AMI

Portable Hydrogen Sulfide Analyzer Manual

Model 3000RS

Advanced Micro Instruments, Inc.

Made in the USA

Contents

Preface

Thank you!

We would like to thank you for purchasing the most cost-effective portable hydrogen sulfide analyzer available. We have gone to great lengths to make this analyzer as simple, user-friendly, and complete, as possible. It includes our revolutionary cell block design that integrates all sample handling components necessary and a very sophisticated set of electronics. It uses the most sophisticated 24 bit electronics with complete microprocessor control to provide extreme ease of use as well as built in data logging to make record keeping easier.

Please verify that the analyzer was not damaged in transit. If so please contact the shipper as well as AMI.

WARNING!

HYDROGEN SULFIDE IS EXTREMELY TOXIC AND CAN BE LETHAL! Read this manual carefully before using this instrument.

Because Hydrogen Sulfide is extremely dangerous at certain levels, care must be taken when venting the sampled gas from the analyzer. Please refer to your internal safety limits when measuring Hydrogen Sulfide or refer to OSHA standards at https://www.osha.gov/SLTC/hydrogensulfide/standards.html.

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, and associated with the contents of the sensor used.

ATTENTION !

LE SULFURE D'HYDROGÈNE EST EXTRÊMEMENT TOXIQUE ET PEUT ÊTRE MORTEL ! Lisez attentivement ce manuel avant d'utiliser cet instrument.

Dans la mesure où le sulfure d'hydrogène est extrêmement dangereux à certains niveaux, il faudra être attentif lors de l'évacuation du gaz prélevé à partir de l'analyseur. Veuillez vous référer à vos limites internes de sécurité lors de la mesure du sulfure d'hydrogène ou référez-vous aux normes de sécurité sur https://www.osha.gov/SLTC/hydrogensulfide/standards.html.

Avertissement

Veuillez lire et comprendre entièrement ce manuel avant toute première utilisation de l'instrument. En particulier, veillez à bien comprendre les dangers associés à l'utilisation des gaz inflammables ou toxiques ainsi que ceux associés avec le contenu du capteur utilisé**.**

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The 3000RS Portable Hydrogen Sulfide Analyzer

Intrinsic Safety Notes and Warning (Very Important Please Read !!!)

1. Do not use the USB Interface and/or the 12VDC Input in a Hazardous Area.

2. A data download device may only be connected to the USB connector of this analyzer in a non-hazardous area and shall be approved as SELV or Class 2 equipment against UL 60950 or an equivalent IEC standard. The maximum voltage from a data download device shall not exceed 5.25 VDC.

3. Only connect Intrinsically Safe Equipment to the Analog Out (Parameters Uo=4.65V, Io=47mA, Po=34.8mW, Ci=57.76µF, Li=0µH)

4. Substation of any components in this analyzer may effect intrinsic safety.

5. Potential Electrostatic Charging Hazard:

    a. No precautions against electrostatic discharge are necessary for portable equipment that has an enclosure made of plastic, metal or a combination of the two, except where a significant static-generating mechanism has been identified. Activities such as placing the item in a pocket or on a belt, operating a keypad or cleaning with a damp cloth, do not present a signifiant electrostatic risk. However, where a static-generating mechanism is identified, such as repeated brushing against clothing, then suitable precautions shall be taken, e.g. the use of anti-static footwear.

    b. The certification marking plate is aluminum. Care must be exercised during use to avoid causing sparks by impact or friction.

6. The analyzer shall only be charged in a non-hazardous area using a charger specifically supplied for use with the unit (for example part number 3ACA08, type TRG1512-A, manufactured by CINCON Electronics Ltd), approved as SELV or Class 2 equipment against UL 60950-1 or an equivalent IEC standard. The maximum voltage from the charger shall not exceed 12.0 VDC.

7. Failure to observe the above requirements will invalidate the Hazardous Locations certification.

8. **Exia** means Intrinsically safe.

Remarques et avertissements de sécurité intrinsèque (Très important Prière de lire !!!)

1. Ne pas utiliser l'interface USB et/ou l'entrée 12 V CC à un endroit dangereux.
2. Un dispositif de téléchargement de données peut uniquement être branché au connecteur USB de cet analyseur dans une zone non dangereuse et doit être homologué comme équipement TBTS ou équipement de classe 2 en vertu de la norme UL 60950 ou d'une norme CEI équivalente. La tension maximale provenant d'un dispositif de téléchargement de données ne doit pas dépasser 5,25 V c.c.
3. Raccorder uniquement un équipement intrinsèquement sûr à la sortie analogique (paramètres Uo=4,65 V, Io=47 mA, Po=34,8 mW, Ci=57,76 µF, Li=0 µH)
4. La substitution de tout composant de cet analyseur peut affecter la sécurité intrinsèque.
5. Danger potentiel de charge électrostatique :
    a. Aucune précaution contre la décharge électrostatique n'est nécessaire pour l'équipement portable dont le boîtier est fait de plastique, de métal ou d'une combinaison des deux, sauf lorsqu'un mécanisme générant un niveau important d'électricité statique a été identifié. Les activités telles que

placer l'appareil dans une poche ou sur une ceinture, l'utilisation d'un clavier ou le nettoyage à l'aide d'un chiffon humide ne présentent aucun risque électrostatique significatif. Cependant, lorsqu'un mécanisme producteur d'électricité statique est identifié, tel que le brossage répété contre des vêtements, des précautions adéquates doivent alors être prises, telles que l'utilisation de chaussures de sécurité antistatique.

b. La plaque de marquage de certification est faite d'aluminium. L'utilisation doit se faire prudemment pour éviter de produire des étincelles par impact ou friction.

