

Read this manual before using the analyzer. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this analyzer.

Please visit our website www.phymetrix.ca for other products that may be applicable to your needs. Every effort has been made to ensure accuracy in the contents of this manual. Should there be any doubts to the accuracy of the content please contact the manufacturer. The contents of this manual are subject to change without notice.

The instructions, procedures, drawings, specifications and concepts contained in this manual are the property of Phymetrix Ltd., and shall not be used as the basis for the manufacture or sale of apparatus or services, or reproduced or copied or transmitted in any form or by any means without written permission.

Warranty

While the Phymetrix's instrument has no problem in materials and workmanship, the manufacturer shall have the right to make the decision to repair or replace the analyzer. The battery is not

within the scope of this quality assurance. This warranty is effective from the date of delivery to the original purchaser. If Phymetrix determines that the equipment was defective, the warranty period is:

- one year from delivery for electronic or mechanical failures
- one year from delivery for sensor shelf life

If Phymetrix determines that the equipment was damaged by misuse, improper installation, the use of unauthorized replacement parts, or operating conditions outside the guidelines specified, the repairs are not covered under this warranty.

Normal wear and tear, parts damaged by abuse, misuse, negligence or accidents are specifically excluded from the warranty. Purchaser acknowledges that in accepting and using this analyzer, notwithstanding any contrary term or provision in the purchaser's purchase order or otherwise, the only warranty extended by Phymetrix is the express warranty contained herein. Purchaser further acknowledges that there are no other warranties expressed or implied, including without limitation, the warranty of merchantability or fitness for a particular purpose; that there are no warranties which extend beyond the description of the face hereof; that no oral warranties, representations, or guarantees of any kind have been made by Phymetrix, its distributors or the

agents of either of them, that in any way alter the terms of this warranty; that Phymetrix and its distributors shall in no event be liable for any consequential or incidental damages, including but not limited to injury to the person or property of the purchaser or others, and from other losses or expenses incurred by the purchaser arising from the use, operation, storage or maintenance of the product covered by the warranty; that Phymetrix's liability under this warranty is restricted to repair or replacement of defective parts at Phymetrix sole option; and that Phymetrix neither assumes nor authorizes any other person to assume for it any other warranty. The warranty shall be void if serial numbers affixed to the products are removed, obliterated or defaced.

Return Policy / Procedures

If equipment malfunction is suspected or it is determined that the analyzer needs recalibration, please contact York Instrument, who is Phymetrix's general agent in China.

Communicate the instrument model number, serial number, application including oxygen concentration range being measured, and the details of the problem.

If the analyzer needs factory service you will be issued a RMA and shipping instructions.

The factory will diagnose the equipment and upon determining

the problem will notify you whether the terms of the warranty cover the required repair. If the costs are not covered you will need to approve the estimated cost in order to proceed with the repair.

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1 Introduction

POA210 portable oxygen analyzer adopts a special weak acidity electrolyte oxygen sensor, which is a safe and secure non-corrosive electrolyte, it is unaffected by CO, CO₂, NO_x and other kinds of corrosive gases. The analyzer's signal is very stable, it make individual measurements or monitor continuously, making it applicable in many demanding oxygen measurement settings. It is widely used in in many different sectors of the economy; such as combustion efficiency analysis, gas blending, breathing apparatus, compost monitoring and food storage monitoring, etc.

Standard equipment includes:

- The portable analyzer with sensors
- Stainless steel Quick Disconnect
- Power adapter
- Manual
- Shoulder Strap
- Carrying Case

Options:

- Stainless steel sleeve
- FPT pipe
- Printer functionality
- Software

Analyzer performance characteristics:

- POA210 percent oxygen analyzer adopts a special weak acidity electrochemical sensor. In its measuring range; the sensor is linear and therefore measuring oxygen concentration is very stable, and its measuring range is very wide: 0-100%.
- The resolution for the high quality LCD Screen has a 320 x 240 color high-definition screen, and also shows the oxygen density, maximum and minimum values, the total time of measurement, the time difference, measurement process curve, the power and the current time. Furthermore, it can also display the measurement process curve, which will provide a clear and reliable process analysis data for the users.
- Automatic temperature compensation is corrected for the full range, making the instruments more adaptable to harsh environments
- A variety of measurement settings, users can choose one appropriate to their needs.
- It can switch interface in both English and Chinese according to users' needs.
- The analyzer is small and portable, making it

comfortable to service multiple locations on site.

