User Manual R1.0
Santacary Technology Co., Ltd.
HL-OC Desktop O_2 and CO_2 Gas Monitor

INTRODUCTION

Santacary HL-OC is a precise desktop gas monitor for monitoring oxygen (O_2), carbon dioxide (CO_2) concentration, temperature and relative humidity in the ambient air. It has been designed to protect the safety of peoples in dangerous work places. The HL-OC will continuously display the ambient concentration of oxygen, carbon dioxide and activate its audible and visual alarms whenever the preset set points are exceeded. This monitor is a safety device. It is users' responsibility to respond properly to the alarm.

HL-OC is used exclusively for monitoring and cannot be used for measuring oxygen concentrations.

HL-OC can be widely used in the car, touring car, garage, food/fruits/goods container, petrochemical, power plant, telecom, medicine, mine, heavy industry, army, food industry, gas industry, and other confined spaces for personal safety.

HL-OC can also be widely used in the houses, office, school, meeting room, restaurants, hospitals, mining facilities, metal refineries, commercial and public buildings, agriculture green house, and other places where carbon dioxide monitoring in confined spaces for personal health and personal comfort is important.

Please read this manual carefully before use. This operation manual will provide you with all the necessary information for the correct use of your HL-OC monitor. HL-OC is shipped fully tested and calibrated and, with proper use, will provide years of reliable service.

FEATURES

- Desktop O_2 and CO_2 Gas Monitor
- O_2 range: 0 ~ 30.0% vol. Resolution: 0.1% vol.
- CO_2 range: 0~9,999ppm display. Resolution: 1ppm

- Using world top brand electrochemical oxygen sensor
- Stable and accurate NDIR sensor for CO_2 detection
- Support ambient fresh air calibration (20.9% vol. O_2 and 400ppm CO_2)
- Audible and visual alarm
- Two levels of instantaneous alarm
- With temperature and humidity measurement

THEORY OF OPERATION

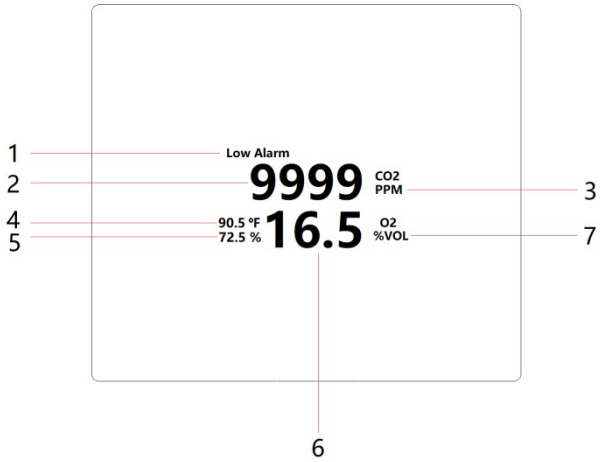
The Santacary HL-OC desktop O_2 and CO_2 Gas Monitor uses two-electrode electrochemical and Dual Beam Non-dispersive infrared (NDIR) technology, operating by the diffusion principle, for determining the concentration of oxygen and carbon dioxide respectively in air samples. In diffusion mode, the air penetrates the grille on one side and back of the monitor into the interior. Normal air movements are enough to carry the sample to the sensor.

UNIT DESCRIPTION

Device

1. Display panel
2. Power button
3. Grille
4. 5VDC Power socket

Display



1. Alarm Status (None/Low Alarm/High Alarm)
2. Carbon dioxide concentration in ppm
3. Carbon dioxide concentration unit
4. Air Temperature
5. % Relative Humidity
6. Oxygen concentration in %VOL (% vol.)

7. Oxygen concentration unit

OPERATION

1. Turn On/Turn Off Monitor

1) When the monitor is turned off, press Power button to turn on the unit.

2) When the monitor is turned on, press Power button for 2 seconds to turn off the unit.

When the unit is first turned on, it performs 60 seconds countdown for monitor initial warm up, then enters normal display with current O_2 concentration (% vol.), CO_2 concentration (ppm), temperature (°C or °F), and humidity (%RH) readings displayed. If the monitor is not used for a long time, the warm up time of oxygen sensor needs more than 5 minutes.

