



Combustion Analyzers

Fyrite®

  
**INSIGHT**

Real Time Data — Real Time Results

**BACHARACH**

*The Measurable Difference*

**QUICK START**  
User Guide

# Quick Start Guide



## Fyrite® **INSIGHT**

**Real Time Data — Real Time Results**

### **Combustion Gas Analyzer**

This quick guide provides basic setup, operating and maintenance information for the Fyrite® INSIGHT. If required, more detailed information concerning the analyzer's technical specifications, operation, set-up, calibration, and parts list can be downloaded from [MyBacharach.com/insight](http://MyBacharach.com/insight) (P/N 24-9460) .

# Setting Up the Analyzer

## Front Panel Push Buttons

Note that a push button may perform several functions, depending on the analyzer's model number and what screen is being displayed at the time.



- Turns the analyzer **ON** and **OFF**.
- Turns the backlight **ON** and **OFF** while the analyzer is turned **ON**.



- Scrolls up, down, left, and right through the display screen options.
- Causes the displayed value to increase or decrease correspondingly.



- Acts as an **ENTER** button. Performs the action selected.



- While in the **HOLD** screen, turns the sample pump on, displays the **RUN** screen, and begins a combustion test.
- While in the **RUN** screen, turns the sample pump off, displays the **HOLD** screen and the last set of combustion data.
- Displays the **HOLD** screen while pressing it from most menus.
- Return the display to the **HOLD** screen while pressing it during the 5 second power down sequence.

**ESC**

- Cancels most operations and displays the previous screen.



- Pressing function keys accepts the corresponding function defined at the bottom of the display including **PRINT**, **SAVE**, **MENU**, differential pressure **ZERO**, differential temperature **ZERO**, **PAGE UP**, **PAGE DOWN**, and **CLEAR** data.

# Operating Tips

1. When an analyzer is brought in from a cold vehicle, let it warm up slowly to minimize condensation. Temperatures below freezing will not damage the analyzer; however, bringing a cold analyzer into a warm, humid environment may cause condensate to form inside the case.

***CAUTION: Although the analyzer itself is not damaged by an extremely cold environment, the electrochemical sensors may be damaged. The O<sub>2</sub> sensor's electrolyte will freeze at approximately -20 °F and the CO sensors at approximately -94 °F. If the analyzer is exposed to an extremely cold condition, it is strongly suggested that the sensor housings be examined for hairline cracks. Be aware that a leaking sensor can cause chemical burns to the skin and possibly damage the PCB assemblies.***

2. Ensure that the analyzer is sampling fresh air when turned **ON**. Pulling a stack-gas sample through the analyzer during its warm-up period will not damage the analyzer, but it will result in incorrect sensor readings, and may result in sensor error messages appearing after the warm-up cycle completes.

Note that flue-gas condensate is acidic and very corrosive. It is important not to allow the analyzer's internal components to come in contact with condensate for long periods of time.

3. Before each use, inspect the filter element of the water-trap / filter assembly. Replace the filter if it looks dirty.
4. When sampling flue-gas, keep the analyzer above the water-trap, and keep the trap in a vertical position. This will maximize the effectiveness of the trap and keep liquid from being drawn directly into the analyzer.
5. When liquid condensate is seen inside the water trap, empty the trap before it becomes full.
6. When storing the analyzer, it's a good idea to empty the water trap and leave it open to further dry it out.
7. Calibrate the analyzer every 6 months - 1 year to assure its accuracy

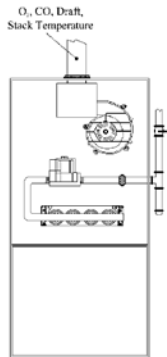
# Performing Tests

Make sure that the sample point is before any draft diverter/hood or barometric damper so that the flue gasses are not diluted and the stack temperature has not been decreased by surrounding air used to balance the draft.

The sample point should also be as close to the breach area as possible, again, to obtain an accurate stack temperature. This will also provide a more accurate O<sub>2</sub> reading should air be entering the flue gas stream through joints in sheet metal vent connectors.