1.1 Panel descriptions

Front view:

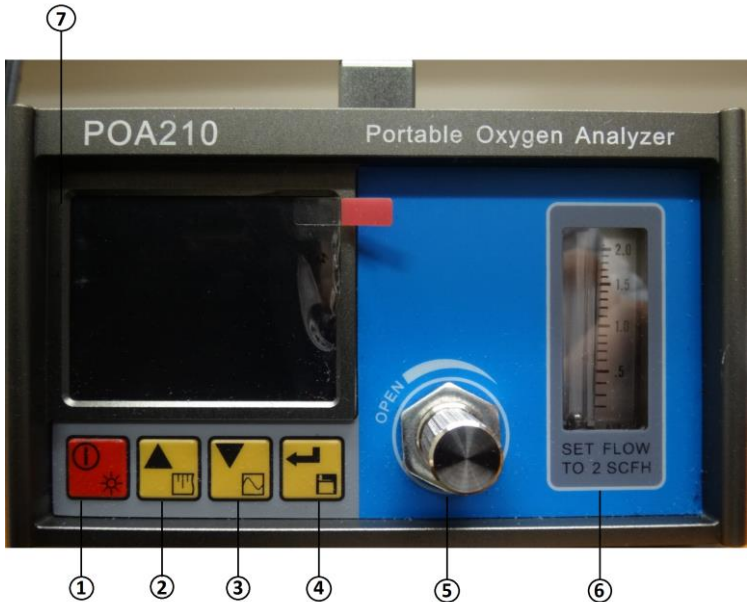


Figure 1

The front panel has a high definition LCD screen, four touch buttons, a flow adjusting needle valve, and an observation window to monitor the flow on the flowmeter.

Functions of buttons:

No.	Name	Funcion
①	Power/Dimness adjust button	Hold this button to power on or power off; Quick presses will adjust the screen light. When monitoring for long periods, you can dim the screen to save power.
②	Up/calibration button	Only in the measuring interface you can perform the calibration operation, all other interfaces scrolls up.
③	Down/clear curve button	In the measurement interface you can eliminate the displayed curve, all other interfaces scrolls down
④	Confirm/save button	Function keys, long press will save your data, short press to confirm.
⑤	Flow adjusting needle valve	Adjust gas flow
⑥	Flowmeter	Display the gas flow, a range of 0.2 to 2; the unit is SCFH
⑦	Display screen	Display the concentration of oxygen, process time, minimum and maximum difference, the current time, power and other parameters

Table 1

Back View:

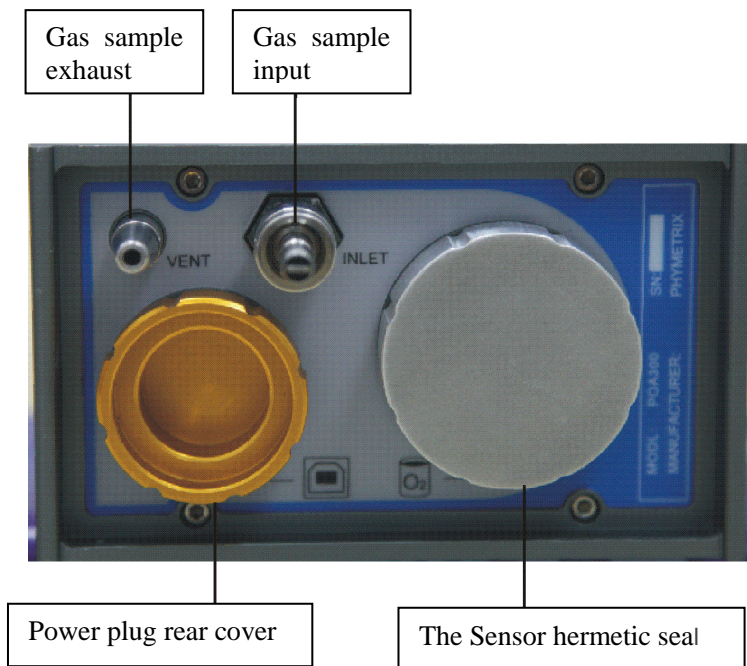
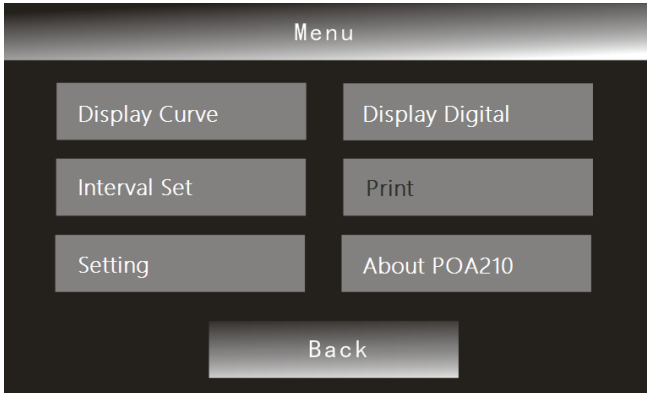


