INFRARED INDUSTRIES

IR208

Continuous Gas Monitoring Analyzer

Operator's Manual

Version 2.3

25590 Seaboard Lane
Hayward, CA 94545
Phone 800.344.0321 • Fax 510.782.8101
www.infraredindustries.com

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The IR208 is capable of monitoring up to six individual gases within a single gas sample stream. The IR-208 takes advantage of shared components and subsystems within the analyzer to prepare and process additional infrared detectors as a cost saving multiplier. This enables Infrared Industries to offer a much more powerful and capable analyzer while at the same time keeping cost to a minimum. These savings multiply when more than one gas is required to be monitored and a substantial savings can be made when compared to separate analyzers.

The IR208 utilizes a multiple detector array, single infrared beam optical system. The analyzer infrared detector and optics are tailored to the customer's specified gases by limiting the infrared spectral energy using specially designed optical bandpass filters and comparing them to a specialized optical filter outside the bandwidth of the other gases in the sample stream. Comparing the absorption of the reactive gas filter to the comparator characterizes a measure of the gas concentrations. The measured transmittance levels are electronically processed to develop the displayed gas concentration readings.

Up to three gases may be measured using IR spectroscopy. In addition the IR-208 has the capability to utilize electrochemical, paramagnetic or other sensors to measure up to 3 additional gases.

A touch-screen LCD display and DC Voltage analog outputs are standard with the unit, as well as an RS232 port for printer connection and PC control.

Other options for the IR208 include:

- **High-current analog outputs (4-20 mA)** – provide high-current output of measured results
- **Zero Air Pump** – Adds built-in pump used for purging & zeroing the sample cell
- **Sample Conditioner** – Adds built-in sampling system conditioner (pump, filtering, and pneumatics)
- **Probe and Hose Assembly** – Sample hoses and probes are available for a variety of applications
- **PC Software** – Controls multiple IR-208 units via PC; captures data and presents graphs
- **AC/DC power / Integrated Battery**– Allows the analyzer to operate on either AC or DC or battery
- **Alarms** – provides Alarm outputs (relays) on the back of the unit with user-configurable hi and low values

This section provides a description of the set-up of the analyzer. When using the analyzer for the first time, check for any damage that may have occurred during shipping. We suggest filling out the Instrument ID Sheet at the back of this manual for your permanent records.

Please familiarize yourself with the front and back panels of the unit by examining the unit and the pictures on the following pages.

POWER UP

The analyzer can be operated from AC power source at 110-120 VAC or 220-240 VAC (12VDC or 24VDC optional). The AC power-input connection is a standard 3-wire recessed computer-type connector. Various types of power cords may be used to connect to wall power as needed to be compatible with the various supply voltages and wall sockets throughout the world.

Attach the power cord to the rear of the analyzer and plug the end of the cord into the appropriate main power.

Make sure that the sample probe or line has been placed in an area where there is only clean dry air to be drawn into the sample line or, if using an external sample conditioner, that the sampling selector switch is set to "ZERO".

Connect the sampling conditioners output line to the inlet port on the back of the analyzer.

Press the Power button to turn on the unit.

The front panel will then display the Infrared Industries logo while the analyzer is starting up. The warm-up time will vary depending on analyzer's internal temperature. Zero gas should flow continuously during warm-up; if not, the accuracy of the analyzer maybe significantly reduced.

Once the analyzer is warmed-up, it is ready to begin measuring gas concentrations. Select the sample line you wish to measure and turn on your sample conditioner sample pump. Allow a few seconds for the gases to reach the analyzer and for the displayed values to stabilize.

Optional Automated Zero:
With the automated zeroing feature option; it is necessary to add an additional supply line from your Zero gas (N2) cylinder and connect it to the "Zero" port on the back of your analyzer. This line will supply the Zero gas to the automated solenoid valve located inside the analyzer. This feature allows the operator to perform a zero from the front panel of the analyzer. When the zero is engaged; the sample port to the analyzer will close and zero port will open allowing your zero gas to purge the analyzer and then "ZERO" the analyzer. After the zero is completed; the zero port will close and the sample port will again open and begin reading the sample stream.
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Before attempting to operate the analyzer, review the analyzer features described below as well as all warning labels. Identification and understanding of the physical features of the instrument will make operation easier.

