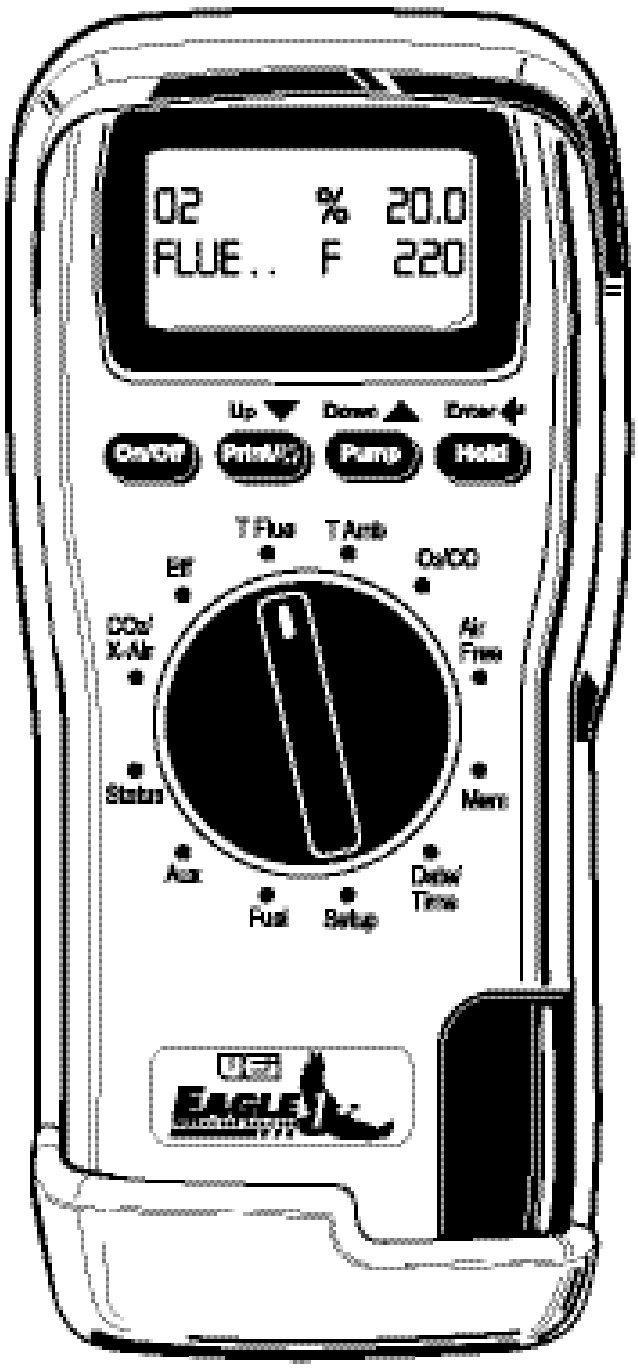
INSTRUCTION MANUAL

C75

Combustion Analyzer



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Introduction

The goal of combustion analysis is to maximize the energy obtained from a fuel while minimizing the risk of toxic gases and additional maintenance needs. Using an electronic combustion analyzer will give you the needed values quickly for proper equipment set-up and tuning of combustion equipment.

Common parameters to measure are CO2 and efficiency. This analyzer measures O2, CO and flue temperature, and then calculates those. The rotary selector makes choosing what is displayed fast, and easy, and you can quickly move between parameters based on your needs.

This analyzer is designed for easy use, down to these simple steps

1 Power on the analyzer
2 Select the fuel
3 Place probe in the flue and measure combustion gases

More specific information on using the analyzer is included in this user guide, including some basics of combustion.

Maximizing CO2 and efficiency has been used as a general guide, but UEi recommends consulting technical information from the equipment manufacture for targeted gas values.

Features include

- Measures: Flue temperature, oxygen, carbon monoxide (CO)
- Calculates: Carbon dioxide, gross efficiency, excess air, CO air free
- Unique DMM style rotary selector
- Real time clock
- CO readings to 1 ppm
- Large 2 line back-lit display
- Infrared printer port
- User programmable header
- 16 memory positions

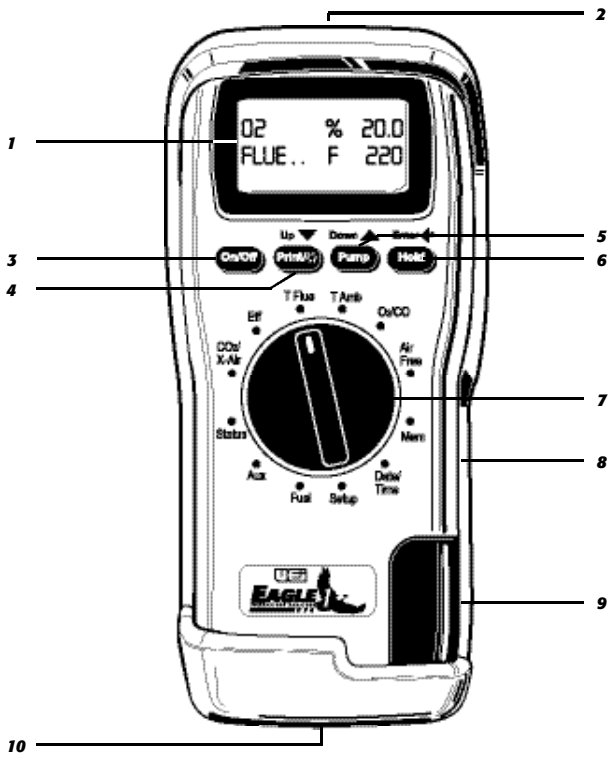
Safety Notes

Before using this meter, read all safety information carefully. In this manual the word **"WARNING"** is used to indicate conditions or actions that may pose physical hazards to the user. The word **"CAUTION"** is used to indicate conditions or actions that may damage this instrument.