Figure 2

1.2 Introductions of display

Press the "Confirm/save" button, the following Interface will be shown



You can use other functions on using the UP and DOWN button.

1. Display Curve: The following screen will be displayed after pressing the "Confirm" button.



Displaying maximum and minimum values of Oxygen concentration, or the maximum and minimum difference, testing time and process parameters such as displaying the curve.

2. Display Digital: The following interface will be displayed after pressing the “Confirm” button.



Displaying the maximum and minimum values of Oxygen concentration, also the maximum and minimum difference and the average.

3. Interval Set

The following interface will be displayed after pressing the “Confirm” button.



You can set the average time of the measuring interval

4. Print: This is an optional function, if you need this, please contact the supplier/distributor for more information.

5. About POA210

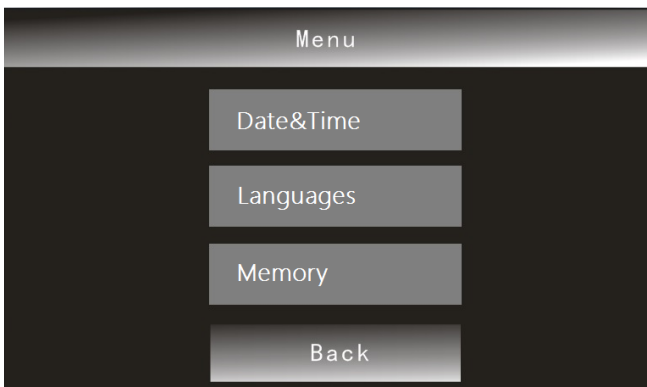
The following interface will be displayed after pressing the “Confirm” button



You can see the system information.

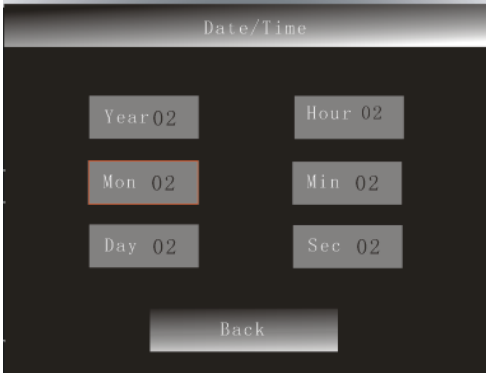
6. Settings

The following interface will be displayed after pressing the “Confirm” button



A) Date/Time

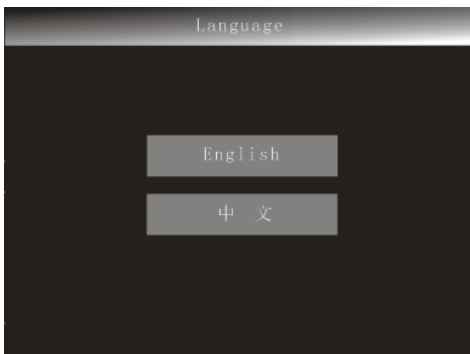
The following interface will be displayed after pressing the “Confirm” button



You can set up the correct date and time on using the UP and DOWN button.

B) Language

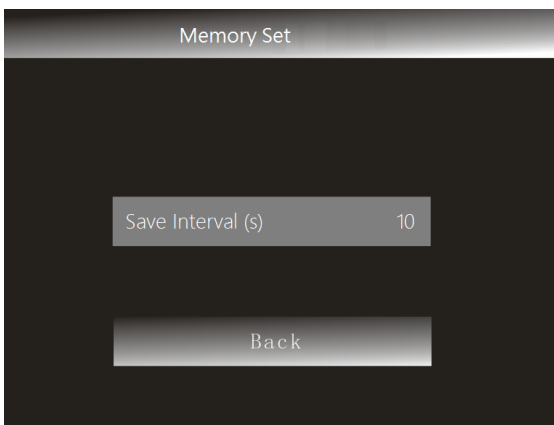
The following interface will be displayed after pressing the “Confirm” button.



