MODEL 111
Operator Manual

AMI, Costa Mesa, CA

Made in the USA

Contents

Preface

Thank You

For purchasing a state of the art oxygen analyzer. The 111 series of analyzers provide unmatched accuracy, reliability and longevity among percent level oxygen analyzers. They use an innovative zirconium oxide sensor that is highly stable, and minimally responsive to pressure changes, thus making the analyzer one of the few not to be affected by barometric pressure changes.

The standard model, called 111, is intended for positive pressure samples up to 100psig; the 111P adds a pump that allows it to operate on low pressure and vacuum samples from plus 10psig to 15 inches of mercury vacuum (7.5psia). Both analyzers are battery powered, but may be operated indefinitely from the wall charger supplied. They are CE marked, meaning that they meet the European (and thus by default the American) standards for EMI immunity and safety in a general purpose area. They are not designed for use with flammable samples or in a hazardous area.

Oxygen analysis can be a problematical area for people with no experience in it – and AMI is always happy to help you if you run into any problems. Please feel free to call at any time for help.

Caution

Read and understand this manual fully before attempting to use the instrument. In particular understand the hazards associated with using flammable or poisonous gases.

Address

Advanced Micro Instruments.

225 Paularino Avenue

Costa Mesa, CA 92626

(714) 848-5533

www.***amio2***.com

The unit meets the requirements of EN 61326-1 2006 and EN 61010-1. It is therefore CE marked.

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OM-300-024 Rev B

Model 111 Oxygen Analyzer

Introduction

The Advanced Micro Instruments Model 111 and 111P provide the latest in high precision percentage oxygen measurement in the range of 0.1% to 25% (or optionally, 50% and 95%). The Model 111 and 111P incorporate a state of the art Zirconium Oxide sensor that provides unprecedented accuracy and stability, while retaining the traditional AMI features and ease of use. The analyzers are portable and battery powered, however the sensor uses quite a lot of power and so the battery life is shorter than that of wet electrochemical analyzers, particularly if the pump is used. It has no analog output but instead records data electronically for subsequent download to a PC.

Features:

- Single measurement range; four datalog ranges selectable.
- High resolution 3 ½ digit LCD
- RFI protected
- Data logger
- USB virtual comport communication for advanced features
- Power requirements: 115/230VAC to 12VDC battery charger
- Low minimum detection limit 0.01% oxygen (25% version)
- Excellent repeatability and stability
- Extended operating temperature range to 130°F
- Fast upscale/downscale response times
- Long life sensor, 10 year life expectancy
- Unaffected by changes in flow rate from 0.1 to 2.0 SCFH
- Compact portable
- Meets UL Requirements (EN 61326-1 2006 and EN 61010-1). CE Marked for European Use.

Data logging:

The unit contains a real-time clock and 32K of non-volatile memory that provide a data logging function to be accessed by the AMI User Interface Program. It will automatically log readings and the time and date at intervals for subsequent downloading into a computer.

It records the average reading over a user-selectable period (in minutes), and after every 32 readings it records the time and date so that the user may reconstruct the data accurately. If logging is turned off, and then restarted, it will continue logging where it left off (starting with a new time and date stamp) – it won't overwrite the earlier data until it reaches the end of its memory.

Using the User Interface program supplied by AMI, the data may be downloaded into a "CSV" file for manipulation in Excel™ or similar spreadsheet programs, and the logging can be restarted at the beginning again. The internal time and clock may also be set, as well as a label to distinguish data from this analyzer from others.

As an example, if the time interval is set for 1 minute, the unit will average the readings for one minute and then store the average. Every 32 minutes it will also store the current date and time. It will continue doing this for about 20,000 data points, i.e. about two weeks, assuming it is left plugged in to its charger! After that time it will start writing over its earliest data.

Sample conditioning:

The model 111 is intended to use a positive pressure sample. The sample should be free of liquids, and dust. It must be free of combustible material, since the sensor will oxidize anything combustible, reducing the oxygen reading by the amount it took to burn up the contaminant. It is intended to operate with nitrogen as the background gas – high concentrations of other gases may be problematical, mostly because any significant change in thermal conductivity will either overheat or cool off the sensor. Generally speaking, up to 10% of any non-flammable gas is not a problem, but higher concentrations (other than nitrogen) may be. Please contact the factory for details if this should apply to you.

The analyzer does not respond to barometric pressure changes, unlike conventional oxygen analyzers.

Optional versions are available that can measure oxygen up to 50% or 95%.

The model 111P is equipped with a long-life pump, capable of drawing a sample through the sensor from an ambient pressure source, or vacuums down to 15"Hg. It will also operate at inlet pressures up to 10psig. The pump does draw more current than the rest of the analyzer, so the battery life is considerably shorter if you run the pump all the time; however like the standard unit it will operate indefinitely if plugged into its charger.

Using the AMI user interface program, the unit can be programmed to switch off the pump after a few minutes of operation, though by default it will run continuously. The LED on the front panel will change from green to blue when the pump is in use. If the batteries are low, the pump will only run for five seconds. Sometimes when the batteries are getting low, the increased current draw of the pump will

reduce the battery voltage and thus turn the pump off – in this case both the red and blue LED's will come on while the pump is running.

Safety:

A component of the sensor operates internally at a high temperature and will ignite any flammable gas mixture it sees. **Do not use this analyzer with flammable gases of any kind**. (Note, the analyzer itself runs at ambient temperature).

