



Fyrite® Pro

Quick Start Guide 0024-9396

Rev. 8 – May 2010

This Guide provides basic operating and maintenance information for Fyrite Pro Model 100/105/110/120/125. Detailed information concerning the analyzer's operation, set up, calibration, maintenance, and parts list is contained in Instruction 0024-9395.

Analyzer Turn On and Warm Up

1. Depending on the analyzer's model number, connect the probe's sample-gas hose and, if used, its draft hose and thermocouple connector to the bottom of the analyzer as shown in Figure 1.

If the optional Combustion-Air Thermocouple is being used, plug it into the T-AIR connector.

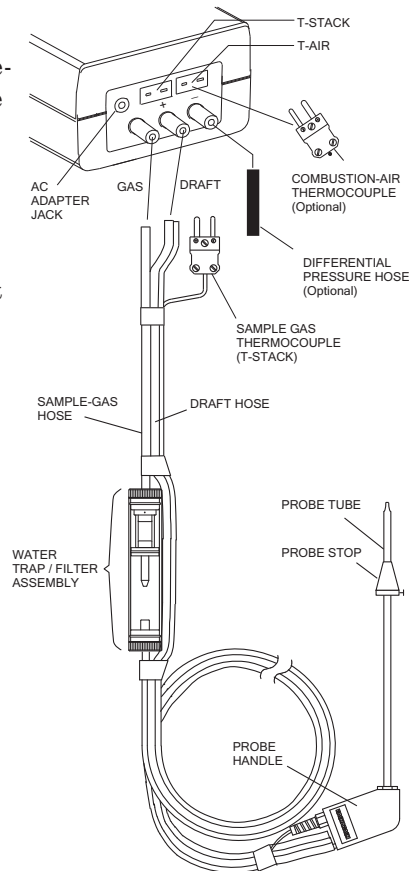
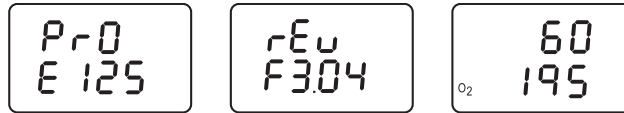


Figure 1. Analyzer Connections

2. Turn ON the analyzer by pressing its **I/O** button and observe that a series of three Warm-Up Screens are displayed.

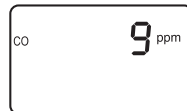


The first screen identifies the model number of the analyzer, the next screen shows the software revision number, while the last screen counts down the warm-up time from either 10 or 60 seconds. If an oxygen sensor is installed, its output level is also displayed.

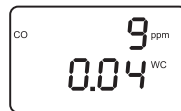
Note: *The warm-up time is 10 seconds for analyzers that do not contain an oxygen sensor, and have their CO channel set up for manual zero. The warm-up time is 60 seconds for analyzers that contain an oxygen sensor, and/or have their CO channel set up for auto zero.*

Tip: *An O₂ error will occur when the oxygen sensor's output drops to between 80 and 90. Consider replacing the oxygen sensor when its output level drops below 100.*

3. Wait for the analyzer to count down its warm-up period; after which, either the CO Screen (Model 100), the CO & Draft Screen (Model 105), or the Fuel Screen (Model 110/120/125) is displayed.



Model 100



Model 105



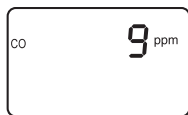
Model 110/120/125

Measuring CO (Model 100/105/120/125)

1. Turn ON the analyzer and allow it to warm-up.

Important: *If the CO channel is set up for **auto zero**, then the analyzer must be turned ON in fresh air; otherwise, incorrect CO readings will occur. If the CO channel is set up for **manual zero**, and if the CO reading is higher than zero when sampling fresh air, then the CO channel must be manually zeroed per Section "CO Channel Zero" on Page 13.*

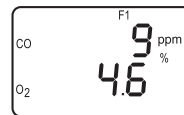
- For the Model 100/105, the CO or CO & Draft Screen should already be displayed. For the Model 120/125, push the **ENTER** button to display the CO & O₂ Screen.



Model 100



Model 105

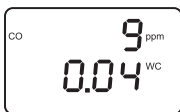


Model 120/125

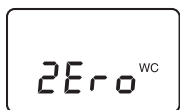
- Insert the analyzer's probe into the area to be tested and observe the detected CO level on the LCD.