You can select either English or Chinese

C) Memory

The following interface will be shown after pressing the “Confirm” button



You can select the Save interval times.

7. Save set: You can set up automatic storage intervals
9. Return: return to previous menu.

1.3 Function

1. Turn on the analyzer, the display will appear. Please wait approximately 15S before beginning to measure.
2. Connect the sample gas into the “Quick Connect” fitting located on the backside of analyzer.
3. Adjust the sample gas flow with the needle valve between 1.0 to 2.0 SCFH.
4. Allow approximately 1-2min.time for the gas to purge the lines.
5. Please wait for a few minutes for oxygen readings to stabilize.
6. Disconnect the sample line.
7. Calibration: Introduced in Section 1.4.
8. To use the data storage function: Hold "confirm/save" button for about a second, the data will be saved automatically.
9. To download the data stored in analyzer: Open the "power/data connection hermetic seal", connect the USB data connection and instrument computer connections. Note that this operation must be done in a safe area. The USB module must be purchased separately, if necessary, please contact us for more

info.

10. Charge the unit by opening the "power/data connection hermetic seal", on the power cord for instrument charging. Please connect the supplied power adaptor to the charging port on the back end of the analyzer. When the instrument is charging it will display the status on screen. Note that the charging process must be in a safe area.

1.4 Calibration

First of all, connect the calibration gas and purge the lines, on the measuring screen, press the "up/calibration "button, as shown by



the button: ,display the calibration interface,and then adjust the reading with UP and DOWN buttons until the analyzer agrees with the calibration gas value.

Detailed calibration steps:

1. Connect the calibration gas into the analyzer sample inlet and set the flow to about 1SCFH.
2. Wait for a few minutes to allow the calibration gas to flow and the reading to stabilize.
3. If the reading is reasonably close to being right, press the "confirm/save" button, and then the UP or DOWN arrow buttons

until the number displayed is the same as the on the calibration gas tank.

4. Finish calibration.



CAUTION:

1. It is rather common to find that when you introduce calibration gas into the analyzer, the reading is quite different from what you expect. This is normally caused by errors in gas handling, rather than by calibration errors. If the gas doesn't read close to what you expected, please look at the troubleshooting section of the manual rather than simply adjusting the calibration to what may be a completely incorrect value.

2. Although we can use air to calibrate the analyzer roughly, but when the instrument is placed in air directly, you will find that the local oxygen content value does not agree with analyzer values, this is due to the differences in the pressure and flow. Thus the instrument itself does not have a problem, and if one wishes to use air to calibrate, they will need to set the flow to 1-2 SCFH to relieve this problem.

2 The Principle of Sensor

The POA210 oxygen sensors are lead-oxygen batteries, each consisting of a lead anode, oxygen cathode (gold), and a weak acid electrolyte. A non-porous Teflon FEP membrane is bonded to the gold electrode. Oxygen diffusing the membrane is electrochemically reduced at the gold electrode. The current generated is directly proportional to the partial pressure of the oxygen at the sensing surface of the cell.

Cathode:	$O_2 + 2H_2O + 4e^- \rightarrow 4OH^-$	(1a)
Anode:	$2Pb + 4OH^- \rightarrow 2PbO + 2H_2O + 4e^-$	(2a)
Overall:	$O_2 + 2Pb \rightarrow 2PbO$	(3a)

Reactions in the conventional KOH type oxygen sensor occurs in the above manner.

In the POA210 oxygen sensors using the weak acid electrolyte, the following reaction occurs:

Cathode:	$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$	(1b)
Anode:	$2Pb \rightarrow 2Pb^{2+} + 4e^-$	(2b)
Overall:	$O_2 + 4H^+ + 2Pb \rightarrow 2H_2O + 2Pb^{2+}$	(3b)

In both the KOH and the weak acid type cells, the net reaction generates PbO. The PbO is normally dissolved into the electrolyte. However, there is a point at which the electrolyte becomes saturated with PbO. At this point, PbO precipitates onto the lead anode which can cause the cell to fail eventually. However, the weak acid of the POA210 has a clear advantage over the KOH type electrolyte. The weak acid has a higher capacity to dissolve PbO than sensors which contain the conventional KOH electrolyte, (up to 20 times higher)! The weak acid electrolyte results in a sensor with exceptional life characteristic.