Oxygen sensor:

The Model 111's Zirconium oxide sensor produces an output current in proportion to the amount of oxygen present, and has virtually zero output in the absence of oxygen, thus avoiding any requirement to zero the analyzer. The span calibration may be performed using a standard span gas or oil-free compressed air. The sensor is so stable that span calibrations are only necessary once or twice a year. Unlike conventional sensors, the sensor does not age when it is not powered.

 **WARNING**	All zirconium oxide sensors operate at high temperature, and are unsuitable for measuring flammable gases. Any hydrocarbon gas will oxidize on the sensor, reducing the oxygen reading by the amount of oxygen required to burn the hydrocarbons. **DO NOT USE THIS ANALYZER WITH FLAMMABLE OR EXPLOSIVE SAMPLES!**

Installation and Operation

Receiving the analyzer

When you receive the instrument, check the package for evidence of damage and if any is found, please contact the shipper.

Charge the batteries:

Plug the wall adapter supplied into a suitable wall socket. The charger is a universal charger, and can be plugged into any voltage between 100 and 240 VAC. Plug the power jack into the back of the analyzer, and allow it to sit overnight for at least 14 hours. The internal charging circuit will not allow the batteries to be overcharged. The batteries in the model 111 will last for about 8 hours of continuous operation. In the 111P, they will last the same length of time if you don't use the pump; the pump will drain them in about an hour if you use it continuously. The unit is able to operate while the batteries are being charged. The maximum voltage the power input can accept is 13VDC. Anything higher than this will damage the unit.

Location:

The unit is designed to be used in a general-purpose area. It is not suitable for use in a hazardous area or with hazardous (explosive or flammable) gases. It may be operated either off its internal batteries or else off the charger, in which case it will simultaneously operate and recharge itself.

Although the unit is RFI protected, do not to mount it close to sources of electrical interference such as large transformers, motor start contactors, relays etc. Also avoid subjecting it to significant vibration.

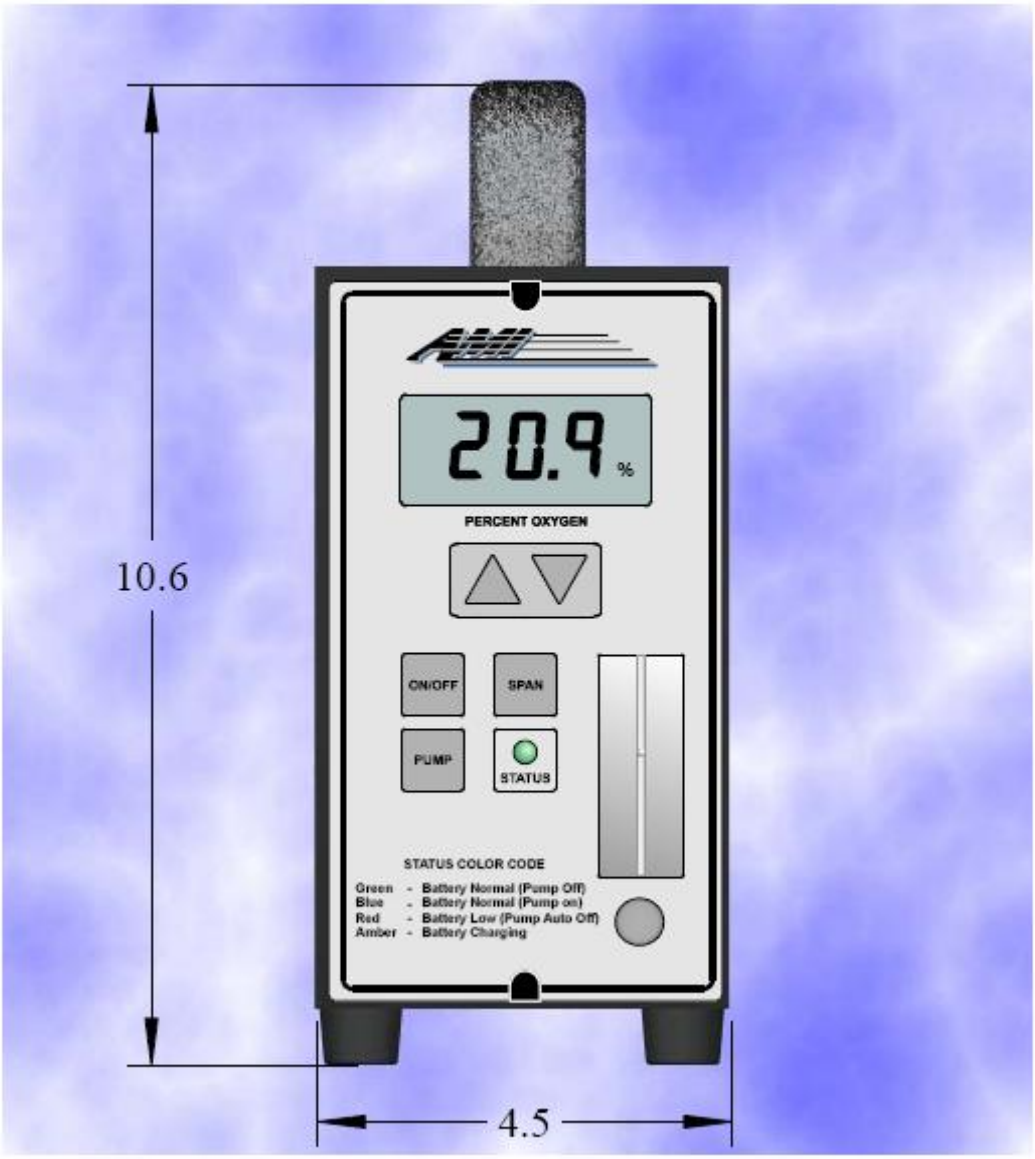


Figure 1. Outline Drawing

Sample gas and electrical connections:

The sensor is built into the analyzer, and does not need any separate installation. It is equipped with ¼" compression fittings on the inlet.