WARNING!

This analyzer extracts combustion gases that may be toxic in relatively low concentrations. These gases are exhausted from the back of the instrument. This instrument must only be used in well-ventilated locations. It must only be used by trained and competent persons after due consideration of all the potential hazards.

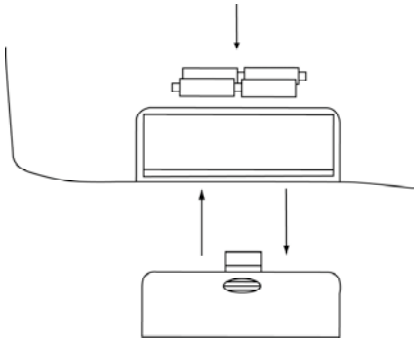
Controls and Indicators



1. **Display**
2. **Infrared Print Emitter**
3. **ON/OFF:** Turns analyzer ON and OFF.
4. **Print/Back-Light:** Print data - press briefly until "**PRINTING**" appears. Back-light - press and hold to toggle back-light ON or OFF.
5. **Pump:** Turns pump ON and OFF. (Readings change to " - - - -" when the pump is OFF)
6. **Hold/Store:** Hold - Freezes reading on display. Entire display flashes.
   Store - press and hold for 2 seconds to store data in memory.
7. **Rotary Selector**
8. **Particle Filter:** (Inside water trap)
9. **Water Trap**
10. **Analyzer Connections**

Battery Replacement

This meter has been designed for use with both alkaline and rechargeable Nickel Metal Hydride (NiMH) batteries. No other types are recommended. The analyzer is supplied with 4 "AA" size alkaline batteries. These should be installed into the instrument as shown below (Fig 1) and indicated on the back of the unit.



(Fig 1)

CAUTION!

Take great care when installing the batteries to observe correct polarity. Always check the meter for operation immediately after installing new batteries.

Using Re-Chargeable Batteries

The battery charger must only be used when NiMH batteries are fitted.

Alkaline batteries are not re-Chargeable. Attempting to recharge alkaline batteries may result in damage to the product and may create a fire risk.

Charging

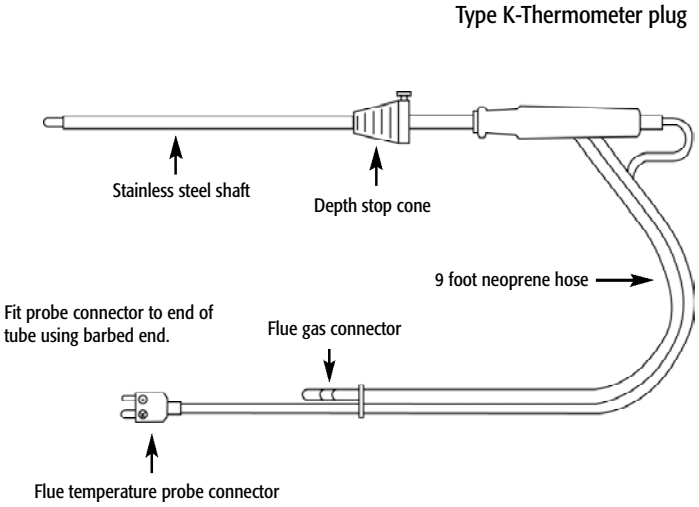
Ensure that you use the correct charger. This unit uses a 9V DC regulated charger.

Ensure that the batteries are fitted in the correct manner, and then charge for at least 16 hours. Subsequent charges should be overnight. NiMH batteries may be charged at any time, even for short periods to conduct testing.

WARNING!

*Under **NO** circumstance should you expose batteries to extreme heat or fire as they may explode and cause injury. Always dispose of old batteries promptly in a manner consistent with local disposal regulations.*

Probe Configuration



Operating Instructions

Before Use Each Time

- The particle filter is not dirty
- The water trap and probe line are empty of water
- All hose and thermocouple connections are properly made
- The flue gas probe is sampling ambient FRESH air
- The water trap is fitted correctly to the instrument
- The Flue temperature probe is connected if required to set the inlet air temperature
  NOTE: If using ambient air for combustion leave disconnected

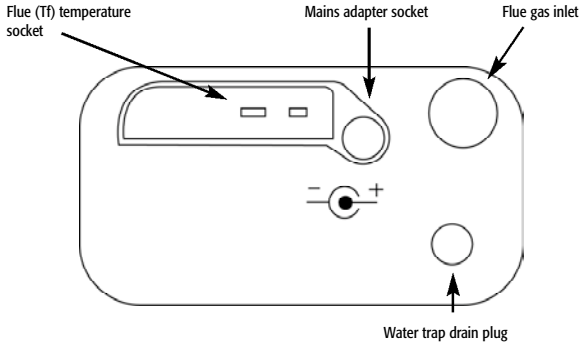
Switch ON the instrument by pressing "**ON/OFF**".