The monitor starts taking measurements when power on and updates readings every 2 seconds. In the condition of operating environment change, it takes 15 seconds to respond for O_2, 2 minutes to respond for CO_2 and 30 minutes for humidity.

Note:

Always ensures that the grille is not blocked and open to the atmosphere.

Note:

Do not put the monitor close to faces in case that exhalation affects O_2 and CO_2 levels.

2. Fahrenheit and Celsius switching

Press Power button shortly to switch two temperature units: °F and °C.

3. Ambient Air Calibration for O_2 and CO_2

This monitor can implement ambient air calibration (20.9% vol. O_2 and 400ppm CO_2) when needed (such as annually).

By pressing the Power button shortly for 6 times, the monitor enters into Ambient Air Calibration operation. The prompt sentence "Fresh Air Calibration" will be shown as in the following figure.

If the Power button is pressed shortly within 6 seconds, the HL-OC will perform an automatic fresh ambient air calibration (20.9% vol. O_2 and 400ppm CO_2). Otherwise, the monitor will cancel calibration and return to normal display.

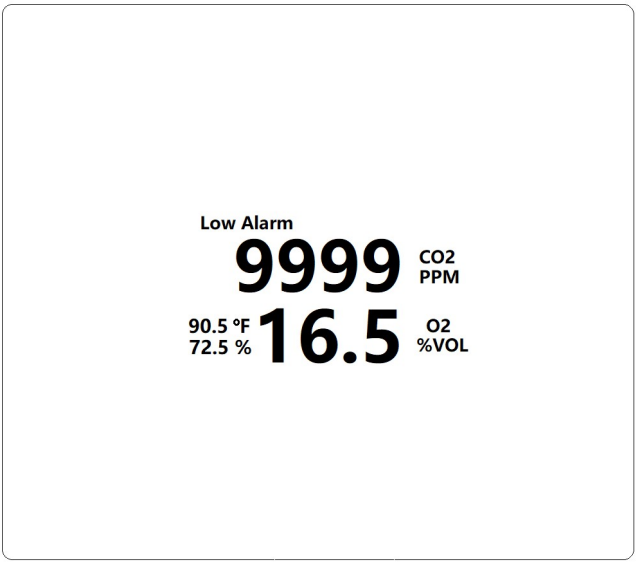
ALARM

Low Alarm and High Alarm

HL-OC has two alarm set points: Warning (either O_2: 23.5% or 5000ppm CO_2) and Danger (either O_2: 19.5% or 9999ppm CO_2). The danger alarm is sounded for oxygen deficiency and the warning alarm is sounded for oxygen enrichment or CO_2 reach above 5000ppm. These set points are factory set and cannot be changed. HL-OC is equipped with audio and visual alarms to alert you when the ambient gas concentration exceeds one of the two alarm set points. When oxygen value is reach the defined danger alarm set point, the audio alarm will sound at 3 beeps/sec. When oxygen value exceeds the defined warning alarm set point, the audio alarm will sound at 2 beeps/sec.

Factory Alarm Set points

Gas	Low	High
O_2	19.5% vol.	23.5% vol.
CO_2	5000ppm	9999ppm



ATTENTION!

If a Warning or Danger alarm is triggered while using the instrument as a monitor, leave the area immediately. Remaining on site under such circumstances can cause serious damage to health or can even lead to death.

PLACEMENT

HL-OC can not only be placed on the desktop, but also be pasted onto the wall for use. Use double-sided adhesive to stick the back of this monitor. Note that the thickness of the double-sided adhesive is more than 3mm to reserve air flow space for the rear grille. The wall mount placement method is referred to the following figure.

Install the HL-OC at a location and height in the room where you want to test the air quality. Be aware that O_2 and CO_2 concentration can vary dramatically from one location to another within the same house.