The exhaust should be left open, or if desired, brought through a low restriction tube such as ¼" diameter plastic tubing to a safe area.

The only electrical connection, other than the battery charger input, is a USB connector suitable for use with a standard USB type A to type B cable (such as is often supplied with a PC printer).

The unit is powered by its internal batteries but may also be powered as well as recharged by plugging in the power adapter supplied to the socket on the rear of the unit.

Interconnections:

Digital communications:

The Model 111/111P is equipped with a USB connector on the back of its case. This may be used to access data that has been logged by the built-in data logger, as well all the other features of the analyzer. These include the calibration settings, linearity settings, heater settings and internal voltages.

Use a standard USB cable and software supplied by AMI to configure and download data.

NOTE: THE COMPUTER USED MUST MEET UL STANDARDS FOR ELECTRICAL SAFETY!

Sample connection:

This unit is designed to be used with ¼" tubing supplied by the user. As an option AMI can supply a special flexible tubing accessory that avoids damage to fittings. It uses O ring sealed hand removable fittings. See the accessory page below. Attach it to the analyzer using a suitable fitting. Adjust the flow with the flowmeter valve to approximately 1 SCFH. After one to two minutes (depending on flow rate) the reading will stabilize.

For the standard unit (model 111), make sure the inlet pressure is between 0.5psig and 100psig.

For the pump version (model 111P), make sure the inlet pressure is between +10psig and about 15" Hg vacuum. Higher vacuums than this may damage the pump.

If the unit is plugged into its charger, it will run indefinitely.

For best response time and repeatability, take the reading at 1SCFH.

The sensor responds only minimally to barometric pressure changes – about 0.4% of reading for a 5psi pressure change (which is equivalent to a change in elevation of about 12,000 ft!).

Its output is slightly reduced by the presence of CO2 – substituting 1% CO2 for an equivalent amount of nitrogen in a gas mixture (i.e. air) will change the reading from 20.9% to 20.85%. Water vapor will also reduce the reading but merely by diluting the oxygen, not by affecting the sensor. Saturated air at 110F contains about 3% water vapor, so the oxygen reading will be reduced by 3% of 20.9% i.e. to 20.3% oxygen.

Operation

General Description:

This analyzer is designed to be as simple to operate as possible. The analyzer displays the oxygen level in appropriate units on the LCD, automatically adjusting its sensitivity as required. **Please note that the sensor takes about two minutes to warm up when the analyzer is turned on.** During this time, the analyzer will at first display 0% oxygen, and then the reading will climb up and overshoot before settling back down. Don't span it for at least ten minutes after it has warmed up as its reading may change by 0.1% oxygen over that time. You can view the sample flow rate on the built-in flow meter, and adjust it with the needle valve on the front of the analyzer.

Front Panel Controls:

The basic operation of the analyzer is controlled from its front panel. It has a series of tactile switches marked On/Off, Span and (in the case of the 111P) Pump, and two up and down arrow switches.
Pressing the ON/Off switch will turn the unit on (if it is off) and off if it is on. Press and hold it for a second. Note that the sensor will take the same two minutes to warm up no matter how quickly you turn it on again after it has been turned off!
The Span button allows you to calibrate the unit. See the Calibration section below.
The analyzer has a security feature which may be enabled by the User Interface program. If enabled, the span control will not have any effect. This may prevent an unauthorized person from changing the calibration incorrectly.

Flow Rate Adjustment:

Use the valve on the bottom of the flow meter to control the flow rate. This is not critical, since the analyzer is not sensitive to small pressure changes. The main effect is to change the response time – a slow flow rate may take a while to refresh the gas at the sensor. Simply standardize on a particular flow rate (typically 1 SCFH) and take all measurements at that value of flow.

Front panel LED:

There is a multi-color LED visible behind the little box with "Status" written on it. This LED changes color depending on the operational state.
In normal operation, it will be green.
If the pump is running, and the batteries are charged, it will turn blue (this is not applicable for the 111 version).
When the batteries are low, it will turn red, and the pump in the 111P will not work for more than five seconds.
When the unit is being recharged, and is turned on, both the red and green LED elements will turn on, producing a yellowish effect.

Calibration (25% unit):

1. **(111P) Turn on the pump, and allow the analyzer to draw in clean air at 1SCFH.**
2. **(111P) Optional: connect to a span gas cylinder with the regulator set at 8 psig.**
3. **(111) allow clean air from an air compressor (with an oil filter) or span gas to flow through the analyzer at 1SCFH. Make sure the source pressure is under 100psig, preferably 10psig.**
4. **Let the reading stabilize for approximately 2 minutes.**
5. **If the value shown by the analyzer is other than 20.9%, press the SPAN button.**
6. **Within 3 seconds, press the Up or Down arrow button and hold it.**
7. **When the reading has reached the desired level, release the button.**

Once you let go of the SPAN button, after a few seconds the "SPAN" flag on the display will go out and the unit will store the new span coefficient in its non-volatile memory

Note: It is possible to disable the calibration function with the AMI User Interface program. If it is not apparently possible to change the calibration, you must reset the security condition to "All front panel adjustments allowed" using the AMI user interface. Perform the calibration as above, and then change it back to "No front panel adjustments allowed" when you are done.