Additionally, because each POA210 sensor uses an acid electrolyte, it is virtually unaffected by the presence of background gasses such as CO₂, SO₂ and NO_x. **This characteristic results in an ideal oxygen sensor for emissions testing applications!**

Each oxygen sensor is designed with an integral temperature compensation circuit. The temperature circuit effectively

compensates cell output from 5° to 40° C. The sensor may be stored in a temperature range from -15° to 50° C.

Each sensor utilises a specially formulated solution of acetic acid electrolyte. This results in two exceptional characteristics; the POA210 sensors exhibit low or non-existent cross sensitivity to gas species common in the end products of combustion. The POA210 sensors also show excellent signal stability to changes in position and to motion.

The sensor chemistry is minimally affected by several other gasses including refrigerants and hydrocarbons. However, since the electrolyte is acidic, the MAX-250 series of sensors show some sensitivity to high concentrations of corrosive vapours.

Please refer to the table:

Effect	Type of Gas
No Effect	CO ₂ , N ₂ , Ar, CH ₄
Minor Effect	Cl ₂ , CFC's, SO ₂ , NH ₃ , HCl, CO, H ₂ S, NO _x , H ₂
Moderate Effect	Isopropyl Alcohol, Hexane, CCl ₄

Severe Effect in high concentrations; not recommended	Sodium Hydroxide, Acetone*, MEK* (* affects CPVC housing of sensor)
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3 Specifications:

Measurement ranges: 0-1%, 0 ~ 5%, 0 ~ 10%, 0-25%

0-100% measurement is auto-ranging.

Sensitivity: 0.01%

Repeatability: $\pm 1.0\%$ of full range (at 20 °C)

Operating temperature: 32-113 F (0-45 °C)

Display: truecolor LCD screen

Sample pressure: 1-2 psig

Drift voltage: in 100% of N₂ (Standard Temperature and Pressure), less than 0.5 mV

Response time:

< 15 seconds (change 90%)

< 25 seconds (change 95%)

Sensor life: 5 years (typical)

Battery charge: 115/230V AC $\pm 10\%$

Power: it can work continuously 16 hours after charge adequately

Certifications: Intrinsically Safe, Class I, Div. I, Groups B, C, D.

Box dimension: Height: 4.41''x Width: 5.43'' x Depth: 7.28''

Height: 112 x Width: 138 x Depth: 185(mm)

Weight:70.55 oz (2.0Kg)

4 Instrument instructions

4.1 Using the analyzer

Although the instrument has a strong and robust structure, one should still be gentle and take care when operating. Please avoid exposure to the rain and rapid temperature changes. For example, during operation on a cold winter day, the rapid temperature change from indoor to outdoor can cause the temperature compensation function to fail temporarily and the analyzer will spend a period of time to rebalance. The low temperature will also make the sensor slow to respon, damaged or even freeze in extreme scenarios. To prevent this, one should keep the instrument in a temperature stable environment approximately (15°C-30°C). During transit, it is best to stow the instrument in the portable case. Please avoid long exposures to harsh cold temperatures in the winter or direct sunlight.

4.2 Powering up the analyzer

To power up the analyzer, press the "Power/Dimness Adjust" button on the front panel. When powering up, readings will be slowly rising to the measured value of the current analyzer. If the instrument is correctly calibrated, when placed in air, it will display around 20.9% (the values are generally lower due to the influence of pressure and flow).

If the battery power is low, the instrument will begin "beeping" alarm and the battery icon on the display will become red and flashing. After this point, if operation is continued and the battery power is too low, the instrument will eventually be turned off automatically. To be fully charged, please allow up to seven hours, and for the first use, the recommended charging time is at least 14hrs.

4.3 Ranging

Analyzer range is 0-100% O₂.

4.4 Calibration

Prior to delivery, every analyzer & sensor has been certified & supplied with a factory calibration certificate. If verification of accuracy is required the general procedure is to connect a bottle of standard calibration gas to the analyzer; press the

"up/calibration" button, and through the display of the analyzer adjust until the displayed value matches with the calibrated gas values. The user can also connect the instrument to the air, and verify whether the instrument matches the local air oxygen concentration.