6. L'analyseur doit uniquement être chargé dans une zone non dangereuse à l'aide d'un chargeur fourni spécialement pour cet appareil (par exemple, référence 3ACA13, type TRG1512-A, fabriqué par CINCON Electronics Ltd), homologué comme équipement TBTS ou équipement de classe 2 en vertu de la norme UL 60950-1 ou d'une norme CEI équivalente. La tension maximale provenant du chargeur ne doit pas dépasser 12,0 V c.c.
7. Tout non-respect des exigences ci-dessus invalidera l'homologation pour zones dangereuses.
8. **Exia** signifie intrinsèquement sûr.

Warning on using the Appropriate charger for 61010 assessment

1. The charger for this unit must be rated at a maximum of 12V, 1A and approved as SELV or Class 2 equipment against UL 60950-1 or an equivalent IEC standard.

Basics of Hydrogen Sulfide measurement

The AMI model 3000RS use an electrochemical sensor that responds rapidly and reliably to hydrogen sulfide in natural gas, air, and many other gas streams, and will give much more accurate readings than traditional Draeger tubes or old-style lead acetate tape analyzers.

Because it operates by oxidizing the hydrogen sulfide, it also responds to other electrochemically active reducing gases to some degree, though it is optimized for hydrogen sulfide. For example, it responds at about 40% to mercaptans, i.e. gases which replace one of the hydrogen atoms with an organic radical such as the butyl radical (making butyl mercaptan, the smelly gas often introduced into natural gas to make a leak obvious). The standard sensor will respond negatively to chlorine and slightly positively to sulfur dioxide and carbon monoxide. It also responds slightly to hydrogen, enough to make it impractical to try to measure hydrogen sulfide in a pure hydrogen stream.

Hydrogen sulfide is a "sticky" gas. That is, it adsorbs onto surfaces very readily and comes off only with difficulty. This means that you need to give the analyzer time for the tubing to equilibrate. The sensor responds in a few seconds, but the tubing takes many minutes. We recommend that you take 20 minutes for a calibration and for a reading.

The sensor likes being exposed to air, unlike an oxygen sensor, and so it is not sealed when not in use. It does not like methanol, which is often added as part of hydrogen sulfide scrubbing material to natural gas streams. If this is the case, make sure you minimize exposure to the stream – don't leave it sampling for longer than necessary for a good reading.

Introduction

Figure 1 Front view

- Turn the analyzer on using the ON/OFF button.
- The Analyzer has a sensor installed, calibrated, and ready for use.
- Connect sample gas into the “Quick Connect” fitting located on the backside of analyzer.
- Adjust the sample flow with the needle valve between 1.0 and 2.0 SCFH.
- Allow approximately 20 min. time for the gas to purge the lines and the reading to stabilize.
- Disconnect the sample line.
- Calibration- carefully read calibration section of this instruction manual.
- To use the data logging feature; push and hold the “LOG” button for approx. 1 second. The “LOG” button is located on the front panel.
- Download stored data by plugging a PC into USB data port on the back, and using the AMI User Interface program to get the data. Do this only in a safe area.
- Charge the unit by plugging the wall mount AC power adapter into AC, and the other end into the 12VDC socket located on the back side of analyzer. Alternatively use the auto adapter accessory to charge it from your truck. The green LED will light to show that it is charging. Do this only in a safe area.

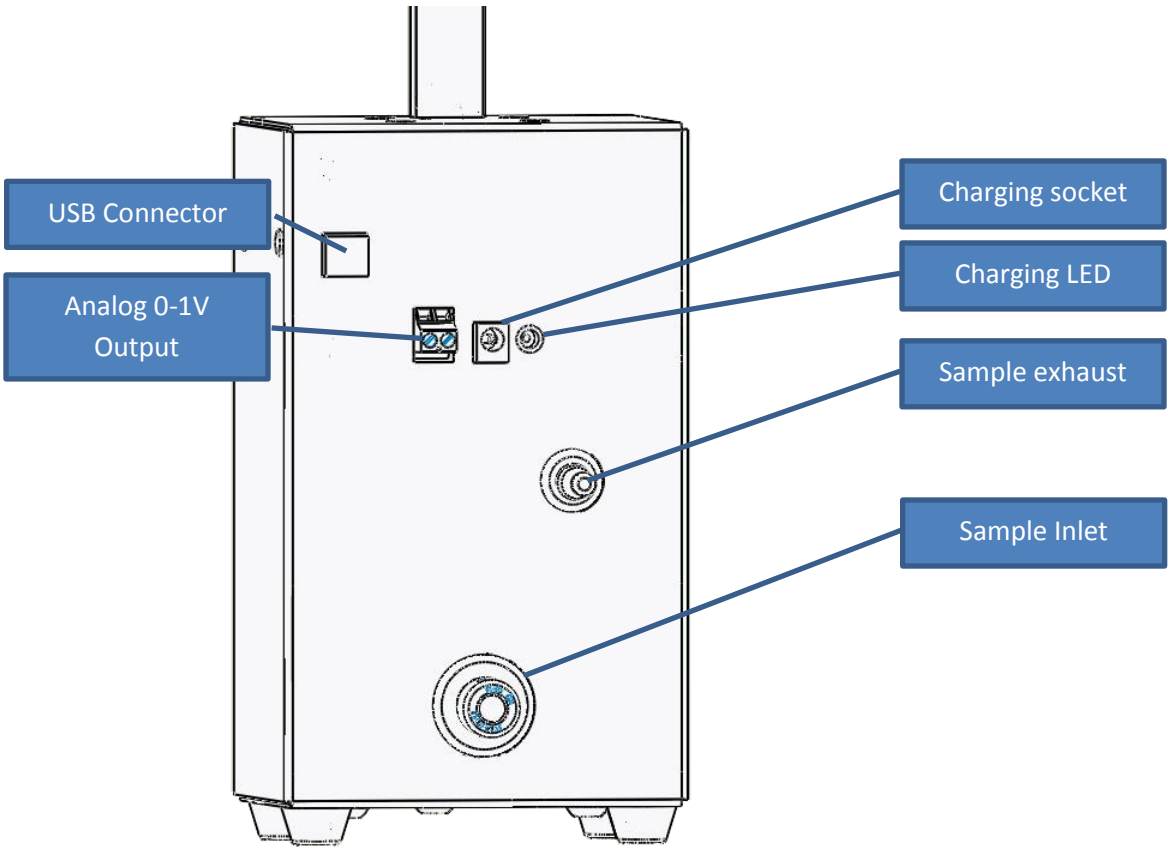

Figure 2 Back view

On the back the analyzer is a quick-disconnect fitting for the sample inlet. It is provided so as to minimize wear on the fitting - it is not required to seal gas in the analyzer. Conventional compression fittings cannot be used more than a few times without damaging them to the point that they leak enough to cause erroneous readings. An exhaust fitting is also provided suitable for a length of tubing should you need to vent the exhaust somewhere (for example, out of the cab of a truck).

