TEST INSTRUMENTS™

HET

Heat Exchanger Tester

INSTRUCTION MANUAL

ENGLISH

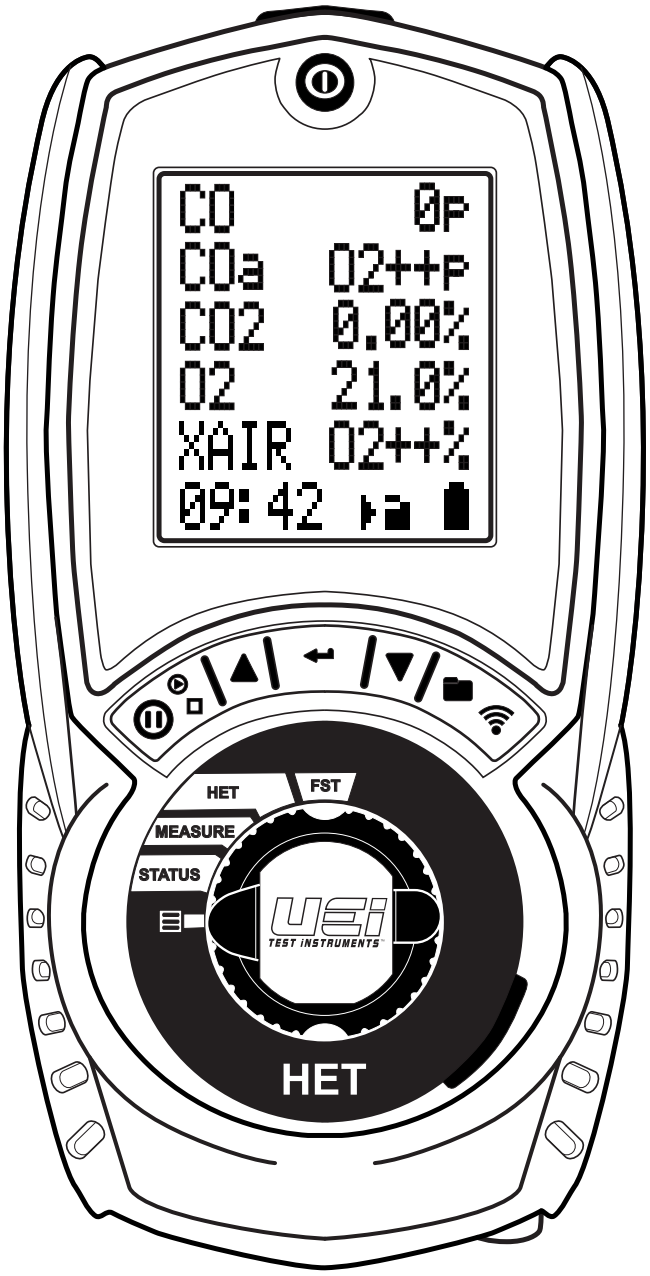

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TABLE OF CONTENTS

OVERVIEW

The direct measurement of CO_2 is achieved using UEi's own EOS technology sensor. CO_2 is set to zero in fresh air automatically after the initial 60 second countdown.

If "ZERO CO_2" is indicated, ensure the unit is in **outside fresh air** before selecting the "Purge" option.
It is very important that re-zeroing is done in **outside fresh air** as indoor CO_2 levels are affected by human breath.

The analyzer has a protective rubber boot with magnets for hands-free operation and is supplied with a probe with an integral temperature sensor.

A low flow detection system warns of a low flow and switches the pump off, this also helps prevent water condensate ingress from overfilled water traps.

A large 6 line display provides the user with relevant information based on current activity including instrument status via the new intelligent Status Bar. All data can be printed via an optional infrared printer.

The HET uses a data storage system allowing you to store up to 45 test logs.

GENERAL SPECIFICATIONS

- **Operating Temperature:** 32˚ to 113˚F (0˚ to 45˚C)
- **Storage Temperature:** 0˚ to 113˚F (-18˚ to 45˚C)
- **Operating Humidity:** 15% to 90% R.H..
- **Back light:** Yes
- **Dimensions:** 8.54 x 4.18 x 1.86 inch
- **Item Weight:** 1.5 lb
- **Calibration:** Recommended Annually
- **Certification:** UK CA, CE Conformity, RoHS, REACH Compliant, AHRI 1260 standard
- **Battery Type:** NiMH (AA) 3
- **Accuracy:** ± (% of reading + # of least significant digits)

IMPORTANT SAFETY WARNINGS

⚠ Read entire Safety Notes section regarding potential hazard and proper instructions before using this analyzer. 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. This analyzer must only be used in well-ventilated locations by trained and competent persons after due consideration of all potential hazards.

⚠ To ensure safe operation and service of the tester, follow these instructions. Failure to observe these warnings can result in severe injury or death.

⚠

- Do not use this analyzer during electrical storms or in wet weather.
- To avoid false readings, charge batteries if a low battery indicator appears.
- Always adhere to national and local safety codes. Use proper personal protective equipment (PPE).

⚠ This analyzer extracts combustion gasses that may be toxic in relatively low concentrations. These gasses are exhausted from the back of the analyzer.

⚠ This analyzer is designed for trade professionals who are familiar with the hazards of their trade. Observe all recommended safety procedures that include proper lockout utilization and use of personal protective equipment that includes safety glasses, gloves and flame resistant clothing.

Users of portable gas detectors are recommended to conduct a "bump" check before relying on the unit to verify an atmosphere is free from hazard. A 'bump" test is a means of verifying that an instrument is working within acceptable limits by briefly exposing to a known gas mixture formulated to change the output of all the sensors present. This is different from a calibration where the instrument is also exposed to a known gas mixture but is allowed to settle to a steady figure and the reading adjusted to the stated gas concentration of the test gas.