Measuring Draft (Model 105/125)

- Turn ON the analyzer and allow it to warm-up.
- For the Model 105, the CO & Draft Screen should already be displayed. For the Model 125, press **ENTER** and then press the \square or \square button as necessary to display this screen.



- The draft reading should be zero when sampling room air. If not, press the \square button *once* to display the Draft Zero Screen, and then press **ENTER** to zero the draft channel to ambient conditions.





- Insert the analyzer's probe into the area to be tested and observe the draft reading on the LCD.

Performing a Combustion Test using the Model 110/120/125

Important: *The probe must be at room temperature before performing the following steps.*

1. Perform one of the following:
 - **Model 110/120** – Before turning ON the analyzer, its probe must be located in the area containing the burner’s combustion-air supply. If the burner is using room air, simply place the probe within the room. In the case of a high-efficiency furnace where combustion air is drawn in from an outside source, insert the probe into the combustion-air stream so it can measure its temperature with the burner operating.
 - **Model 125** – This analyzer has a second thermocouple channel that can be used to independently monitor the temperature of the burner’s combustion-air supply. When using this second thermocouple channel, insert the thermocouple into the burner’s combustion-air stream, and position the probe to measure the ambient room temperature. If the second thermocouple channel is *not used*, then use the probe’s thermocouple to measure the combustion-air temperature as described above for the Model 110/120.
2. Turn ON the analyzer and allow it to warm-up; after which the Fuel Screen will be displayed.



3. Use the  or  button to step through the fuels codes until the proper fuel is selected. The analyzer defaults to the most recently selected fuel.

F1 = Natural Gas
F2 = Oil #2
F3 = LPG
F4 = Kerosene

4. Press the **ENTER** button to select the displayed fuel code and enter the Run Mode.

5. Insert the probe into the flue-gas stream of the appliance being tested as described below:

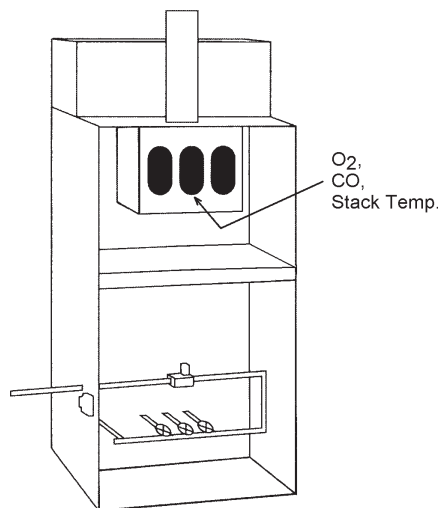
Forced Air Furnace – When testing atmospheric burner or gravity vented, forced air heating equipment with a clamshell or sectional heat exchanger design, test each of the exhaust ports at the top of the heat exchanger. The probe should be inserted back into each of the exhaust ports to obtain a flue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

Hot Water Tank – Domestic hot water tanks with the ‘bell’ shaped draft diverter on top can be accurately tested by inserting the probe tip directly into the top of the fire tube below the diverter.

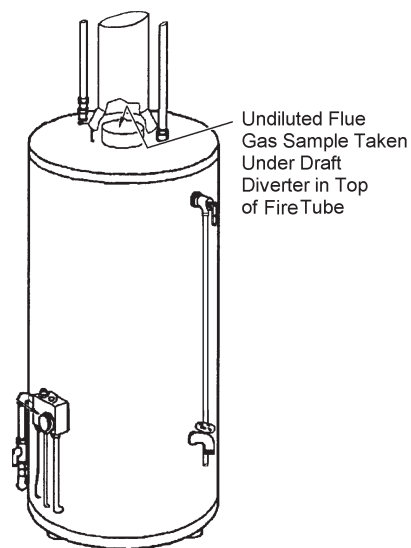
80% Efficiency Fan Assist or Power Vented – Combustion testing of fan assist or power vented, furnaces/boilers should be done through a hole drilled in the vent immediately above the inducer fan.

90% Efficiency Condensing – 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.