A charging socket is used with a DC charger. An analog output with a 0-1V signal is used to datalog the analyzer reading. A standard USB type B connector is used to connect to a computer's USB port.

Detailed description:

The analyzer contains a micro-processor that controls its functions, and displays the current hydrogen sulfide reading in an appropriate range. It automatically adjusts its gain, and measures the signal with an high accuracy from zero to 200ppm. An optional high range version is available which supports readings up to 2000ppm. The analyzer contains a set of rechargeable batteries, and draws so little current that the batteries will last about 500 hours of continuous use (about 20 days). It is able to log its readings for up to 15 days at 1minute intervals and store this data indefinitely.

A standard USB printer cable and the User Interface Program for accessing logged data is available from AMI as an optional accessory.

The analyzer contains a needle valve and flow meter so you can easily control the flow from a positive pressure source of between 0.5 psig to 150 psig.

Hydrogen sulfide is "sticky" - it sticks to the walls of the sample tubing, the valve and so on. This means that it can take as long as 20 minutes for the reading to stabilize. Don't hurry this process!

There are connections on the back of the analyzer for 0-1V analog output, the battery charger, and also for a USB link to a computer. This latter with the optional User Interface Program allows downloading logged data (as well as setting up internal parameters).

Sensor Warranty:

The sensor is warranted to operate for one year. If the sensor ceases to operate correctly before this time has elapsed, return it to AMI for evaluation. If there is any evidence of defective material or workmanship the sensor will be replaced on a pro-rated basis. Contact the factory for an RMA number.

NOTE: Any evidence of abuse or physical damage, such as a torn membrane, will not be covered under the warranty.

Instrument Warranty:

Any failure of material or workmanship will be repaired free of charge for a period of two years from the original purchase (shipping date) of the instrument. AMI will also pay for one way ground shipment (back to the user).

This warranty does not cover the sensor, which is covered by its own warranty (see above).

Any indication of abuse or tampering will void the warranty.

Using the Analyzer

Introduction:

The AMI portable analyzer model 3000RS is shipped with the sensor already installed, calibrated and ready to use. Available options include its own carrying case and a length of flexible sample tubing, and the User Interface program CD. A high range (0-2000ppm) unit is available.

The analyzer has a needle valve that allows you to set the sample flow in the integral flow meter.

The analyzer is shipped with its batteries fully charged. However since NiCd batteries self-discharge, you may wish to charge it overnight before using it. When charged the batteries will last for up to 500 hours of continuous use.

The analyzer automatically reads the hydrogen sulfide level and scales the display so that it always reads on an appropriate range. You don't need to select a range. The voltage output and the data log use a preset range (normally 0-100ppm) that can be changed with the User interface program.

Using the Analyzer:

When you turn on the unit the data log function is always off. If you wish to data log you have to manually turn it on, by pressing and holding the LOG button on the front panel for one second.

Although the analyzer is rugged, and built into a steel case, it should nevertheless be treated carefully. Try to avoid exposing it to rain, or sudden temperature changes. For example, taking it from a heated building to the outdoors in a Wyoming winter will cause a rapid temperature change that will temporarily upset the temperature compensation, and it will take a little while for the sensor to come back to equilibrium. Low temperatures below 50ºF will slow the chemical reactions in the sensor (of course) and cause it to respond upscale and downscale more slowly. If the temperature drops below about 23ºF it can freeze, which will damage it. If it is to be used in cold weather, keep the analyzer in a warm place such as your truck's cab, and run the sample line into it. Make sure that you run an exhaust line so that the sample vents outside the cab of your truck!

Powering up the analyzer:

Press the On/Off button on the right side of the front panel to turn the analyzer on or off. It is normal for it to flash three dashes very briefly, and then show a random number for a short time. The reading will then change to whatever the sensor is currently seeing - normally zero ppm.

If the batteries are low, the unit will flash "Bat" and "Lo" every 7 seconds or so, and otherwise show the correct hydrogen sulfide reading. You can use the analyzer if it does this, but you should recharge it as soon as you reasonably can. If the batteries get too low for reliable operation, it will display "dEd" until the

power fails so deeply that it can't do anything at all. If this occurs you will have to recharge it. For a complete recharge, leave it charging for at least 14 hours.

Ranging:

The electronics and software in the analyzer automatically ranges the display for best resolution. The maximum it will read is 200ppm hydrogen sulfide, and the minimum is 0.1ppm of hydrogen sulfide. A high range version is available which can read up to 2000ppm with a minimum of 1ppm.

The voltage output and the data logging are scaled to a particular range, normally 0-100ppm. It is possible to change this range to one of four values (0-10ppm, 0-50ppm, 0-100ppm and 0-200ppm) by the use of the optional User interface program. Normally the default range (0-100ppm) is most practical. The high range version uses ranges 0-100ppm, 0-500ppm, 0-1000ppm and 0-2000ppm.

Calibration:

When shipped, the unit and sensor have already been calibrated at the factory. However you may wish to verify the calibration; the general procedure for doing this is to bring a suitable calibration gas into the analyzer, press the "SPAN" button, and then adjust the reading with the UP and DOWN buttons until the analyzer agrees with the span gas value. There is a detailed procedure describing the exact steps given later in this manual.

