ADVANCED MICRO INSTRUMENTS

An ENPRO Company

MODEL 3000BX

PORTABLE TRACE HYDROGEN SULFIDE ANALYZER

Operator Manual

Special Message from Advanced Micro Instruments® (AMI):

Thank you for purchasing this **MODEL 3000BX** for your portable trace hydrogen sulfide (H_2S) measurement needs. This portable trace H_2S analyzer is the industry's most advanced and has several innovative features. You will find that it will deliver the highest levels of performance, reliability, and intuitive features.

NOTE: *Read this manual carefully prior to use.*

If you have any questions, contact AMI at 1.714.848.5533 or www.amio2.com.

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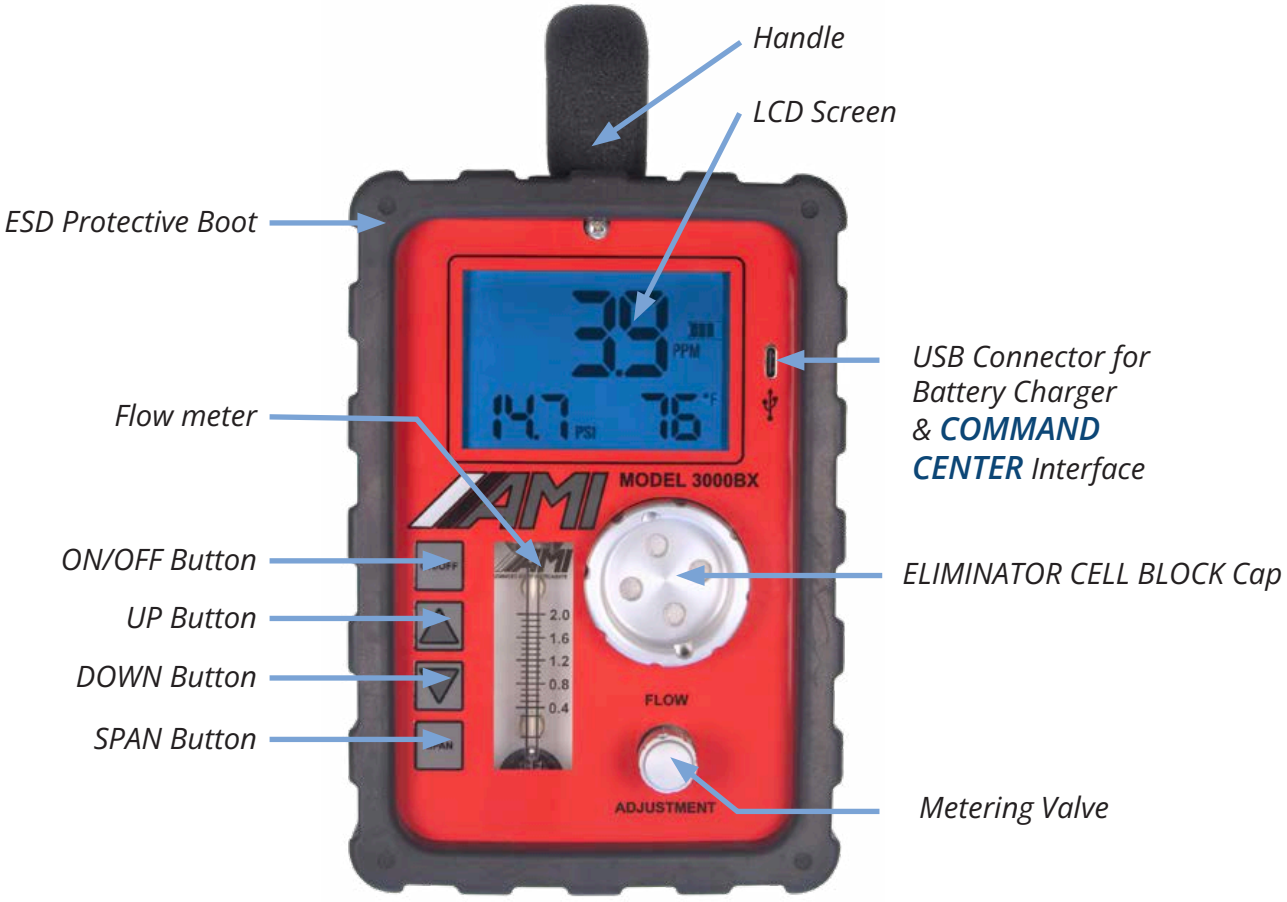
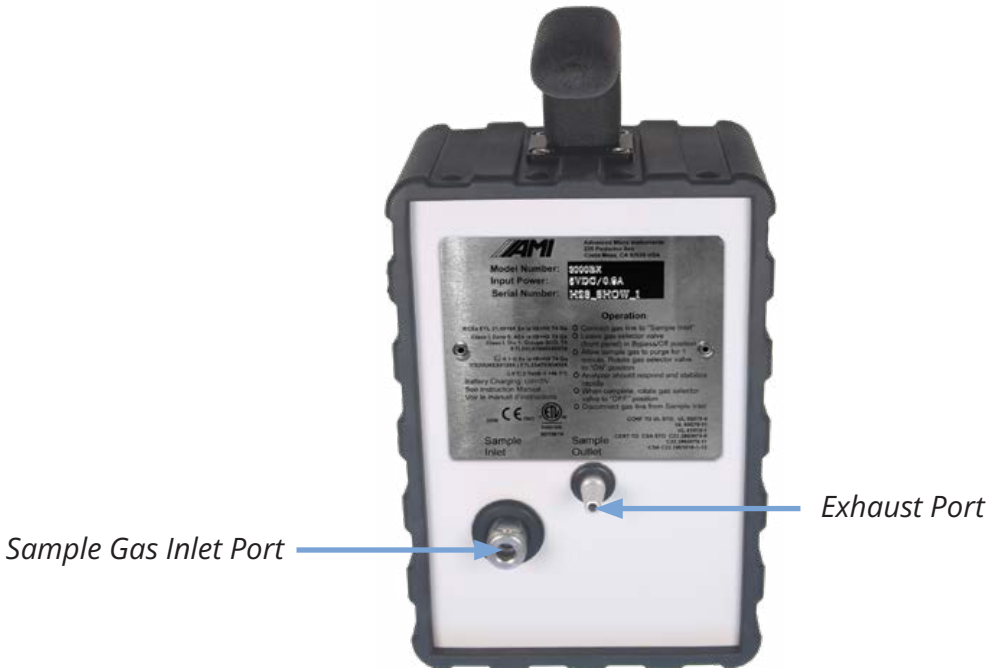
ANALYZER OVERVIEW

Analyzer Front View



Analyzer Back View



END OF ANALYZER OVERVIEW

METHOD OF MEASUREMENT: ELECTROCHEMICAL HYDROGEN SULFIDE SENSORS

The **MODEL 3000BX** utilizes an electrochemical sensor with a strong sensitivity to trace levels of hydrogen sulfide. AMI offers customers two sensor options, based on the needs of their applications. One option can measure trace hydrogen sulfide levels to as high as 200 ppm, while the other option increases the measurement range to 2,000 ppm.

Hydrogen Sulfide Sensor Type	Low Range	High Range
Measurement Range	0 – 200 ppm	0 – 2,000 ppm
Sensitivity	0.1 ppm	1 ppm

IMPORTANT:
*The **MODEL 3000BX** Analyzer measurement configuration is SPECIFIC to the H_2S Sensor it uses. The Analyzer is configured for the H_2S sensor that is selected at the time of shipment. If the type of H_2S sensor is changed from the originally selected sensor, please contact the AMI factory for information on how to configure the Analyzer for a different sensor.*

While our sensors have a strong sensitivity to trace levels of H_2S, they also have a cross-sensitivity to other gases.

Cross-sensitivity of Interfering Gases					
Interfering Gas Compound	**Symbol**	**Tested Concentration Input**	**Tested Level**	**Low Range Sensor % Effect**	**High Range Sensor % Effect**
Methyl Mercaptan	CH_4S	PPM	40	< 60	< 60
Hydrogen	H_2	PPM	400	< 0.5	< 0.2
Carbon Monoxide	CO	PPM	400	< 3	< 4
Sulfur Dioxide	SO_2	PPM	20	< 18	< 20
Nitrogen Dioxide	NO_2	PPM	10	< -30	< -25
Chlorine	Cl_2	PPM	10	< -25	< -12
Nitrogen Oxide	NO	PPM	50	< 35	< 10
Ethylene	C_2H_4	PPM	400	< 0.5	< 0.25
Ammonia	NH_3	PPM	400	< 0.1	< 0.1
Carbon Dioxide	CO_2	%	5	< 0.1	N/A
Hydrogen Cyanide	HCN	PPM	10	N/A	N/A
Hydrogen Chloride	HCl	PPM	5	N/A	N/A

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To calculate the effect of the interfering gas on the output of the analyzer, the percent effect is multiplied by concentration input of the known interfering gas. This value will be the offset of the analyzers reading.

EQUATION: Analyzer Reading = (known H_2S concentration) PPM + (Known Interfering Gas with concentrations levels noted from tested levels) x (% Effect on sensor)

EXAMPLE 1: A sample gas contains 20 ppm of H_2S and 10 ppm of Sulfur Dioxide. The sensor used is an AMI low range sensor. The Cross-Sensitivity calculation for SO_2 is 10x 0.18=1.8 ppm. The reading for H_2S on the Analyzer will be 20 ppm + 1.8 ppm = 21.8 ppm.