If the analyzer values are significantly different from the standard gas during the calibration process, this kind of phenomenon is not uncommon. This is generally due to the sampling system/method used and not an instrument error. Prior to re-adjusting the instrument to a new value. Please consult "Troubleshooting" in Section (6) of this manual.

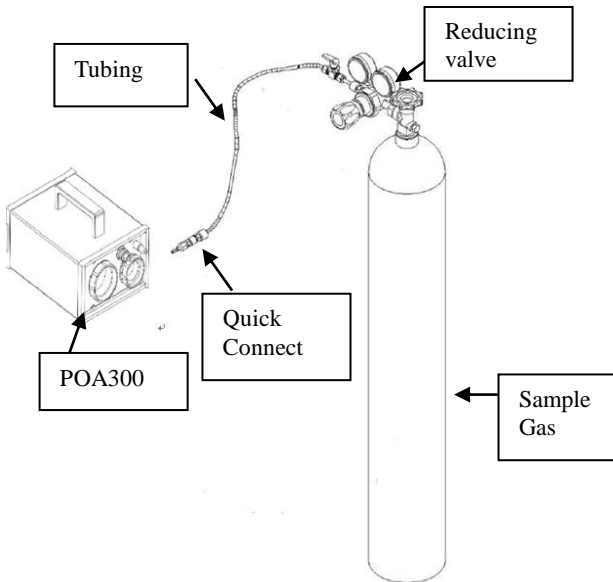
4.5 Sensor life

Analyzer uses a special weak acidity electrolyte sensor, allowing the sensor life to last up to 5 years, so that users can use at ease.

Stocking the sensors for extended periods of time is not recommended as the internal chemicals will degrade over time reducing it's useful capacity. Replacements are recommended to be purchased shortly prior to expiry of it's life.


4.6 Sample measurement

Sample Line Connection



As shown in the diagram, the sample gas pipeline is inserted into

the Quick Connect. Slowly open the needle valve until the flow reaches about 1 SCFH (cubic feet per hour). Please allow time to let the air samples purge the analyzer, you think you have fully cleared the sample gas pipeline, wait for a minute or so to let the readings stabilize. When you have completed the oxygen concentration measurement, record the current value, and shut off the analyzer.

 **CAUTION: Never allow emissions port to be restricted, this will produce back pressure in the sensor, and will cause erroneous readings and possible damage to the sensor.**

4.7 Data storage: (data storage function by default is turned off)

4.7.1 Data storage function turned on: In measuring interface, holding the “Confirm/Save” key (about 3 S), will open the storage function, at the same time, the flash storage icon will begin flashing at the center bottom of the screen.

4.7.2 Data storage function turned off: In measuring interface, holding the “Confirm/Save” key (about 3 S)), the storage function will be closed; Storage icon will disappear.

4.7.3 Storage interval setting: To enter setup interface, choose the "Storage Settings", and select the storage time interval setting desired;

4.7.4 Storage capacity: Up to 10000 data points. When full capacity, the earliest data of the storage will automatically overwrite.

4.8 Battery charging and discharging

4.8.1 Battery charge: 7 hours;

4.8.2 Battery discharge: bright: 15 hours less bright: 20 hours dark: 30 hours

4.8.3 Battery replacement: such as the need to change the battery, please return to the company to replace.

4.9 Safety

This instrument is intrinsically safe, Class I, Div I, Groups B, C, D and can be used in all applicable environments.

Although this instrument has anti-interference protection for its' circuitry, but avoid placint the instrument close to any electrical installations, such as large transformer, generators, relays, etc. Please also avoid operation in an environment with lots of vibration.

5 Maintain&Sensor Replacement

Instrument maintenance and replacement of the sensor

1. Warranty: Within one year on the acquisition date, any material and/or quality damage of the analyzer due to faulty workmanship or defective parts is covered by warranty, but will not extend to damages caused by careless and/or misuse of equipment.
2. Periodic calibration: Factory recommended calibration cycle is every two weeks, but if the analyzer is used frequently and/or used in harsh environments, shorter intervals are recommended.
3. The sensor replacement:
 - (i) If the sensor is found to be damaged, electrolyte may be leaking from its' chamber. Please replace the sensor.
 - (ii) If the sensor has been operational for 5 years. Please replace sensor.
4. The sensor replacement steps:
 - (1) Power off;
 - (2) Have the replacement sensor ready.