The span adjustment actually changes an internal parameter, a number called the "Span Factor" that you can read by simply pressing the UP arrow. This number is only meaningful after a calibration when it gives you a gauge of the remaining sensor life.

The analyzer stores the last five times it was calibrated, along with the calibration factor and the value of the gas used. These records may be viewed with the User Interface program.

Sensor Life:

A sensor is slowly used up during its life, rather like a flashlight battery. As it gets used up, you will need to increase the span to keep the unit calibrated. You can judge the state of the sensor by performing a calibration, and then reading the "Span factor" by pressing the UP button. When the sensor is new this number will be around 450; by the time it reaches 1000 the sensor is used up. You will find that this number doesn't change much at first, but as the sensor ages it begins to change more rapidly. We recommend that you order a new sensor when the number reaches 900.

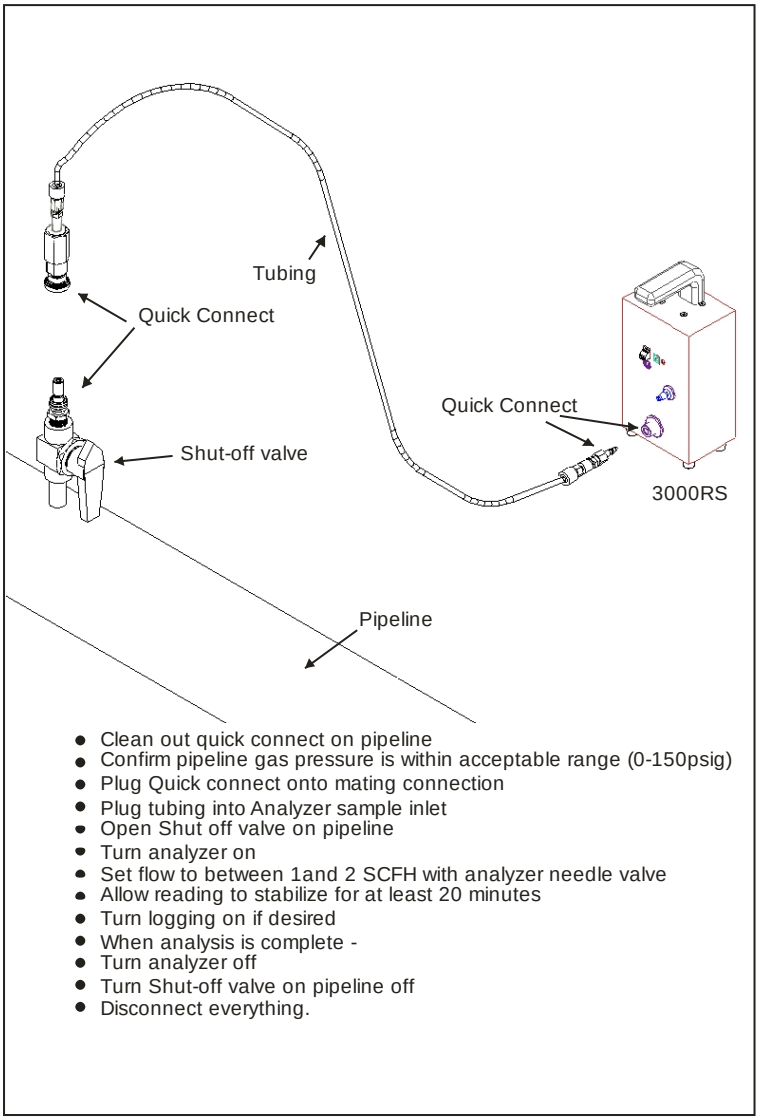

Figure 2 Sampling from a pipeline

Sample Line Connection:

The sample is brought into the "quick connect" fitting on the rear of the analyzer. We use this kind of fitting because it can be made and unmade many times without damage, unlike a compression fitting. If you are using the flexible tubing supplied as an optional accessory, simply plug it into this fitting. Otherwise, you will need to attach the male matching fitting to the tubing you are using.

Tubing used for the sample line must be a suitable material that adsorbs minimal amounts of hydrogen sulfide. Otherwise it may take a very long time for the reading to stabilize. Polished stainless steel is preferred, as is the special AMI supplied flexible tubing.

The line does need to be at a positive pressure to drive a sample through the analyzer: do not try to sample from vacuum lines unless you have a pump to perform the extraction. If you do wish to do this, please contact the factory for assistance.

If you are sampling natural gas in an enclosed space, such as a "Pod building", you must use some tubing to bring the exhaust outside the building. Slip it onto the exhaust fitting, and run it downhill to a suitable place outside. Any kind of tubing, such as silicone or other plastic, is acceptable for the exhaust line (unlike the sample inlet line).

NOTE: Never allow the vent to become restricted, thus back-pressuring the sensor. Doing so will cause inaccurate readings and may damage the sensor.

Measuring a sample:

Plug the sample line into the quick connect fitting, and allow gas to flow. Use the needle valve to control the flow to between 1 and 2 SCFH. Allow the sample to flow through the analyzer at least twenty minutes, until the reading has achieved a stable value. The sensor responds rapidly, but hydrogen sulfide sticks to the walls of the tubing, valves, and any other objects in the sample path and thus is initially stripped out of the sample gas. Usually twenty minutes is enough for everything to stabilize, but if in doubt leave it longer.

Data Logging Feature:

The analyzer can log its readings periodically. When power is turned on, the logging is always disabled. You have to tell it to log by pressing the "LOG" button, and holding it down until the display changes from "OFF" to "On". By default, it will then log an averaged reading once a minute. It will log up to about 23,000 data points – that is, for somewhat more than 2 weeks at 1 point per minute.

You can start and stop it logging at will. If you turn the power off, that will stop the unit from logging, and you will have to restart it as above if you want it to log the next time you turn it on. If you fill up the storage, it will continue again at the bottom, overwriting the earliest data.