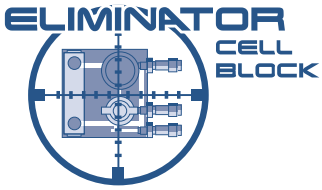
EXAMPLE 2: A sample gas contains 4 ppm of H_2S and 50 % of CO_2. The sensor used is an AMI low range sensor. The Cross-Sensitivity calculation for CO_2 is 50x 0.001=0.05 ppm (units are ignored here). The reading for H_2S on the Analyzer will be 4 ppm + 0.05 ppm = 4.1 ppm.

END OF METHOD OF MEASUREMENT: ELECTROCHEMICAL HYDROGEN SULFIDE SENSORS

KEY INNOVATIONS

Advanced Micro Instruments has developed proprietary technologies that enable our Analyzers to deliver the highest levels of **PERFORMANCE, RELIABILITY** and **EASE-OF-USE**. These technologies are utilized by the **MODEL 3000BX** and are not available on any competitive offering.

ELIMINATOR CELL BLOCK



The proprietary **ELIMINATOR CELL BLOCK** provides a unique, compact sample system approach and a flow-efficient sensor pocket machined into a solid metallic block. Precision cross-drilled intersecting gas passages eliminate the need for long lengths of tubing and leak-prone compression fittings. It also provides the user with direct front panel access for installing and replacing sensors without the need for disassembly or tools.

This approach is far superior to traditional sample systems that use multiple off-the-shelf components, numerous compression fittings, and long lengths of tubing that join everything together. The traditional, outdated approach requires a great deal of space and fittings and is prone to leaks.

COMMAND CENTER Interface Software

This powerful software platform comes standard with every **MODEL 3000BX** purchase and provides users with access to a full suite of advanced features, including:

- Data logger that records measurement readings, temperature of the cell block, and power voltage over a period of fifteen (15) days at one-minute intervals (data can be displayed on a graph or in tabular format)
- Security settings to prevent unauthorized adjustments to the Analyzer via the front panel

END OF METHOD OF KEY INNOVATIONS

SYMBOL TABLE

	Warning - Risk of Danger or Harm to the User or Risk of Damage to the Product. Consult the operator manual.

	USB Symbol

END OF SYMBOL TABLE

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SAFETY, WARNINGS & CAUTIONS

A **WARNING** identifies conditions or procedures that can be dangerous to the user.

A **CAUTION** identifies conditions or procedures that can cause damage to the Product.

⚠ WARNING

Make sure no hazardous gas is present in the area before and during charging.
Violation of the National Electrical Code requirements (especially Article 500 that deals with hazardous areas) may cause a fire or explosion with the potential for serious injury or loss of life.

⚠ WARNING

Drilling any holes in the enclosure will violate the safety approval and may create risk of harm.

⚠ WARNING

SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

LE REMPLACEMENT DE COMPOSANTS PEUT COMPROMETTRE LA SECURITE INTRINSEQUE.

⚠ WARNING

Any use of this equipment in a manner not specified in this manual or approved AMI documentation may impair the protection provided by the equipment.

Toute utilisation de cet équipement d'une manière non spécifiée dans ce manuel ou dans la documentation AMI approuvée peut altérer la protection fournie par l'équipement.

⚠ CAUTION

The product is rated to IP20. The enclosure does not protect against the ingress of dust or fluids. Electronics are conformally coated to provide protection in outdoor environments. Conformal coating is a protective layer consisting of a specially engineered polymeric film-forming product. This coating protects circuit boards and components from harmful environmental conditions such as moisture, thermal shock, static, vibration, and contamination.

This product is not designed for use in environments where condensation or dust may accumulate on or around the device. Use only in environments free from condensation, dust, and excessive humidity. It is recommended to limit exposure by not using the product in humid or dusty conditions.

Do not clean Analyzer by spraying it down with a cleaner. Cleaner should be sprayed on a clean cloth which is used to wipe the Analyzer as needed.

⚠ CAUTION

The voltage rating of the Analyzer is 5 VDC.

– Voltages outside this range may cause the Analyzer to malfunction.

⚠ WARNING

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

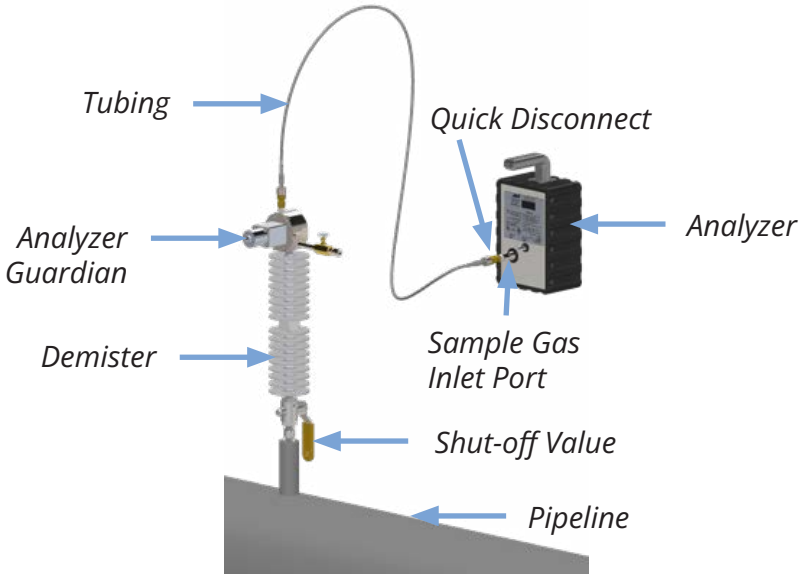
AVERTISSEMENT – DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES – VOIR INSTRUCTIONS

END OF SAFETY, WARNING & CAUTIONS

ANALYZER OPERATION

Analyzer Connection

Portable Analyzer Connections



Key Points

– The Analyzer should only be used in an environment where the ambient temperature remains between 25 °F (-3.9 °C) and 115 °F (46.1 °C)

⚠ WARNING:

The Analyzer weighs 6 lbs (2.7 kg) and can pose a risk to the user if dropped.

Steps (refer to figure Portable Analyzer Connections)

1. Turn the Shut-off Valve on the pipeline to the off position.
2. Connect one end of the flexible tubing with the supplied quick disconnect to the SAMPLE GAS INLET PORT on the back of the Analyzer.
3. Connect the other end of the flexible tubing to the Sample Tap of the pipeline.

⚠ CAUTION

Tubing must be suitable material that does not react with hydrogen sulfide. Polished stainless steel or other specialty flexible tubing is recommended.

NOTE: *AMI offers non-diffusive flexible tubing as an accessory for purchase. See Accessories Section for available options.*

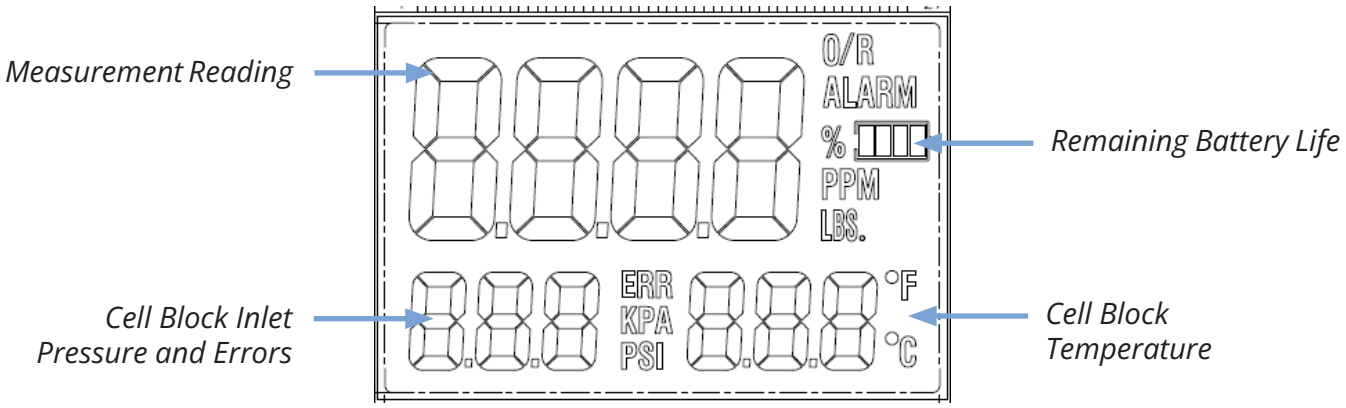
If the pipeline gas contains liquids, water, oil or glycol vapors, we recommend installing AMI's ***DEMISTER*** *and* ***ANALYZER GUARDIAN*** *or an equivalent to prevent damaging the Analyzer.*

Powering Up the Analyzer

Analyzer ON/OFF Button

To turn on the Analyzer, press the ON/OFF Button on the front panel.

Analyzer LCD Display



The LCD will take a few seconds to stabilize once the Analyzer is turned on. The LCD has a backlight that will turn on when the analyzer is powered up or when any button on the front panel is pressed. The backlight will turn off after twenty (20) seconds if no buttons are pressed. The backlight can be turned on again by pressing any button on the front panel.

Initiation of Sample Flow & Performing Measurements

Analyzer Flow Controls

⚠ CAUTION:

DO NOT OVERTIGHTEN the METERING VALVE or you will damage it.

Sample Gas Flow

To increase the Flow Rate, turn the METERING VALVE Knob counterclockwise. To decrease, turn the METERING VALVE Knob clockwise.