When testing atmospheric, forced air heating equipment with a clamshell or sectional heat exchanger design, test each of the exhaust ports at the top of the heat exchanger. The probe should be inserted back into each of the exhaust ports to obtain a flue gas sample, before any dilution air is mixed in.

Draft tests should be taken from a hole drilled in the stack downstream from the draft hood.



80% Fan Assist Furnace/Boiler

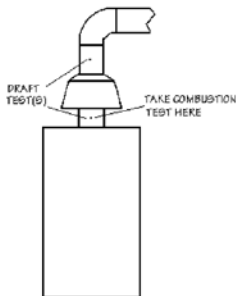
Combustion and draft testing fan assist, furnaces/boilers should be done through a hole drilled in the vent immediately above the inducer fan. While fan assist equipment operates under a negative draft, it is good practice to seal the sample hole, high temperature silicone is generally recommended.

# Performing Tests

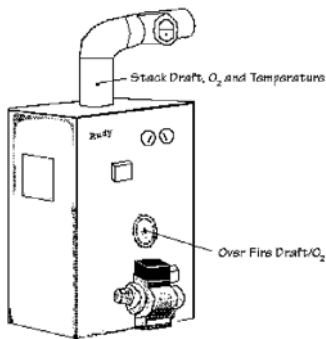
Boilers, which have a 'bell' shaped draft diverter directly on top, should be tested directly below the diverter through a hole-drilled in the vent connector.

Should draft tests below the diverter measure insufficient draft levels, an additional test should be performed above the diverter to determine if the reason for insufficient draft is related to a chimney problem or a draft hood problem.

It is also a good idea to test any areas with openings that provide a path for combustion air to be introduced to the flame. These areas provide a path where flue gases can potentially be exhausted.



Typical Atmospheric Boiler



With forced air systems this area is generally limited to immediately in front of the burners while many styles of boilers allow secondary combustion air to also be drawn in from all around the base of the cabinet.

Gas and oil fired power burners should be tested up stream from the barometric, as close to the breach area as possible.

While stack draft may be an important measurement, fuel oil and gas fired power burners require draft control over the fire to maintain a proper and controlled intake of combustion air.

# Performing Tests

## Diagnostics Menu

1. In the **MAIN MENU** highlight the **DIAGNOSTICS MENU** and select **ENTER**. This screen allows you to look at the total run times for the instrument, check O<sub>2</sub> and CO sensor status and thermocouple output.

## Turning Off the Analyzer

1. Before turning off the instrument, disconnect the hose and probe assembly and check the water trap for moisture, empty if necessary. Allow the instrument to continue to pump fresh air for a few minutes to make sure all water and flue gases are purged from the internal components.
2. Press and hold down the **POWER** button for approximately 2 seconds at which time the display will read **PURGING SENSORS**, then count down for 5 seconds and power off.
3. You can also opt to set the instrument up to do a longer post purge period by going to the **MAIN MENU**, **SETUP** and scrolling down to the **POST-PURGE PERIOD** and pressing the **ENTER** button. The default time from the factory is 5 seconds; you can also select **NONE** (We recommend against no purge), 1 minute, 5 minutes or 10 minutes.

## Calibration and Maintenance: IMPORTANT

1. Before performing any calibration procedure, ensure that fresh batteries are installed or use the optional AC power adapter. Also, ensure that the analyzer is at room temperature and will be sampling fresh air when turned **ON**.

**IMPORTANT:** To maintain accuracy, the standards used must be at least four times as accurate as the stated accuracy of the Fyrite® INSIGHT. (See INSIGHT instruction manual P/N 24-9460)

# B-Smart™ Sensors

The Fyrite® INSIGHT utilizes Bacharach's new Smart Sensor technology for its CO sensors. B-Smart™ sensors are market with a 10-Digit Calibration Code that can be entered in the B-Smart™ calibration screen. Once the B-Smart™ code is entered and the sensor is installed the CO channel is calibrated.

## Benefits of Smart Sensors:

- a. New sensors can be installed without needing to be calibrated.
- b. Sensors can be pre-calibrated and installed when needed.
- c. Sensors can be moved from one analyzer to another.
- d. Sensors can be sent in for calibration without sending in the entire instrument.