- (3) Open the sampling cover in the back of the analyzer. Gently unplug the red and black wires connecting the plug, and then gently untighten the sensors, take out the old sensor;
- (4) Gently tighten the new sensor, reconnect the red and black wires onto the plug;
- (5) Put on sampling cover and tighten.

 **Caution:**

- (1) After replacing the new sensor, be sure to tighten the screw, and ensure that the red and black lines are connecting to the correct terminals.
- (2) The sensor should be tightened to ensure correctly sealing the sensor.

6 Troubleshooting

Analyzer does not power up.

1. Recharge the battery. When charging, please check that the charger is plugged into a receptacle that is itself powered.
2. If the instrument is plugged to the adaptor and the battery does not take a charge, replace the battery.

Analyzer reads too low

1. If the sensor has not been calibrated before, flow calibration gas through it as described and adjust the measured value, until the analyzer reads in line with the calibration gas.
2. If sensor readings are still too low, use air to further verify measured values. If readings are still too low, the calibration gas may not be correct.
3. If the use of calibration gas is not correct, the use of air could be a reliable means to calibrate the analyzer, if the reading is still not correct, please replace contact our support agents.
4. Commonly, the tank of compressed air you are using is

manufactured air where the oxygen content is not 20.9%. Calibrate the analyzer using natural air as the calibration gas, and verify it against the bottled air. If it reads incorrectly, replace it with a tank of certified air.

Analyzer readings were too high

1. Verify that there is no flow restriction in the outlet port of the analyzer.
2. If measured Oxygen concentration is less than 20.9% and this fault appears. Increase the sample gas flow through analyzer, if readings decrease accordingly, this shows that the sample gas pipeline into the unit or connecting pieces has a leak. Use "Snoop TM" or similar soap to locate the leaking joint.
3. Remove the sensor, and confirm analyzer reads zero, if not, there is moisture or corrosion between the sensor contacts in the cell block; clean the contacts and the area around them with isopropyl alcohol, dry with dry compressed air or nitrogen, then replace the cap on the cell block.

Analyzer reads zero

1. Confirm the terminals make good contacts with the sensors, if the contact pieces are bent, remove the sensor, gently straighten the contact pieces and reconnect to get a better contact.
2. Please ensure the contacting terminals are clean, if not, gently

use a Q-tip or other cleaning tools clean them. Do not use abrasive cleaning tools as they may cause damage to the metal coating.

3. Check with digital voltmeter against sensor output, the output of the sensor in the air is about 13 ± 3 mV. It takes a few seconds of time to stabilize the output. If the stabilized output is not the suggested value, replace the sensor. Refer to the sensor replacement steps.

Batteries don't last long , or will not charge at all:

1. Charge the batteries with the power turned off, for at least 14 hours.
2. The batteries have an expected life of about 300 charge/discharge cycles. They will last best if they are never completely discharged.

If all else fails, please consult with factory for support.

7 Safety of the analyzer

Understand the following safety prevention measures to avoid injury, and prevent damage to the product and the other connecting products. To avoid possible danger, please be sure to operate within the guidelines when using this product.

1. Only allow qualified personnel to perform maintenance programs.
2. Avoid fire and injury.
3. Use certified power cables. Only use the product's supplied cable applicable to the country.
4. Ensure correct installation & gas extraction.
5. Products must be properly grounded. This product is grounded by power grounding wires. To avoid electric shocks, conductor must be grounded. Prior to powering up or operation of this product, please make this product is grounded.
6. Connected to the probe properly. View all ratings of terminal. To avoid fire excessive pressurization, please check all the rating and specifications of this product. Please consult the

manual before operating products in order to understand the ratings and other detailed information.

7. Do not open the front cover. Do not open the sampling pod cover when powered on.
8. Avoid any exposed circuit when powered on, please do not touch any of the exposed components.
9. If malfunction is suspected, please do not operate. When in doubt, please contact a qualified service personnel for inspection.
10. Please keep the product surface clean from dust or debris.

8 Safety of sensor

Electrolyte's primary route of entry to human body:

Ingestion, eye/skin contact.