Steps

1. The Analyzer should already be connected to the pipeline and powered-up from following the instructions in the sections Analyzer Connection and Powering-up the Analyzer.
2. Open the Shut-off Valve on the pipeline. The sample gas pressure must be in the range of 0.5 – 150 psig (3 – 1,034 kPa).
3. Adjust the flow rate to approximately 1 SCFH using the METERING VALVE.
4. Allow the sample to flow through the Analyzer for at least twenty (20) minutes for the reading to stabilize.
5. Record the H_2S reading. Once completed, turn the METERING VALVE clockwise until it is closed.
6. Turn the Analyzer off by pressing the ON/OFF button.
7. Turn the Shut-off Valve on the pipeline to the off position.
8. Disconnect the Analyzer and flexible tubing from the Sample Tap.

Measurements Over Extended Period of Time

The **MODEL 3000BX** Analyzer may be used to record measurements over an extended period of time. The Analyzer data log will start recording when turned on and will record continuously until the analyzer is powered off. The data log can be downloaded when the

Analyzer is connected to the ***COMMAND CENTER*** Interface Software.

Verify that the Analyzer date and time are configured correctly in order for measurement values to be time stamped correctly. The Analyzer date and time can be updated by connecting the Analyzer to the ***COMMAND CENTER*** Interface Software. When using the Analyzer to measure over an extended period of time, the Analyzer should be left in a secure area away from moisture, dust, and direct sunlight. The temperature must remain within the operational temperature range of the Analyzer.

Sensor Installation

⚠ WARNING

Do not use a sensor that is leaking. The sensor contains an acidic electrolyte. If the sensor is leaking, use protective gloves to properly dispose it according to local regulatory guidelines. If the electrolyte comes into contact with your skin, immediately flush the affected area for a minimum of fifteen (15) minutes and refer to the Safety Data Sheet for the sensor.

⚠ CAUTION

Only use AMI hydrogen sulfide sensors with AMI Analyzers. Sensors from other manufacturers will degrade Analyzer performance, result in accuracy errors, and void the warranty.

NOTE:
A new Analyzer ships from the AMI factory with an H_2S sensor installed.

Analyzer Sensor Replacement

Sensor Replacement

Analyzer Sensor Pocket

1. Remove the ELIMINATOR CELL BLOCK CAP by turning it counterclockwise.
2. Remove the expired sensor.
3. Open the bag containing the new hydrogen sulfide sensor.
4. Orientate the new hydrogen sulfide sensor into the sensor pocket as shown in the image above.
5. Replace and tighten the ELIMINATOR CELL BLOCK CAP by turning clockwise until 'hand-tight'.
6. Connect analyzer to a suitable, known span/calibration gas. Adjust the flow rate to approximately 1 SCFH. Allow the measurement reading to stabilize for twenty (20) minutes.
7. Press the SPAN Button and release. The word SPAN will appear on the LCD for one (1) second and then display the H_2S reading, while the PPM FLAG blinks. Quickly press the appropriate UP/DOWN Button to adjust the LCD reading to the value stated on your calibration gas cylinder.
8. Dispose the old sensor in accordance with local, state, and federal regulations.

Change Sensor Type in Analyzer

The **MODEL 3000BX** Analyzer is configured at the factory for the AMI hydrogen sulfide sensor selected at purchase. If another type of sensor is installed, the Analyzer will not read correctly. However, the Analyzer can be reconfigured for another sensor type. If you want to change the sensor type installed in the Analyzer, please contact the AMI factory for instructions on how to update the Analyzer to recognize the new sensor type.

Calibration

NOTE: *Every* ***MODEL 3000BX*** *unit undergoes rigorous internal quality tests prior to shipping. This includes a complete electronics and in-depth gas test.*

For the best accuracy, calibrate your Analyzer every thirty (30) to forty-five (45) days using a calibration gas standard with your desired range of H_2S in a background of nitrogen.

We recommend 50 ppm H_2S in a background of nitrogen for safety for our low range (0 – 200 ppm) model.

If you are calibrating the high range ***MODEL 3000BX*** *Analyzer (0 – 2,000 ppm) with a Span Gas, we recommend a Span Gas < 200 ppm for safety reasons.*

Calibration With Span Gas

We encourage you to view our calibration video at www.amio2.com before starting.

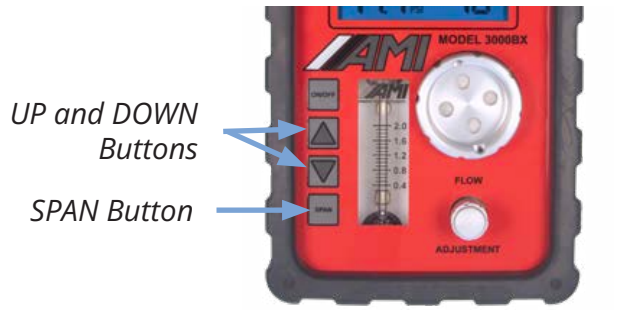
Required Components:

- Certified Span gas with approximately 50 ppm H_2S in background of nitrogen
- Stainless steel reducing regulator, outfitted with inlet/outlet pressure gauges and CGA 330 connection fitting
  (***NOTE:*** regulator must have a stainless-steel diaphragm)
- Flexible (non-diffusive) tubing (available for purchase from AMI) or a length of stainless-steel tubing
- Tank wrench

Calibration Steps:

1. Connect the AMI-supplied non-diffusive flexible tubing or stainless steel tubing from the regulator outlet fitting to the SPAN INLET GAS PORT.
2. Open the valve of the Span Gas Tank and adjust the regulator pressure to approximately 20 psig.
3. Adjust the flow rate to approximately 1 SCFH.
4. Allow the measurement reading to stabilize for twenty (20) minutes.
5. Span the Analyzer to the value of the H_2S, specified on the Span Gas Tank, by doing the following:
   Press the SPAN Button and release. The word Span will appear on the LCD for one (1) second and then display the H_2S reading, while the PPM FLAG blinks. Quickly press the appropriate UP/DOWN Button to adjust the LCD reading to the value stated on your calibration gas cylinder.

Analyzer SPAN Buttons



6. Once completed, wait for a few seconds. The PPM FLAG will stop blinking, and the Analyzer will accept the new calibration.
7. Disconnect the unit from the Span Gas Tank.

Displaying the Current Span Factor

Analyzer UP Button

Press the UP Button.

Importance of Span Factor

The Span Factor is an indication of sensor life. The Span Factor is accurate only after an accurate calibration has been completed.

The Span Factor of a new H_2S sensor is in the range of 400 to 600.

Over time, as the H_2S sensor ages, each calibration should require an adjustment with the UP Button to correct for any degradation of the electrochemical sensor output

NOTE: *The degradation is approximately 1% of the reading per month.*

When the Span Factor reaches around 980, it will become necessary to replace the sensor during the next calibration.

Front Panel Interface

Analyzer Main Screen

Click here return to a Table of Content page.

Readings on the LCD – Main Screen

Hydrogen Sulfide Concentration

Hydrogen sulfide readings are displayed in ppm. The **MODEL 3000BX** automatically adjusts the resolution of the displayed measurement value. The displayed resolution by measured H_2S concentration is per the following table.

Low Range Sensor	
Measurement Value	**Output Resolution**
0 – 200 ppm	###.#

High Range Sensor	
Measurement Value	**Output Resolution**
0 – 2,000 ppm	####

Cell Block Inlet Temperature

Operating temperature of the measurement cell block can be displayed in either Fahrenheit (°F) or Celsius (°C).

⚠ CAUTION:

Operational temperature range of the Analyzer is 25 °F to 115 °F (-3.9 °C to 46.1 °C). Operating the Analyzer outside the operational temperature range could damage the Analyzer.

NOTE: *Fahrenheit is the factory default unit for temperature. Users can switch to Celsius by changing the settings in the* ***COMMAND CENTER*** *User Interface Software. See Change Display to Metric Units section.*

Cell Block Inlet Operating Pressure.

Gas inlet pressure can be displayed in either psi or kPa.

⚠ CAUTION:

Gas inlet pressure must be between 0.5 –150 psig (3 – 1,034 kPa). Exposing the Analyzer to a pressure greater than 150 psig (1,034 kPa) could damage the analyzer. An inlet gas pressure less than 0.5 psig (3 kPa) will not provide the necessary pressure for the Analyzer to operate.

NOTE: *Imperial psi is the factory default unit for gas pressure. Users can switch to kPa by changing the settings in the* ***COMMAND CENTER*** *User Interface Software. See Change Display to Metric Units section.*

Battery Indicator

Battery indicator has four (4) bars to indicate battery charge. The Analyzer will operate approximately twenty-five (25) days when fully charged.

If the battery indicator shows no bars and is blinking, the battery level is critically low and unit should be charged immediately in order to prevent the unit from shutting down.

If the battery indicator shows four (4) bars and is blinking, the battery is in an overvoltage condition. Contact AMI for assistance if the battery experiences an overvoltage condition.

If the battery indicator is cycling showing one, then two, then three, then four bars, the unit is charging.

NOTE: *When the analyzer is charging, the battery indicator does NOT indicate the battery charge.*

Error Indicator Display

Error Indicator

Error Indicator

If the Analyzer detects any errors, ERR will display next to the Operating Pressure reading. See Error Status Display: Error Reference Guide section for more information.

Readings on the LCD – Toggled Screens

Model Information Display

Model Information

From the main screen, press the DOWN Button once. Screen will show “AnA” in the lower left-hand corner and display the analyzer model number “3000” and gas measured “H2S”.