After switch-on, the analyzer will scroll through the following information while performing a zero countdown:

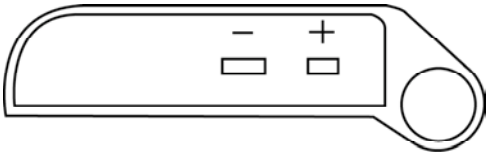
- Currently Set Date
- Currently Set Time
- Remaining Battery Level
- Fuel Selected
- Model and Analyzer Firmware Level

NOTE: *The count begins at 59 seconds, and will display the parameter selected with the rotary knob when the sensors are detected as stable. If the analyzer will not auto-zero, the sensors are in need of replacement and the unit should be returned to the authorized service center.*

Analyzer Connections



NOTE: *Take care when inserting the temperature probes as the pins are polarized. Insert with the smaller pin (+) to the right. A view of the sockets is shown below.*



Automatic Calibration

During this sequence the analyzer pumps fresh air into the Oxygen and CO (C75 only) sensors to allow them to be set to 20.9% and zero respectively. See "Setting Inlet Temperature) for information on options.

Changing the Display

The parameters on the display are selected from the following using the rotary selector knob. Certain items are available on the AUX display by selecting through the menu.

Selector	Top Line	Bottom Line
Fuel	Fuel Selected (Scroll selection with the up/down arrows and then press the enter key "**HOLD**" to choose	Fuel Indicator • NAT GAS Natural Gas • PROPANE • BUTANE • L OIL Light Oil • LPG Liquid Petroleum Gas • H OIL Heavy Oil
Aux	User selectable line 1	User selectable line 2
Status	Fuel selected	Battery level
CO2 / X-Air	CO2 in percentage	Excess Air % (represented by Greek Lambda λ)
Eff (Efficiency)	Flue Temperature (TF)	Efficiency% (represented by Greek eta η)
T Flue	TF (Flue temp)	Net Temperature (ΔT)
T Amb (Ambient)	Ambient Temp (or set inlet temperature See page 7)	Net Temperature (ΔT)
O2/CO	Measured O2%	Measured CO ppm
Air Free		Calculated value for CO Air Free (see page 17)
Mem (Memory)	Used to view or delete stored readings	
Date/Time	Date	Time
Setup	Used to setup instrument	Adjustment position for Time, Date, Temperature scale, Screen Contrast, Language, Header, Aux selector display, or entering Service mode.

Selecting Fuel

To set the fuel simply rotate the selector to "**FUEL**" then press the "**UP**" or "**DOWN**" arrows to scroll through the choices. When the correct fuel is displayed on the bottom line press "**ENTER**" to choose this fuel.

Symbol Legend

Symbol	Description	Notes
η	Efficiency (gross)	Calculated percentage efficiency based on net temperature, O2 value and fuel selected.
	Battery Level	Battery level indication with percentage remaining.
λ	Excess Air	Theoretical amount of air in excess of level needed to completely burn fuel.
	Losses	Losses calculated from Oxygen and type of fuels. Displays reading during a combustion test. "- - - -" is displayed while in fresh air.
ΔT	Delta Temperature	Net Temperature of Flue and Ambient (or inlet).
TF	Flue Temperature	Measure of Flue Temperature.

Setting Inlet Temperature

During the automatic calibration sequence the burner INLET (Ti) temperature used in the NET temperature calculation is stored in the analyzer. There are two methods of storing the INLET temperature.

A. Without the flue probe connected temperature inside the analyzer is used (ambient temperature).

B. If the flue probe is connected the temperature of the probe tip is used. This can be useful when the temperature of the air entering the burner is different than the ambient temperature of the room.

NOTE: *On ducted inlets, insert the probe tip into the inlet air during the zero countdown. The analyzer will then store this temperature as the ambient (inlet) for use in efficiency calculations. Do not sample flue gas during the zero countdown.*

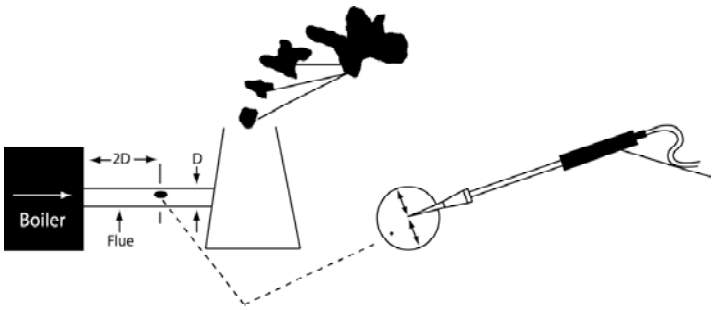
WARNING!

If the INLET temperature is set incorrectly, then errors will be made in the calculation of net temperature and efficiently.

Sampling the Flue Gas

Once the automatic calibration procedure has been completed and the specific fuel has been selected (see menu options) the probe can be inserted into the desired sampling point.

It is recommended that the sampling point be located at least two flue diameters downstream of any bend, as close to the source as possible, and that the probe tip is in the center of the flue. With balanced flues and other domestic units the probe should be positioned far enough into the flue so that no air can "back flush" into the probe.