ANALYZER OVERVIEW

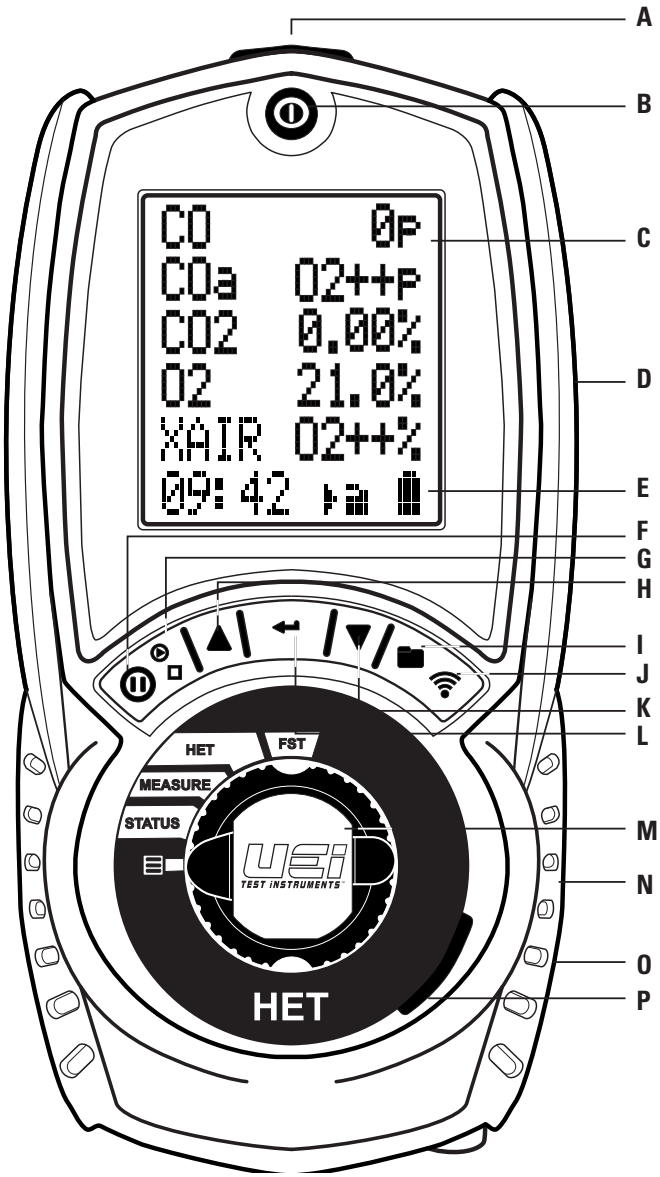
A. Infrared Printer Port
B. On/ Off (Power) Button
C. 6 Line Backlit Display
- Press any button to turn Back light on (will turn off after 10 seconds)

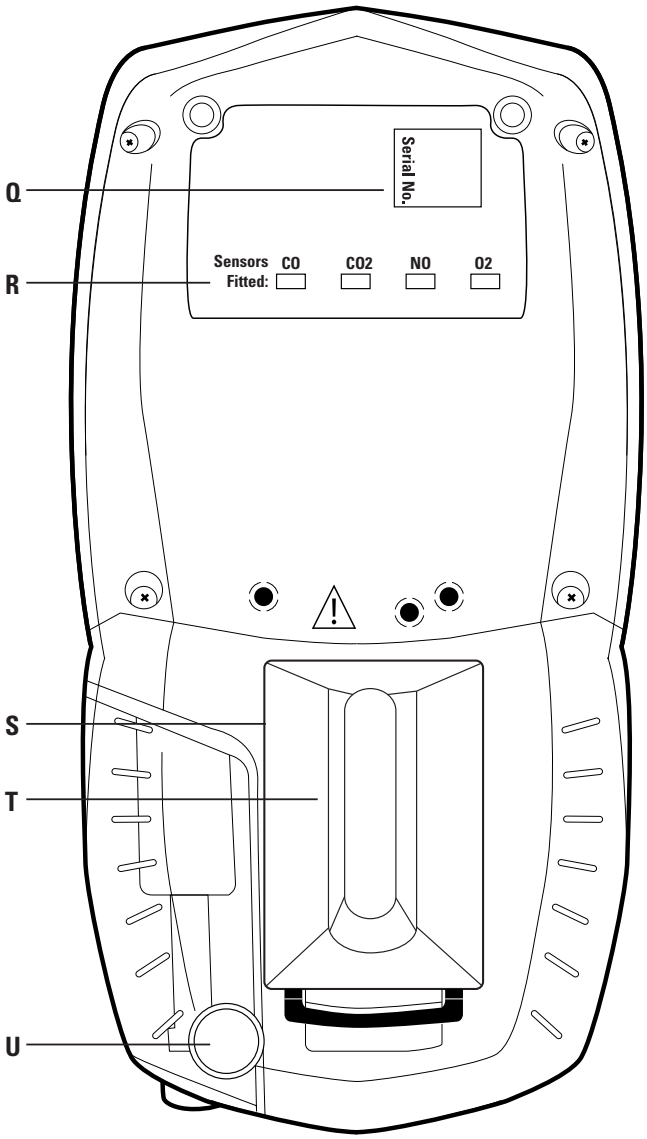
D. Protective Rubber Boot With Magnets
E. Status Bar Line
F. Data Hold Button: Short press to hold current data.
G. Pump Toggle Button: Long press to toggle pump on and off
H. UP Button
- Short press to navigate "UP".

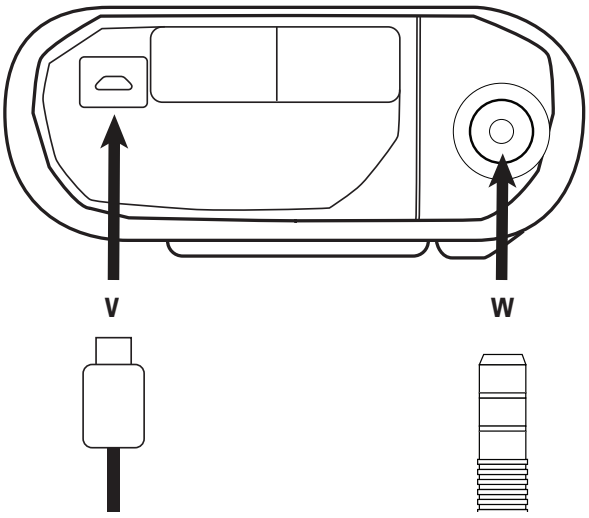
I. Save Log Button: Long press to store data.
J. Print Report Button: Short press to print a report to IR Port. (will enter a print option if Wireless Module is fitted)
K. Down Button
- Short press to navigate "DOWN"

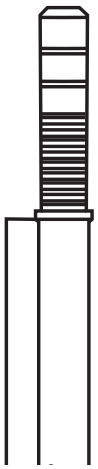
L. ENTER Button
- Short press select current option displayed
- Long press to activate some menu items

M. Rotary Selector Dial
N. Particle Filter (inside water trap)
O. Water Trap
P. LED Full Water Trap Indicator
Q. Serial Number: (under Protective Boot)
R. Sensors Fitted: (under Protective Boot) Indicates Sensors fitted in unit
S. Battery Compartment: (under Protective Boot)
T. Grip Indentation: Indentation for fingers to grip analyzer
U. Water Trap Drain Plug (Red plug; take caution NOT to damage plug when removing protective boot)
V. Battery Charge USB Adapter Connection
W. Flue Gas Inlet Connection









Red Connector (plugs into Flue Gas Inlet)

Flue Probe Gas Inlet Plug

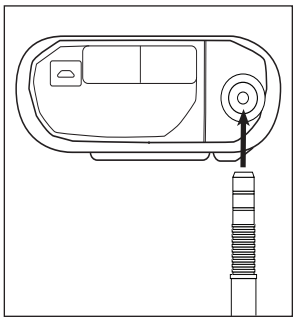
PRE TEST CHECKLIST

- Clean particle filter
- Water trap and probe line are empty of water
- Power on and zero
- Hose and probe connections are properly secured
- Flue gas probe is sampling ambient FRESH air
- Water trap is fitted correctly to the instrument
- Ensure water trap plug is inserted correctly

ANALYZER CONNECTIONS

WARNING!