Battery Voltage Display

Battery Voltage

From the main screen, press the DOWN Button twice. Screen will show “bat” in the lower left-hand corner and display battery voltage in volts as the reading.

Date Display

Date

From the main screen, press the DOWN Button three (3) times. Screen will show “da” in the lower left-hand corner and display the date as a two (2) digit day and two (2) digit month separated by a period in the top of the display and the year as two (2) digits in the lower right hand corner.

If the incorrect date is displayed, it may be updated through the ***COMMAND CENTER*** User Interface.

NOTE: *The unit is shipped with the date and time at the manufacturing factory. Please verify that the date and time is correct for the operational location of the Analyzer prior to use.*

Time Display

Time

From the main screen, press the DOWN Button four (4) times. Screen will show “ti” in the lower left-hand corner and display the time in a twenty-four-hour time format as a two (2) digit hour and two (2) digit minute separated by a period in the top of the display and the seconds as two (2) digits in the lower right hand corner.

If the incorrect time is displayed, it may be updated through the ***COMMAND CENTER*** User Interface.

NOTE: *The unit is shipped with the date and time at the manufacturing factory. Please verify that the date and time is correct for the operational location of the Analyzer prior to use.*

Sensor Type Display

Sensor Type

From the main screen, press the DOWN Button five (5) times. Screen will show “SnS” in the lower left hand corner and display the sensor configured for the analyzer in the top of the display as follows:

- 21 for a Low Range Sensor, 4SEN21
- 22 for a High Range Sensor, 4SEN22

In the lower right hand corner of the display, “trc” will show indicating it is a trace measurement sensor.

If the incorrect sensor is displayed, please contact the AMI factory for assistance on how to update the sensor type using the ***COMMAND CENTER*** User Interface.

Firmware Revision Display

Firmware Revision

From the main screen, press the DOWN Button six (6) times. Screen will show “rEL” in the lower left-hand corner and display the installed firmware revision.

Error Details Display

Error Details

From the main screen, press the DOWN Button seven (7) times. Screen will show “Err” in the lower left-hand corner and display the first error code. If there are multiple active error codes, pressing the DOWN Button again will show the next error code. Continue pressing the DOWN Button to reveal all error codes. When all error codes have been shown, the next press of the DOWN Button returns the screen to the Battery Voltage display.

Powering-off the Analyzer

Analyzer ON/OFF Button

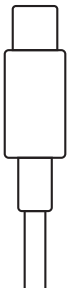
Press the ON/OFF Button on the front panel to turn the Analyzer off.

END OF ANALYZER OPERATION

COMMAND CENTER SOFTWARE

Interface with *COMMAND CENTER*

USB Type C Connector

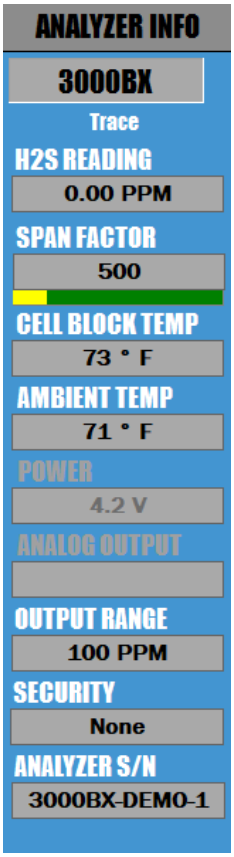


Analyzer USB Connector

1. The Analyzer has a USB Type C Connector. This port is used for both charging and communication. Take the Type C end of a USB cable and connect it to the Analyzer. Take the other end of the cable and connect it to a laptop or PC. Unit can also be charged by connecting the USB cable to an appropriate USB wall plug.

COMMAND CENTER User Interface Window

View of the Analyzer Info Column in *COMMAND CENTER* User Interface Window



2. Power up your Laptop and open the current version of the ***COMMAND CENTER*** User Interface Software.

3. Once the link is established, the software will automatically recognize the Analyzer and populate the Analyzer Info Column with information specific to your Analyzer. You may need to click the OPEN COM button at the center-top of the ***COMMAND CENTER*** screen to establish a connection.

   The Analyzer Info Column will display the following information about your Analyzer:
   - Analyzer Model Number
   - Measurement Reading
   - Span Factor
   - Cell Block Temperature
   - Ambient Temperature
   - Output Range
   - Security Selection
   - Analyzer Serial Number

Operating the Data Logging Feature

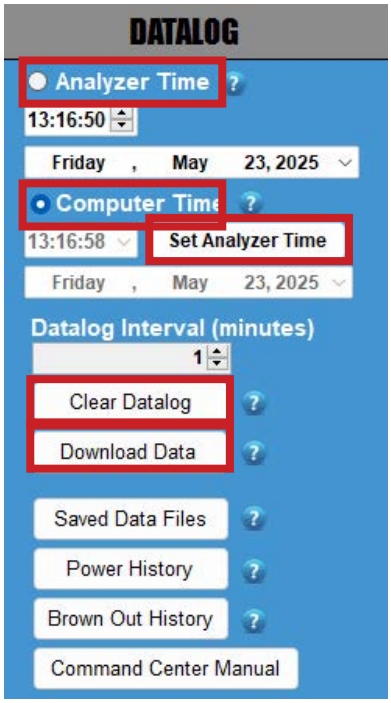
Analyzer ON/OFF Button

When the Analyzer is turned on, the Data Logging feature will turn on by default.

NOTE: *The default data collection interval is set for one (1) minute. This means that the Analyzer will record information once every minute.*

To change the data collection interval, a laptop with the ***COMMAND CENTER*** Software must be connected to the Analyzer.

COMMAND CENTER Data Log Screen



A. **Set Analyzer Time**
To manually set the time, select ANALYZER TIME and enter the date and time you want to set. To synchronize the date and time to match the time on your computer, select COMPUTER TIME and click the SET ANALYZER TIME Button. The time should automatically adjust and closely match the time shown on your laptop.

NOTE: *The unit ships set to the time of the Pacific Time Zone. Prior to first use, update the time. If time is not updated prior to first use, logged data will be time stamped to Pacific Time.*

NOTE: *When battery in Analyzer is changed, unit does not retain time in memory. Always set Analyzer time when battery is replaced.*

B. **Clear Data Log**
Press the CLEAR DATALOG Button to clear any recorded data performed at the factory.

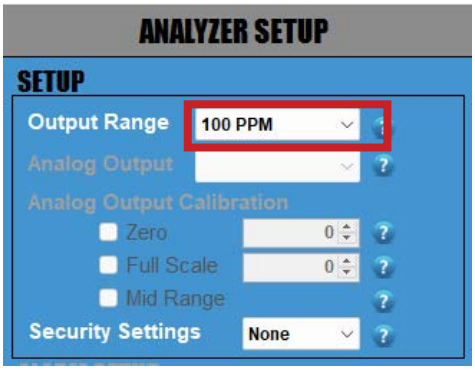
C. **Data Interval (minutes)**
Then set your desired collection interval for the data logger by adjusting the time (in minutes).

NOTE: *The default setting has the data logger operating in one-minute intervals for fifteen (15) days. You can increase the interval (in minutes) of how often data is collected. Keep in mind that increasing the duration of the interval will also proportionally change how long data is collected. If you increase the interval every two (2) minutes, the data collection will now last for thirty (30) days. Every three (3) minutes will increase the collection period to forty-five (45) days and so forth.*

NOTE: *The data log is a rolling log. The data log will begin to overwrite the oldest data after once the maximum collection period has been reached for the selected data log interval.*

Download Data

Output Range Dropdown Menu

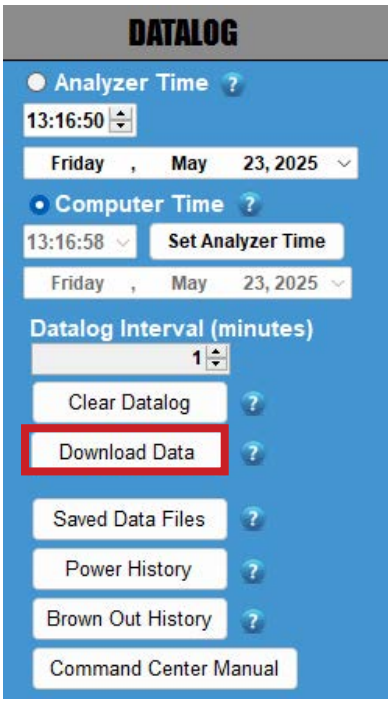


While the Analyzer automatically scales the displayed H_2S concentration on the Analyzer LCD SCREEN, the output from the data log is scaled for a defined range. The data log output range is defined in ***COMMAND CENTER***.

To specify the output range, select the desired output range from the OUTPUT RANGE dropdown menu under ANALYZER SETUP.