FRONT PANEL

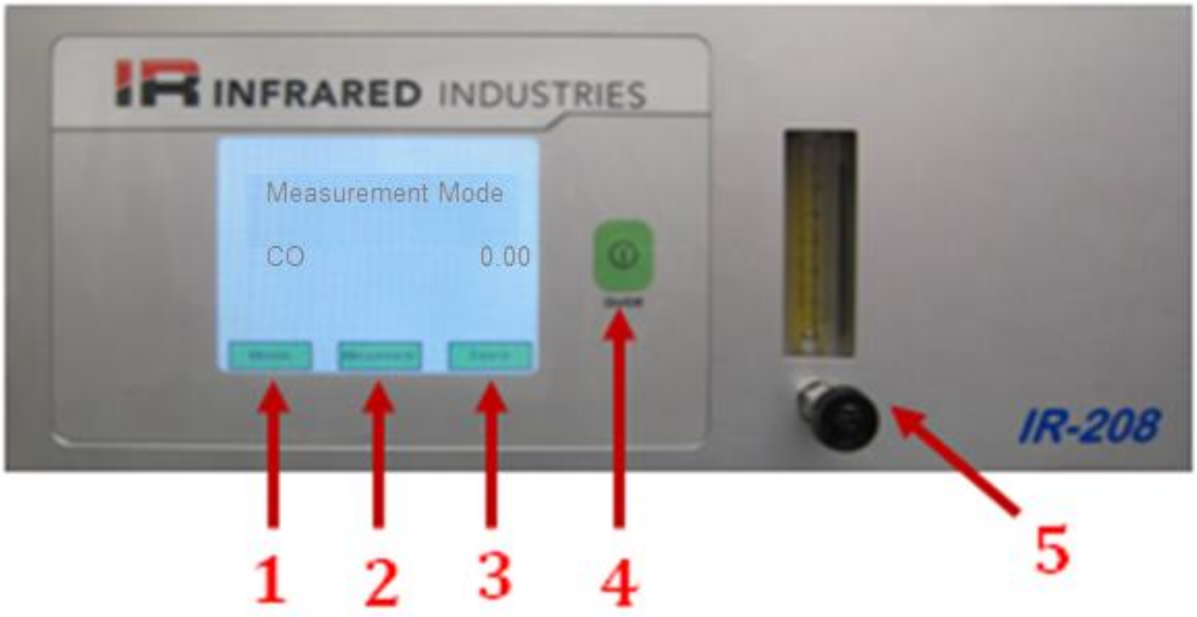


Figure 1: Front Panel/Display

1. **Span –** Calibrates the analyzer to the current gas concentration. This should be performed while calibration gas is flowing through the analyzer.

2. **Zero –**Zeros the analyzer. This should be performed while zero gas is flowing through the analyzer.

3. **Menu –** Leads to setting the Configuration options.

4. **On/Off –** Turns power on and off.

5. **Flow Meter and Control–** Regulates flow to the sample cell and shows measured flow in SCFH or LPM.

REAR PANEL

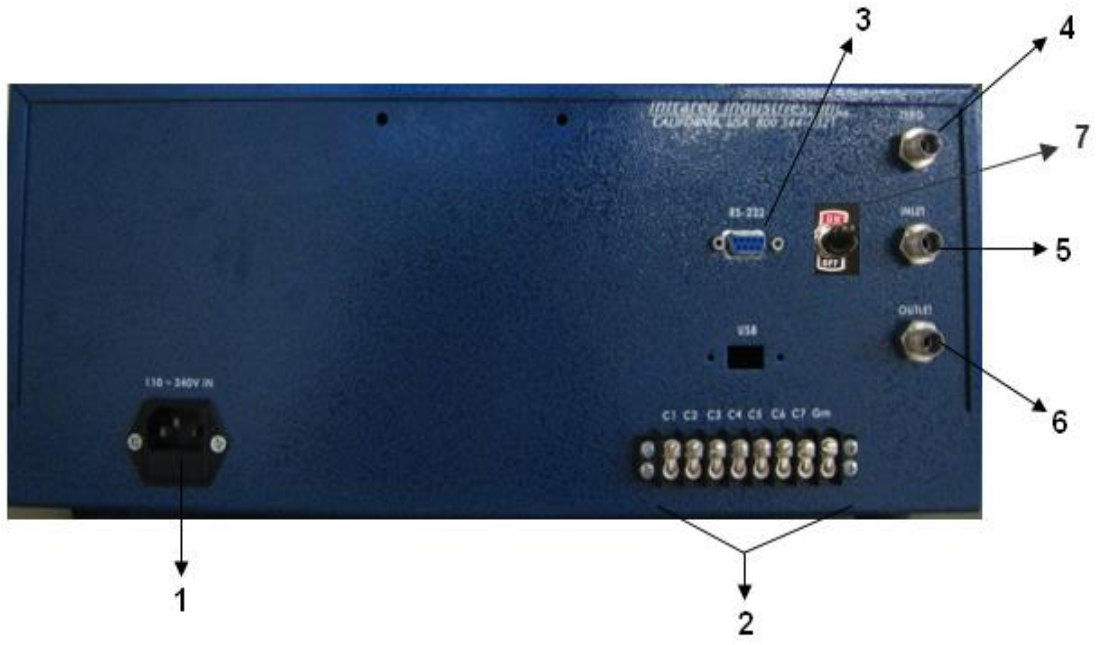


Figure 2: Rear Panel

1. **AC Power socket and Fuses** - Fuses installed below the AC power socket provide protection from electrical overload.