Calibration (111 or 111P with optional 95% or 50% range):

WARNING

95% oxygen is a hazardous oxidizer! Use only components cleaned for oxygen service!

Use only a dual stage regulator with stainless steel diaphragms on the span gas tank!

1. **(111P) Allow the analyzer to draw in 1SCFH of 95% (or 50%) oxygen with balance nitrogen span gas. Make sure the cylinder regulator is set at 8 psig.**
2. **(111) Flow 95% (or 50%) oxygen with balance nitrogen at 1 SCFH. Make sure the source pressure is no more than 10psig.**
3. **Let the reading stabilize for approximately 2 minutes.**
4. **If the value shown by the analyzer is other than 95% (or 50%), press the SPAN button.**
5. **Within 3 seconds, press the Up or Down arrow button and hold it.**
6. **When the reading has reached the desired level, release the button.**

A note on analyzer linearity:

Since the analyzer generates a relative measurement, it is not possible to characterize its linearity any better than by using a series of primary standard gases to verify its performance. Since these gases are only specified to be 1% accurate, we can't specify the analyzer as being any better than that, hence the 1% linearity spec. Experience indicates that in fact over many measurements we do better than 1%, but we can't guarantee it since there is no way of verifying that we really do so. For particular purposes, there are software adjustments that we can make that provide specific curve changes so that we can exactly match what a particular set of gases say, however these are by default left in their standard (linear) position. If for some reason you absolutely do have to match the analyzer to a set of standard gases, we can help you do so using our User Interface software package. We do recommend against doing this save as a last resort.

Atmospheric pressure effects:

The sensor is not particularly sensitive to changes in ambient pressure – a 5psi ambient change will change its reading by 0.4% of its value (i.e. 20.9% at 15psia will read about 20.8% at 10psia). Atmospheric pressure changes are usually less than 1psi, so the error due to this will be unnoticeable. Greater changes will be noticed from humidity effects when measuring air – at 110^{o}F you can have up to 3% humidity, which effectively reduces the oxygen concentration by the same proportion, to 20.3%.

High oxygen level gas hazards:

High oxygen level gas such as 95% oxygen in nitrogen is a very strong oxidizing agent. Treat it as if it is pure oxygen, and familiarize yourself with the rules for handling pure oxygen before attempting to use it. In particular, all tubing used must be suitable for oxygen service, and if you are using a high pressure span gas cylinder, you MUST use a dual stage regulator with stainless steel diaphragms on it. Any sudden failure of a regulator may allow enough temperature rise through adiabatic compression to ignite virtually anything, including stainless steel tubing and an AMI analyzer.

Communication program:

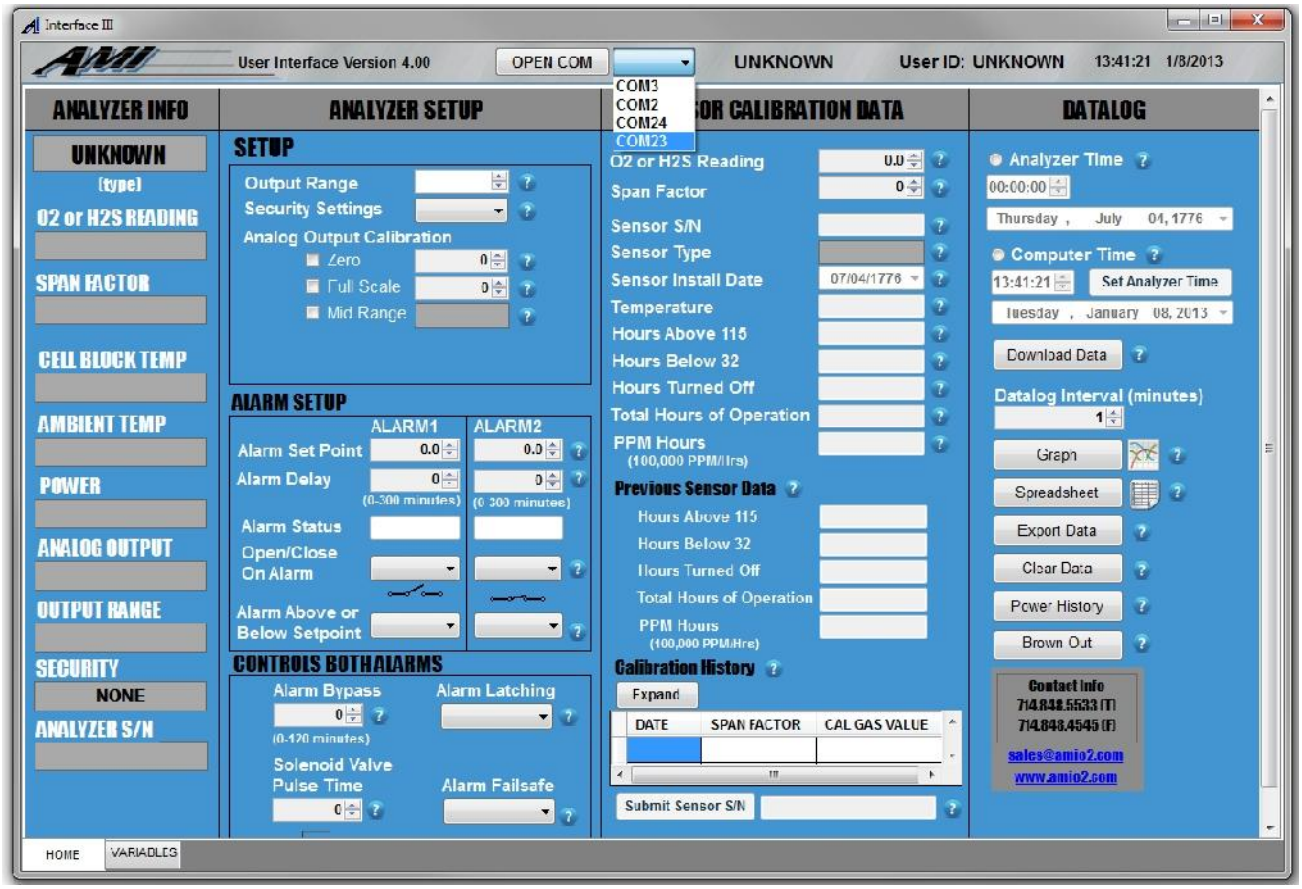


Figure 2. User interface initial screen

Load the program into your laptop computer by putting the CD into its CD or DBVD drive, and following instructions in the usual way. Make sure the analyzer is turned on and plugged into the computer using the USB cable before running the program.

The program will come up, and once you click the “Port” button (next to the OPEN COMM button at the top) will show a screen as above. Select the appropriate port, click “Open Com” and the program will automatically select the appropriate baud rate and determine the kind of analyzer present. It will fill in the relevant boxes and grey out the irrelevant ones.

The ports available will be shown. Depending on your particular computer, the port may be anything. If there are more than one available, you may have to try them all until you get the one that works.

Note that if the analyzer loses power, you will have to restart the AMI program as the USB chip will have to restart. This is why you have to turn the analyzer on before you run the program.

Once the program has connected, it will automatically fill in the various boxes with values it gets from the analyzer.

You can change values by writing in the new value and pressing ENTER (on the keyboard), or by clicking the appropriate button or scroll button. The program will send the values down to the analyzer, and after a little, read the value back to make sure it "took". If it didn't for some reason, the value will change back to whatever the analyzer actually has. Don't try to change many settings simultaneously, as the analyzer may get confused. Give each one a second or so to take.

Top section:

This shows the version of the user interface, the user ID (which can be set as desired by clicking on it) and the time and date.

Analyzer Info Section:

These boxes are populated by the program from data provided by the analyzer. (The 111 series of analyzers do not have all the features supported by this program, so a number of these boxes will be greyed out).

The analyzer model code will be shown at the top of this section.

The current oxygen reading will be shown in the "Reading" text box. The span factor will be shown below that.

The power supply voltage is shown in the box marked "Power". The output range is shown – this is the range over which the unit logs data - and also the security setting and the analyzer serial number.

Analyzer Setup Section:

First, set the desired output range. The logged data is stored as a percentage of this range.

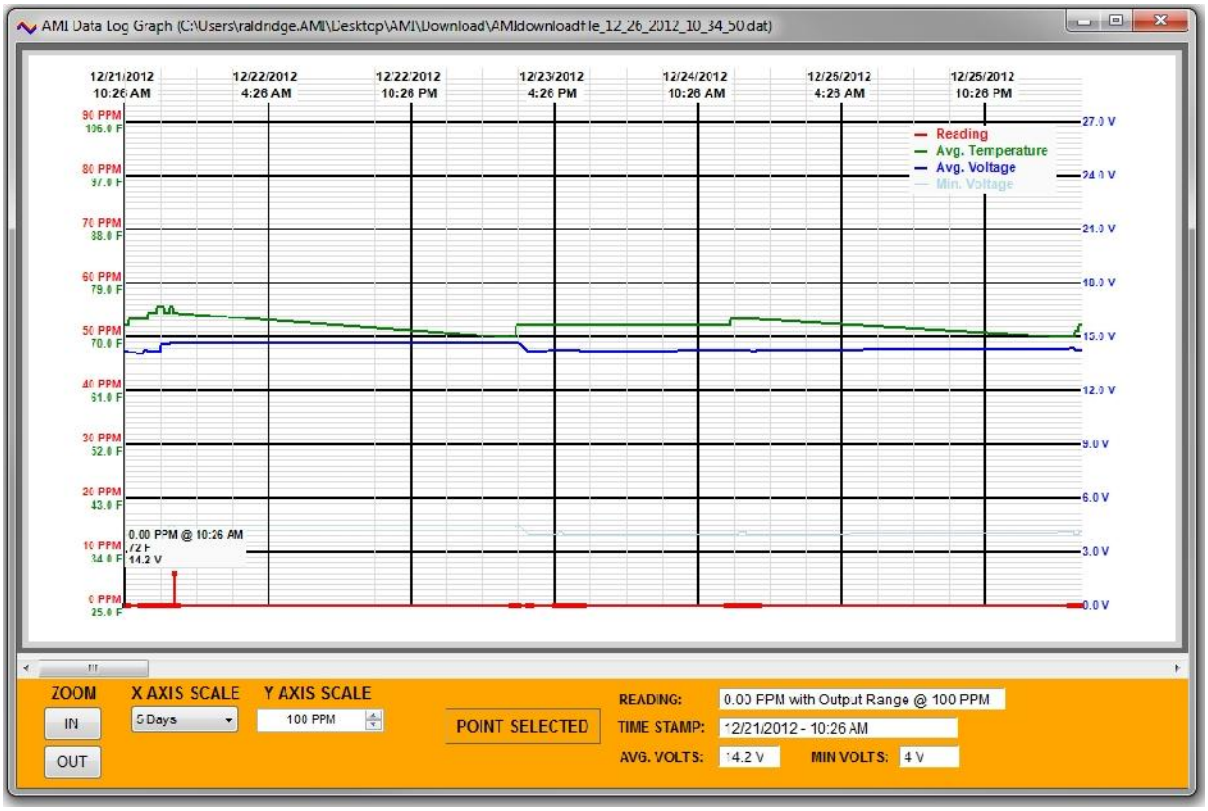
Select the security level desired. You can choose between none, (a user can adjust any of the front panel controls), span only (which is effectively the same as "none" for this analyzer), and full, in which case he can look at the settings but not change any of them.