The smart sensors should be calibrated every 6 months to 1 year to assure that the analyzer continues to meet its published accuracy specifications. For details surrounding the B-Smart™ re-calibration program, go to [MyBacharach.com\bsmart](http://MyBacharach.com\bsmart). For additional information regarding Calibration, see specification model located at [MyBacharach.com\insight](http://MyBacharach.com\insight).



# Setting Up the Analyzer

## Preliminary Steps

### *Before using the analyzer . . .*

- Check batteries
- Connect probe to analyzer
- Check setup

## Analyzer Turn On and Warm up

1. Remove the back cover and install the 4 AA batteries.
2. Connect the probe and hose assembly. Note the combustion hose fitting is slightly larger in diameter than the pressure hose fitting. The stack thermocouple plugs into the yellow connector on the left hand side with the wider prong on the right.
3. Turn **ON** the analyzer by pressing the **PWR** button for a second until the pump starts up and the display comes on. For several seconds you will see the Version, Model Number and Serial Number of the instrument displayed, the instrument will then start a 60 second countdown to allow the sensors to calibrate. *NOTE: make sure the probe is sampling fresh air during these 60 seconds. To set the time/date and other settings go to the **SETUP** section.*
4. The first screen that comes up is in the **HOLD** position. To start sampling press the **RUN/HOLD** button. The backlight will be illuminated at start-up.

## Fuel Type

1. The **FUEL TYPE** will be displayed at the top of the screen. To change to another fuel, press the **MENU (F2)** button, the **MAIN MENU** will be displayed with the **FUEL** selection highlighted. Press the round, green, **ENTER** button in the center of the keypad to select **FUEL**, scroll the up/down keypad until the cursor is highlighting the desired fuel and press the **ENTER** button. That will return you to the **HOLD** screen; press the **RUN/HOLD** button to continue operation.

# Setting Up the Analyzer

## Setup

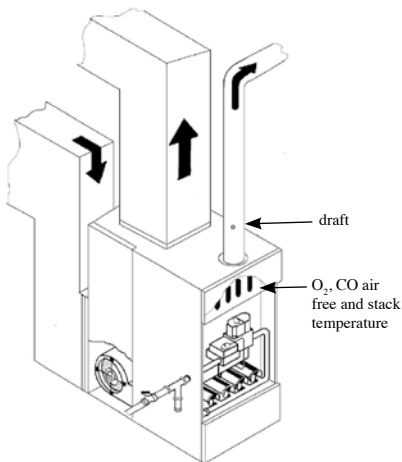
1. The analyzer is preset at the factory for the parameters shown below, but can be changed as described in their associated sections. The functions include:
  - Fuel (8 options)
  - Temperature Unit (Fahrenheit/Celsius)
  - Pressure Units (Inches of water column, Pascals, etc.)
  - Clock
  - O<sub>2</sub> REFERENCE (calculates the CO reference to O<sub>2</sub> reading)
  - Print Pressure (measurement on combustion printout)
  - Zoom (2-4 lines of text in the screen)
  - Username (company name, address, phone #)
  - Run/Hold Format\*
  - Language Selection (English, French, Spanish)
  - Button Sound
  - Calibration Reminder Period (6, 8, 10, 12 or 15 month reminders)
  - Inactivity Timeout (30 or 60 minutes – set to None)
  - Post-Purge Period (5 seconds, 1,5 or 10 minutes)
  - Date Format
2. To enter Setup; in the **MAIN MENU** screen, highlight **SETUP** and press **ENTER**.
3. Highlight the function you want to change by scrolling up and down. Make selections by hitting the **ENTER** button. From there, additional scrolling either up and down or side to side is required.
4. \***RUN/HOLD FORMAT** determines what order the combustion readings are displayed. Press the **ENTER** button and select **EDIT FORMAT**. To change the order in which the data is displayed, scroll up or down to select the position you want to change and press the **ENTER** button. The cursor should start flashing. Press the up or down keys to scroll through and select the desired data to appear in that location and press **ENTER**. Change the data at other locations by scrolling up or down and repeating the procedure. To go back to the default setting, select **RESET FORMAT**.