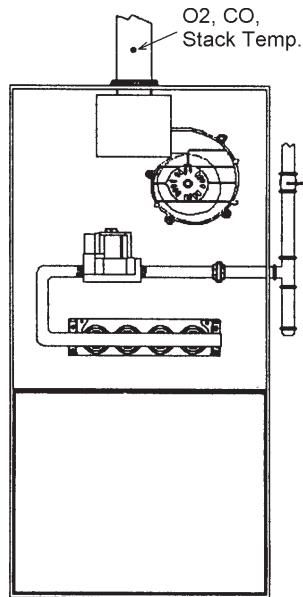
Atmospheric or Gravity Vented Boiler – Boilers, which have a ‘bell’ shaped draft diverter directly on top, should be tested directly below the diverter through a hole drilled in the vent connector.



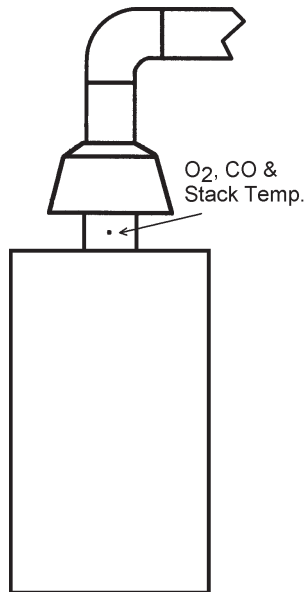
Atmospheric Burner or Gravity Vented Forced Air



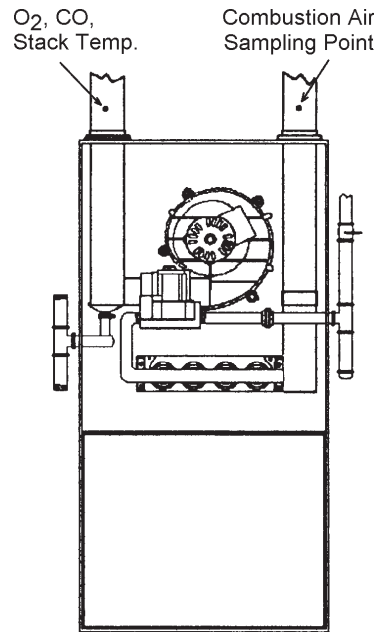
Hot Water Tank



**80% Eff. Fan Assist
or Power Vented
Furnace/Boiler**

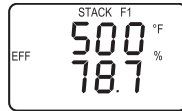


**Atmospheric or
Gravity Vented Boiler**



**90% Eff. Condensing
Furnace/Boiler**

6. After turning ON the analyzer and selecting the appropriate fuel, press the \square or \square button to display the Stack Temperature & Efficiency Screen.



7. Position the probe in the flue-gas stream to obtain the hottest "Stack" reading. *Locating the highest stack temperature is very important for accurate efficiency calculations.*
8. Burner-service procedures can now begin. Use the \square and \square buttons to scroll through the analyzer's other display screens (refer to Section *Run Mode Screens* on Page 8). The analyzer readings will update continuously showing changes in burner performance.

Note: *When a calculation cannot be made because of improper data (i.e., oxygen level above 17.9%), four dashes " - - - " appear in place of the calculated value on both the screen and printout.*

Tip: *Pressing the **HOLD** button will freeze all readings and stop the pump, allowing the operator to scroll through the Run Mode Screens and examine the readings at that point in time. Press **ENTER** to restart the pump and resume testing.*

9. End a test as follows:

WARNING! *Burn Hazard. Do not touch the probe after removing it from the stack. Allow the probe to cool before handling (about 5 minutes).*

- a. Remove probe from the flue-gas stream.
- b. Allow the pump to run until all combustion gases are flushed from the analyzer as indicated by the O₂ reading returning to 20.9%.
- c. Turn OFF the analyzer by pressing the **I/O** button as described in Section *Turning OFF the Analyzer & CO Purge* on Page 18.

Run Mode Screens

Figures 2A thru 2E show the order in which the screens are displayed by pressing the **ENTER** and **↔** buttons after the analyzer warms-up and enters its Run Mode.

The top screen in each figure is the one that appears immediately after the analyzer completes its warm-up cycle.