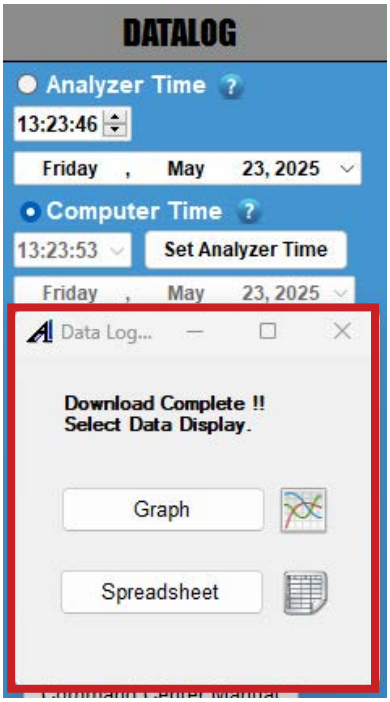
NOTE: *The data log downloaded from* ***COMMAND CENTER*** *will only report measured values up to 125% of the maximum value of the selected Output Range. If there are measured values greater than 125% of the maximum value of the selected Output Range, those values will be reported as 125% of the maximum value of the selected Output Range. If the data log has clipped data of 125% of the maximum range value, increase the Output Range and download the data log again.*

Download Data Log Button



To begin, click the DOWNLOAD DATA Button located on the ***COMMAND CENTER*** screen.

Data Log Handler Window

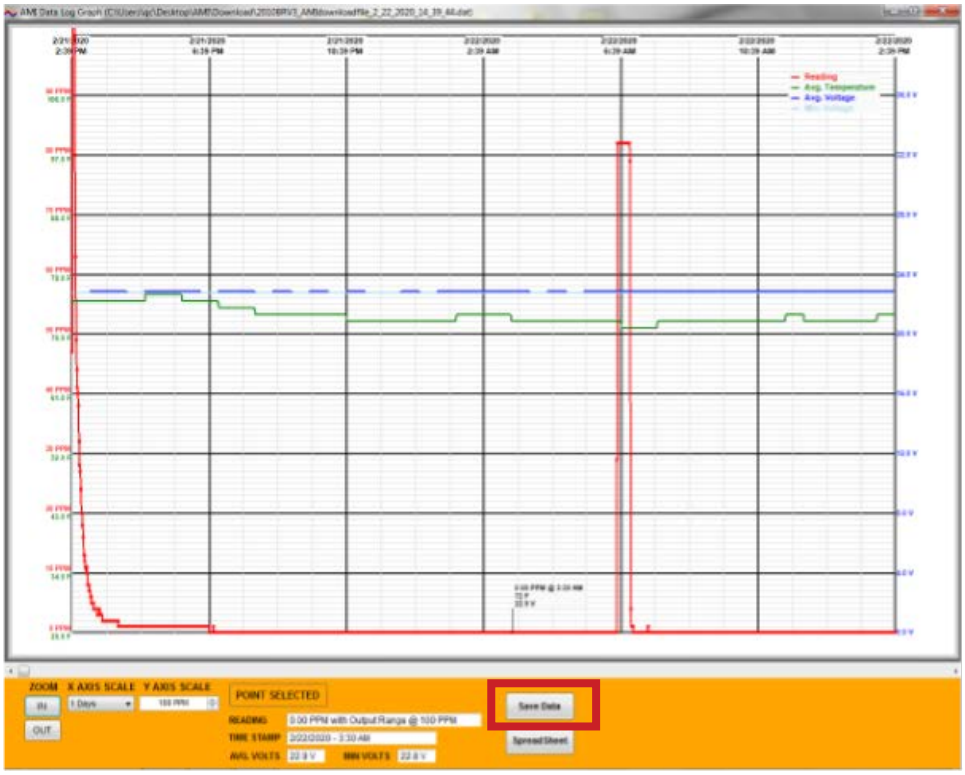


DATA LOG HANDLER window will appear giving you the option to seeing your downloaded data as either a graph or spreadsheet.

To see the data as a graph, click the GRAPH Button on the DATA LOG HANDLER window.

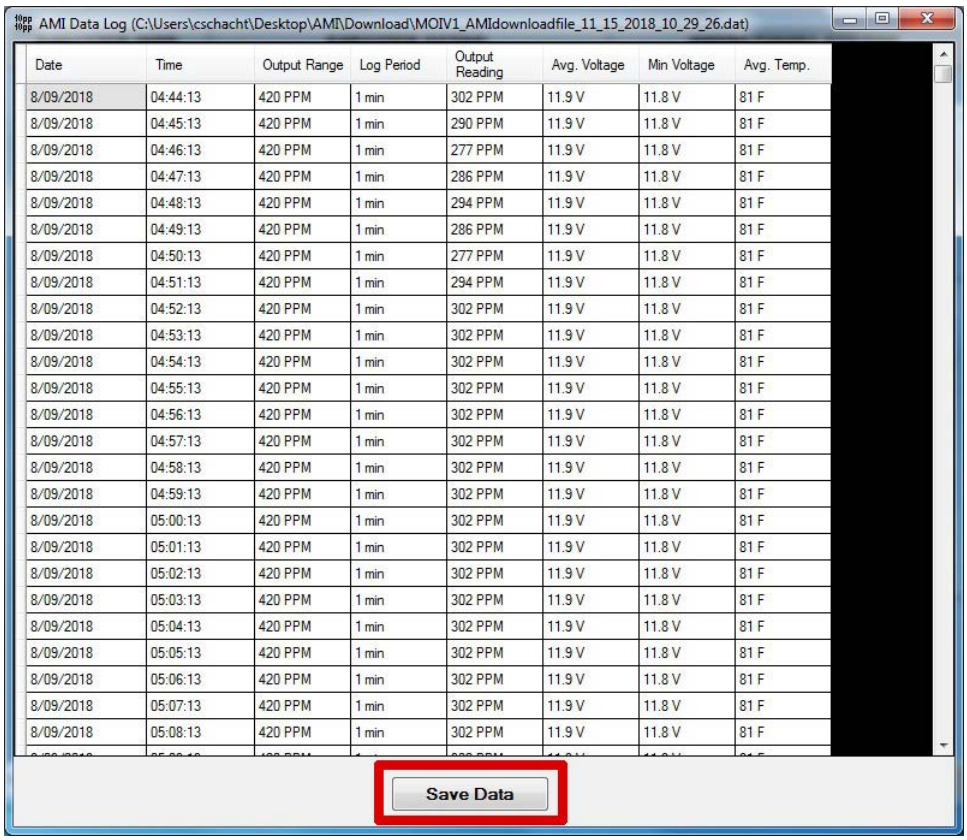
To have the downloaded data in a spreadsheet, click the SPREADSHEET Button on the DATA LOG HANDLER window.

Sample Downloaded Data Graph



To save the graph to a file, click the SAVE DATA Button.

Sample Downloaded Data Spreadsheet

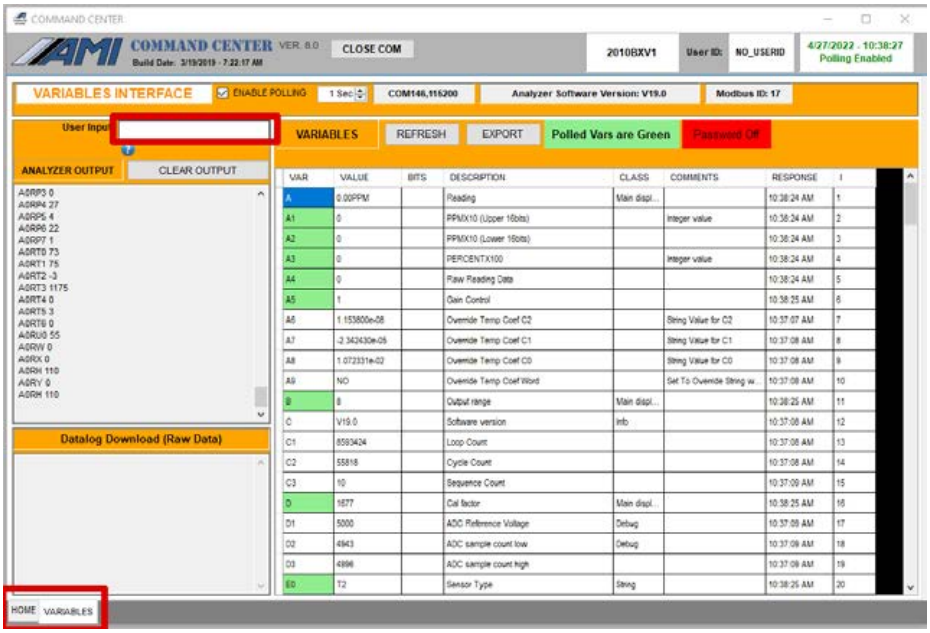


Date	Time	Output Range	Log Period	Output Reading	Avg. Voltage	Min Voltage	Avg. Temp.
8/09/2018	04:44:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:45:13	420 PPM	1 min	290 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:46:13	420 PPM	1 min	277 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:47:13	420 PPM	1 min	286 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:48:13	420 PPM	1 min	294 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:49:13	420 PPM	1 min	286 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:50:13	420 PPM	1 min	277 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:51:13	420 PPM	1 min	294 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:52:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:53:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:54:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:55:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:56:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:57:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:58:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	04:59:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:00:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:01:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:02:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:03:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:04:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:05:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:06:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:07:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F
8/09/2018	05:08:13	420 PPM	1 min	302 PPM	11.9 V	11.8 V	81 F

To save the spreadsheet to a file, click the SAVE DATA Button.