# Performing Tests

## Performing a Combustion Test Using the Fyrite® INSIGHT

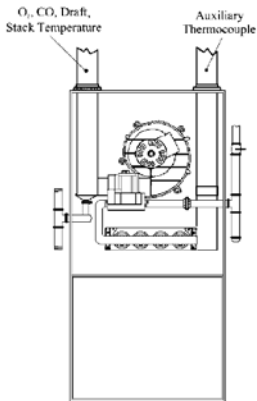
After the analyzer is powered up and the appropriate fuel selected, insert the probe in the proper sample location for the equipment being tested. Contact the manufacturer of specific equipment or consult the manufacturers' literature to determine the proper sample locations for combustion/carbon monoxide, stack temperature and draft tests. The following are recognized as generally accepted locations for testing heating equipment, consult with the manufacturer of specific equipment to make certain.

The measurement for gases and temperature should be taken at the same point. Typically, this is done by selecting a sample location 'upstream' from the draft diverter/hood, barometric control or any other opening, which allows room air to enter and dilute flue gases in the stack. In larger installations it may also be necessary to extract a number of samples from inside the flue to determine the area of greatest flue gas concentration. Another common practice is to take the flue gas sample from the 'Hot Spot' or the area with the highest temperature.



Atmospheric furnace

# Performing Tests



90% Condensing Furnace/Boiler

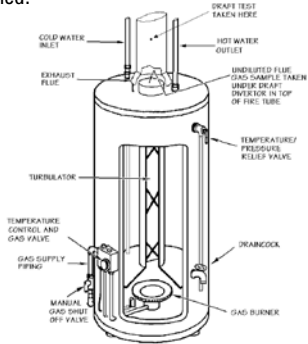
Domestic hot water heaters with the 'bell' shaped draft diverter on top can be accurately tested by attaching a section of copper tubing to the probe or using a flexible probe which is then inserted directly into the top of the fire tube below the diverter.

Another common practice is to insert the probe in the hole drilled for the draft test, direct it down and push it below the level of the draft hood.

Condensing furnaces/boilers can be tested through a hole drilled in the plastic vent pipe (when allowed by the manufacturer or 'local authority of jurisdiction) or taken from the exhaust termination.

In order to obtain an accurate Steady State Efficiency reading, an auxiliary thermocouple must be inserted in the combustion air intake so that a true net stack temperature is used in the calculation.

It is important to remember that the vent system on these units operates under a positive pressure. As a result, any holes in the vent need to be sealed.



Gas Fired Domestic Hot Water Tank

# Performing Tests

## Pressure

1. To measure draft, gas pressure, External Static Pressure, differential pressure, troubleshoot pressure sensors, etc, press the **F2** button to go to the **MAIN MENU**. Press the scroll down button once to Highlight **PRESSURE** and press the center, green, **ENTER** button. Press the **F2** button to **ZERO** the pressure channel and follow the prompts in the screen.
2. Press the **ESC** button at any time to return to the previous screen.

## Temperature (Differential)

1. Select the **TEMPERATURE** feature in the main menu to record/document temperature differences (ie temperature rise). Two 'K' type thermocouples must be plugged into the bottom of the instrument to use this feature. Press the **F2** button to zero the temperature channels.
  - a. Note: Thermocouple should be located in same area to zero.

## Saving test results

1. To save test results, simply press the **F3** Key. To access the saved test results, go to the **MAIN MENU**, scroll down to **MEMORY** and press the green **ENTER** button. Press the **MEMORY DIRECTORY** and up to 100 sets of test results will load up. Scroll down to find the time/dated set of test results and press the **ENTER** button to recall that information.

## Documenting Test Results

1. To print a set of test results, point the IR transmitter located in the top of the **INSIGHT**, and press the **F1** or **PRINT KEY**. Flue gas test results or diagnostic information in the screen will be printed.
2. To download the test results to the Bacharach Software through the supplied USB cable, follow the instructions included with that package.