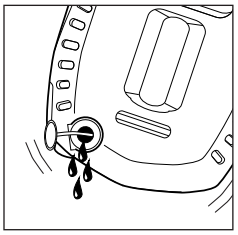
Turning the pump off while the probe is in the flue will leave toxic gasses inside the analyzer. Once data has been printed or copied, it is advisable to purge the unit with fresh air as soon as possible. To do this remove the probe from the flue and turn pump ON. Always allow the readings to return to zero (20.9% for O_2) prior to shutting the unit off. The meter will not switch off until the CO reading is below 20 ppm.



WARNING!

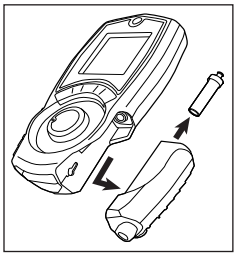
The probe will be hot from flue gasses. Remove the probe from the flue and allow it to cool naturally. Do not immerse the probe in water, as this will be drawn into the analyzer and damage the pump and sensors.

EMPTYING & CLEANING THE IN-LINE WATER TRAP



- Remove the rubber plug
- Allow the water to drain out
- Re-insert the rubber plug

CHANGING THE PARTICLE FILTER

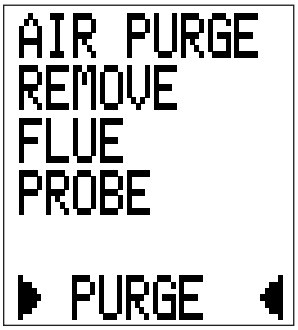


- Remove the protective rubber boot
- Slide the water trap unit from the analyzer
- Remove the particle filter from its' spigot and replace
- Slide the water trap back into position and replace protective rubber boot

QUICK START

Turn on the analyzer by pressing the On/Off Button for 2 seconds until the unit activates. As described the analyzer will perform a 60 second turn on purge. Once completed simply select the reading desired by the position of the rotary dial.

FRESH AIR PURGE



Each time the analyzer is turned on it will perform a 60 second air purge, this is to clear the gas sampling path (including probe, if connected), and self calibrate the CO_2 detection system. For these reasons it is very important that the analyzer be in **outside fresh air** when powered on.

WARNING

When in the Rotary Dial positions MEASURE; Press ▲ and ▼ buttons, scroll to CO2 Zero. Press and Hold ↵ for 2 seconds to enter purge mode. Press ↵ start the 60 second Purge. **CO2 Zero should be performed in fresh air.**

ANALYZER SYMBOLS

	Power Button		Navigate Down
	Pump Pause		Save Log
	Pump Start		Print
	Pump Stop		Menu Screen
	Navigate Up	MAX	Maximum Water Level In Trap
	Enter Key		WARNING Dangerous Conditions

DISPLAY SYMBOLS

	BATTERY LEVEL: Readings may be affected if used with low power batteries.
CAL	CALIBRATION: Number of days left before recalibration is due.
CO	CARBON MONOXIDE: Displayed in ppm (parts per million).
COn	CARBON MONOXIDE NORMALIZED
COx	CARBON MONOXIDE HIGHEST MEASURED READING
CO2	CARBON DIOXIDE reading in percentage (%).
CO/CO2	CO/CO2 RATIO: CO (ppm) divided by (CO2 (%) x 10,000).
DATE	DATE shown as month, day, and year, MM/DD/YY. Date is recorded when each combustion test is printed or stored.
EFF	COMBUSTION EFFICIENCY: calculation displayed in % either as Gross Ef(G), Net Ef(N), Gross Condensing EF(GC), or Net Condensing Ef(NC).
EFg	GROSS EFFICIENCY
Efcg	GROSS CONDENSING EFFICIENCY
Efn	NET EFFICIENCY
Efcn	NET CONDENSING EFFICIENCY
FULL	MEMORY FULL: Displayed when maximum number of tests have been stored in the memory.
INT	INTERVAL in seconds.
LOSS	LOSSES calculated from oxygen and type of fuel. Displays reading during a combustion test.
mg/m3	MILLIGRAMS PER METER CUBED
mg/m3(n)	MILLIGRAMS PER METER CUBED NORMALIZED
mg/kWh	MILLIGRAMS PER KILOWATT HOUR
mg/kWh(n)	MILLIGRAMS PER KILOWATT HOUR NORMALIZED

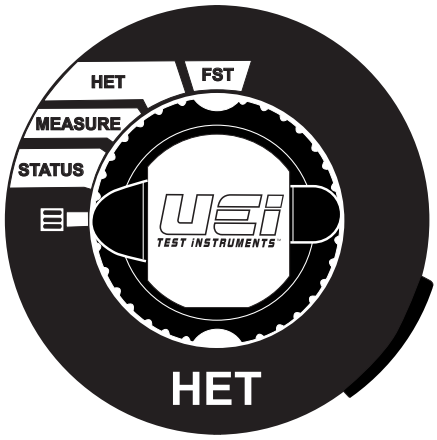
- -	Not fitted.
O2	OXYGEN reading in percentage (%).
O2++%	Displayed when O2 is greater than 18%
O2 ref:	O2 REFERENCE level in % for normalization calculation.
p	Parts per million
ppm	Parts per million
	Pump on
	Pump off
PRS	Pressure reading, either single point or differential.
Ra:	CO to CO2 ratio.
Tf:	Flue Temperature measured Fahrenheit and Centigrade.
Ta:	AMBIENT TEMPERATURE
F	DEGREES FAHRENHEIT
C	DEGREES CELSIUS
- OC -	Probe is disconnected or broken
ΔT	Net temperature calculated by deducting the INLET from FLUE temperature.
TIME	TIME: HH:MM:SS.
X – AIR	EXCESS AIR: calculated from oxygen and fuel type.
- - - -	Displayed while in fresh air.