2. **Analog Outputs** – Allows connection to a recording device. Output is DC voltage and the range is specified at the time of purchase. Optionally 4-20 analog outputs can be configured on these connectors.

3. **Serial RS232 Connector**- The serial Communication Port allows the analyzer to be connected to a PC-compatible computer or a printer. Set the proper Configuration based on the device that will be attached (see Configuration Menu -> Serial Port).

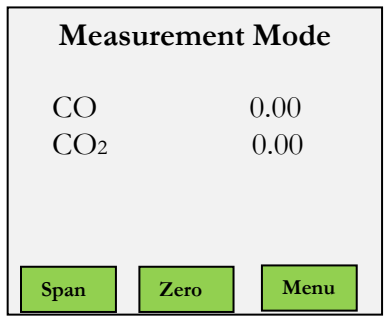
4. **Zero Port** – this is an optional port where zero gas can be connected.

5. **Sample Gas Inlet Port**

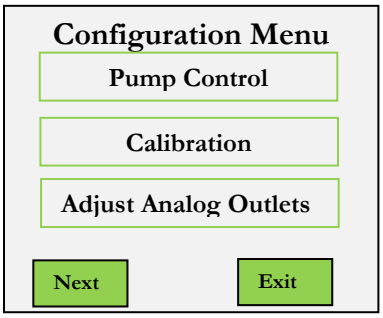
6. **Sample Gas Exhaust Port**

7. **Pump Switch (Optional)**

The IR-208 has various configuration choices. This section outlines the configuration screens.

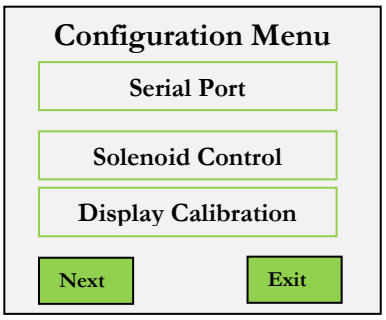


The Measurement Mode Screen is referred to as the **Home Screen**. From this screen you can access the Configuration Menu by touching the MENU button.



This is an example of the **Configuration Menu** screen; from here you can select multiple items as shown.

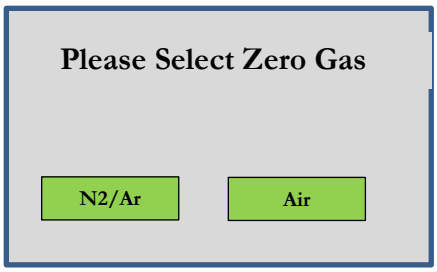
The NEXT button will display additional Menu options as seen in ***Figure 3***.



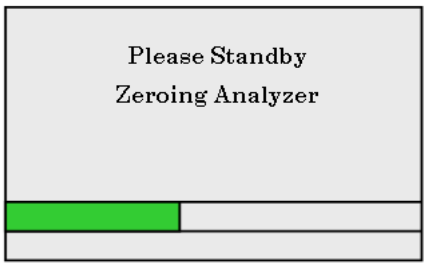
Press EXIT to return to the **Home Screen** at any time.

Figure 3

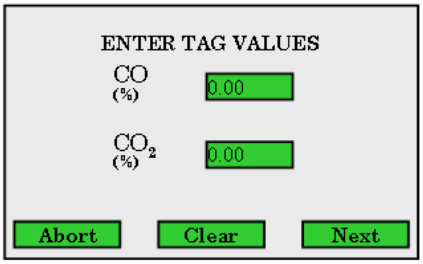
CALIBRATION



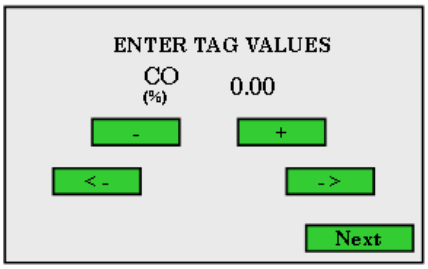
By pressing the **Calibration** button from the main settings screen the analyzer goes into standby and prompts for the type of purge gas. The options are Nitrogen, Argon and Air. Zero gas should flow through the unit while zero is performed.



The analyzer goes into standby and begins to purge the gas lines. The bar at the bottom of the screen shows the progress of the process as it moves from left to right.

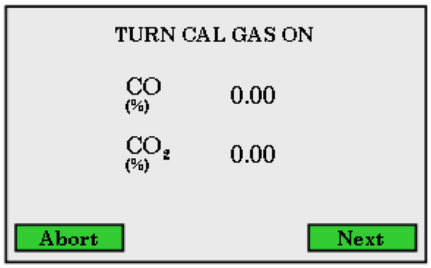


Once the "zeroing" has completed you will see this screen. Enter each gas tag value by pressing the corresponding box.