The alarm set points and the output calibration are irrelevant for this analyzer.

Sensor Calibration Data:

This section shows information about the sensor. The Oxygen reading shown on the front panel, as well as the upper left portion of this screen is repeated in this section, and can be adjusted by editing the span factor in the box below, just as if the unit is calibrated via the front panel.

The sensor history is not supported by this analyzer, due to the special nature of the sensor used.



Data Logging

Figure 3. User interface datalog chart (ppm analyzer shown)

The program shows what the analyzer thinks is the current time and date, and also what your computer thinks is the current time and date. You can send the computer time and date to the analyzer by clicking on the “Set Analyzer Time” button. If you change the time and date, you may want to click the Clear Data button so the software doesn’t get confused by later times being earlier than earlier times!

The analyzer logs data at a rate set by the “Datalog Interval” box. Typically this interval will be set to 1 minute. The unit is capable of storing about 21000 data points, corresponding in this case to 21000 minutes, or rather more than 14 days. Setting the interval to 4 minutes will allow it to store over two

months of data. The oxygen reading is averaged for the logging period, and stored as a percentage of the current output range, with a resolution of 1% of the output range. Every 32 data points, various internal parameters including the time and date are stored as well. If the memory capacity is exceeded, the unit will overwrite the oldest data and keep on storing data in a circular fashion so that always the most recent set of data points can be retrieved.

Note that since the unit only stores the output range every 32 data points, if you change the output range this won't be recorded until the next time it stores this value, but the reading of course will change immediately. This means that there will be up to 32 data points with apparently the wrong value stored. We recommend that if you do change the output range you clear the data so that no confusion can arise.

You can download the stored data by pressing the "Download Data" button. It may take a couple of minutes to get it all, and the progress of this process is shown in a color bar, in traditional Windows style, though unlike most Windows programs the length of the bar does in fact correspond with the amount of data already retrieved.

Once the data is retrieved, it will be displayed in tabular form. It is automatically saved as an Excel™ compatible "CSV" format for subsequent analysis, so when you press the graph button the program opens a dialog box which allows you to graph any of the stored files – the latest one will of course be the most recent one. Double click it and the graph will appear. In the graph display you can zoom into data by clicking the "Zoom In" button, and zoom out by clicking the "Zoom out" button.

The analyzer can be left to overwrite the old data by itself, or else it can be told to start again at the beginning by pressing the "Clear Data" button.

The chart shows the oxygen reading, and the average battery voltage.