You will need the optional program and cable to download the log onto a PC. The program lets you view the data as a graph or as a table of values, and allows you to export it as a data file that can be manipulated by programs such as Excel. It also allows you to erase all stored data.

RFI Interference:

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

Battery Charge:

Make sure that the batteries are charged. When you turn the unit on, it will indicate the battery state as follows:

LCD flash	**Meaning**
"---"(Momentary flash, followed by zeros)	Batteries are OK

"Bat Lo" (Shows alternately "Bat" then "Lo" with the reading, every ten seconds)	Batteries are low, but OK for a while. Recharge soon.
"Ded" (Shown continuously)	Batteries are too low for operation (dead). They must be recharged

Although the batteries are charged when the analyzer leaves the factory, NiCd batteries self discharge and they may be discharged by the time you use it. Since it is not possible to overcharge the batteries, you may wish to recharge them before using the instrument. Do this by plugging the AC charging unit provided into a suitable receptacle, and into the charging receptacle on the rear of the analyzer. The LED on the rear of the unit will glow green indicating that charging is occurring. For a full charge allow fourteen hours. It is best to completely recharge them if you are going to charge them at all.

Note that the unit won't know how much the batteries have been charged (due to the nature of NiCd batteries). If you just charge it for a short time, it won't know that the batteries are about to fail until it's been powered on for a while. This is due to the behavior of batteries under charge – they develop a high voltage that lasts for a while after the charging current has been removed.

Output Connections:

Wire connections for the 0 - 1 V output are provided on the rear of the unit. This corresponds to a percentage of the unit's "Output Range", a value that can be set with the optional PC program. By default this is 100ppm. 0V corresponds to 0ppm, and 1V corresponds to 100ppm.

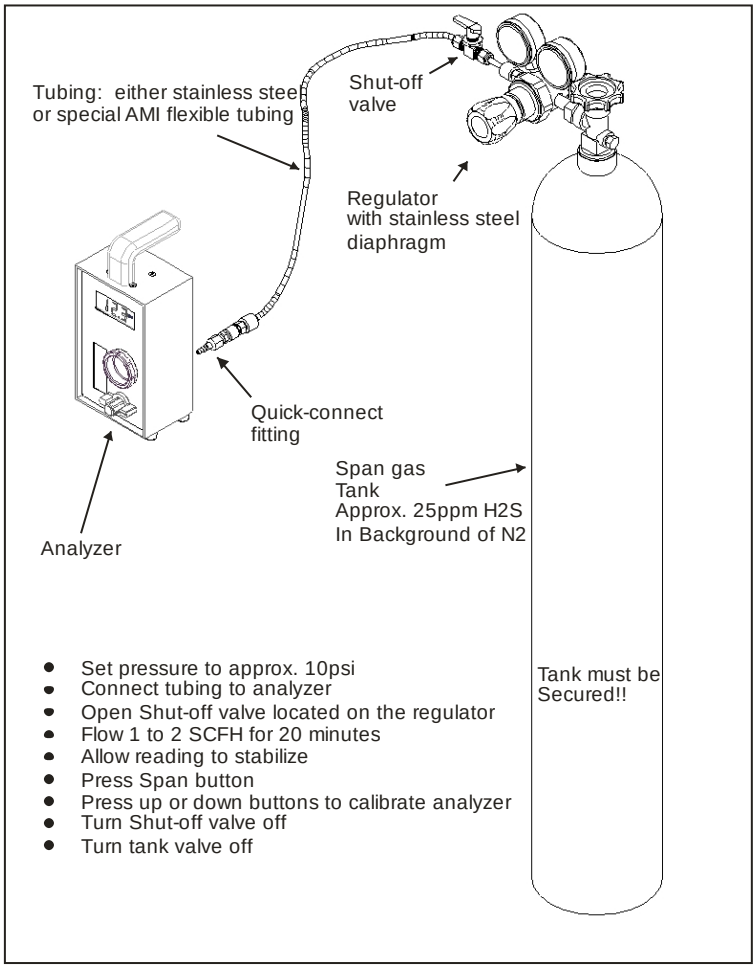

Figure 3: Calibrating the analyzer

Calibration Procedure:

A new unit is supplied with its sensor installed, and has been calibrated at the factory. It is generally not necessary to calibrate it for a month or so after receiving it.

It is necessary to calibrate the analyzer on a suitable span gas. For the low range unit, use a gas containing about 25ppm hydrogen sulfide in nitrogen. For the high range unit, you will need a gas containing about 250ppm hydrogen sulfide in nitrogen.

Normally calibration is straightforward, but it is possible for things to go wrong if incorrect components and procedures are used. If the calibration seems a long way off, don't panic. See the troubleshooting section below before you try to change the calibration too much. Make sure you are using a regulator with a stainless steel diaphragm – DO NOT USE RUBBER DIAPHRAGMS!

1. Connect the span gas into the analyzer sample input and set the flow to about 1SCFH.
2. Allow the span gas to flow and the reading to stabilize. This will take at least twenty minutes!

3. If the reading is reasonably close to being right, press the “SPAN” button, and then the up or down arrow buttons until the number displayed is the same as that on the span gas tank.
4. Shut off the span gas and disconnect it.

Calibration Troubleshooting:

Sometimes when you get to step 4 of the calibration procedure above, the span gas reads something quite different from what you expect. There are some common reasons for this.

The first is that the span gas does not actually contain what you thought it does. Hydrogen sulfide sticks to surfaces, and it may be that if your gas is old, and has lost enough pressure, that it's all stuck to the inside of the cylinder and nothing is coming out.

The other is that it really takes twenty minutes for the system to stabilize. This is part of nature, and there's nothing to be done about it, except be patient.

Finally, you may simply have bad gas. Try a different span gas bottle.