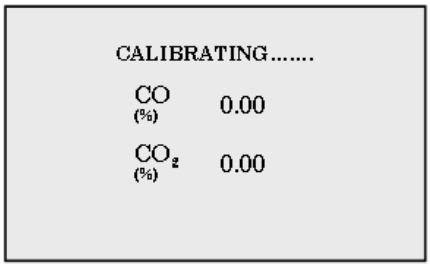


When entering the tag values you should enter them just as they are on the calibration bottle*.
Enter zero for the tag value of any gas that you are not calibrating or for any gas not present in the calibration bottle. Fields containing a decimal point require tag values to be entered as percentages. Fields without a decimal point should be entered as ppm.
*Use + and - to change the number that is currently highlighted. To move to the next digit or field use the <- or -> buttons. Press the NEXT button to move on to the next gas.

CALIBRATION (CONTINUED)

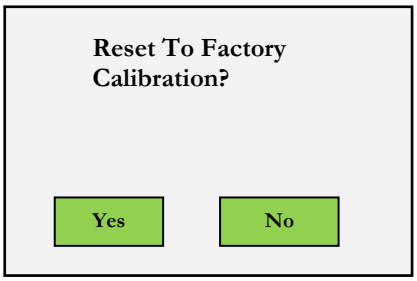


At this point, turn on your calibration gas. When the gas is on, wait for the gas readings to stabilize. Once stable click NEXT, otherwise, you can exit the calibration by pressing ABORT.



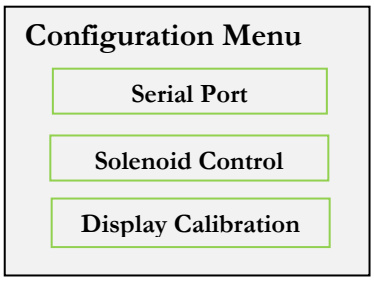
This window will now display **Calibrating**. When completed the **Home Screen** will display.

Note: If the analyzer is measuring O2 and air was used as the zero gas the analyzer will purge the sample cell. If nitrogen was used this step is skipped and the analyzer returns to the Home Screen.



If you decide to Abort the calibration the analyzer will give you an option to reset to factory calibration.

SERIAL PORT



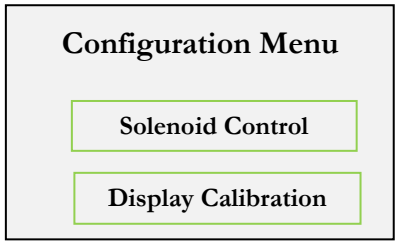
From the Configuration Menu select **Serial Port**

This selection defines the communications on the serial port. Select PC if remote control and display is desired. Select USB for the optional USB data collection.

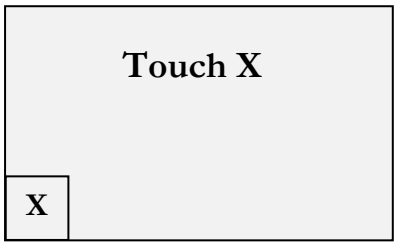
Note: contact IRI for information on the software required for PC control.

The analyzer returns to the Measurement Mode Screen after the selection is made.

DISPLAY CALIBRATION

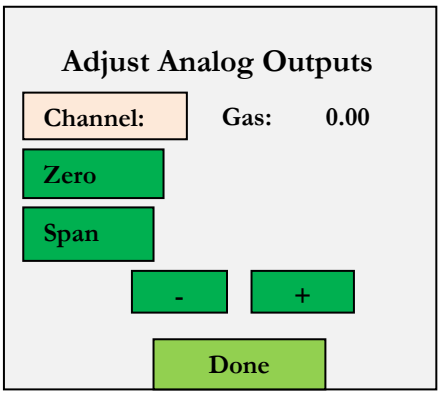


From the Configuration Menu select **Display Calibration**.



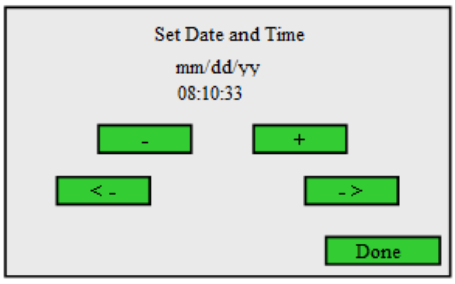
LCD Touch Screen Calibration; follow the instructions on the screen. Touch the X on the lower left side, then on the upper right side.

ADJUST ANALOG OUTPUT



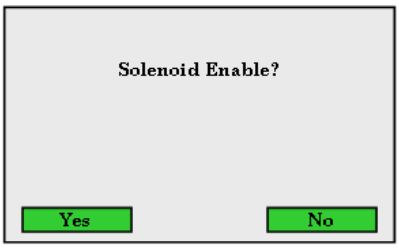
From the Home Screen select **Adjust Analog Outputs**. For each gas measured configure the low (zero) and high (span) by pressing the value in the box. Use – and + increment/decrement to set the corresponding option.