The Effects of overexposure:

1. **Ingestion:** May be fatal if swallowed. The electrolyte will cause a burning sensation; the lead will cause symptoms such as loss of sleep, loss of appetite, metallic taste and fatigue.
2. **Eye :** The electrolyte is corrosive: it will produce a burning ,soapy sensation ,irritation or severe chemical burns.
3. **Dermal:** The electrolyte will cause a soapy, slippery feel, and eventually a burning sensation. It may cause irritation and chemical burns .
4. **Inhalation:** Inhalation of the electrolyte will cause severe irritation and chemical burns.

➤ Symptoms of exposure:

The electrolyte is harmful if swallowed, inhaled or absorbed through the skin. It is extremely destructive to the mucous membranes, stomach, mouth, upper respiratory tract, eyes and skin. The lead will cause symptoms such as loss of sleep, loss of appetite, metallic taste and fatigue.

➤ **Medical conditions aggravated by exposure:**

Persons with pre-existing skin disorders, eye condition or impaired respiratory function may be more susceptible to these substances. Lead exposure may aggravate blood diseases and/or blood forming organs, hypertension, kidney damage, nervous and possibly reproductive system damage.

➤ **Emergency and first aid procedures**

Eye contact: Flush eyes with water for at least 15 minutes and receive immediate medical attention.


Skin contact: Wash affected area with plenty of water and remove contaminated clothing.

Ingestion: Give large amounts of cold water. Do not induce vomiting. Seek medical attention. Do not administer liquids to an unconscious person.

Inhalation: Liquid inhalation is unlikely. If it occurs, provide fresh air and seek immediate medical

attention.

➤ **Handling information**

 **NOTE: Oxygen sensors are sealed and under normal circumstances their contents do not present a health hazard. The following information is given as a guide in the event of a leak.**


Hygienic practices: Wash hands after handling.

Protective clothing: Rubber gloves, chemical splash goggles.

Clean up procedures: Wipe down the area several times with a wet paper towel. Using a fresh towel each time.

➤ **Protective measure during sensor replacement:**

Before opening the bag containing the sensor, check the sensor for leakage. If any leakage is found, do not open the bag. If there is liquid around the sensor installed in the instrument, put on gloves and eye protection before removing it.

 **NOTE: The above information is derived from the supplier's MSDS. This information is believed to be correct, but is not necessarily inclusive, thus should be used only as a guide. Phymetrix shall not be held liable for any damage arising out of using or abusing this product.**

9 Glossary of Terms

Accuracy

In general with analyzers when we use the word “accuracy” we imply “repeatability” as well; which is the degree to which an analyzer can repeat the same measurement reading on the same gas. All factory analyzers are compared using a measured gas against a known standard, and the accuracy of their measurement is therefore dependent upon this standard.

Come-down

A term referring to the operation of an analyzer reducing its reading from a high level to a low or zero level. For trace analyzers this can be quite long, as it can take a long time for the final traces of oxygen to diffuse out of the gas sampling system.

Electrochemical

A type of chemical reaction which produces an electrical current as part of the reaction. In this case, the oxygen sensors produce an electrical current in proportion to the amount of oxygen present at their membrane surface.

LCD

Liquid Crystal Display-a form of digital display suitable for reading in bright light conditions. The display degrades below about -20°C and above about 60°C

Membrane

A thin layer of permeable material (normally teflon or a similar fluoro-carbon) that controls the rate of diffusion of oxygen into the electrochemical sensor. It also controls the rate of diffusion of electrolyte out of the sensor. If the membrane is torn the sensor must be discarded.

Output-voltage or current

An analog voltage or current proportional to the oxygen measurement as a percentage of range, suitable for acquisition via a chart recorder or computer input.

Range

The operational measurement range of the analyzer. The range is dependent by its amplifier sensitivity forming the analyzer working measurement range. This process is performed via an induction amplifier. If the Oxygen concentration is above the full scale value, it will not be measured accurately. Usually, the analyzer can measure oxygen concentrations between the ranges of the 20-80% accurately.

Response

The response time of an analyzer is defined as the time taken to go from the beginning of a noticeable change to 90% of the final level. The beginning is often defined as 10% of the final level. This is also called the “T90” time. The transit time of the gas is not included in this measurement.

Calibration

Regularly performed on the upper end range of the measurement, as opposed to the bottom end or zero. Generally this is done by exposing the sensor to a gas of known concentration, and making the analyzer read that value.