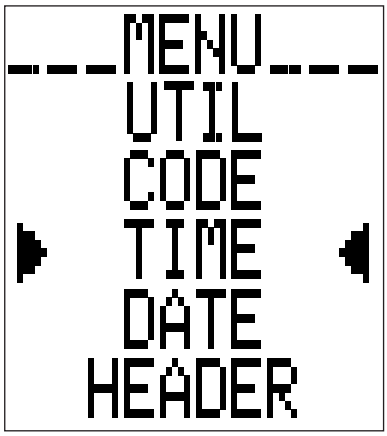
MENU SCREEN

Using the Menu

The Menu position on the Rotary Dial allows users to customize the default settings.
Navigate through the Menu using the interface buttons (▲ , ▼ , and ↵).

As you navigate up or down through the Menu, the items will scroll accordingly, eventually back to the beginning.





Arrows indicate option

MENU ITEMS

MENU	Sub Menu	OPTIONS/COMMENTS
Time	**HH:MM:SS**	24 Hour Format (e.g. 7AM = 0:00:00, 7PM = 19:00:00)
Date	**DD/MM/YY**	
Header	**LINE 1**	Customer info displays on print outs
	LINE 2	Customer info displays on print outs
	EXIT	
IR Print	**IRP-2/3**	Select to print to IRP-2 or IRP-3
	KMIRP	Select to print to KMIRP
Logs	**VIEW**	View current memory usage and view stored Logs
	EXIT	
	DELETE ALL	
Gas Unit	**ppm**	Parts per million
	mg/kWh	Milligrams per kilowatt hour
	mgm3	Milligrams per cubic meter
Language	**English**	
	Espanol	
	Francais	
UTIL	**INFO**	Displays Firmware version and calibration due date. Format is DD/MM/YYYY (e.g. January 4, 2025 is 04/01/2025)
	LEAK	Connect flue probe to run a test to ensure no leak.
	B'LIGHT	Backlight. Set the backlight duration from 15 to 300 seconds.
	BACK	
Code		Password protected for authorized service agents only/ LEAVE SET TO "0000".

SET TIME & DATE

Rotate dial to **MENU** ☰.

Press ▲ and ▼ buttons to navigate to **DATE**, Press ↵.
Press ▲ and ▼ buttons to set **MONTH**, Press ↵ to advance.
Press ▲ and ▼ buttons to set **DAY**, Press ↵ to advance.
Press ▲ and ▼ buttons to set **YEAR**, Press ↵ to return to **MENU**.

CALIBRATION DATE

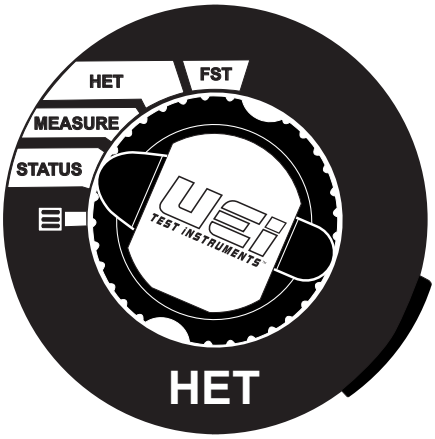
Rotate dial to **STATUS**.

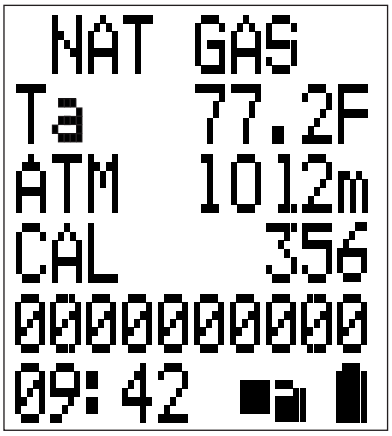
The Calibration date, identified as **CAL**, displays the number of days remaining until next calibration is due.

STATUS SCREEN

The large six-line display has 5 lines of readings and a status bar. The backlight will activate on each button press and turn off after 10 seconds of no activity. This can be changed in the Utility screen under MENU (see page 8). Button presses are categorized as Press (short/quick press) and Press and Hold (Press for 2 seconds then release).

Select "Status" on the dial to view the following





Current Fuel Type

Ta = *Ambient temperature*

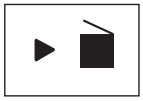
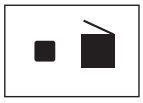
ATM = *Current atmospheric pressure (mBar).*

CAL = *Number of days until next calibration is due.*

Serial Number = *9-Digit Serial Number*

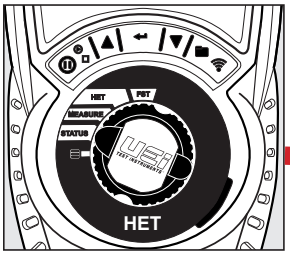
Status Bar = Time, Pump Status, and Battery level
Press ▼ for Fuel Type
Press ▼ for Date DD/MM/YY

STATUS BAR ICONS

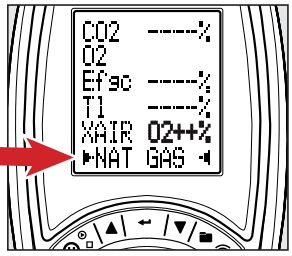
Pump		*Pump on*
Pump		*Pump paused*
Sending Data		*Indicates data is being transmitted to either the App or the Printer*
Battery		*Battery level indication*

CHANGE FUEL TYPE -

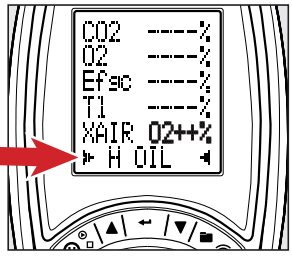
Select from preprogrammed fuels - Natural Gas, LPG,Propane, Butane, Bio Gas, Light Oil, Bio Oil, Heavy Oil, and Pellets.



Rotate the dial to either MEASURE, STATUS setting.



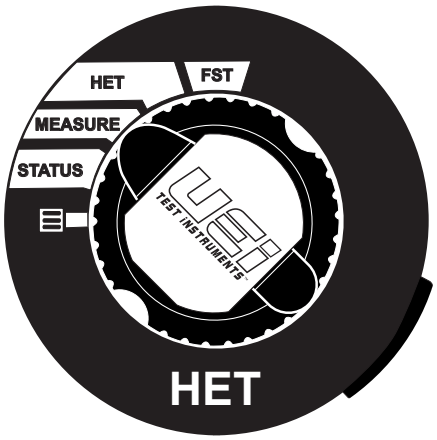
Press ▼ button until the Fuel Type displays on the Status Bar.
Press and Hold ↵ until two arrow icons display.