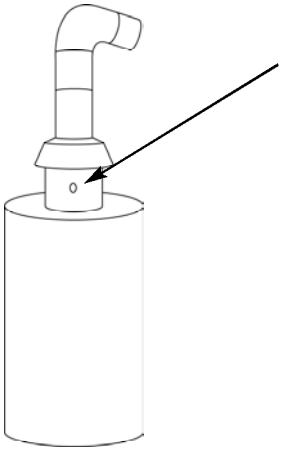


The probe depth stop cone provided with the instrument allows the probe to be used in holes whose diameters range from 1/4 to 4/5 inch (6 mm to 21 mm).

The standard probe is rated at 1112˚F (600˚C).

Where To Test

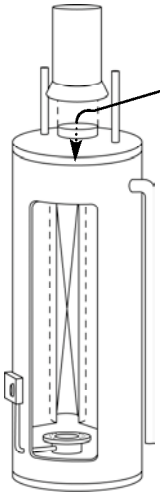
Boiler & Water Heaters



Boiler

Verify proper combustion:

- O2
- CO
- Stack temp
- Efficiency

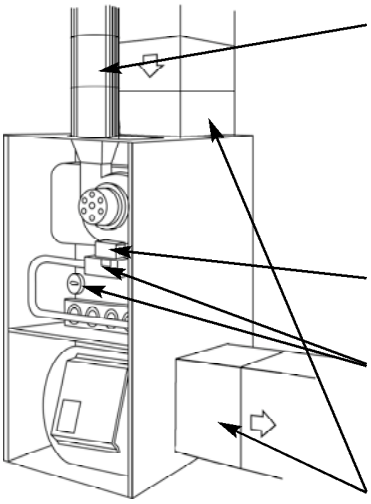


Water Heater

Verify proper combustion:

- O2
- CO
- Stack temp
- Efficiency

Furnaces: 80%



80% Furnace

Verify proper combustion:

- O2
- CO
- Stack temp
- Efficiency

(***Note:*** *The following may require additional test instruments*)

Set Up

- Gas pressure

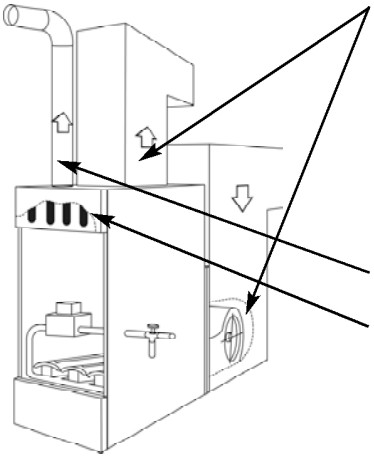
Test

- Limit switch
- Pressure switch

Verify proper combustion:

- Static duct pressure
- Temperature rise
- AC side static pressure drop across coils

Atmospheric, Gas & Oil



Atmospheric Furnace

Verify proper combustion:

- O2
- CO
- Stack temp
- Efficiency

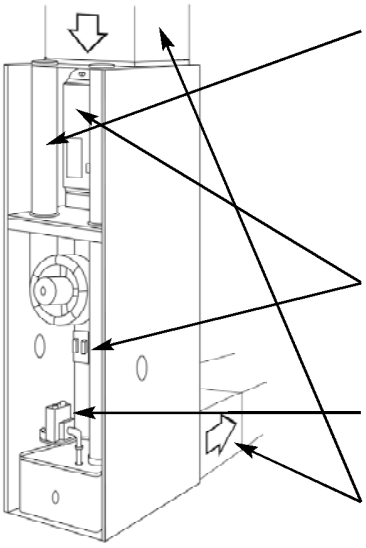
(***Note:*** *The following may require additional test instruments*)

Draft

Verify proper

- Temperature
- AC side static pressure drop across coils

Furnaces (CONTINUED): Atmospheric, Gas & Oil



Gas Furnace

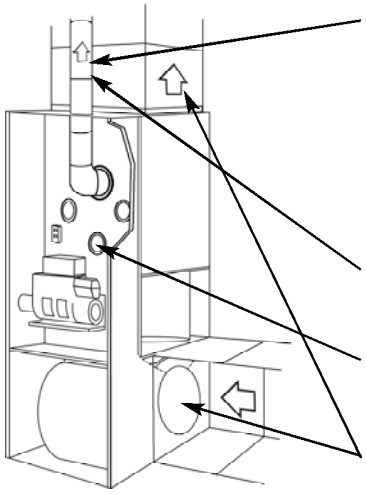
Verify proper combustion:
- O2
- CO
- Stack temp
- Efficiency

(***Note:*** *The following may require additional test instruments*)

Test
- Limit switch
- Pressure switch

Set Up
- Gas pressure

Verify proper:
- Static duct pressure
- Temperature rise
- AC side static pressure drop across coils



Oil Furnace

Verify proper combustion:
- O2
- CO
- Stack temp
- Efficiency

(***Note:*** *The following may require additional test instruments*)

Test
- Smoke

Set Up
- Over fire draft

Verify proper:
- Static duct pressure
- Temperature rise
- AC side static pressure drop across coils

Regular Checks During Sampling

Care must be taken at all times not to exceed the analyzer's operating specifications. In particular ensure the following:

- Do not exceed the maximum temperature of the flue probe
- The analyzer internal temperature does not exceed normal operating range
- DO NOT PLACE THE INSTRUMENT ON A HOT SURFACE
- The water trap is correctly attached at all times - Water condenses in the probe line and can quickly fill the water trap when the probe is moved - Take care and watch the water trap closely
- The particle filter is clean and does not become blocked

Normal Shutdown Sequence

WARNING!