Data Logging Procedure:

The analyzer has a built-in data logger that can store up to about 23000 data points. You can turn the logger on and off with the button on the front panel – if you press the button once it will show you whether it is currently logging or not.

It doesn’t matter if you leave it logging all the time – you will just have a lot of uninteresting data points logged if you do. You can set the log period – the time in between when it stores data points – with the AMI communication program. Normally it is set for 1minute, which will mean the logging time is longer than the batteries will last anyway.

Procedure:

1. Turn it on.
2. Press the LOG button.
3. It will say “On” or “OFF”; hold the LOG button down to turn it on if it isn’t already.
4. Let the analyzer measure gas for a few minutes until you have a satisfactory amount of data stored.
5. Press the LOG button again and hold it until the display says “OFF” to turn off the logging function.

Sensor tracking:

When you install a new sensor, you can use the optional User Interface program to tell the analyzer that it has a new sensor, and record the sensor serial number in the analyzer. The analyzer will then track how long the sensor has been in operation, how much hydrogen sulfide it has been exposed to, and how long it has been exposed to temperature extremes. Of course it can only do this while it is turned on, but it does

track the total length of time it was been out of operation as well, so you can get an idea of the state of the sensor.

It also keeps in storage the details of the last sensor it used, so you can compare them. All of this is available through the User Interface Program.

Calibration History:

The analyzer stores the last five times it was calibrated, whether via the front panel or via the User Interface program. When it detects a change in its Span Factor, it stores the time and date, the new value of Span Factor, and the hydrogen sulfide value it was reading when it does so, giving you an idea of the span gas that was being used. If the unit is calibrated several times in one day, it only stores the last time – it doesn't fill up the storage with failed attempts.

Note that if a user adjusts the span without using a span gas, this feature will tell you that, since the gas value it stores will look odd.

Turn-on/turn-off history:

The analyzer stores the last ten times it was turned on (it doesn't have a chance to store times it was turned off). It also records how many memory errors it saw when it was turned on and loaded its operational memory from its non-volatile storage. It actually stores its important parameters in four separate locations and thus won't be affected by individual memory errors, but if it does ever show errors it implies something is wrong with the electronics.

Communications

Communications:

The USB port is located on the back panel, and is provided as a type B USB connector. It uses a standard cable such as is often used to connect PCs to printers.

Through the USB interface you can operate the analyzer from your PC, and you can set up its internal parameters to your liking. The USB communication runs at 57600 baud.

- We recommend that you use the AMI communication program for reading from and setting up the analyzer.
- Use the Interface III V6.0 or later.
- See the AMI communications manual for details.

Maintenance and troubleshooting

Maintenance:

The AMI hydrogen sulfide analyzer is virtually maintenance free other than for periodic calibration and occasional sensor replacement.

Periodic Calibration:

The analyzer should be calibrated about once every month to obtain the best accuracy. The sensor typically declines in sensitivity gradually, so a monthly calibration is usually satisfactory. Use in a particularly aggressive environment may degrade the sensor faster: in this case calibrate more often.

Sensor Replacement:

Use the UP arrow on the front panel to determine the span factor after a valid calibration. When this has reached about 900, it is time to replace the sensor.

CAUTION: If using compressed air to clean the sensor block, proper eye protection must be worn.

CAUTION: The sensor contains a sulfuric acid gel. Do not allow this to come into contact with your skin. If it does, immediately flush the affected area with water for a period of at least 15 minutes.

Dispose of leaking or used sensors in accordance with local, state and federal regulations. Refer to the MSDS (contact factory) to learn about potential hazards and corrective actions in case of any accident.

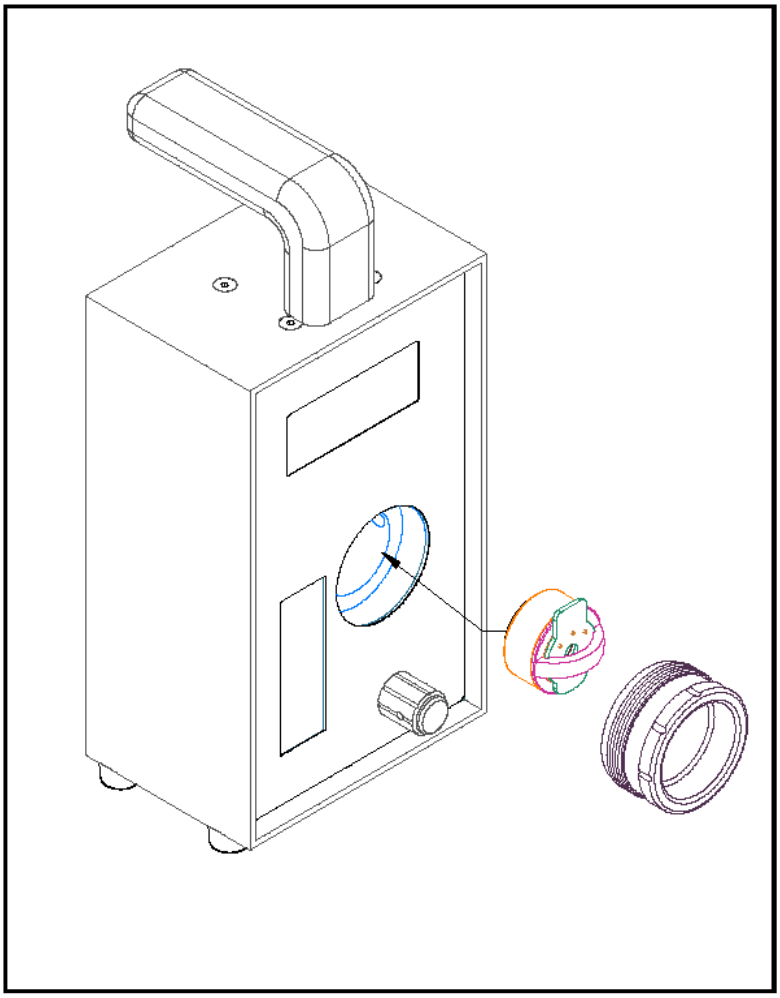

Figure 4 Sensor installation

The sensor is provided in a special sealed bag. Do not open this until you are ready to install the sensor.