# Connecting the INSIGHT

## Computer to INSIGHT Connection & USB Device Driver Configuration

Connect the USB cable (P/N 104-4032) that was supplied with the INSIGHT, and, if necessary, install the analyzer's USB device driver as follows:



1. With both the Insight and computer turned **ON**, insert the appropriate ends of the USB cable into the USB connectors on the INSIGHT and computer as seen below.
2. If this is the first time the Insight is being connected to the computer, then the "Found New Hardware Wizard" should shortly appear. Select "No, not this time" and click **NEXT**.  
*(Note: The USB device driver only needs to be installed once. It does not require to be re-installed each time the Insight is connected to the the computer.)*
3. Select "Install from a list or specific location (Advanced)" and click **NEXT**.
4. Select to search for the best driver and then browse to folder C:\Program Files\InSightData. Click **NEXT**.
5. At the Hardware Installation window, click **CONTINUE ANYWAY**. Our driver has been thoroughly tested in Windows for stability. This message appears because Microsoft has not tested this product through WHQL certification.
6. After the Found New Hardware Wizard has finished installing the software, click **FINISH** to close the Wizard.

*\* Only available with the Reporting Kit*

# Potential Error Messages

1. **O<sub>2</sub> SENSOR MISSING** - The O<sub>2</sub> sensor is not installed.
2. **T-STK DISCONNECTED** - The probe thermocouple is not connected to the analyzer's T-Stack connector. Plug the probe thermocouple plug into the T-Stack connector at the bottom of the instrument.
3. **BAD SENSOR** - O<sub>2</sub> sensor is too low and can not be calibrated in the instrument and needs replaced.
4. **LOW SENSORS** - O<sub>2</sub> or CO sensor outputs were low but still usable. Sensor(s) may need to be replaced in the near future. Message will indicate which sensor(s) were in warning.
5. **WARMUP SENSOR ERROR** - CO sensor was not zeroed at warm-up because of high output. Run instrument on fresh air then restart instrument to re-zero sensor. If message persists CO sensor may need to be replaced.
  - a. Stack or Air temperature channel is measuring temperature outside the range of -4 to 212°F at startup. Make sure that the Stack and Air thermocouples are sampling ambient room air within the temperature range at startup.
  - b. Pressure sensor is measuring pressure outside the range of  $\pm 3$  in wc at startup. Ensure that the analyzer is sampling atmospheric pressure and restart the instrument.
  - c. The analyzer was turned on with the probe sampling flue gas. Move the probe to fresh air and restart the instrument.
  - d. Message will indicate which channel is in error.
6. **LOW BATTERY** - Battery voltage is low. Replace the batteries.
7. **XXXX** - Occurs in the number fields of sensors that are in over-range.
8. **\*\*\*\*** Occurs in the number fields of sensors and the calculated values that depend on the sensors that were in error coming out or warm-up.
9. **\*\*\*\*** Occurs in the number fields of calculated values when Oxygen is above 16%.

# Parts and Service

## Replacement Parts:

DESCRIPTION	PART NO.
O <sub>2</sub> Sensor.....	24-0788
CO Sensor.....	24-7265
B-Smart™ CO Sensor.....	24-1467
O <sub>2</sub> Sensor Cover.....	24-1421
CO Sensor Cover.....	24-1484
Probe and Hose Assembly.....	24-3004
Water Trap.....	19-3265
Filter (pkg of 3).....	07-1644
Thermocouple Replacement (12 in.).....	24-8414
Probe Stop.....	19-3037
Gas Connector.....	24-0877
Draft Connector.....	24-0878
Connector Plate Assembly.....	24-1483
O-Ring Kit (2 sets).....	24-1471
USB cable.....	104-4032
Carry Case.....	24-0865
Replacement Pump.....	24-3049
PC Software.....	24-1470
Battery / Sensor Cover.....	24-1453

## Accessories:

DESCRIPTION	PART NO.
IrDA Printer.....	24-1400
Printer Paper (pkg. of 5).....	24-1310
Printer Paper (pkg. of 1).....	06-8733
Boot.....	24-1461
AC Adapter.....	24-1254
Calibration Kit.....	24-7059
Calibration Gas, 500 ppm CO.....	24-0492
Calibration Gas, 100 ppm CO.....	51-1994
Thermocouple, 1 IN.....	104-1798
Thermocouple, 10 FT.....	104-1797
Smoke Kit.....	21-7006
Pressure Kit.....	24-8214