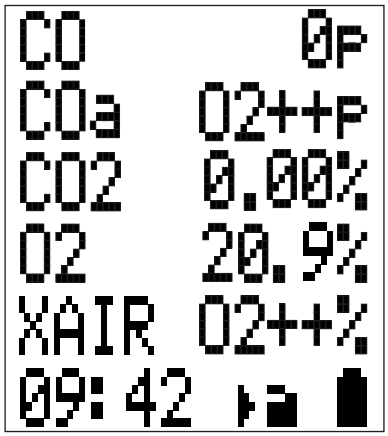


Press ▲ and ▼ buttons to scroll fuel selections.
Press ↵ to select fuel.

MEASURE SCREEN

The HET measures basic combustion parameters.
Select the HET position on the rotary dial position.





CO = *Carbon Monoxide in ppm (parts per million)*

COa = *Carbon Monoxide Air Free in ppm*

CO2 = *Carbon Dioxide in %*

O2 = *Oxygen in %*

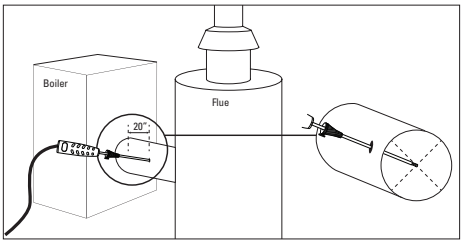
Excess Air = (Excess Air, O2++ displayed in %)

Status Bar = Time, Pump Status, and Battery level
Press ▼ for CO2 ZERO
Press ▼ for Fuel Type
Press ▼ for Date DD/MM/YY

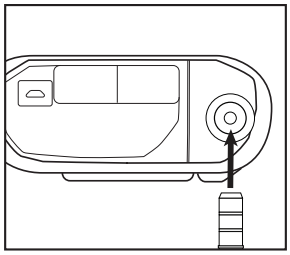
MEASURING FLUE GASES

After the initial countdown is finished and the analyzer is properly setup, put its' flue probe in the appliance's sampling point. The tip of the probe should be at the center of the flue. Use the flue probes depth stop cone to set the position.
With balanced flues, make sure the probe is positioned into the flue so no air can "back flush" into the probe.

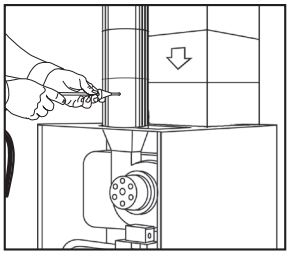
NOTE: *Ensure the flue probe handle does not get hot!*



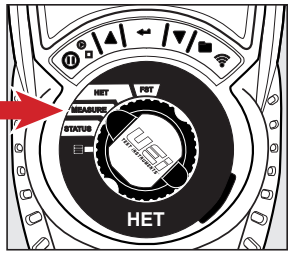
TESTING



Insert flue probe into combustion input.



Insert flue probe into stack. Adjust cone so the probe tip is approximately at the center of the stack.

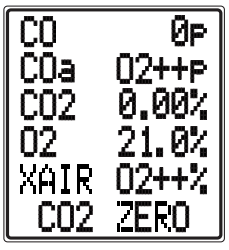


Rotate function rotary dial to MEASURE for Test parameters.

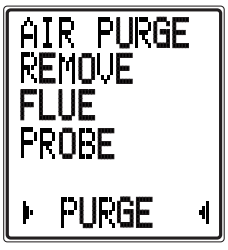
NOTE: If there is no hole, check with service and installation instructions of appliance for best testing method or check with your local authority on best practice

PURGE ANALYZER

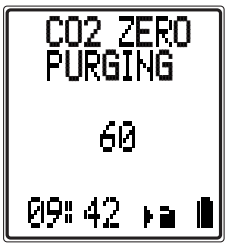
If analyzer has gas remaining in flue and it needs a Fresh Air Purge before resuming testing. Follow these steps.
When in MEASURE screen;
Press and Hold ▶ to turn pump ON.



Press the ▲ or ▼ Buttons to scroll to CO2 ZERO on the bottom line of the STATUS Bar.



Press and hold ↵ to select PURGE.



Press ↵ to start a 60 second fresh air PURGE.

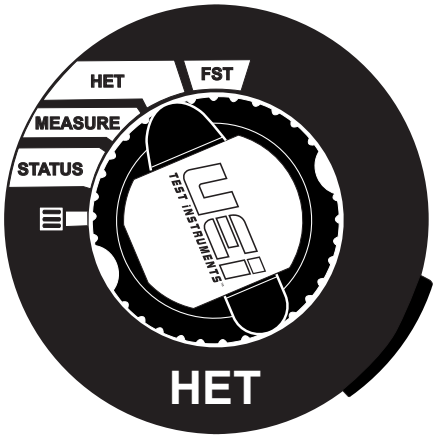
HEAT EXCHANGER TEST (HET) SCREEN

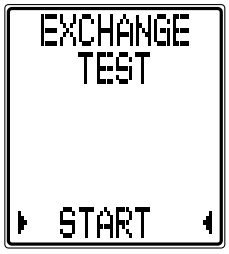
There are many methods to test heat exchanger integrity. Many cracks are invisible to borescopes or the naked eye, and only open or separate from pressure or temperature changes during operations. This test measures the Excess Air, O2 and CO readings both before and after the blower turns on. If the heat exchanger is sealed your O2 and CO readings should remain stable.

A breach in the heat exchanger may allow fresh air to be forced into the flue after the blower turns on due to a pressure increase in the plenum. The result may be a rise in the measured O2 in the stack gas and an increase in the Excess Air . In some sealed systems the fresh air drawn in through the breach may reduce the combustion air available leading to an increase in the CO reading.

If either of these situations are present it is probable that there is a problem with the Heat Exchanger which may require additional testing and inspection.

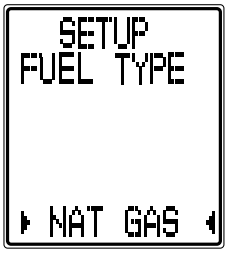
Select the HET position on the rotary dial position. Press ↵ to RUN test and follow steps below.





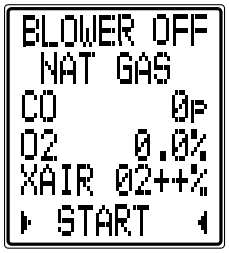
Press ↵ to START.

Confirm Fuel type.
(To change, see Change Fuel Type section). Press ↵ .

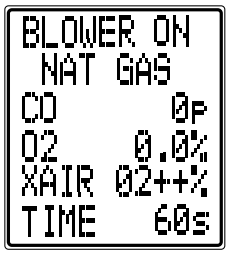


Call for heat on the system. Observe and wait for O2 readings to stabilize.

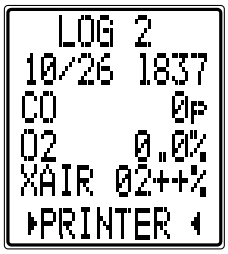
After the blower turns on, press the ↵ to start the Post-Blower test



Call for heat on the system. Observe and wait for O2 readings to stabilize. Press ↵ .