Change Display to Metric Units

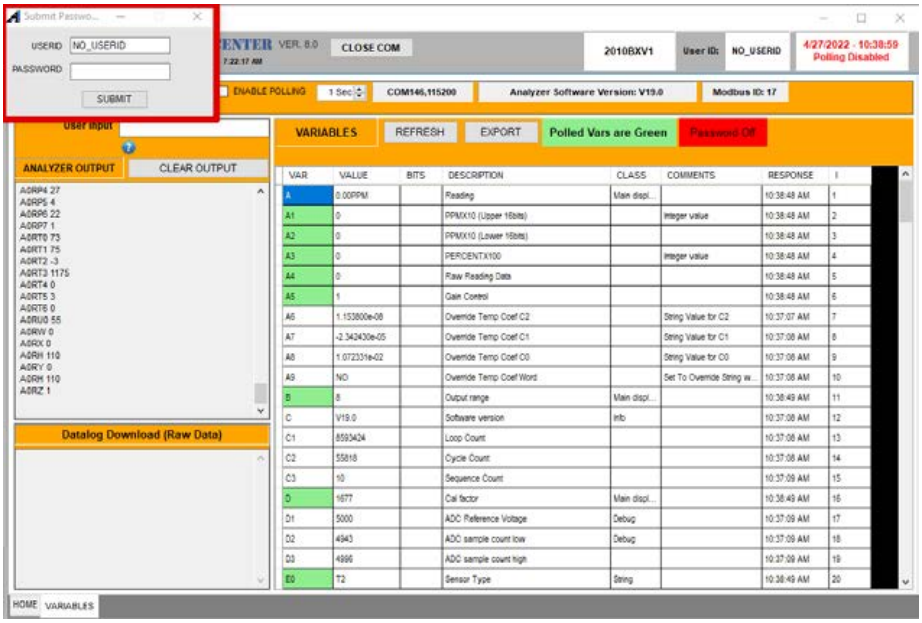
COMMAND CENTER Variables Screen (MODEL 2010BX Screenshot shown)



This step will require a password. Contact AMI before proceeding with the instructions below.

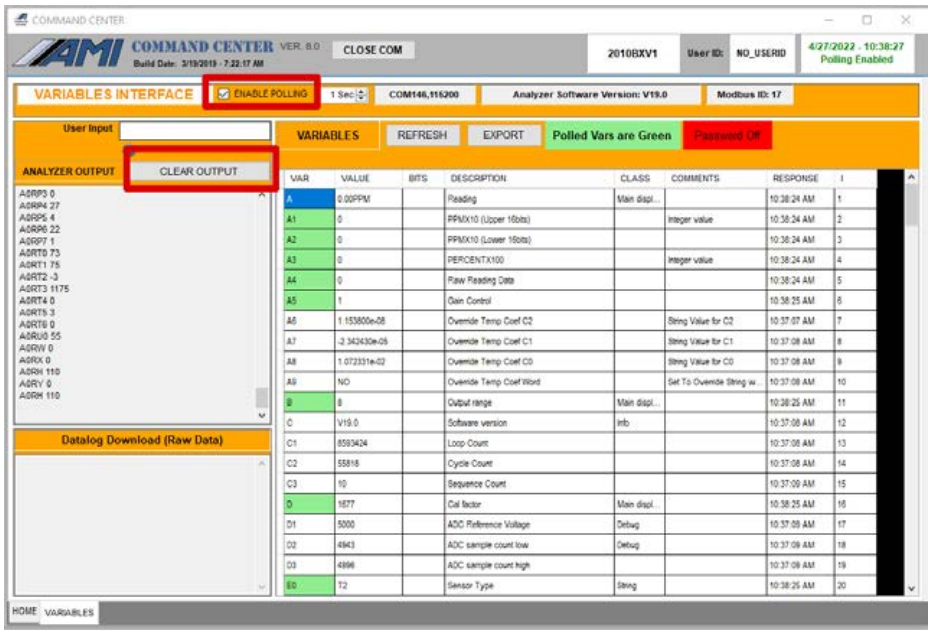
- Click on the VARIABLES Tab at the bottom left-hand window.
- Click the USER INPUT Cell at the upper left-hand area of the window.

COMMAND CENTER Variables Password Screen



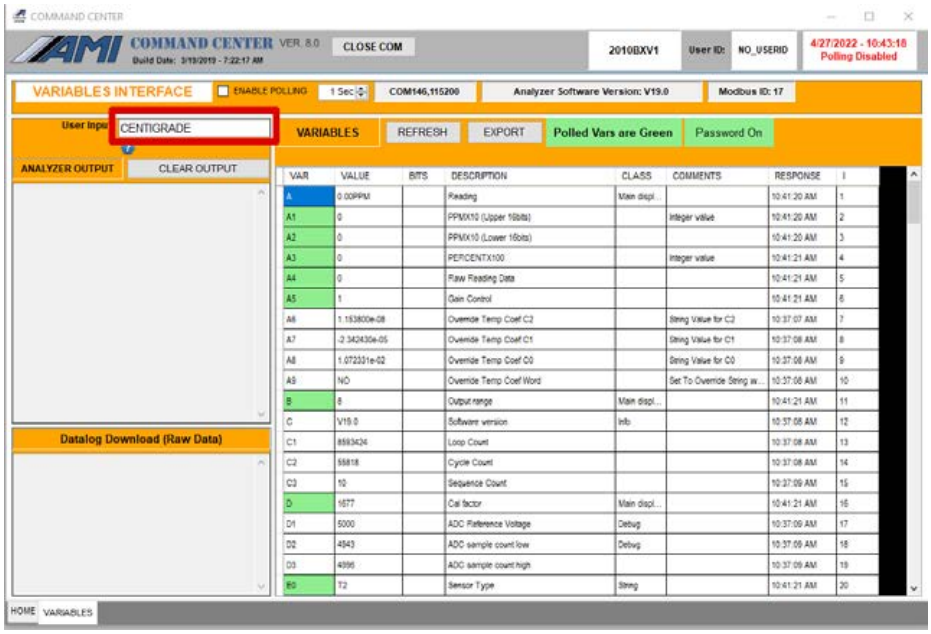
- Once the small SUBMIT PASSWORD window opens, enter the password that you receive and press SUBMIT.

COMMAND CENTER Enable Polling and Clear Output



- Uncheck ENABLE POLLING.
- Click CLEAR OUTPUT.

COMMAND CENTER Variables Change Measurement Units



- Type CENTIGRADE into the User Input area (shown in the red box to the left) and press RETURN. This will change BOTH Temperature to Celsius and Pressure to kPA.

NOTE: *To return to Imperial Units, enter 'FAHRENHEIT' and press RETURN.*

END OF *COMMAND CENTER* SOFTWARE

MAINTENANCE AND TROUBLESHOOTING

The following section identifies potential system issues and provides possible resolutions. If you are unable to resolve an issue after following the suggestion(s) shown in this section, contact AMI for further support.

Recharging Battery

⚠ WARNING

DO NOT CHARGE BATTERY IN A HAZARDOUS ENVIRONMENT, SUCH AS WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT OR IN A PRECIPITOUS AND/OR DUSTY ENVIRONMENT.

NE PAS CHARGER LA BATTERIE DANS UN ENVIRONNEMENT DANGEREUX, COMME LORSQU'UN UNE ATMOSPHERE EXPLOSIVE EST PRESENTE OU DANS UN ENVIRONNEMENT PRECIPITUOS ET/OU POUSSIEREUX.

Directions to Recharge Battery

1. Take the Type C end of a USB cable and connect it to the Analyzer.
2. Attach the other end of the USB cable to a compatible power source connection (e.g. charger or computer).

IMPORTANT REQUIREMENTS:

Charging voltage:	*5 V from host*
USB charging min current:	*100 mA*

3. Once the connections are done, the batteries will start recharging. Battery needs a minimum of eighteen (18) hours to recharge from a completely depleted state.

Replacing Battery

⚠ WARNING

DO NOT REPLACE BATTERY IN A HAZARDOUS ENVIRONMENT, SUCH AS WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT OR IN A PRECIPITOUS AND/OR DUSTY ENVIRONMENT.

NE PAS REMPLACER LA BATTERIE DANS UN ENVIRONNEMENT DANGEREUX, COMME LORSQU'UN UNE ATMOSPHERE EXPLOSIVE EST PRESENTE OU DANS UN ENVIRONNEMENT PRECIPITUOS ET/OU POUSSIEREUX.

⚠ WARNING

DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT

AVERTISSEMENT – NE PAS OUVRIR EN CAS DE PRESENCE D'ATMOSPHERE

NOTE: *AMI offers a battery replacement kit, part number 4KIT21, that includes a replacement battery and twenty (20) plastic rivets to reinstall the protective boot.*

Steps to Replace Battery Pack

NOTE: The pictures for battery replacement show a MODEL 1000BX analyzer.

Remove Hex Screws

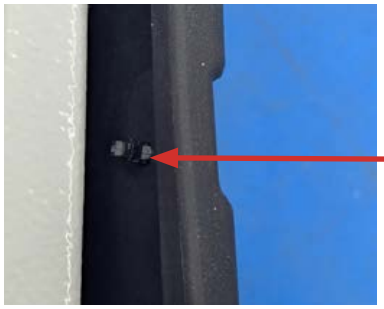
Hex screw 4x

Handle Removed

1. Detach the handle by removing the four (4) screws with a 5/32” hex wrench as shown above.

Pull Boot From Analyzer

Plastic Rivets

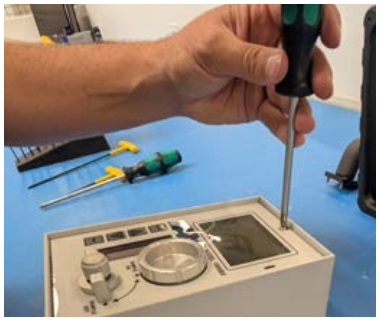


Plastic Rivet

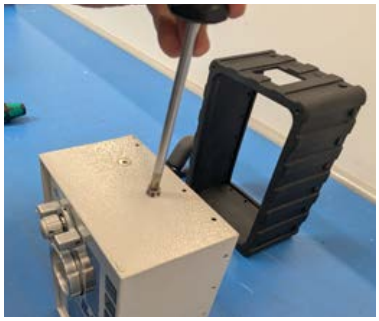
Slide Boot Off Analyzer

2. Separate the twenty (20) plastic rivets from the analyzer by hand by pulling the boot away from the analyzer case. Slide the rubber boot away from the front of the Analyzer.