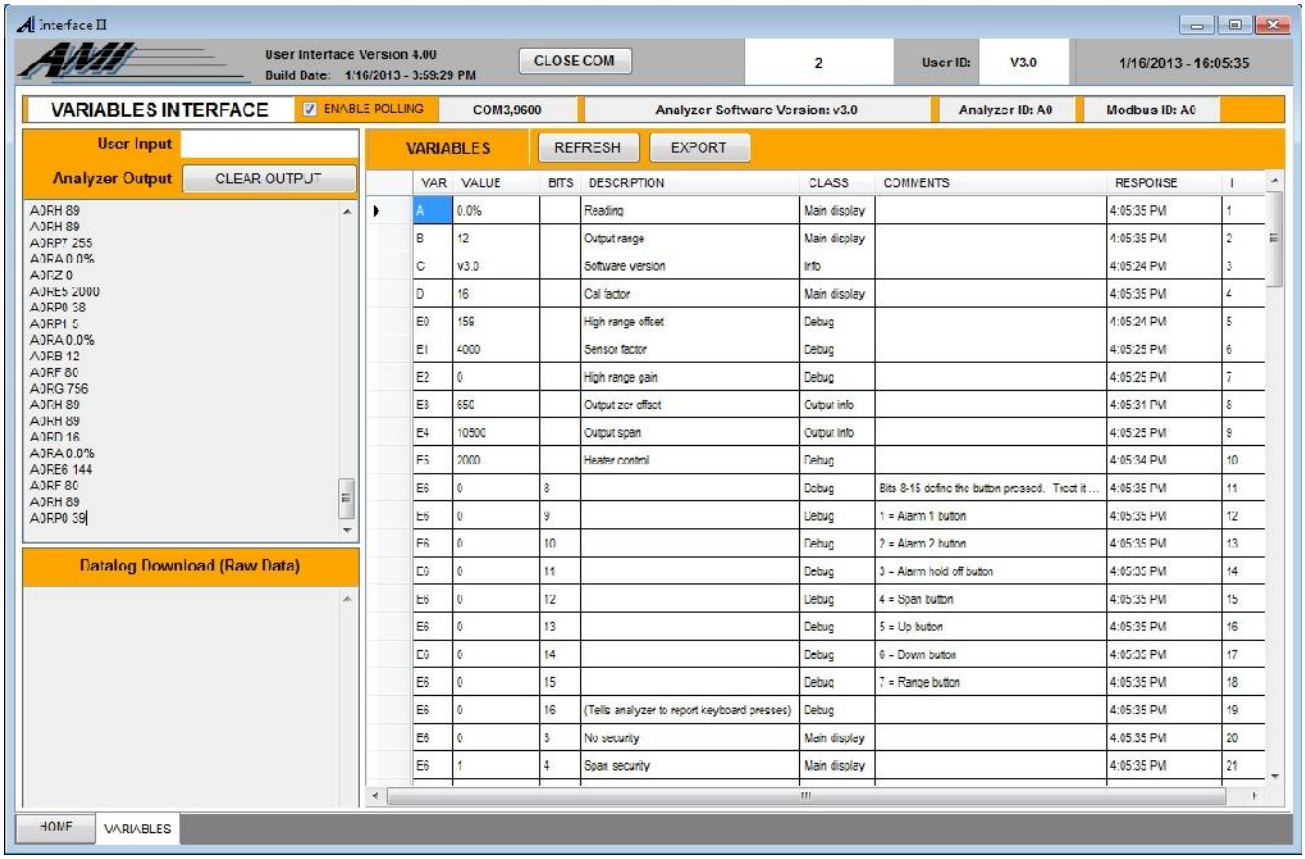


Figure 4. User interface Variables Screen

Variables:

This screen shows the internal operation of the analyzer, together with the operation of the communication program. It allows you to interrogate the analyzer for a particular variable manually, but normally this is not necessary. When the analyzer is first connected, the program will fill up all the variables in the list and will then poll a subset of them regularly. If desired the "REFRESH" button will cause the program to update every variable.

Mostly this screen is used for troubleshooting.

Maintenance and troubleshooting

Maintenance:

The AMI oxygen analyzer is virtually maintenance free other than for periodic calibration.

Sensor Replacement:

The sensor should last for many years. If the sensor expires you will have to return the analyzer back to the factory.

Battery Replacement:

The NiCd batteries provided should last for many years, but as with all batteries they will die eventually. To replace the batteries, follow these steps:

1. Remove the two front panel screws, and pull out the front panel. It won't come out very far as it is attached to many wires.
2. Disconnect the USB connector ribbon cable from the pc board.
3. If it is easier, unscrew the terminals holding the four sensor wires.
4. Remove the four socket head cap screws holding the battery bracket. These are located on the left side of the unit.
5. Remove the battery bracket.
6. Locate the two wires leading from the batteries to the pc board, and unplug them.
7. Replace the entire assembly with a new one available from AMI.
8. If you removed the sensor wires, screw them back into the terminal block. Note the color code is written on the back of the PC board next to the connectors.
9. Plug in any connectors you unplugged and replace the front panel. Charge (or recharge) the batteries for 14 hours prior to using the unit.

Troubleshooting

Analyzer does not power up.

1. Plug the charger into it and verify that the green light on the back comes on.
2. Charge the batteries overnight.
3. If it still won't power up, remove the front cover.
4. Check that the cables are plugged into the PC boards.
5. If nothing seems to be amiss, return the unit to AMI for repair.

Analyzer reads too low

1. Sensor is not calibrated. Flow span gas through the analyzer and span the analyzer until it reads appropriately. Use compressed air or certified calibration gas.
2. Flow rate is inadequate. Increase the flow using the valve on the flowmeter, or else turn on the pump and adjust the flow.

Analyzer reads too high

1. Verify that the gas flow rate is approximately 1 SCFH.
2. Check for leaks in the sample system using SNOOP or similar.
3. Oxygen diffusion can be a problem. Verify that no silicone tubing is used in the sample system. Use Copper, Stainless Steel, Teflon™ , Tygon™ or similar high quality tubing.
4. Verify the analyzer calibration using air as the span gas.

Analyzer reads zero

1. **The analyzer takes about two minutes to warm up. Give it some time**!
2. See if it will respond to air. If it does, you have zero oxygen in your sample.
3. If problem persists call AMI for a return authorization number.

Can't span the unit

1. (The unit won't respond to the up and down buttons during span)
2. Use the AMI User Interface program to set the security to either "Span only" or "No security".
3. Once you have spanned it, set the security back again so people do not adjust it in error.

No output to recording device

1. This unit has no analog output! You will have to use the digital connection, or download the stored data into a PC.

Incorrect readings

1. Verify that there are no leaks in the sample system.
2. Verify that the span gas bottle is correctly marked by comparing its reading when the analyzer has been spanned on air to what it actually says.
3. If spanning on air, verify that the air source is free of water vapor (humid air will contain about .3% less oxygen than expected, depending on temperature), and that bottled air does actually contain 20.9% oxygen. Manufactured air often does not!
4. The flow rate is off. Adjust it to be the same as when the unit was spanned.
5. Verify that there is no flammable gas in the sample. Anything flammable will burn on the surface of the sensor, reducing the oxygen reading by how much oxygen it takes to burn it all up. For example, 1% of hydrogen or carbon monoxide will reduce the oxygen reading by 0.5% of oxygen – if the sample contains 1% hydrogen, 2% oxygen and balance nitrogen, the reading will be 1.5%. If the sample contains 0.1% of pentane (C5H12) this will eat up 1.3% of oxygen, reducing the reading to 0.7% in the above case.
6. If you are trying to read oxygen levels below 1%, the above effects may be very significant.
7. Verify no exposure to gases containing silicone, lead or mercury. These will poison the sensor and reduce its output.
8. Verify no exposure to halogenated gases such as sulfur hexafluoride, or anesthetic agents. These will decompose on the sensor, both damaging it and also generating highly toxic reaction products such as $COCl_2$ (mustard gas).
9. Verify that the background gas does not contain high levels (over 10%) of non-conductive gases such as argon or carbon dioxide. These will overheat the sensor, causing premature failure. Also verify that the gas does not contain more than 10% of helium – this will cool the sensor causing it to read low.