The analyzer will countdown 60 seconds then record Post-Blower values for CO, O2 and Excess Air.

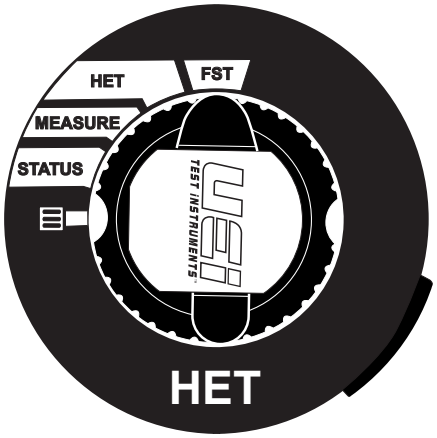


Test results will display when done. Readings show any difference between pre and post blower readings for CO, O2, and Excess Air.

NOTE: If CO, O2, and Excess Air readings change, this may be evidence of a cracked heat exchanger and further investigation is warranted.
Test results; O2, CO and Excess Air will show on the printout and log.

FURNACE SAFETY TEST (FST) SCREEN

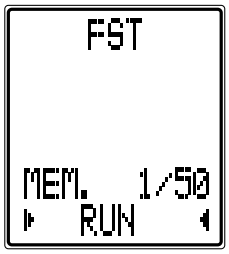
Perform 2-minute Appliance Sweep Test to quickly identify if a combustion appliance is leaking CO from any of the seals after a service has been performed.



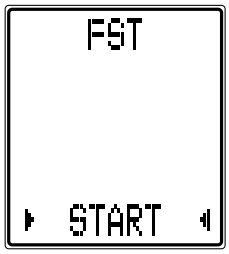
Purge Analyzer
Before starting a Furnace Safety Test (FST), turn the analyzer on in fresh air to set a base line for the CO and CO2.

Then go into the room with equipment and check the base line readings inside the room to ensure its safe.

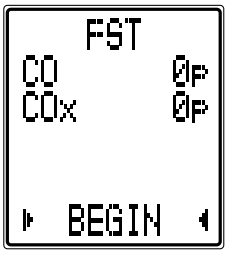
Select the FST position on the rotary dial.

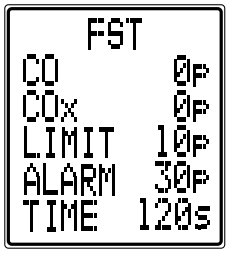


Press ↵ to RUN test. Screen displays which LOG it will be recording.

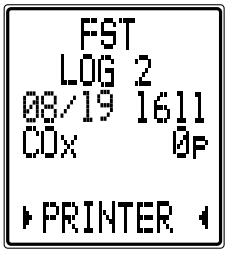


Press ↵ to START test.





Once pump starts, run the probe slowly around the outside of the equipment casing about 4-5 inches away from seals and joins have potential risks for fumes to escape. During the test, make 2 passes around the outside of the equipment.

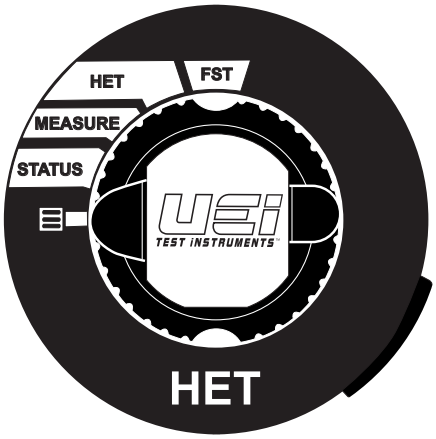


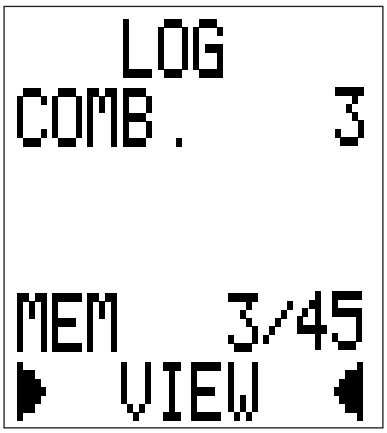
Test results will display when done. Press and Hold ↵ to PRINT.

STORED LOGS MEMORY

The HET stores LOGS sequentially until the memory is full.

To view current memory LOGS, Rotate dial to MENU screen -----> Press the ▲ or ▼ Buttons to scroll to LOGS, Press ↵.

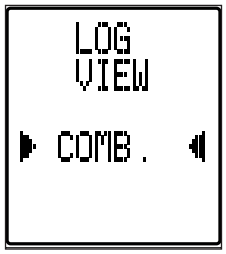




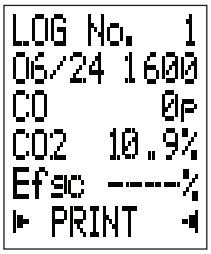
Combustion LOG = Number saved

Total Memory Used =

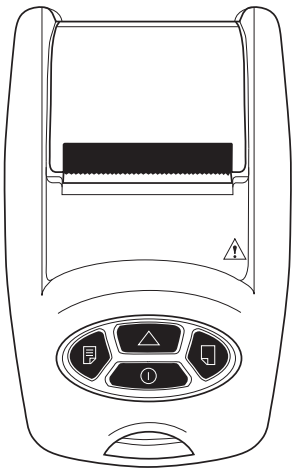
LOG Options = Press ↵ to VIEW logs (see below)
Press ▼ to EXIT to previous menu
Press ▼ to DELETE ALL Logs



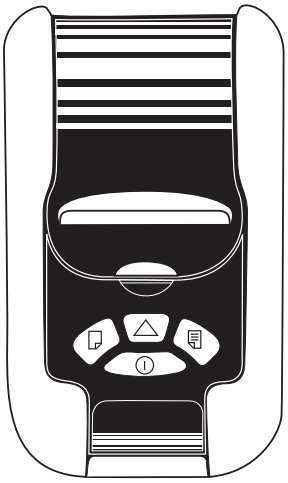
Press ↵ to list available Logs.
(Navigation and selection via the ▲, ▼ and ↵ buttons).



Press ↵ to PRINT this Log.
Press ▼ for NEXT screen
Press ▼ again for PREVIOUS screen
Press ▼ again to EXIT
Press ↵ to make selection



[IRP2]



[KMIRP2]

Selecting a Printer

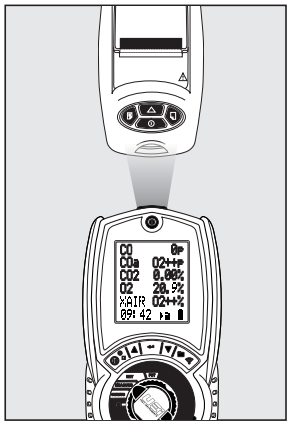
Rotate selector Dial to **Menu** Position.