Sensor Installation:

1. Unscrew the cell cap.
2. Carefully remove the old cell by pulling on the little black handle provided.
3. Inspect the cell block cavity, and if any sign of moisture clean it out with a Q tip or similar. Make sure that the contact springs inside the block are intact. Be careful not to snag them with the Q tip.

4. Carefully open the bag using a pair of scissors or a knife. Make sure you don't cut yourself or stab the sensor! Make sure that there is no sign of any liquid in the bag, if so do not proceed, you need a new sensor
5. Install the sensor, membrane side away, into the cell block (the circuit board tab should slot into the cell block opening so that it can touch the cell block contacts).
6. Verify that the sealing O ring is in place in the cell cap groove. Verify that the O ring and the cap are clean and free of any particulate deposits (dirt).
7. Carefully replace the cap, making sure that you do not cross thread it, and tighten firmly by hand.
8. Use a suitable 25ppm span gas (250ppm for the high range unit) to calibrate the unit per the calibration procedure above.

Common Calibration Errors:

Common errors when spanning the analyzer are as follows:

- Leaky gas fittings.
- Incorrect regulator, or regulator with non-metallic diaphragm.
- Not allowing long enough for the system to stabilize.
- Use of any plastic tubing (should be the special AMI tubing or stainless steel tubing).
- Inaccurate gas in the calibration cylinder.

Any of these will cause an erroneously reading.

Accessories

Carrying case

This rugged protective carrying case extends the life of our portable gas analyzers in the most demanding and hazardous environments.
It is lined with a thick die cut foam providing complete protection to your portable analyzer during travel and storage periods. The die cut foam also has built in compartments for the battery charger and quick disconnect fitting, as well as the flexible tubing and Liquid Rejection Probe accessories.
These compartments not only protect them, they keep all the necessary components together and organized.

Calibration Tubing

This special flexible tubing not only provides very low oxygen diffusion but also an o-ring sealed fitting that avoids the common problems of wear on fittings that are disassembled frequently.

User Interface CD

Provides a user-friendly way of using the advanced features of the analyzer, including accessing the sensor history, the advanced calibration capability and the data log. It runs on a standard Windows PC or laptop, and uses the standard USB connection.

Troubleshooting

Analyzer does not power up.

1. Recharge the batteries. Recharge them, and if they do not take a charge, replace the battery board.
2. When charging, check that the charger is plugged into a receptacle and that the receptacle is itself powered. The Green LED will glow if the batteries are being charged.

Analyzer reads too low

1. Sensor is not calibrated. Flow span gas through it as described and adjust the span until the analyzer reads appropriately.
2. If you cannot adjust the span enough to accomplish this, replace the sensor.
3. Hydrogen sulfide hang-up can be a serious problem. Verify that no plastic tubing, or other plastic components are used in a trace gas system, including diaphragms of pressure regulators, packing of valves etc.
4. The span gas you are using is incorrect. Span the analyzer using natural air as the span gas, and measure the span gas. If it reads incorrectly, replace it.

Analyzer reads too high

1. Verify that there is no flow restriction in the vent line of the analyzer.
2. Remove the cell and verify that the 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 again.

Analyzer reads zero

1. Verify that the cell block contacts are touching the sensor circuit board. If they are completely pressed in you may be able to gently pull them out and clean the shafts with a Q tip and alcohol.
2. Make sure that the gold plated contacts are clean. If not, gently clean them with a Q tip or an eraser. Do not use an abrasive cleaner, as it will remove the gold plating.

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

1. Charge the batteries with the power off, for at least 14 hours.
2. NiCd batteries have an expected life of about 300 charge/discharge cycles. They will last best if they are never completely discharged. Legend has it that they prefer to be well discharged so as to avoid a memory effect, but it is by no means clear that this is true. In any case they will eventually die.

Still no correct operation

1. Look at the AMI web site at www.***AMIO2***.com - there may be some hints there that will help you.

2. Call AMI at 714 848 5533, and ask for Service.

Specifications

Specifications:

Standard output ranges: 0 - 10 ppm, 0-50ppm, 0 -100 ppm, 0-200ppm.

Optional high range unit: 0-100ppm, 0-500ppm, 0-1000 ppm, 0-2000 ppm.

Analog Output: 0-1V DC (Self Powered)

Sensitivity: 0.5% of full scale.

Repeatability: +/- 1% of full scale at constant temperature.

Operating temperature: 25 - 115°F.

Charging Ambient Temperature: 25 - 105°F.

Humidity: < 95%, non-condensing.

Operational conditions: Pollution degree 2, Installation category N/A since this is battery powered.

Area Classification: Designed for intrinsic safety for Class 1, Div. 1, Groups B,C,D

Sample Pressure: < 150psig.

Drift: +/- 1% of full scale in 4 weeks (dependent on sensor).

Cell life: 1 – 2 year (typical).

Response times: 90% of full scale (0 - 100 ppm) < 2 min.

Power requirements: 115/230 VAC +/- 10%; 50/60 Hz; less than 5 W.

Dimensions: 4 ½”w x 9½”h x 4½”d.

Weight : 5 lbs.

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.

Certificate of Compliance

Certificate: 70043390 **Master Contract:** 227773

Project: 70043390 **Date Issued:** April 15, 2016

Issued to: **Advanced Micro Instruments Inc.**
18269 Gothard Street
Huntington Beach
CA 92648
USA

Attention: **Charles Schacht**

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and US Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only

Issued by: P Johnson

PRODUCTS

CLASS 2258-03 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non Incendive Systems – For Hazardous Locations
CLASS 2258-83 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non-Incendive Systems - For Hazardous Locations - Certified to U.S. Standards

Class I, Division 1, Groups B, C and D:

Model 1000RS battery powered portable oxygen analyzer and Model 3000RS battery powered portable hydrogen sulfide analyzer. Built in non-replaceable battery pack. Output rated 0-1V provides intrinsically safe output to attached external measurement device. Temperature code T4, Tamb = -3.8°C to +46.1°C (25°F to 115°F)

For details related to rating, size, configuration, etc. reference should be made to the CSA Certification Record or the descriptive report CSA Hazardous Location Report 70043390.