MATERIALS SUPPLIED

- HL-OC desktop O_2 and CO_2 gas monitor
- Carry case
- DC 5V 1.0A adapter
- English user manual

SPECIFICATIONS

Oxygen Sensor Specification:

O_2 Measurement Range	0 ~ 30.0% vol. O_2
O_2 Resolution	0.1% vol.
Sample Method	Diffusion
Temperature Range	-20 to 50°C (-4°F ~ 122°F)
Humidity Range	5 to 95%RH
O_2 baseline Drift (-10-50°C)	<1% change in output @ 3 months
O_2 response time	<15 seconds from 20.9% to 0% O_2
O_2 Measurement Interval	2 seconds

CO_2 Specification:

CO_2 Measurement Range	0~9,999ppm display
CO_2 Resolution	1ppm / 0.01%
CO_2 Accuracy	±40ppm or ±3% of reading
Repeatability	±20ppm @ 400ppm
Sample Method	Diffusion

Temperature Dependence	Typ. ±0.3% of reading per °C or ±4ppm per °C, whichever is greater, referenced to 25 °C
Pressure Dependence	0.13% of reading per mmHg
CO_2 Response Time	About 2 min for 90% of step change
CO_2 Warm-up Time	<5 seconds at 22°C
CO_2 Measurement Interval	2 seconds

Temperature Specification

Temperature Range	-10.0~60.0°C (14~140°F) display
Display Resolution	0.1°C (0.1°F)
Display Options	°C/°F switchable
Accuracy	±0.5°C (±0.9°F)
Response Time	5~30 seconds (device must equilibrate with environment)

RH Specification

Measurement Range	0.0~99.9%RH
Display Resolution	1%RH
Accuracy	±4.5%RH
Response Time	<8 seconds for 63% of step change

General Specification

Operating	-10°C to 50°C (14°F to 122°F), 5~95% RH non-condensing
Storage	-10°C to 60°C (14°F to 140°F), <99% RH non-condensing
Power Supply	5.0VDC 1.0A

Dimensions	77x77x33mm (3.03x3.03x1.3”)
Weight	93grams (3.28oz.) without adapter

Out of range of operating conditions will impact the accurate of O_2 measurement.

MAINTENANCE

To maintain the monitor in good operating condition, perform the following basic maintenance as required.

1. Calibrate and inspect the monitor at regular intervals.
2. Clean the exterior with a soft damp cloth. Do not use solvents, soaps, or polishes.
3. Do not immerse the monitor in liquids.

Troubleshooting

If a problem occurs, refer to the solutions provided in below table. If the problem persists, contact Santacary Technology Co., Ltd..

Problem	Possible cause	Solution
The monitor can't power on	Power adapter isn’t well plugged.	Please check whether the power adapter is well plugged.
	Damaged or defective monitor	Contact Santacary Technology Co., Ltd.
The monitor enters alarm immediately when activated	Sensor needs to stabilize	If the monitor is not used for long time, the warm up time of oxygen sensor needs more than 5 minutes.

	Sensor requires calibration	Calibrate the sensor
	Hazardous environment	Leave the area immediately. Deactivate and reactivate the monitor in a safe area that is free of hazardous gas.
Monitor does not accurately measure O_2 or CO_2 concentration.	Sensor requires calibration	Calibrate the sensor.
	Monitor is colder/hotter than gas temperature	Allow the monitor to attain ambient temperature before use
	Air grilles are blocked	Make sure that the air grilles are ventilated

WARRANTY

The HL-OC is warranted to be free from defects in material and workmanship for a period of one year from the date of purchase. This warranty covers normal operation and does not cover misuse, abuse, alteration, neglect, improper maintenance.
Proof of purchase is required for warranty. Warranty is void if the monitor has been opened.

CO2 LEVELS AND GUIDELINES

NIOSH recommendations
250-350ppm: normal outdoor ambient concentrations
600 ppm: minimal air quality complaints

600-1000 ppm: less clearly interpreted
1000 ppm: indicates inadequate ventilation; complaints such as headaches, fatigue, and eye/throat irritation will be more widespread. 1000 ppm should be used as an upper limit for indoor levels.

ASHRAE Standard 62-1989: 1000ppm
CO_2 concentration in occupied building should not exceed 1000ppm.

Building bulletin 101 (BB101): 1500ppm
UK standards for schools say that CO_2 at averaged over the whole day (i.e. 9am to 3.30pm) should not exceed 1500ppm.

OSHA: 5000ppm
Time weighted average over five 8-hour work days should not exceed 5000ppm.
Germany, Japan, Australia, UK: 5000ppm
8 hours weighted average in occupational exposure limit is 5000ppm.

CONTACT US

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