Turning the pump off while the probe is in the flue will leave toxic gases inside the analyzer. Once data has been printed or copied it is advisable to purge the unit with fresh air as soon as possible. To do this, with the probe removed from the flue, turn ON the pump. Always allow the readings to return to zero (20.9 for O2) prior to shutting the unit off. ***The meter will not switch off until the CO reading is below 20 ppm****.*

WARNING!

The probe will be hot from flue gases.

Remove the probe from the flue and allow it to cool naturally. Do not immerse the probe in water, as this will be drawn into the analyzer and damage the pump and sensors. Once the probe is removed from the flue and the readings have returned to ambient levels hold down "**ON/OFF**" button and switch off the analyzer.

The instrument will count down from 30 to switch off.

If you pressed "**ON/OFF**" button by mistake, pressing "**HOLD**" button will return you to normal operation.

Moving Through the Menu

The options in the menu system are in the following sequence by pressing the down arrow:

Note: *The menu choices are selected using the text printed on the case above the function keys. The three keys are "△" increases, "▽" decrease and "↵" enter.*

Set Time

1. Press "**ENTER**".
2. Use the up and down keys to select the correct time.
3. Press "**ENTER**" to move to the next digit.
   Note: *Time is displayed in military format, example 7:00 pm is 19:00.*

Date

1. Press "**ENTER**".
2. Use the up or down arrows to select the correct data.
3. Press "**ENTER**" to move to the next digit and then exit.

Note: *Time is displayed in military format. For example 7:00 pm is displayed 19:00.*

C ⇔ F

1. Press "**ENTER**".
2. Select degrees displayed in Fahrenheit or Centigrade using the up or down keys.
3. Press "**ENTER**" to save and exit.

CONTRAST

1. Press "**ENTER**".
2. Select a value between 02 and 254 for desired contrast using the up or down keys.
   Note: *Lower values result in a darker display.*

LANGUAGE

1. Press "**ENTER**".
2. Select the desired language using the up or down keys.
3. Press "**ENTER**" to save and exit.

Header

1. Press up or down and "**ENTER**" to select desired header.
2. 2 lines of up to 16 characters will appear on the printout.
3. After entering text for header use the up or down buttons to select "**EXIT**".

AUX

1. Line 1 or Line 2.
   - Press "**ENTER**"
   - Press "△" or "▽" to scroll through options
   - Press "**ENTER**" again to choose the displayed option
2. Exit.
   - Select "**EXIT**", and then press "**ENTER**" to return to the menu

SERVICE

1. The service mode is used for repair and calibration, and should only be entered by authorized service facilities.
2. The firmware can be displayed by entering "**2222**" for the code.

You may exit the menu at any time by rotating the selector to a different position unless the final logical "**ENTER**" is pressed, no changes are made.

Storing and Viewing Test Results

At any time during a test you may store the readings in one of the 1 memory positions. Press "**HOLD**" button for 2 seconds or more to store a reading. The memory location will be displayed briefly after the two beeps.

To review stored readings select "**Mem**" on the selector.

VIEW

1. Pressing "**ENTER**" will allow you to view stored readings.
2. Press "△" or "▽" to select different memory positions.
   Note: *You may print this test at any time by pressing "**PRINT**" for 2 seconds.*

DEL ALL

1. Clears all values stored in memory - Confirm with "**YES**" then "**ENTER**".

Rotate selector to any other position to exit Memory mode.

Printing Information

Supplied as an accessory for the analyzer is an infrared thermal printer. Read the manual supplied with the printer prior to operation. Connection to the analyzer is detailed below:

- Infrared thermal printer - this does not require a cable to transmit the data but uses an infrared (IR) link similar to a TV remote control. The IR emitter is positioned on the top of the analyzer and the bottom of the printer. Ensure they are pointing at each other and within 3 feet, with no obstructions in the way. Data may be lost if transmission is interrupted. Keep the analyzer pointing at the printer until the printout has finished.

Printing A Test

During combustion tests the analyzer can print data on request. With the analyzer showing the data, briefly press the "**PRINT**" button until "**PRINTING**" is displayed.

The standard printout is:

NOTE: *Printouts of stored readings will also include the TEST NO. below the header.*

SMOKE area on printout is for adding data from manual test.

UEI C75
16 character header
16 character header
503 644 8723

Date: 06-26-02
Time: 14:27

Fuel	NATU	GAS
O2	%	20.9
CO2	%	0.0
CO*	PPM	00
COaf*	PPM	00
FLUE	˚F	----
AMB	˚F	----
NETT	˚F	----
EFF%	(G)	----
LOSSES**	%	----
XAIR	%	----

SMOKE.....

Maintenance

Periodic Service

WARNING!

Repair and service of this instrument is to be performed by qualified personnel only. Improper repair or service could result in physical degradation of the instrument. This could alter the protection from personal injury this meter provides to the operator. Perform only those maintenance tasks that you are qualified to do.