Front Panel Screw



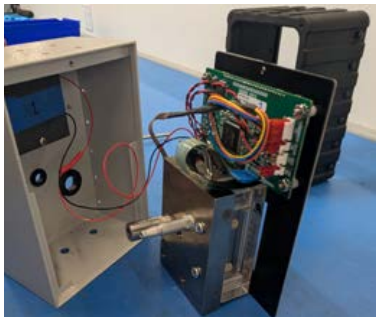
Bottom Screws



3. Remove the screw at the top on the front panel of the Analyzer with a #2 Phillips screwdriver. Then remove the two (2) screws on the bottom of the Analyzer.

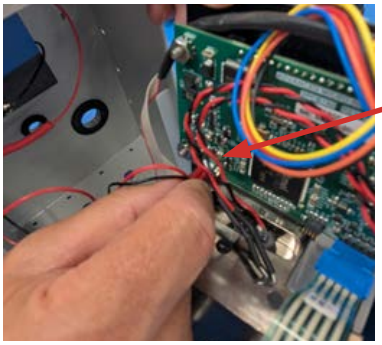
Push on Gas Fittings

Assembly Separated From Case



4. While pushing on the gas fittings on the back side of the analyzer, slide the assembly containing the ELIMINATOR CELL BLOCK, PCB board, and front panel out of the case.

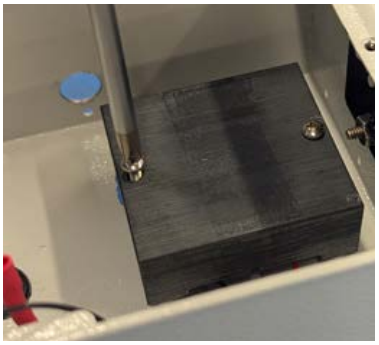
Detach Battery Pack Cable from PCB



5. Disconnect the battery pack cable from the PCB.

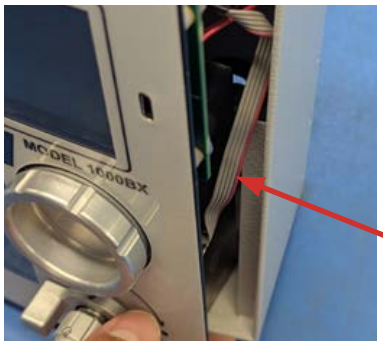
Battery Pack CableConnector Attached PCB

Battery Pack Screws to Case



6. Remove the two (2) screws holding the battery pack to the case. Then, replace the old battery pack with the new battery pack. Re-fasten the two (2) screws to hold the battery pack to the case and re-attach the battery pack cable to the PCB.

Re-install ELIMINATOR CELL BLOCK, PCB Board, and Front Panel in Case

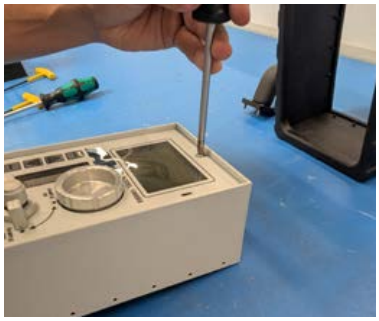


Cable Pinch Point

7. Slide the assembly containing the ELIMINATOR CELL BLOCK, PCB board, and front panel into the case. Be careful not to pinch any of the cables or wires against the case.

Bottom Screws

Front Panel Screw



8. Secure the assembly by fastening the two (2) screws to the bottom of the Analyzer and the one (1) screw at the top on the front panel of the Analyzer.

Re-install Rubber Boot

9. Slide the rubber boot back on through the front of the Analyzer and secure with the plastic rivets. Replace any plastic rivets that were broken during disassembly with new rivets prior to reassembling.

Re-attach Handle

10. Attach the handle back on the Analyzer and fasten with the proper screws.

    Properly dispose of the old batteries according to local, state, and federal regulatory guidelines.

Calibration Intervals and Sensor Replacement

For the best accuracy, it is recommended the Analyzer is calibrated every thirty (30) to forty-five (45) days. Reference Calibration information in Analyzer Operation section of this manual.

It is recommended to replace the sensor when the Span Factor exceeds a value of 980. Refer to Sensor Installation information in the Analyzer Operation section of this manual.

Error Status Display: Error Reference Guide

Error Indicator Display

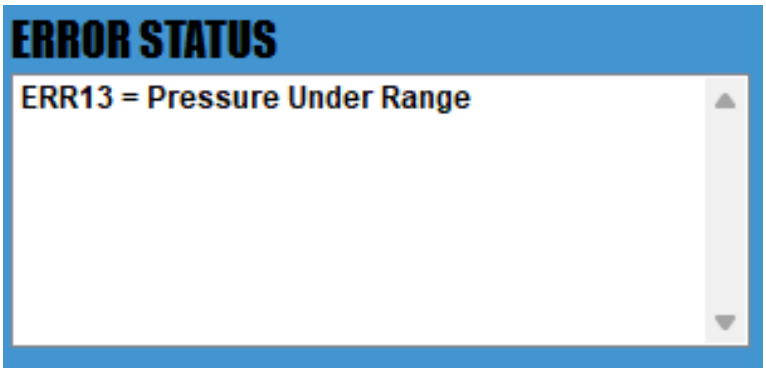
Error Indicator On Analyzer Display

If the Analyzer detects any errors, ERR will display next to the Operating Pressure reading.

Some error codes will oscillate between the main screen and the error screen. These error codes are designated flashing errors. Other error codes can only be seen when viewing the error codes via the DOWN Button and are designated as not flashing errors.

To view all error codes the Analyzer is reporting, from the main screen press the DOWN Button seven (7) times to show the first error code. If there are multiple active error codes, pressing the DOWN Button again will show the next error code. Continue pressing the DOWN Button to reveal all error codes. When all error codes have been shown, the next press of the DOWN Button returns the screen to the Battery Voltage display.

COMMAND CENTER Error Status Display



In ***COMMAND CENTER***, any active error codes are displayed on the ERROR STATUS display under OPERATIONAL STATUS. Once troubleshooting is complete and the error is resolved, the message will automatically be removed from the ERROR STATUS display.

The following table shows the errors that can be detected by the Analyzer and whether they are a flashing or not flashing error. Each error has an assigned number which is what is displayed on the Analyzer error screen. If you are unable to correct and clear an error code, please contact the AMI factory for assistance.

Analyzer Error Codes Table

Error Code	Error Name	Error Description	Flashes On Main Screen
1	RTC_NOT_SET	Default Date/Time detected at startup. Need to update analyzer date and time.	No
4	DETECT_PRESSURE	Pressure sensor not detected at start up	Yes
7	BATTERY	ADC implausible signal for VBAT channel. Check battery and battery connection.	No
10	USBREAD	Reading from USB failed	No
11	USBWRITE	Writing to USB failed	No
12	OVERPRESSURE	Pressure is above the operating range of 150.0 psi	Yes
13	UNDERPRESSURE	Pressure is below the operating range of 0.5 psi	No
14	OVERTEMPERATURE	Block temperature is above the operating range of 120 °F	No
15	UNDERTEMPERATURE	Block temperature is below the operating range of 20 °F	No
16	ADCTIMEOUT	ADC has stopped collecting.	Yes
17	SIGPROCTIMEOUT	Processing of ADC samples has stopped	Yes
18	MEMORYREAD	Error reading from NVRAM	Yes
19	MEMORYWRITE	Error writing to NVRAM	Yes
20	ADC_NTC_CHANNEL	ADC reading zero, railed or out of sequence for NTC channel	Yes
21	ADC_VBAT_CHANNEL	ADC reading zero, railed or out of sequence for VBAT channel	Yes
22	ADC_DIET_CHANNEL	ADC reading zero, railed or out of sequence for DIET channel	Yes
23	PRESSURE_CHANNEL	Bad status from pressure sensor pressure channel	No
24	TEMPERATURE_SIGNAL	ADC implausible signal for temperature channel	Yes
25	ADC_H_2S_SIGNAL	ADC implausible signal for H_2S channel	No
26	ADC_H_2S_CHANNEL	ADC reported that it failed an internal integrity check or that the channel was out of range, out of sequence or failed CRC check.	Yes
29	SPAN_HIGH	SPAN value is above the operating range (>= 1,000)	Yes
30	SPAN_LOW	SPAN is below the operating range (<= 300)	Yes
31	RTC_SYNC	Clocks failed to perform periodic synchronization	No
32	SENSOR_TYPE	Sensor type is invalid or unsupported	Yes

Troubleshooting the Analyzer

The following section identifies potential system issues and provides possible resolutions. If you are unable to resolve an issue after following the suggestion(s) shown in this section, contact AMI for further support.

Analyzer Does Not Power Up

Resolution(s):
- Recharge the batteries and then power-up the Analyzer.