SET DATE AND TIME



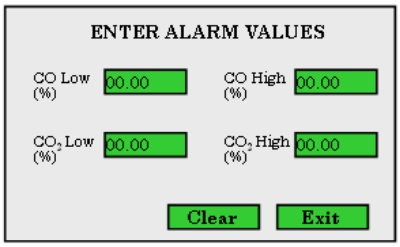
Use the plus and minus buttons to change the value in the highlighted field. Use the left and right arrows to move between fields. When finished press Done to return to the Measurement Mode window.

SOLENOID CONTROL

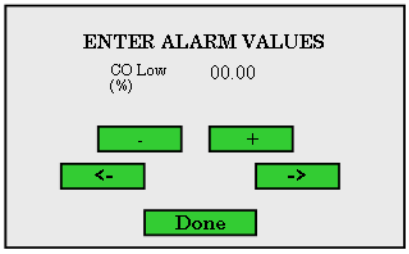


When installed, the Zero Solenoid is enabled and will open the Zero Port automatically when the analyzer is Zeroed. The solenoid can be disabled manually by selecting NO at this screen. The analyzer returns to the Home Screen after the selection is made.

ALARM SETTINGS

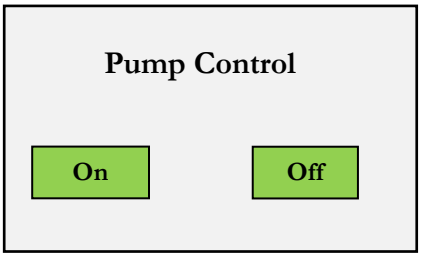


If the unit was purchased with the optional Alarms, there will be an Alarm output panel on the rear of the analyzer. For each gas measured configure the low and/or high alarms by pressing the value in the box to set it. If your unit does not have Alarm outputs, skip this step by pressing Exit.



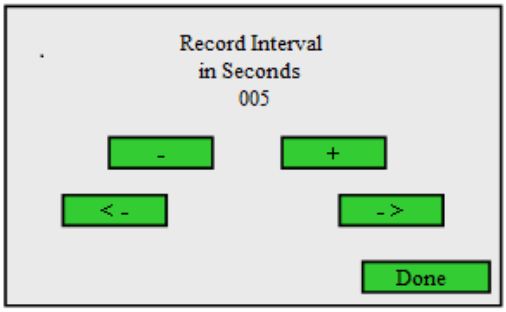
Use – and + in increment/decrement to set currently selected digit. Then use the <- and -> to move to the next digit to be edited. When you have finished editing, press the DONE button to complete this step.

PUMP CONTROL



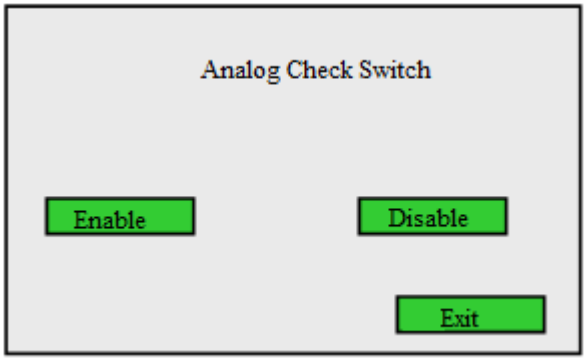
When a pump is installed the pump is controlled by this menu option. In addition the unit also has an external switch on the rear panel. When selecting ON via the menu set the rear switch to ON.

DATA RECORDING



When the optional USB data collection is configured in the analyzer the Data Recording screen sets the interval used to record data readings. If the interval is set to zero no data recording occurs.

ANALOG CHECK



This feature will send full voltage out all analog ports when Enable is selected. The voltage will stay at full range until Disable is selected. When exiting this screen the switch will be set to disabled.

WARM-UP

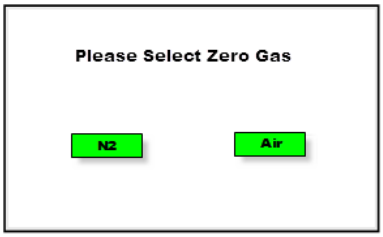
When power is first turned on, the analyzer will beep 5 times to indicate normal start-up, and then enter the START-UP phase.

During WARM-UP, purge any residual gases from the sample hose by providing Zero air or Nitrogen to the Sample Inlet. No other modes of operation can be initiated during WARM-UP. When complete, the Measurement Screen is displayed. To configure the analyzer the "Menu" button is pressed from the Measurement Screen and the Configuration Menu will be displayed.

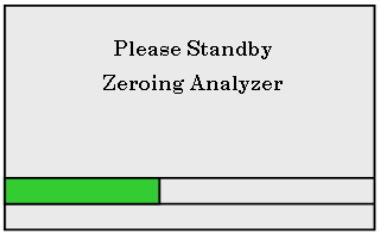
In the MEASURE mode, the analyzer is processing the detector signals, converting them to concentrations and displaying these measurements as well as sending data to the other outputs. The following screen is displayed:

ZEROING

The operator may initiate the ZERO cycle from the Home Screen. The analyzer will prompt for the type of zero gas being used. Zero gas show be flowing throughout this process.