These guidelines will help you attain long and reliable service from your meter:

- Calibrate your instrument annually to ensure it meets original performance specifications
- Keep your instrument dry. If it gets wet, wipe dry immediately. Liquids can degrade electronic circuits
- Whenever practical, keep the instrument away from dust and dirt that can cause premature wear
- Although your instrument is built to withstand the rigors of daily use, it can be damaged by severe impacts. Use reasonable caution when using and storing the meter

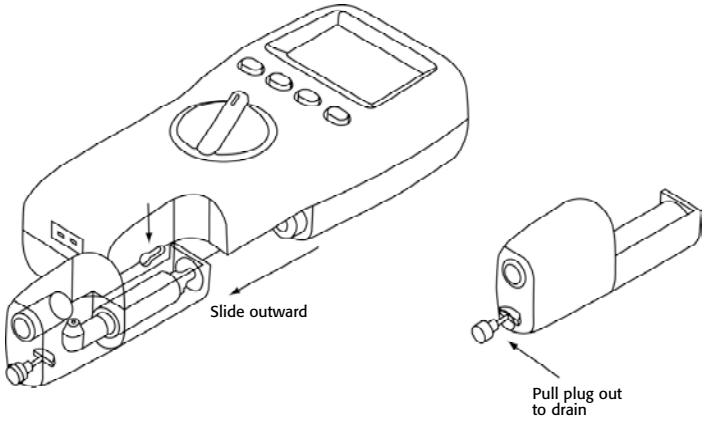
Cleaning

Periodically clean your instruments case using a damp cloth. **DO NOT** use abrasive, flammable liquids, cleaning solvents, or strong detergents as they may damage the finish, impair safety, or affect the reliability of the structural components.

Emptying and Cleaning the In-line Water Trap

The in-line water trap should be checked and emptied on a regular basis. Water vapor will condense in the probe line, which may cause the water trap to fill suddenly if the probe is moved. Care should be taken at all times.

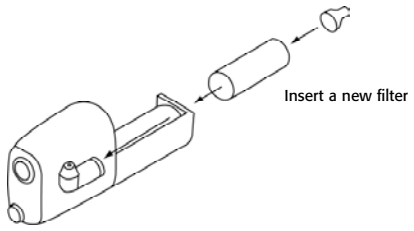
Carefully remove the rubber plug from the bottom of the water-trap housing. Dispose of the condensate in a suitable drain, care must be taken as it could be acidic.



If condensate spills onto the skin or clothing, clean off immediately using fresh water, seek medical advice if problems occur. Ensure plug is replaced before performing combustion tests.

Changing the Particle Filter

This is a very important part of the analyzer and should be changed regularly. It prevents dust and dirt particles from entering the pump and sensors that will cause damage. The filter MUST be changed when it appears discolored.



Remove water-trap assembly from the analyzer as shown above. Remove the filter and plastic holder from the housing. Discard the filter element but keep the holder to fit to the new filter. Clean the inside of the filter housing with a suitable soft cloth. Fit the holder onto the new filter element and then insert into the housing. Refit the housing onto the analyzer.

Combustion

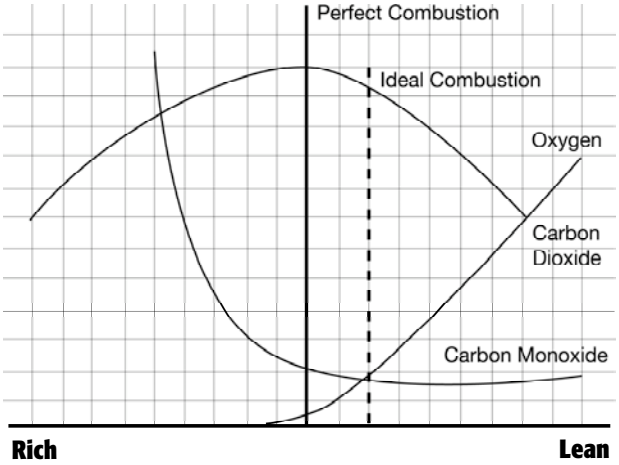
Combustion Theory

In its simplest form, combustion is the combining of oxygen (O_2) from the air with hydrogen (H) and carbon (C) from the fuel to form carbon dioxide (CO_2), water (H_2O) and energy (light and heat).

Perfect combustion occurs when all of the carbon and hydrogen in the fuel unite with all of the oxygen supplied by the air. This is also referred to as "**STOICHIOMETRIC Combustion**".

In the real world perfect combustion is nearly impossible to achieve. When tuning a combustion appliance, the goal is to come close to this target to minimize losses and excess emissions. One method is to adjust the amount of air supplied to the combustion area. Too little combustion air, and there will not be enough oxygen to unite with the hydrogen and carbon. This will result in partially burnt fuel, and the creation of carbon monoxide (CO), smoke, and lower efficiency. Too much air will also lower efficiency because the high amount of excess air draws heat away from the combustion area up the flue (increase in ΔT, difference between flue temperature and ambient or inlet). If the amount of excess air is too high, it will also move past the heat exchanger too quickly, resulting in a lower amount of heat transferring to the target.

Below is a graph of typical combustion, showing the point of perfect combustion and an approximate location for ideal combustion. You will notice that by moving farther to the right on the air rich side (high amounts of excess air), the pollutants (CO) don't drop any further. This is where you only lower efficiency. On the left side (fuel rich or starved for air) you see a dramatic increase in carbon monoxide (CO), indicating that a portion of the fuel is not being converted to heat.



