass	Approx. 870g (main body only, without case)

*1: Under an identical measurement condition.
*2: Time taken to reach 90% of the gas concentration applied to the tip of gas sampling tube at 20±2ºC
*3: The time varies according to the circumstances, condition of use, storage period, battery manufacturer, etc.

■ Alarm unit (Optional)

Model	AL-302M-R-8
Alarm method	Chirping alarm, flashing green light (operation light) or flashing red light (gas alarm light)
Alarms	・1st/2nd stage gas alarm: Flashing red light and chirping/rapid chirping alarm ・Communication error: Flashing green light and 2-repeating beeps (5 min) ・Detector fault/error : Flashing green light and 2-repeating beeps ・Replace-battery: Flashing green light and pulse beeps (10 sec) ・Battery empty alarm: Green light off and steady tone (5 min)
Operating temperature and humidity range	-10 to 40ºC, 0 to 95%RH (No condensation)
Structure/approvals	Drip proof: IP22. For explosion proof specs, refer to page 45.
Power source	Panasonic alkaline AA battery (LR6) x 2 pcs
Continuous operation time *1	Approx. 70 hours at 20ºC with no alarm activated
Communication cable length	8 m
Dimensions	Approx. (W) 65 × (H) 119 × (D) 23mm (excluding protrusions, without case)
Mass	Approx. 280g

*1: The time varies according to the circumstances, condition of use, storage period, battery manufacturer, etc.

10. Specifications

Explosion proof specifications

■ Gas detector

Model		XP-302M-R
Type of protection		Ex ibd IIB T3 X This product is an intrinsically safe device as a whole (ib) and uses a combustible gas sensor which employs a flameproof enclosure.
Degree of protection (IP code)		IP20
Rating	Electrical parameters	Power source: 3.0 VDC, 0.35 A (Panasonic alkaline AA battery (LR6) x 4 pcs) Combustible gas sensor: 2.5 VDC, 0.13 A IS max. input voltage (Ui): 10 V IS max. input current (Ii): 12 mA IS max. input power (Pi): 100 mW IS max. Internal capacitance (Ci): Negligible value IS max. Internal inductance (Li): Negligible value
	Ambient temperature	-20 to 40ºC

■ Alarm unit (Optional)

Model		AL-302M-R-8
Type of protection		Ex ib IIB T3 Intrinsically safe (ib)
Degree of protection (IP code)		IP20
Rating	Electrical parameters	Power source: 3.0 VDC, 0.2 A (Panasonic alkaline AA battery (LR6) x 2 pcs) IS max. output voltage (Uo): 4.7 V IS max. output current (Io): 7.6 mA IS max. output power (Po): 8.9 mW IS max. external capacitance (Co): 60 µF IS max. external inductance (Lo): 300 mH
	Ambient temperature	-20 to 40ºC

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:

Noble metal electrode: $O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$

Base metal electrode: $2Pb \rightarrow 2Pb^{2+} + 4e^-$

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.

● Electrochemical sensor (Hydrogen sulfide/Carbon monoxide)

This sensor consists of three electrodes and an electrolyte, and the method adopted here is to produce electrolytic oxidation with a potentiostat circuit while keeping the working electrode at a constant potential against the reference electrode. Measuring the current generated here allows determining the concentration of the gas (e.g. H2S, CO).

The electrolytic reaction of H2S is as follows:

Working electrode: $H_2S + 4H_2O \rightarrow H_2SO_4 + 8H^+ + 8e^-$

Counter electrode: $2O_2 + 8H^+ + 8e^- \rightarrow 4H_2O$

● Catalytic sensor (Combustible gas)

Catalytic combustion occurs on the catalytic layer applied on a platinum coil even if the gas concentration is well below the lower flammable limit (LFL). This causes a rise in temperature of the platinum coil and increases its electrical resistance. This change is read as a differential voltage using a bridge circuit. This process enables detection of combustible gases in air up to the LFL.

11. Glossary

Term	Definition
O2	Oxygen
H2S	Hydrogen sulfide
COMB	Combustible gas
CO	Carbon monoxide
Zero adjustment (zeroing)	Adjusting 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.
Span adjustment	Adjusting the indicated values by using span gas.
Target gas	Specific gas to be detected, concentration displayed, and used to trigger alarms.
Detection range	A range of target gas concentrations that can be displayed and trigger alarms.
Service range	A range of target gas concentrations the detector is able to indicate, which are usually outside the Detection Range and used only as reference.
Flameproof enclosure (explosion-proof enclosure)	Enclosure in which the parts which can ignite an explosive atmosphere are placed. This enclosure can withstand the pressure created during an internal explosion of an explosive mixture, and prevent the ignition of an explosive atmosphere outside the enclosure.
Intrinsically safe (IS) structure	Structure tested (e.g. spark test) to not become an ignition source in a flammable atmosphere due to an electrical spark or hot surface during normal operation and fault conditions.
Alarm set value	A gas concentration value that is set on a gas detector for alarm activation.
Operating temperature and humidity ranges	Ambient temperature and humidity ranges in which the gas detection and alarm system can operate normally.

11. Glossary

Term	Definition
Hazardous area	An area in which an explosive atmosphere is present, or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of electrical apparatus.
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.
%LEL	Concentrations of combustible gas given in terms of percent of the lower explosive limit.
vol%	Gas concentrations given in terms of percent of cubic volume.
ppm	Gas concentrations given in terms of millionth part of cubic volume.
LEL (or LFL)	Lower Explosive Limit (or Lower Flammable Level). Lowest concentration (percentage) of a gas or vapor in air capable of producing a flash fire, or explosion in the presence of an ignition source like arc, flame or heat.

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