Still no correct operation

1. Call AMI at 714 848 5533, and ask for Service.
2. Or contact us by email at sales@AMIO2.com.

Specifications and Disclaimer

Specifications:

Single measurement range: 0-25%, Optional ranges: 0-50% or 0-95%
Selectable datalog range: 0-1%, 0-5%, 0-10%, 0-25% (0-50% and 0-100%* optional)
Digital display: 3 ½ digit LCD. Reads full scale from 0.01 to 25.0% (or 50.0% or 95.0%)
Data logger: Logs data for 15 days @ 1 minute intervals, 30 days @ 2 minute intervals, etc Represents the datalog range selected.
Power requirements: 115/230VAC to 12VDC battery charger. Rechargeable NiCad batteries, 8 hours continuous for **Model 111.** Rechargeable NiCad batteries, 1 hour continuous for **Model 111B and Model 111P** pump versions
Minimum detection: .01% of oxygen
Repeatability: +/- 0.1% of range or +/- 0.1% of oxygen, whichever is greater
Operating temperature range: 0 to 130˚ F
Diurnal temperature specification: < +/- 2 % of scale over temperature range
90% full scale response times for specified range: 0-25% <12 seconds; 0-95% < 12 seconds
Long life zirconium oxide sensor: 10 year life expectancy
Area Classification:
Model 111 and 111P: Designed to meet General Purpose requirements
Model 111B: Designed to meet Class 1, Div. 2, Groups C,D requirements
Inlet gas pressure:
Model 111: 0.5 to 100psig
Model 111P and 111B: -14in Hg to +10psig
Gas connections: ¼" 316 S.S. compression fittings
Wetted parts: 316 S.S. fittings, anodized aluminum cellblock, acrylic flow meter and Viton O-rings
Unaffected by changes in flow rate from 0.1 to 2.0 SCFH
Dimensions: 4.5"W x 10.5"H x 5.5"D
Weight: 5 to 6 lbs. depending on Model

*The datalog range is 0-100% but the analyzer can only measure up to 95% due to limitations of the sensor.

CE marked.

*Note that accuracy is determined by the accuracy of the gas calibration standard used for calibration. Any uncertainty in the oxygen content of the standard used will add to the analyzer specification.

Disclaimer

Although every effort has been made to assure that the AMI analyzers meet all their performance specifications, AMI takes no responsibility for any losses incurred by reason of the failure of its analyzers or associated components. AMI's obligation is expressly limited to the analyzer itself.

In particular, the AMI analyzer is designed for operation with non-flammable samples in a general purpose or Class 1 Division 2 Group C, D area. Any damage resulting from its use in a more hazardous area is expressly the responsibility of the user.

The AMI analyzer is not designed as a primary safety device, that is to say it is not to be used as the primary means of assuring personnel safety. In particular it is not designed to act as a medical instrument, monitoring breathing air for correct oxygen concentration, and should not be used as such when it is the only safety device on the gas system.

AMI® WARRANTY & SUPPORT

LIMITED WARRANTY/DISCLAIMER

The warranty period is **TWO YEARS** for the Analyzer. Any failure of material or workmanship will be repaired free of charge for that specified period from the original purchase (shipping date) of the instrument. AMI will also pay for 1-way ground shipment back to the customer.

The warranty period for the electrochemical oxygen sensor is 6 months.

The warranty period for the electrochemical H_2S sensor is 6 months.

The warranty period for the zirconium oxide sensor is 2 years.

Any indication of abuse or tampering of the instrument will void the warranty.

Receiving the Analyzer
When you receive the instrument, check the package for evidence of damage and if any is found contact the shipper. Although every effort has been made to assure that the Analyzer meets all performance specifications, AMI takes no responsibility for any losses incurred by reason of the failure of this analyzer or associated components. AMI's obligation is expressly limited to the Analyzer itself.

EXCEPT FOR THE FOREGOING LIMITED WARRANTY, AMI MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE NON-INFRINGEMENT OF THIRD-PARTY RIGHTS, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE. IF APPICABLE LAW REQUIRES ANY WARRANTIES WITH RESPECT TO THE SYSTEM, ALL SUCH WARRANTIES ARE LIMITED IN DURATION TO TWO (2) YEARS FROM THE DATE OF DELIVERY.

LIMITATION OF LIABILITY

IN NO EVENT WILL AMI BE LIABLE TO YOU FOR ANY SPECIAL DAMAGES, INCLUDING ANY LOST PROFITS, LOST SAVINGS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, EVEN IF THE COMPANY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, OR FOR ANY CLAIM BY ANY OTHER PARTY.

LIMITATION OF REMEDIES

AMI's entire liability and your exclusive remedy under the Limited Warranty (see above) shall be the replacement of any Analyzer that is returned to the Company and does not meet the Company's Limited Warranty.