The options are Nitrogen, Argon or Air. Once the zero gas is selected the analyzer will start the zero process and displays:

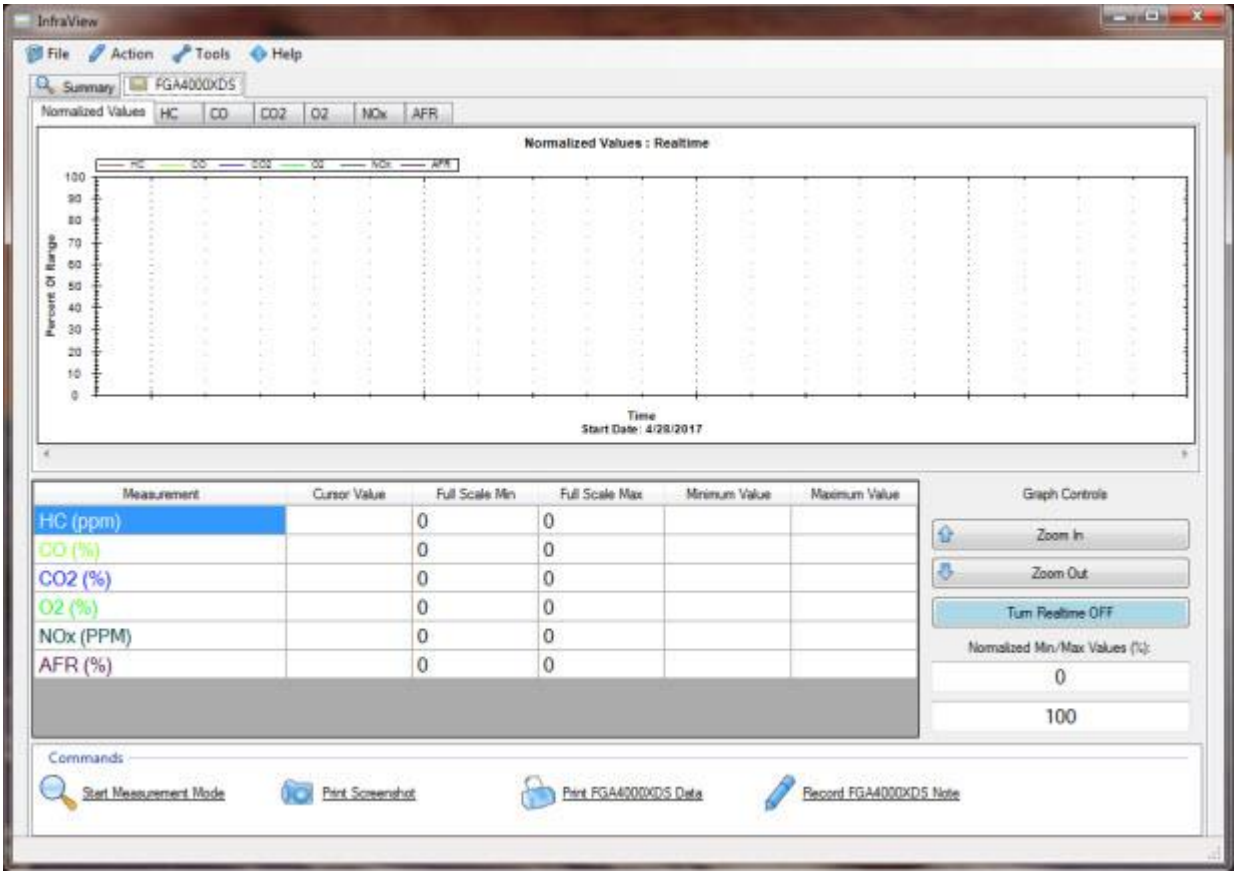


The process takes under 2 minutes, and the display will return to the Home Screen.

PC CONTROL INFORMATION

The analyzer can be remotely controlled by a PC and data can be sent to the PC as well. It is necessary to have a compatible program running on the PC. Please contact IRI for information on the latest software that we offer. Alternatively, we will also provide protocol specifications so that you may write your own software.

If the proper software is running on a compatible PC, ensure that the Serial Port is set to PC. See Configuration Menu -> Serial Port.



USB DATA CAPTURE OPTION

This option allows the analyzer to record the data readings to a USB flash drive. The interval between recording the readings is set through the "Record Interval" setting in the Menu items. The default value for the record interval is 10 seconds. When the interval is set to zero no data will be recorded.

Data is recorded in a csv format. Each day a new file is started. The name of the file has the format YYMMDD.csv.
YY = last two digits of the year
MM = Month
DD = Day

The contents of the file are demonstrated in the diagram below. It contains a Date and Time stamp, Gas Readings, Temperature Readings and the Absolute Pressure reading. Gas concentrations are reported in percent or ppm depending on the analyzer calibration. See the **Instrument Identification Sheet** at the end of this manual.