Analyzer Reads Too Low

Resolution(s):
- Re-calibrate the Analyzer. Flow Span Gas through it and adjust the Span Value of the Analyzer until the Analyzer reads appropriately. See Calibration in the Analyzer Operation section of the manual.
- Check the Span Factor by pressing the UP Button. If the Span Factor displays 980 or higher, replace the H_2S sensor.
- Calibrate with Span Gas as described in the Calibration section.

Analyzer Reads Too High

Resolution(s):
- Leak test all external fittings. We recommend using SNOOP®.
- Check that the gas flow rate is approximately 1 SCFH.
- Calibrate with Span Gas as described in the Calibration Section.

Analyzer Reads Zero

Resolution(s):
- Check the sensor to see if it is leaking. If it is, replace with a new H_2S sensor.

Incorrect Readings

Resolution(s):
- Verify that there are no leaks from the Sample Tap to the Analyzer.

Analyzer Refuses to Accept Front Panel Settings

Resolution(s):

– Use the ***COMMAND CENTER*** Interface Software to verify that the Security Settings match your preference. Security Settings drop down menu is in Analyzer Setup section.

  Security Settings of NONE allows anyone to make changes to the Analyzer's settings using the front panel. Security Setting of FULL prevents anyone from changing the Analyzer's setting using the front panel. However, the user would be able to view settings via the UP Button and DOWN Button. Security Setting of SPAN will allow the user to Span the unit via the SPAN Button but not change any other settings.

'Err' Flashes on the LCD Screen Every Minute

Resolution(s):

– Determine error code as described in Error Status Display: Error Reference Guide section. If you cannot clear error code yourself, contact AMI for support.

For any other issue not covered in this section, contact AMI for support.

END OF MAINTENANCE AND TROUBLESHOOTING

ACCESSORIES

AMI offers the following accessories to be used with your **MODEL 3000BX** Portable Hydrogen Sulfide Analyzer.

PROTECTIVE CARRYING CASE

This rugged protective carrying case extends the life of the portable gas Analyzers in the most demanding and hazardous environments. It is lined with a thick die-cut foam, providing complete protection during travel and storage periods. The die-cut foam also has built-in compartments for the accessories.

NON-DIFFUSIVE FLEXIBLE HIGH-PRESSURE SAMPLE TUBING

This unique high-pressure, non-diffusive sample gas tubing is outfitted with special connection fittings. Designed with an o-ring/swage seal, it can be tightened using only finger-strength. The tubing and fittings are rated up to 6,500 psig.

It is available in lengths of 4 feet, 6 feet, 10 feet, and 15 feet.

ANALYZER GUARDIAN

The ANALYZER GUARDIAN protects the Analyzer from liquids and particulates entering. Its unique membrane and stainless-steel deflector disk combination work as a barrier against liquids while allowing only gas to reach the Analyzer. It is offered with an optional liquid bypass assembly and pressure regulator.

It is recommended the ANALYZER GUARDIAN should be used with AMI's DEMISTER for the best protection.

DEMISTER

Compact, vertically mounted device that attaches directly to the pipeline. As hot sample gas passes through the DEMISTER, it is rapidly cooled, causing compressor oils, glycols, and water vapors to condense, coalesce, and drain back into the pipeline.

END OF ACCESSORIES

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MODEL 3000BX SPECIFICATIONS

USAGE	
Both indoor and outdoor use	
Altitude for Use	<16,404 feet (<5,500 meters)
Relative Humidity	<95%, non-condensing

PHYSICAL	
Dimensions	5.5” W x 10.1” H x 5.2” D (14 cm x 26 cm x 13 cm)
Weight	6 lbs (2.7 kg)
Digital Display	4–digit back lit LCD
Gas Connections, Inlet	Female Quick Disconnect fitting. Supplied with mating male quick disconnect fitting coupled to ¼“ compression fitting
Gas Connection, Outlet (Exhaust)	Male barb fitting for 1/4” flexible tubing
Wetted Parts	316 stainless-steel fittings, electroless nickel-plated cell block, gold-plated contacts, acrylic flow meter, and Viton o-rings (Kalrez or Buna-N optional)
Materials	Cases (painted CRS), Rubber Boot (EDPM), Grommets (Silicone and NBR), and handle (PVC)

TECHNOLOGY	
Method of Measurement	Electrochemical Sensor
Key Technologies	Proprietary ELIMINATOR CELL BLOCK, ***COMMAND CENTER*** Interface Software (with data logger, power-up history, USB virtual comport), and proprietary hydrogen sulfide sensor

PERFORMANCE	
Low Minimum Detection Threshold	Low Range Sensor: 0.5 ppm High Range Sensor: 1 ppm
Linear Range	Low Range Sensor: 0 – 200 ppm High Range Sensor: 0 – 2,000 ppm
Resolution	Low Range Sensor: 0.1 ppm High Range Sensor: 1 ppm
90% Upscale Response Time	< 120 sec
Repeatability	±1% of reading or ±0.2 ppm, whichever is greater
Accuracy	±1% of reading or ±1 ppm, whichever is greater
Diurnal Temperature Specification	< 3% of reading over temperature range

Click here return to a Table of Content page.

Specifications (continued)

OPERATION	
Operating Temperature Range	25 °F to 115 °F (-3.9 °C to 46.1 °C)
Storage Temperature Range	25 °F to 115 °F (-3.9 °C to 46.1 °C)
Recommended Flow Rate	1 SCFH (0.5 lpm)
Inlet Gas Pressure	0.5 – 150 psig (0.03 – 10.3 bar)
Exhaust Gas Pressure	Vent to Atmosphere
Data Collection Capacity	15 days of data recording at 1 data point per minute
Battery Life	25 days, operating 1 year, non-operating storage with sensor installed
Battery Charge Time	>18 hours
Battery Cycle Life	>500 cycles
Protection	RFI-protected

POWER	
Requirement	Electrical Input(s): USB Type C (5 V used for charging) Max Current (With USB plugged in): 100 mA

AREA CLASSIFICATION	
Area Classification	US/Canada: Class I, Division 1, Groups B-D, T4 Class I Zone 0, AEx ia IIB+H2 T4 Ga Ex ia IIB+H2 T4 Ga -3.9 °C ≤ Tamb ≤ +46.1 °C
	IECEx: Ex ia IIB+H2 T4 Ga -3.9 °C ≤ Tamb ≤ +46.1 °C
	ATEX/UKCA: Ⓔx II 1 G Ex ia IIB+H2 T4 Ga -3.9 °C ≤ Tamb ≤ +46.1 °C
Conforms / Certified To	UL 60079-0 UL 60079-11 UL 61010-1 CSA C22.2#60079-0 CSA C22.2#60079-11 CSA C22.2#61010-1-12
Environmental Conditions	Pollution Degree 3

END OF SPECIFICATIONS

AMI WARRANTY & SUPPORT

Limited Warranty/Disclaimer

The warranty period is two (2) 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 one-way ground shipment back to the customer.

The warranty period is twelve (12) months for the H_2S sensor.

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 SHIPPING.

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.

Factory Service and Support

AMI offers calibration and repair services for their analyzers. To return an analyzer to the factory for repair or calibration, please complete a Return Merchandise Authorization (RMA) Request Form at www.amio2.com/request-rma. After your form has been received and reviewed, an AMI representative will contact you by email or phone with RMA number and instructions on how to ship the unit to the AMI factory.

If you have questions about your product, please contact the AMI factory at +1.714.848.5533 or complete the online Service & Support form at www.amio2.com/quote/support.

END OF AMI WARRANTY & SUPPORT

DECLARATIONS OF CONFORMITY

EU Declaration of Conformity

Battery Powered Portable Analyzer:

1000BX
3000BX

In locations:

CE Ex II 1 G Ex ia IIB+H2 T4 Ga -3.9°C ≤ T_{amb} ≤ +46.1°C

We, Advanced Micro Instruments (AMI) declare under sole responsibility that the above products, to which this declaration relates, is in conformity with the requirements of the following EU Directive(s):

- **ATEX DIRECTIVE 2014/34/EU**

Notified Body Name/number: Intertek Testing Services NA Ltd./ 2903
Issued the EU-Type examination certificate: ETL23ATEXQ0280

The Technical Documentation (TD), relevant to the product described above and which support this DoC is available from the contact address on this DoC.

The following harmonized standards and normative documents are those to which the product's conformance is declared, and by specific reference to the essential requirements of the reference Directive:

EN 60079-0:2018: Explosive Atmospheres - Part 0: Equipment - General Requirements
EN 60079-11:2012: Explosive Atmospheres - Part 11: Equipment Protection By Intrinsic Safety "I"

Kevin Bates
President

Signed for and on Behalf of
Advanced Micro Instruments
225 Paularino Ave
Costa Mesa, CA 92626
Tel: 714-848-5533
www.amiO2.com

UK Declaration of Conformity

For the gas analyzers:

1000BX
3000BX

In locations:

⟨Ex⟩ II 1/2 G Ex ia IIB+H2 T4 Ga -3.9°C ≤ T_{amb} ≤ +46.1°C

We, Advanced Micro Instruments (AMI) declare under sole responsibility that the above products, to which this declaration relates, is in conformity with the requirements of the following UK Directive(s):

- **UK DIRECTIVE UKSI 2016:1107**

Notified Body Name/number: Intertek Testing & Certification Limited, Cleeve Road, Leatherhead, Surrey, KT22 7SA (NB number 0359)
Issued the UK-Type examination certificate: ITS21UKQAN0067

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OM-300-038 Rev A en 08.2025,