Certificate: 70043390 **Master Contract:** 227773
Project: 70043390 **Date Issued:** April 15, 2016

Conditions of applicability

The Models 1000RS and 3000RS shall only be charged in a non-hazardous area using a charger specifically supplied for use with the unit (for example part number 3ACA08, type TRG1512-A, manufactured by CINCON Electronics Ltd), approved as SELV or Class 2 equipment against UL 60950 or an equivalent IEC standard. The maximum voltage from the charger shall not exceed 12.0 Vdc.

A data download device may only be connected to the Models 1000RS and 3000RS in a non-hazardous area and shall be approved as SELV or Class 2 equipment against UL 60950 or an equivalent IEC standard. The maximum voltage from a data download device shall not exceed 5.0 Vdc

APPLICABLE REQUIREMENTS

CSA C22.2 No 0-10	General Requirements – Canadian Electrical Code, Part II – Tenth Edition
CAN/CSA C22.2 No. 157-92	Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations.
CAN/CSA-C22.2 No. 61010-1-12	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements
UL Std. No. 61010-1 (3rd Edition)	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements
ANSI/UL 913 (8th edition)	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
ANSI/UL 60079-0:2013	Explosive Atmospheres - Part 0: General requirements
ANSI/UL 60079-11:2013	Explosive Atmospheres - Part 11: Equipment Protection by Intrinsic Safety "i"

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

For the models 1000RS and 3000RS the following markings are permanently painted on a metallic nameplate with a minimum thickness of 0.5mm, which is secured to the flow-meter enclosure by two rivets.

- Manufacturer's name: "Advanced Micro Instruments", or CSA Master Contract Number "227773", adjacent to the CSA Mark in lieu of manufacturer's name.
- Model number: As specified in the PRODUCTS section, above.
- Electrical ratings: As specified in the PRODUCTS section, above.
- Manufacturing date in MMYY format, or serial number, traceable to month of manufacture.
- The CSA Mark with or without "C" and "US" indicators, as shown on the Certificate of Conformity.
- Hazardous Location designation: As specified in the PRODUCTS section, above (may be abbreviated).
- Temperature code: As specified in the PRODUCTS section, above.
- Ex ia
- The following words:
    - Warning: Explosion Hazard. Substitution of components may impair intrinsic safety. Do not connect DC charger or USB in hazardous areas. Only connect intrinsically safe equipment to Analog Out when in hazardous area. See instructions.
      Potential electrostatic charging hazard, see instructions
    - Avertissement : Danger d'explosion. La substitution de composants peut affecter la sécurité intrinsèque. Ne pas brancher un chargeur CC ou un USB à des endroits dangereux. Raccorder uniquement de l'équipment intrinsèquement sûr à la sortie analogique à un endroit dangereux, voir instructions. Danger potential de charge électrostatique, voir instructions.

The following markings are screen printed on the rear panel of the models 1000RS and 3000RS:
EXPLOSION RISK! DO NOT CONNECT USB OR 12V DC TO THIS UNIT IN A HAZARDOUS LOCATION|. ONLY CONNECT INTRINSICALLY SAFE EQUIPMENT TO ANALOG OUTPUT!

RISQUE D'EXPLOSION! NE PAS RACCORDER USB OU 12V CC ACER APPAREIL A UN EMPLACEMENT DANGEREUX. RACCORDER UNIQUEMENT UN EQUIPMENT INTRINSEQUEMENT SUR A LA SORTIE ANALOGIQUE.

The following warnings are stated in the product user manual:

1. Do not use the USB Interface and/or the 12VDC Input in a Hazardous Area.
2. A data download device may only be connected to the USB connector of this analyzer in a non-hazardous area and shall be approved as SELV or Class 2 equipment against UL 60950 or an equivalent IEC standard. The maximum voltage from a data download device shall not exceed 5.25 VDC.
3. Model 1000RS:
   Only connect Intrinsically Safe Equipment to the Analog Out (Parameters Uo=4.65V, Io=47mA, Po=34.8mW, Ci=30.50µF, Li=0µH)
   Model 3000RS:
   Only connect Intrinsically Safe Equipment to the Analog Out (Parameters Uo=4.65V, Io=47mA, Po=34.8mW, Ci=57.76µF, Li=0µH)
4. Substitution of any components in this analyzer may affect intrinsic safety.

CSA Group

Certificate: 70043390 **Master Contract:** 227773
Project: 70043390 **Date Issued:** April 15, 2016

5. Potential Electrostatic Charging Hazard:
    a. No precautions against electrostatic discharge are necessary for portable equipment that has an enclosure made of plastic, metal or a combination of the two, except where a significant static-generating mechanism has been identified. Activities such as placing the item in a pocket or on a belt, operating a keypad or cleaning with a damp cloth, do not present a significant electrostatic risk. However, where a static-generating mechanism is identified, such as repeated brushing against clothing, then suitable precautions shall be taken, e.g. the use of anti-static footwear.
    b. The certification marking plate is aluminum. Care must be exercised during use to avoid causing sparks by impact or friction.
6. The analyzer shall only be charged in a non-hazardous area using a charger specifically supplied for use with the unit (for example part number 3ACA08, type TRG1512-A, manufactured by CINCON Electronics Ltd), approved as SELV or Class 2 equipment against UL 60950-1 or an equivalent IEC standard. The maximum voltage from the charger shall not exceed 12.0 VDC.
7. **Exia** means Intrinsically safe.