	A	B	C	D	E	F	G	H	I
1	Date	Time	NMHC CONC	CH4 CONC	THC CONC	GAS TEMP	PCB TEMP	DET TEMP	ABS PRESS
2	10/22/2018	15:14:53	0.014568	-0.002487	0.013723	34.226868	33.438599	58.452938	767.535095
3	10/23/2018	15:15:03	0.017781	-0.002487	0.017145	34.292908	33.381767	57.838654	767.471191
4	10/24/2018	15:15:13	0.018171	-0.002488	0.017612	34.333717	33.297596	57.611855	767.484009
5	10/25/2018	15:15:23	0.017355	-0.002488	0.017669	34.33848	33.297596	58.009121	767.471191
6	10/26/2018	15:15:33	0.016807	-0.002488	0.016899	34.310539	33.288219	58.42633	767.47119

There is also a set of files on the flash drive with the format IRYYMMDD.csv. This data is for internal use by Infrared Industries when trying to help troubleshoot problems at the analyzer location. The frequency of capturing data is the same as specified in the "Record Interval".

Any time the analyzer is in the Measurement Mode window the recording function will run. When you switch to the menu items the recording will stop until the analyzer is back in the Measurement Mode.

CALIBRATION INFORMATION

The analyzer has been calibrated at the factory and is designed to maintain calibration accuracy for extended periods of operation. We recommend a calibration about every three months to ensure the integrity of the analyzer. Some regulatory agencies specify the time intervals between calibrations based on your application. It is important to comply with the governing regulations for your industry.

CALIBRATION GAS REGULATOR

For high-pressure cylinders of gas, a regulator is needed to monitor the pressure of the calibration gas bottle and to adjust it to the pressure required for testing and calibration. An external sample conditioner often is used to provide pressure regulation and flow control.

> *NOTE: When using calibration gas, the bottle should be kept at about 21°C [70°F] for 8 hours prior to use. Sudden temperature changes can condense some of the components in the bottle, changing their concentration.*

For detailed steps on the Calibration procedure, see Configuring the Analyzer herein.

FRONT PANEL AND EXTERIOR

To maintain the appearance of the analyzer and prevent the buildup of dirt on the touchscreen, periodically clean the exterior with a soft damp cloth. Use a mild detergent to remove grease.

CAUTION: DO NOT USE CLEANERS SUCH AS ACETONE, BENZENE, CARBON TETRACHLORIDE, GASOLINE, OR TOLUENE, AS THEY CAN DAMAGE PLASTIC COMPONENTS AND AFFECT ANALYZER ACCURACY IF THEY CONTAMINATE THE SAMPLING SYSTEM.

ANALYZER TROUBLESHOOTING

There are three failure modes that the analyzer might encounter: General Failure, Zero Failure, and Failure to Calibrate.

For a General Failure and Zero Failure, perform the following procedure:

1. Verify that all the back panel ports are unobstructed, including:
   - Cal gas
   - Zero
   - Sample hose
   - Drain hose
2. Check the sample conditioner filters and pneumatics.
3. If a failure is still indicated, service is required by an authorized Infrared Industries service center.

For a Failure to Calibrate, perform the following procedure:

1. Repeat calibration.
2. If the analyzer still fails to be calibrated, the analyzer can still be used but it will be at reduced accuracy. It should be sent in for service when convenient.

When the default cal values are in use, the analyzer can still be used but the displayed values will be less accurate. It is recommended that the gas calibration procedure be performed to ensure accuracy.

SYMPTOM	PROBABLE CAUSE	SOLUTION
Low sample flow	1. Restrictions in sample hose or probe 2. Restrictions in sample filter	1. Check for kinked, plugged or pinched hose or probe. Clean probe tip with a small pointed tool. Disconnect hose from sample inlet and clean out if necessary 2. Change filter elements
Low sample flow during zeroing.	Restriction in Zero port Low zero gas pressure	Check for obstructions in zero port on the back of the analyzer. (Zero port is under the CAL port)
No output to PC	1. No compatible program running on the PC. Please contact IRI for information on the latest software 2. PC is not selected in the Serial Port menu	1. Ensure PC is selected in the Config Menu -> Serial Port. 2. Please contact IRI for information on the available software (required for PC control). The protocol is proprietary.
No output to printer	Printers are not supported at this time	
All function keys inoperative.	Unspecified error.	Turn analyzer power switch OFF and then back ON
No response when powered on	AC power problem	Check power cord and check fuses that are located under the AC power socket

RETURNING THE ANALYZER FOR SERVICE

If the analyzer needs service, contact your dealer for complete instructions. If you need to ship the analyzer, pack it in its original container. We recommend that you insure the shipment.

Follow all instructions in this manual to be sure that the problem is with the analyzer and not with other equipment, sample purity, or cable connections.

If you determine that repair is required, contact Infrared Industries at (800)344-0321 to receive Return Materials Authorization (RMA) number and form. This is required prior to sending the unit in for repair.