Figure 2A. Model 100 Run Mode Screen

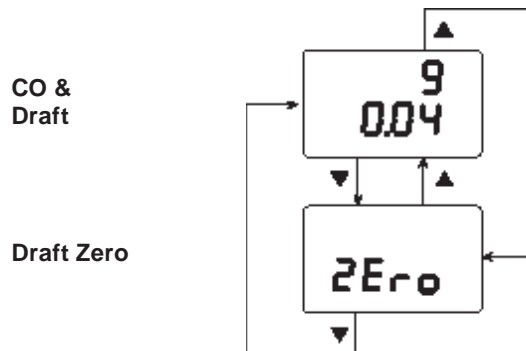


Figure 2B. Model 105 Run Mode Screens

Fuel Select:
F1 = Natural Gas
F2 = Oil #2
F3 = LPG
F4 = Kerosene

O₂

**Ambient /
Combustion Air
Temperature**

**Stack
Temperature &
Efficiency**

CO₂ &
Excess Air

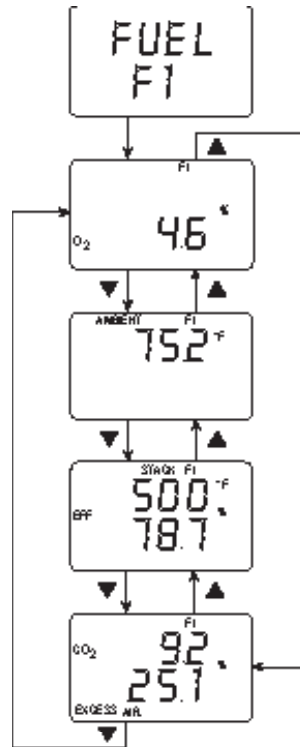


Figure 2C. Model 110 Run Mode Screens

Fuel Select:
F1 = Natural Gas
F2 = Oil #2
F3 = LPG
F4 = Kerosene

**CO &
O₂**

CO Air Free

**Ambient /
Combustion Air
Temperature**

**Stack
Temperature &
Efficiency**

**CO₂ &
Excess Air**

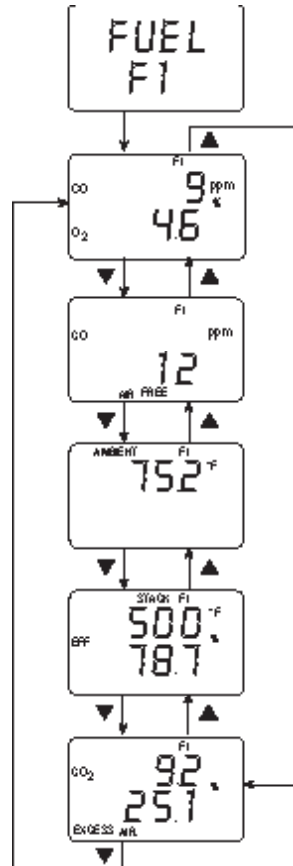


Figure 2D. Model 120 Run Mode Screens

Fuel Select:
 F1 = Natural Gas
 F2 = Oil #2
 F3 = LPG
 F4 = Kerosene

CO & O₂

CO Air Free

**Ambient /
 Combustion Air
 Temperature**

**Temperature
 Differential**

**Stack
 Temperature &
 Efficiency**

**CO₂ &
 Excess Air**

**CO &
 Draft**

Draft Zero

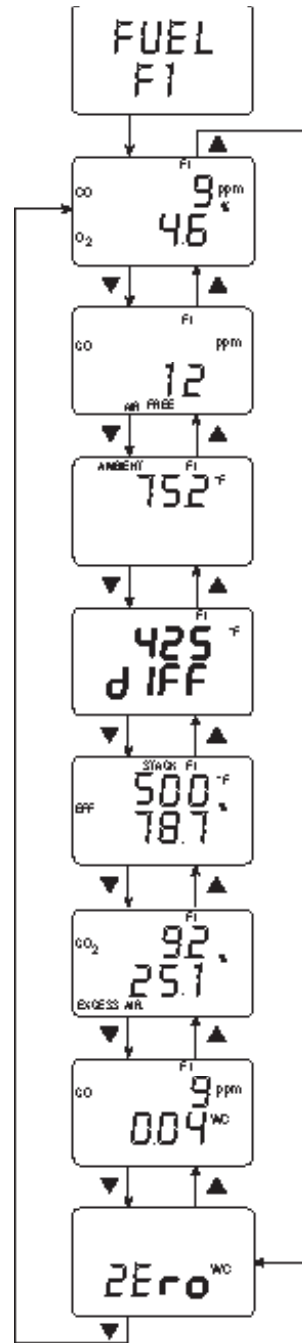


Figure 2E. Model 125 Run Mode Screens

Operating Tips

- 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.
- If the CO channel (Model 100/105/120/125) is set up for Auto Zero (refer to Section 3.5.3 in Instruction 0024-9395), ensure that the analyzer is sampling fresh air when turned ON. Pulling a flue-gas sample through the analyzer during its warm-up period will not damage the analyzer, but it will result in incorrect CO readings. Also note that a CO sensor error will occur if the detected CO level is above 50 ppm during warm-up.
- For analyzers that are used to measure flue-gas, note that flue-gas condensate is acidic and very corrosive. It is important not to allow the analyzer's internal components to become soaked in condensate for long periods of time.
- Before each use, inspect the filter element of the water-trap / filter assembly. Replace the filter if it looks dirty (refer to Section *Water Trap / Filter Maintenance* on Page 18).
- 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 condensate from being drawn directly into the analyzer.
- When liquid condensate is seen inside the water trap, empty the trap before it becomes full (refer to Section *Water Trap / Filter Maintenance* on Page 18).
- It is recommended that the analyzer be purged after taking a flue-gas measurement before turning it OFF. Once the probe is removed from the stack, disconnect the hose assembly from the bottom of the analyzer and let the pump run for 10 minutes or so to completely remove any remaining flue gases and dry any condensate from inside the sensor chamber.
- When storing the analyzer, it's a good idea to empty the water trap and leave it open to further dry it out.
- Calibrate the analyzer about every 6 months to ensure its accuracy.

CO Channel Zero (Model 100/105/120/125)

If the CO channel is set up for manual zero (refer to Section 3.5.3 in Instruction 24-9395), and if the CO Screen shows a value other than zero when sampling fresh air, then zero the CO channel as follows:

1. With the analyzer turned OFF, place the unit in fresh, ambient air; then press and hold down the **ENTER** button.
2. Press the **I/O** button and release it. Observe that all LCD segments are turned ON.
3. Release the **ENTER** button. Observe the unit's model number and software version are displayed. The word "CAL" is then displayed while the unit counts down its warm-up period.
4. Immediately after warmup the CO CAL Screen should appear.



5. Use the **←** and **→** buttons to set the displayed value to 0 ppm.
6. Save the new zero value by holding down the **ENTER** button for 2 seconds; after which, the analyzer enters its Run Mode.

Using the Backlight

The LCD can be read in dimly-lit areas by pressing the **LIGHT** button.

The backlight automatically turns OFF after 10 minutes of keyboard inactivity, but can be turned OFF at any time by again pressing the **LIGHT** button.

Using the Probe

A rigid stainless steel probe with handle, connected to a flexible hose with integral water-trap / filter can be used to draw a gas sample into the analyzer from the room, grilles, diffusers, and furnace flues.

The hose and probe assembly can be detached from the analyzer when the operator desires to sample without the probe.

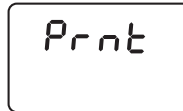
Saving Test Data in Memory (Model 105/110/120/125)

Up to 10 individual sets of test data can be saved in memory as follows:

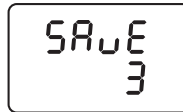
Note: When memory is full, the next reading saved will overwrite the oldest reading.

Note: The analyzer's setup information is stored along with the test data. For example, temperatures stored in °C are recalled and printed in °C even if the analyzer is currently set up for °F.

1. With the analyzer is in its Run Mode, press the **HOLD** button *twice* to display the Print Screen.

A rectangular box with a thin black border containing the word "Print" in a monospaced, digital-style font.

2. Press the \boxtimes button *once* to display the Save Screen. The number shown in this screen represents the memory location (1 thru 10) to which the current test data will be saved.

A rectangular box with a thin black border containing the word "SAVE" in a monospaced, digital-style font, with the number "3" centered below it.

3. Press **ENTER** to save the test data and return to the Hold Mode, or press **HOLD** to return to the Hold Mode without saving.

Opening and Viewing Saved Test Data

(Model 105/110/120/125)

Perform the following to open and view saved test data:

Note: If no test data has been saved, the option to open the memory for viewing will not be available.

1. With the analyzer is in its Run Mode, press the **HOLD** button *twice* to display the Print Screen.

A rectangular box with a thin black border containing the word "Print" in a monospaced, digital-style font.