Use ▲ **or** ▼ buttons to scroll to **IR PRINT.**

Press ↵ button.

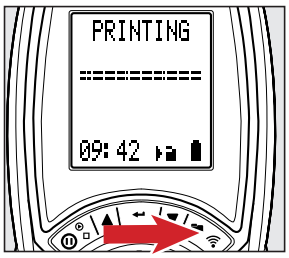
Use ▲ **or** ▼ buttons to select either **IRP-2/3** or **KMIRP** (KMIRP2) printer.

Press ↵ button to save selection.



Make sure the printer is switched on and ready to accept data.

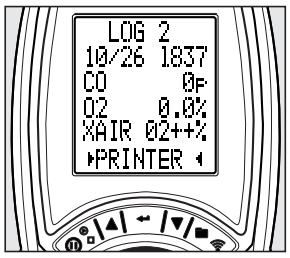
Place the infrared receiver in line with the analyzer's infrared emitter on top of the analyzer. Printer will not receive data if the printer ports are not aligned.



During MEASURE test,

Press (( )) to print results.

Press ↵ again to abort.



After HET or FST tests,

Press ↵ to print when prompted.

Press ↵ again to abort.

SPECIFICATIONS

Parameter	Range	Resolution	Accuracy
Flue Gas Measurement			
Carbon Monoxide (CO)	0 - 2000ppm	1ppm	±3ppm or ±5% of Reading (whichever is greater)
Carbon Dioxide (CO2)	0 - 20%	0.1%	±0.3% Volume
Calculations			
Oxygen (O2)	0 - 21%	0.1%	±0.3% Volume
CO/CO_2 Ratio	0 - 0.9999	0.0001	±5% of Reading
Efficiency (Nett or Gross)	0 - 99.9%	0.1%	±1% of Reading
Efficiency High (C)	0 - 119.9%	0.1%	±1% of Reading
Excess Air	0 - 119.9%	0.1%	±0.2% of Reading
Pre-programmed Fuels	Pellets, Light Oil, LPG, Butane, Propane, Natural Gas, Bio Oil, Heavy Oil, Bio Gas		
Battery Life	>8 hours (continuous with pump on)		
Backlight	Customizable duration from 15 to 300 seconds.		
Certification	The HET is TUV-tested and certified to EN 50379, Parts 1-3 in accordance to 1st German Federal Emission Control Ordinance (BImSchV)		
Operating Conditions			
Temperatures	32˚ to 113˚F (0˚ to 45˚C)		
Humidity	15 to 90% RH, (non-condensing)		
Power Supply	Rechargeable batteries, USB Charging		
Physical Characteristics			
Weight	1.5 lb. (635g)		
Dimensions	H: 8.54”x W: 4.18”x D: 1.86” (H: 217 mm x W:106 mm x D: 47 mm)		

The HET is in conformity with the relevant Union harmonization legislation listed below:

Directive	Title
201430EU	Electromagnetic Compatibility (EMC)
201165EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

The following harmonized standards and technical specifications have been applied:

CERTIFICATION

The UEi HET is TUV-tested and certified to EN 50379, Parts 1, 2 & 3 in accordance to 1st German Federal Emission Control Ordinance (BImSchV). Manufactured to meet AHRI 1260 standard.

EMC

EN507270:2015

Safety

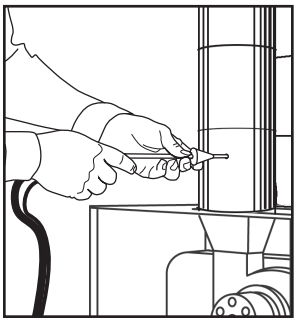
EN61010-1:2010

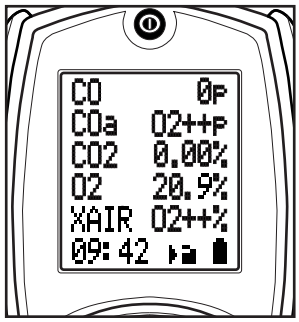
RoHS

IEC62321-2:2013, IEC62321-1:2013; IEC62321-3-1;2013, IEC63321-5:2013, IEC623321-4:2013, IEC62321-7-2:2017, IEC62321-7-1:2015, IEC62321-6:2015

UK CA

POST TEST





Remove the probe from the flue and allow analyzer to purge with fresh air until readings return to zero. O_2 to 20.9%, CO to Zero (Be careful the probe tip will be HOT).

POWERING OFF

When you power off the HET, there is a 45 second purge.

Make sure you do not exceed the analyzer's operating specifications. In particular:

- Do not exceed the flue probes maximum temperature (1112˚F)
- Do not exceed the analyzer's internal temperature range
- Do not put the analyzer on a hot surface
- Do not exceed the water trap's level
- Do not let the particle filter become dirty and blocked

View the displayed data to ensure operating conditions have been achieved and the readings are within the expected range.

GENERAL MAINTENANCE

- Re-certify your instrument annually to ensure it meets original performance specifications. See page 18 for service details.

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.

- 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.

COLD WEATHER PRECAUTIONS

It is important you keep your flue gas analyzer in a warm and dry place overnight.

Electronic devices that become really cold, by being left in a vehicle overnight, suffer when taken into a warm room the next morning. Condensation may form which can affect the analyzer's performance & cause permanent damage. See operating and storage temperature specifications.

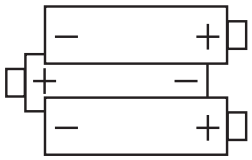
Electrochemical sensors used in flue gas analyzers can be affected by condensation or water being sucked into the analyzer, as the small apertures on top of sensors can become blocked with water, stopping sensors seeing flue gas. When this happens, oxygen or carbon dioxide reading will display as "—" & sensors may be permanently damaged.

If you think that your analyzer is affected by condensation or water ingress, it may be possible to rectify the problem yourself. Simply leave the analyzer running in a warm place, with the pump 'ON' sampling fresh air for a few hours (use mains adapter/battery charger if needed). If, after doing this, you still experience problems please contact our Service Center.

REPLACING THE BATTERIES

This meter has been designed for use with both alkaline and rechargeable Nickel Metal Hydride (NiMH) batteries. No other types are recommended and will void warranty. The analyzer is supplied with 3 (AA) size NiMH rechargeable batteries. These should be installed into the instrument.

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



Using Rechargeable Batteries
The battery charger must only be used when NiMH batteries are fitted. Alkaline batteries are not rechargeable. Attempting to recharge alkaline batteries may result in damage to the product and create a fire risk.