Combustion Efficiency Calculation

The efficiency calculation is based upon British Standards BS845.

This identifies three sources of loss associated with fuel burning:

Losses due to flue gasses:	Dry Flue gas loss, moisture and hydrogen, sensible heat of water vapor, unburned gas
Losses due to refuse:	Combustible in ash, riddlings and dust
Other losses:	Radiation, convection, conduction other unmeasured losses

Since the fuel air mixture is never consistent there is the possibility of unburned/partially unburned fuel passing through the flue. This is represented by the unburned carbon loss.

Losses due to combustible matter in ashes, riddlings, dust and grit, radiation, convection and conduction are not included.

Efficiency Calculation:

Known Data - Fuel: Qgr = Gross Calorific Value (kJ/kg)
Qnet = Net Calorific Value (kJ/kg)
K1 = Constant based on Gross or net Calorific Value
K1g = (255 x % Carbon in fuel)/Qgr
K1n = (255 x % Carbon in fuel)/Qnet
K2 = % max theoretical CO_2 (dry basis)
K3 = % Wet loss
H_2 = % Hydrogen
H_2O = % Water

Measured Data: Tf = Flue Temperature
Ti = Inlet Temperature
O_2m = % Oxygen in flue gas
O_2r = Oxygen reference %

Calculated Data: Tnet = Net Temperature
% CO_2 content in flue gas
% Dry flue gas losses
% Wet losses
% Unburned carbon loss
% Efficiency

Tnet = Flue Temperature - Inlet Temperature (or ambient)

Dry flue gas loss % = 20.9 x K1 x (Tnet)/K2 x (20.9 - O_2m)

Wet loss % = 9 x H_2 + H_2O/Qgr x [2488 + 2.1 Tf - 4.2 Ti]

Simplified = [(9 x H_2 + H_2O)/Qgr] x 2425 x [1 + 0.001 Tnet]

Wet loss % = K3 (1 + 0.001 x Tnet)

Where K3 = [(9 x H_2 + H_2O)/Qgr] x 2425

Net efficiency % = 100 - dry flue gas losses
= 100 - 20.9 x K1n x (Tnet)/K2 x (20.9 - O_2m)

Gross efficiency % = 100 - {dry flue gas losses + wet losses}
= 100 - {[20.9 x K1g x (Tnet)/K2 x (20.9 - O2m)] + [K3 x (1 + 0.001 x Tnett)]}

Excess Air = [20.9/(20.9 - O_2m) - 1] x 100

CO_2% = [(20.9 - O_2m) x K2/20.9]

Unburned fuel loss % = K4 x CO/(CO + CO_2) ***Note:*** *CO scaled in %*

Where K4 = 70 for coke
= 65 for anthracite
= 63 for Bituminous coal
= 62 for coal tar fuel
= 48 for liquid petroleum fuel
= 32 for natural gas

The formula for K4 is based on the gross calorific value Qgr. To obtain the loss based on net calorific value multiply by Qgr/Qnet. Since this loss is usually small, this conversion has been ignored. This loss is subtracted from the efficiency.

CO AIR-FREE and Converting to mg/m³

Certain standards (ANSI Z21.1) for Carbon Monoxide are stated in terms of air-free. Air-free refers to the concentration of CO in combustion gases undiluted with flue, or other gases containing little CO. This value is computed using an equation that takes into account the O_2 concentration of the flue gas.

If 5% is measured (O2m) in the flue then the CO gas value will be recalculated as if 0% were measured. The equation for air-free is as follows:

COa = CO PPM x [(20.9) / (20.9 - O2m)]

Annual Re-Calibration

While the sensor has an expected life of more than two years in normal use it is recommended that the analyzer is re-calibrated at least annually, This is so that long-term drift on the sensor and electronics can be eliminated. local regulations may require more frequent re-calibration and users should check with appropriate authorities to ensure the comply with relevant guidelines.

Troubleshooting

The following is a list of problems that may occur on the instrument through its operating life. If the cause of the fault is not easy to identify then we advise you to contact UEi Technical Support line at (800) 547-5740.

Fault Symptom	Causes
• Analyzer will not power off	CO reading too high, or faulty sensor. The analyzer will not power off completely if the CO reading is above 20 ppm, or the sensor has an error (indicated by "----" in the display for CO
• Oxygen too high • CO_2 too low	Air leaking into probe, tubing, water trap, connectors or internal to instrument, or water trap plug missing
	Oxygen cell needs replacing
• Oxygen error "----" • CO sensor error "----"	Instrument has been stored in a cold environment and is not at normal working temperature
	Oxygen cell or CO sensor needs replacing
• Display flashes	Display "HOLD" is activated
	Battery level is low
• Analyzer not running on mains adapter	AC charger not giving correct output
• Analyzer does not respond to flue gas	Particle filer blocked
	Probe or tubing blocked
	Pump not working or damaged with contaminant's
• Net temperature or efficiency calculation incorrect	Inlet (or ambient) temperature set wrong during automatic calibration
• Flue temperature readings erratic	Temperature plug reversed in socket
	Faulty connection or break in cable or plug
• X-Air, EFF, COa or CO_2 display (---)	Oxygen reading is above 18%
• Meter just continually beeps	Turn dial back to "**MENU**" and press "**ENTER**".