2. Press the \leftarrow or \rightarrow button until the Open Screen is displayed, and then press **ENTER** to open the memory locations for viewing. The number shown in the second screen represents the most recent memory location where data was stored.



3. Press the \leftarrow or \rightarrow button to scroll to the desired memory location, and then press **ENTER** to recall the stored data and return to the Hold Mode. While in the Hold Mode, the recalled data can be viewed using the \leftarrow and \rightarrow buttons, or printed per Section *Printing Test Data* on Page 16.

Clearing Saved Test Data (Model 105/110/120/125)

Clear all saved test data as follows:

Note: *If no test data has been saved, the option to clear memory will not be available.*

1. With the analyzer in its Run Mode, press the **HOLD** button *twice* to display the Print Screen.



2. Press the \leftarrow or \rightarrow button to scroll to the Clear Screen, and then press **ENTER** to display the Clear All Screen.



3. Press **ENTER** to clear memory and return to the Hold Mode, or press **HOLD** to return to the Hold Mode without clearing memory.

Printing Test Data

Tip: To avoid printing errors, it is important to select the correct protocol per Section 3.5.8 in Instruction 0024-9395 **before** saving data.

Turn ON the printer. Refer to the printer's instruction manual for detailed operation and maintenance information.

If not already done, set the printer parameters as follows:

- Data: 8 bits
- Parity: None
- Baud: 9600
- Handshaking: X-on/X-off

Align the printer with the top of the analyzer as shown in Figure 3. The next step in the printing procedure depends on the model of the analyzer, and whether the operator desires to print only the current test data, or all stored test data starting with the most recent. Refer to the appropriate procedure below:

Model 100 – Print Current Test Data

With the analyzer in its Run Mode, press the **HOLD** button *twice* to start printing.

Model 105/110/120/125 – Print Current Test Data

1. With the analyzer in its Run Mode, press the **HOLD** button *twice* to display the Print Screen.



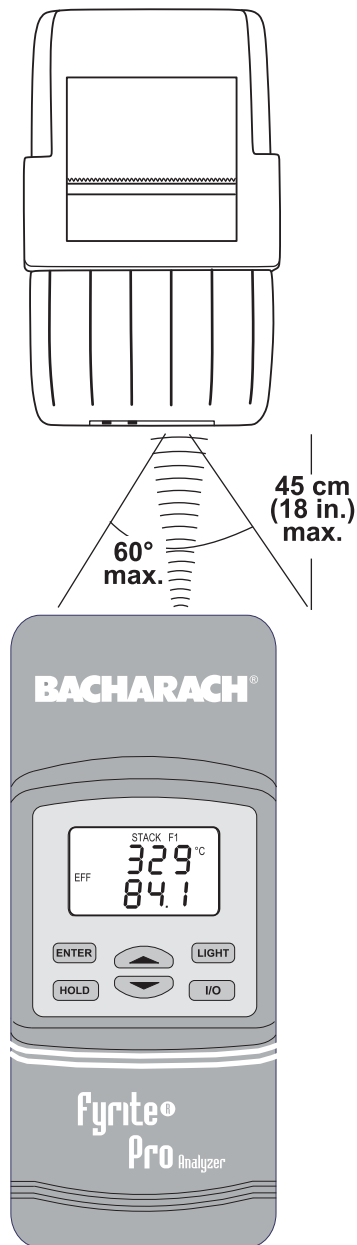
2. Press **ENTER** to start printing.

Model 105/110/120/125 – Print All Test Data

1. With the analyzer in its Run Mode, press the **HOLD** button *twice* to display the Print Screen. Then press the \boxtimes button *once* to display the Print All Screen.



2. Press **ENTER** to start printing.



```

BACHARACH, INC.
FYRITE PRO ANALYZER
=====
DATE: 29/10/2003
TIME: 14:45

FUEL: (F1)

qA          15.9 %
ETa         84.1 %
Efficiency  74.5 %
Lambda      1.41 %
TA          329°C
TL          30.7°C
O2          6.1 %
CO2         9.3 %
CO          57 ppm
CO Undilute 80 ppm
CO/CO2      .0006
Draft       0.00 mB
    
```

Notes: When a calculation cannot be made because of improper data (i.e., oxygen level above 17.9%), four dashes “- - - -” appear in place of the calculated value on both the screen and printout.