Ship to:

Infrared Industries
25590 Seaboard Lane
Hayward, CA 94545
Phone - 510-782-8100 • Fax – 510-782-8101

Repeatability/Accuracy*: ..... +/- 1% of Full Scale
Linearity: ..... +/- 1% of Full Scale
Noise Level: ..... 1% of Full Scale
Zero Drift:** ..... +/- 1% of Full Scale /24 hr.
Span Drift:** ..... +/- 1% of Full Scale /24 hr.

Speed of Response
Display: ..... 90% of Reading in 1 sec (updated every 1 sec)
Output: ..... 90% of Reading in 1 sec (updated every 1 sec)

Outputs
Digital: ..... Data RS 232
Analog – Recorder: ..... 0-1, 5 or 10VDC Standard; 4-20mA Optional

Power: ..... 120/240 VAC; 50/60 Hz.
Operating Temperature: ..... 0º - 50 º C (32 º – 122 º F)
Storage Temperature: ..... 40 º - 75 º C (-40 º - 166 º F)
Warm-up Time: ..... 5 Minutes
Power Consumption: ..... < 20 Watts

Physical
Cabinet: ..... 9" X 11" X 24.6"
Display: ..... 3.6" X 4.75" – Graphic LCD
Rack Mount: ..... 19" Rack; 4U high

Specifications are subject to change without notice.

*Accuracy specifications dependent upon absolute accuracy of the certified calibration gas.

**Performance specifications based on stable ambient conditions, and a sample stream that is clean, dry, and regulated to a flow rate of 2-6 SCFH.

NOTICE TO BUYER AND/OR USER OF THE ANALYZER:

Exclusion of warranties and limitation of damages and remedies

This analyzer is warranted against defects in materials and workmanship under normal use and service for one year from the date of delivery to the original purchaser.

The sole obligation of the seller and/or manufacturer under this warranty is limited to repairing or replacing as the seller or manufacturer may elect, free of charge at the place of business of the seller or manufacturer, any parts that prove, in the seller or manufacturers judgment, to be defective in materials or workmanship within one year after delivery to the original purchaser.

This warranty shall not apply and is void if, in the opinion of the seller and/or manufacturer, the portable analyzer or any component thereof has been damaged by accident, other causes not arising out of defects in materials or workmanship.

Before purchasing and using this analyzer, the user should determine the suitability of the product for his or her intended use and, the user assumes all risks and liabilities whatsoever in connection therewith.

If a product malfunction should occur, you may contact the seller or the manufacturer at:

Infrared Industries, Inc.
25590 Seaboard Lane
Hayward, Ca. 94545
Voice: 510-782-8100 or 800-344-0321
E-mail: service@infraredindustries.com

WARRANTY EXCLUSIONS

THIS WARRANTY AND THE SELLER AND/OR MANUFACTURER'S OBLIGATION HEREUNDER IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND ALL OTHER REPRESENTATIONS CONCERNING THE SALE, USE AND/OR PERFORMANCE OF THE ANALYZER.

No person is authorized to give any other warranties or to assume any other liability on behalf of the seller or manufacturer. This warranty shall not be extended, altered or varied except by written agreement signed by the seller and the buyer.

LIMITATIONS OF DAMAGE

IN NO EVENT SHALL THE MANUFACTURER OR SELLER OF THE PORTABLE ANALYZER BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH ANY OBLIGATION IMPOSED UPON THE SELLER OR MANUFACTURER IN CONNECTION WITH THIS WARRANTY. SUCH INCIDENTAL AND CONSEQUENTIAL DAMAGES SHALL INCLUDE, WITHOUT LIMITATION, LOSS OF USE, LOSS OF INCOME, LOSS OF PROFIT (INCLUDING LOSSES TO BUSINESS INTERRUPTION), LOSSES SUSTAINED AS THE RESULT OF INJURY (INCLUDING DEATH) TO ANY PERSON, AND LOSS OF OR DAMAGE TO PROPERTY. THE LIABILITY OF THE SELLER AND/OR MANUFACTURER ON THIS WARRANTY IS LIMITED TO ACCEPTING RETURN OF THE PORTABLE ANALYZER, REFUNDING ANY AMOUNT PAID THEREON AND CANCELING ANY BALANCE STILL OWING ON THE EQUIPMENT. THIS REMEDY IS EXCLUSIVE-REPAIR OR REPLACEMENT PROCEDURE

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INSTRUMENT ID SHEET

MODEL NUMBER: _____

SERIAL NUMBER: _____

CONFIGURATION: **GAS** **FULL SCALE VALUE**

CH1	_____	_____
CH2	_____	_____
CH3	_____	_____
CH4	_____	_____
CH5	_____	_____

RECORDER OUTPUT: _____

SPECIAL DATA: _____

RECOMMENDED CALIBRATION GAS: _____

ORIGINAL PURCHASER:

_____

_____

_____

_____

DATE OF ORIGINAL SHIPMENT: _____