Electromagnetic Compatibility (EMC)

This product has been tested for compliance with the following generic standards:

EN 50081-1, **EN 50082-1** CE

and is certified to be compliant.

The European Council Directive 89/336/EEC requires that electronic equipment does not generate electromagnetic disturbances that exceed defined levels and has an adequate level of immunity to enable it to be operated as intended.

Since there are many electrical products in use that pre-date this Directive and may emit electromagnetic radiation in excess of the standards defined in the Directive there may be occasions where it would be appropriate to check the analyzer prior to use. The following procedure should be adopted.

- Go through the normal start up sequence in the location where the equipment is to be used
- Switch on all localized electrical equipment that might be capable of causing interference
- Check that all readings are as expected (a level of disturbance in the readings is acceptable)
- If not, adjust the position of the instrument to minimize interference or switch off, if possible, the offending equipment for the duration of the test

At the time of writing this manual (July 200) Kane International Ltd is not aware of any field based situation where such interference has ever occurred and this advice is only given to satisfy the requirements of the Directive.

Specifications

Parameter	Range	Resolution	Accuracy
Temp Measurement			
Flue temperature	1.0˚ F/C	±5˚F (2.0˚C) ±0.3% reading	32 - 1112˚F 0 - 600˚C
Inlet temperature	1˚ F/C	±1˚ F/C ±0.3% reading	32 - 212˚F 0 - 100˚C
Temp (Nett)*2	1.0˚ F/C	±5˚F (2˚C) ±0.3% reading	32 - 1112˚F 0 - 600˚C
Gas Measurement			
Oxygen	0.1%	±0.2%*1	0 - 21%
*Carbon Monoxide	1 ppm	±10 ppm <100 ppm*1 ±5% reading	0 - 1000 ppm
Carbon Dioxide*2	0.1%	±0.3% reading	0 - 30%
Efficiency*2	0.1%	±1.0% reading	0 - 99.9%
Excess Air*2	0.1%	±0.2%	0 - 250%
Pre-programmed fuels	Natural gas, Light Oil, Propane, Butane, LPG		
Dimensions			
Weight	1 kg. / 2.2 lb.		
Handset	200mm/7.9" x 45mm/1.8" x 90mm/3.5"		
Probe	(L) 300mm/7.9" x (Dia) 6mm/0.25" with 200mm/7.8" long stainless steel shaft, type K thermocouple and 3m/6ft long neoprene hose		
Ambient operating	+32˚ - 104˚F (0˚ - 40˚C) 10% to 90% RH non-condensing		
Battery life range	4 "AA" cells >8 hours using Alkaline "AA" cells		
AC adapter (optional)	Input: 110 V AC Output: 9 V DC regulated		

*1Using dry gases at STP
*2Calculated

Appendices

Main Display Parameters

O2: Oxygen reading in percentage (%).

Tf: Temperature is measured by the flue gas probe in Centigrade or Fahrenheit. Will show ambient temperature after fresh air calibration and "**----**" if the flue probe is disconnected.

CO: Carbon Monoxide reading displayed in ppm (parts per million). "**----**" is displayed if there is a fault with the CO sensor or the instrument has not set to zero correctly, switch off instrument and try again.

COa: Carbon Monoxide air-free reading referenced to an oxygen level of 0%. Do not confuse this reading with the actual CO reading as detailed above.

CO_2: Carbon Dioxide calculation determined by the type of fuel. This only shows a reading when a combination test is being carried out. "**----**" is displayed while in fresh air.

ΔT: Net temperature calculated by deducting the **AMBIENT** (or **INLET**) temperature from the measured **FLUE** temperature. Displays in either Centigrade (˚C) or Fahrenheit (˚F) and will display "**----**" if the flue probe is not connected.

EFF (G): Combustion efficiency calculation displayed in percentage. Gross (G) or Net (N) can be set (see MENU). The calculation is determined by the fuel type and uses the calculation in British Standard BS845. The efficiency is displayed during a combustion test, "**----**" is displayed while in fresh air.

XAIR%: Excess air calculated from the measured oxygen and type of fuel used. Displays reading during a combustion test. "**----**" is displayed while in fresh air.

AMB: Boiler air **INLET** temperature used to calculate the **NET** temperature.

: Displays the approximate battery level as follows:

- Full battery level 
- Battery at 75% 
- Battery at 50% 
- Battery at 25% 

When the display flashes this, it indicates the batteries are at less than 10% of charge and should be replaced, readings may be affected if the analyzer is used with low power batteries.

C75
Combustion Analyzer

Limited Warranty

The C75 is warranted to be free from defects in materials and workmanship for a period of three years (two years on sensors) from the date of purchase. If within the warranty period your instrument should become inoperative from such defects, the unit will be repaired or replaced at UEi's option. This warranty covers normal use and does not cover damage which occurs in shipment or failure which results from alteration, tampering, accident, misuse, abuse, neglect or improper maintenance. Batteries and consequential damage resulting from failed batteries are not covered by warranty.

Any implied warranties, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the express warranty. UEi shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expenses or economic loss. A purchase receipt or other proof of original purchase date will be required before warranty repairs will be rendered. Instruments out of warranty will be repaired (when repairable) for a service charge. Return the unit postage paid and insured to:

1-800-547-5740 • FAX: (503) 643-6322
www.ueitest.com • Email: info@ueitest.com

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

PLEASE
RECYCLE