When one or more of the following sensors are not installed, their associated values do not print:

Oxygen Sensor:

Fuel, Efficiency, Excess Air, Stack Temp, Primary Temp, O₂, CO₂, and CO Air Free

CO Sensor:

CO, and CO Air Free

Draft Sensor:

Draft

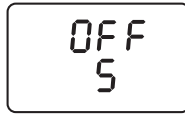
Either Thermocouple:

Delta Temp

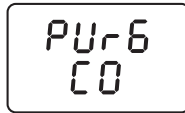
Figure 3. Printer Alignment & Sample Printout

Turning OFF the Analyzer & CO Purge

Press the **I/O** button to turn OFF the analyzer. The unit will count down from 5 before turning OFF, thus allowing time for the operator to abort the turn OFF process by pressing the **ENTER** button.



If a high CO level is detected at turn OFF, the unit will remain ON with its pump running and display "PurG CO". The countdown from 5 will not begin until the detected CO level drops below 50 ppm. Although not recommended, the purging process can be bypassed by pressing the **I/O** button a second time.



Resetting the Microprocessor

If the analyzer 'locks up' and cannot be turned OFF, reset the microprocessor by removing one of the batteries for 5 seconds.

Water Trap / Filter Maintenance

The Water Trap / Filter Assembly removes water condensate from the gas sample, and also prevents soot from contaminating the internal components of the analyzer.

Drain the water condensate after every test.

Procedure:

1. Disassemble the trap (see Figure 4 or 5).
2. Pour out all water condensate; then reassemble the trap.

Replace the Filter Element when dirty.

Material Required:

- Filter Element, P/N 0007-1644
- Small Flat Blade Screwdriver

Procedure:

1. Disassemble the trap (see Figure 4 or 5).
2. Remove and discard old filter.
3. Install new filter and reassemble trap.

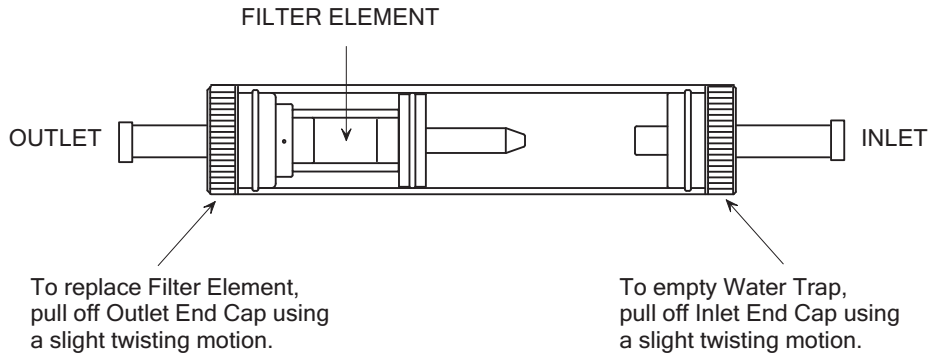


Figure 4. Water Trap / Filter Assembly Used on Model 100/110/120

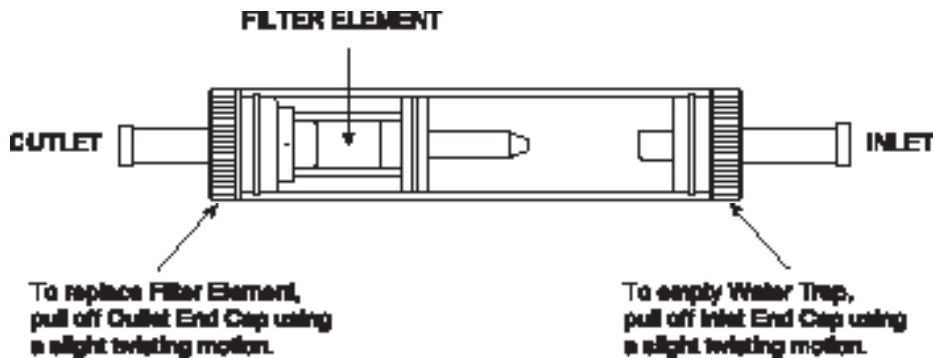


Figure 5. Water Trap / Filter Assembly Used on Model 105/125



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