WARNING
Do not try and charge the unit with Alkaline batteries fitted. Do not mix NiMH cells of different capacities of from different manufacturers, all cells must be identical.

Turn over the analyzer, remove the protective rubber boot and fit 3 "AA" NiMH rechargeable batteries in the battery compartment. **Take great care to ensure they are fitted with the correct battery polarity.** Replace the battery cover and the protective rubber boot.

Time and Date
When changing the batteries, the time and date will need setting.

Battery Disposal
Always dispose of depleted batteries using approved disposal methods that protect the environment.

Battery Charging
Ensure that you use the correct charger. This unit uses a 5V regulated charger. Ensure the batteries are fitted in the correct manner, and 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 circumstances 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.

CANADIAN ANNUAL RECERTIFICATION SERVICES

KANE CANADA MEASUREMENT SOLUTIONS
For recertification service in Canada, please visit https://www.kanetest.ca/.
Tel: 1-877-475-0648
Service Request Email: SR@kanetest.ca

USA ANNUAL RECERTIFICATION SERVICES

UEi SERVICE+ GUARANTEED!

2024 DEALER DESIGN AWARDS theNEWS GOLD

An Award-Winning Promise To Never Let You Down.

BACKED BY UEi SERVICE+

UP TO 10 YEAR WARRANTY

SAME DAY SERVICE GUARANTEED

ups FREE SHIPPING ON ANNUAL SERVICE

10 Year Warranty: All UEi combustion analyzers have a standard 1-year warranty. Each recertification extends the warranty for 1 more year for up to ***10 years*** from the date of purchase.

*Contractors who book recertification of a C160 series analyzer at **www.ueitest.com/service** within 12 months from either the date of purchase or the date of the last recertification will receive reduced service pricing[1] that lowers the cost of ownership and 2 additional benefits:*

Same Day Service: All qualifying analyzers received for recertification through UEi Service+ are returned on the same business day, **GUARANTEED**.[2]

Free Shipping: UEi Service+ offers free shipping both to and from our service center. When customers book their recertification, they receive a prepaid UPS Ground shipping label.

[1]Pricing subject to change without notice. [2]Analyzers that include the additional NO (Nitric Oxide) sensor requires 48-hour turnaround. Only available in USA.

PRODUCT REGISTRATION

Register Online

Registering you analyzer online is quick and easy. Just log in or setup an account, it only takes a couple of minutes. Once logged in you can register you analyzer by providing some product information and uploading a proof-of-purchase.

When it's time to request recertification, just log into your account, select the analyzer, select the service and place your order.

OTHER IMPORTANT FACTORS RELATING TO COMBUSTION

The three T's of combustion

- **Time:** Amount of time that the fuel and oxygen are together in the combustion chamber
- **Temperature:** How high the temperature is determines the rate of oxidation, or spread of combustion
- **Turbulence:** How well the fuel and air are mixed

These three factors are all interrelated and will move your results along the combustion curves.

COMBUSTION MEASUREMENT TERMS

Other parameters measured include Net temperature, draft and efficiency.

Net Temperature

Net temperature is the difference between the combustion air entering the combustion chamber and the flue gas temperature past the heat exchange. This is used to determine how efficient the system is extracting heat from the combustion process in addition to the performance of the combustion process. On sealed systems that have ducted inlet air for combustion air, the Net temperature must compare this air stream temperature with the flue gasses. If the appliance simply uses room air for the combustion air, our analyzers have an internal temperature sensor in the handset, so it will use this temperature when calculating Net temperature. The most accurate results for efficiency are obtained when measuring flue gasses at the point where flue temperature (not flame temperature) is the highest.

Draft

Draft is the difference between the ambient pressure level and the pressure level in the flue.
This is created either by the natural buoyancy of the hot gasses created in combustion lifting, or by an inducer fan that assists the flow of flue gasses up the stack. Most combustion equipment will specify the amount of draft that is required for proper operation. Draft helps draw combustion air into the combustion chamber, and also helps in mixing the fuel and oxygen. Without proper draft, the combustion process can spill poisonous by-products into the space where the appliance is located. This can be a risk to those in the area, or create a danger to residents or employees working near the combustion equipment.

Efficiency

Efficiency is a measure of how well the fuel is burned to create heat, and how well the generated heat is captured for the intended use. The information used to create this value is based on the fuels heating value, the heat lost up the flue and the gas components in the flue gas. The original method to determine efficiency included many manual methods and lookup charts. As an example you would measure the CO_2 level and the stack temperature and then reference a slide scale that would give you the relative efficiency number. UEi's electronic combustion analyzers perform the measurements on a continuous basis, and can calculate the efficiency as adjustments are being made. Combine this with a printout and you are able to provide a before and after comparison of the combustion equipment in relatively little time as part of normal servicing. **Combustion efficiency is not the same as AFUE (annual fuel usage efficiency). AFUE is not measurable with any portable flue gas analyzer.**

Combustion Efficiency Calculations

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, riddling and dust
- Other losses:
  Radiation, convection, conduction other unmeasured losses

Net efficiency calculations assume that the energy contained in the water vapor (formed as a product of combustion and from wet fuel) is recovered and the wet loss term is zero. Gross efficiency calculations assume that the energy contained in the water vapor is not recovered. 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, riddling, dust and grit, radiation, convection and conduction are not included.

CO Air Free

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 gasses undiluted with flue, or other gasses containing little CO. This value is computed using an equation that takes into account the O2 concentration of the flue gas.

- If 5% O2 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:: COaf = CO PPM x [(20.9) / (20.9 - O2m)]
- In our example if a reading of 325 PPM were measured then the air-free value would be calculated as follows:
  COaf = 325 PPM x [(20.9) / (20.9 - 5)] COaf = 325 PPM x [(20.9) / (15.9)] COaf = 427

We may be given a limit on our gas range by the local authority, which stated that we must not emit more than 400-PPM Carbon Monoxide air-free. In the example we would be breaking the limit and corrective action should be taken to reduce the level of CO. Air-free values prevent false readings being submitted, e.g. allowing more air into the boiler will increase the oxygen level in the flue and dilute any toxic gas reading. Air-free referencing gives readings as if they were undiluted.

DISPOSAL

Caution: This symbol indicates that equipment and its accessories shall be subject to separate collection and correct disposal.

CLEANING:

Periodically clean your meters' 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.

STORAGE:

Remove the batteries when instrument is not in use for a prolonged period of time. Do not expose to high temperatures or humidity. After a period of storage in extreme conditions exceeding the limits mentioned in the General Specifications section, allow the instrument to return to normal operating conditions before using it.

WARRANTY:

The HET is warranted to be free from defects in materials and workmanship for a period of 1 year 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