TEST iNSTRUMENTS™

Instruction Manual

C20

Combustion Set-Up Meter

ELECTRO-OPTICAL SENSOR TECHNOLOGY™

COMBUSTION MADE EASY

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OWNERS MANUAL & MAINTENANCE

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.

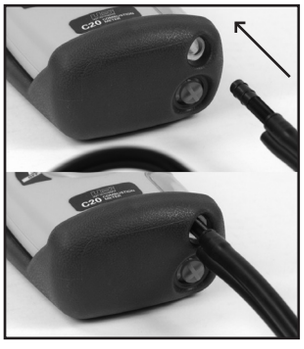
C20 FUNCTIONS

- Carbon Monoxide (CO) Measured in part per million (ppm)
- Carbon Dioxide (CO2) Measured in percentage volume (%)
- CO MAX - Maximum CO measured.

ANALYZER CONNECTIONS

⚠WARNING!

Turning the pump off while the probe is in the flue will leave toxic gases inside the analyzer. Once data has been read, 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 (00 for CO) prior to shutting the unit off.



⚠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 rotate the selector to “OFF”and switch off the analyzer. The instrument will count down from 30 to switch off.

C20 OPERATIONS

The C20 Combustion set-up meter is suitable for use with all common domestic fuels including natural gas, propane, butane and light oil.

NOTE: Always begin operation in an area with fresh air, free from any CO or CO2.

- Power the C20 on by rotating the selector dial to any position
- Allow the C20 to complete countdown
- Rotate selector dial to desired parameter and begin testing

When not measuring CO or CO2 rotate selector to “STANDBY” to extend battery life.

C20 COMBUSTION SET-UP METER TYPICAL USES

- Measure and verify manufacture set-up values for CO2 and CO are within specified range.
- Check for flue gas spillage around capture hoods.
- Measure background and ambient CO levels.

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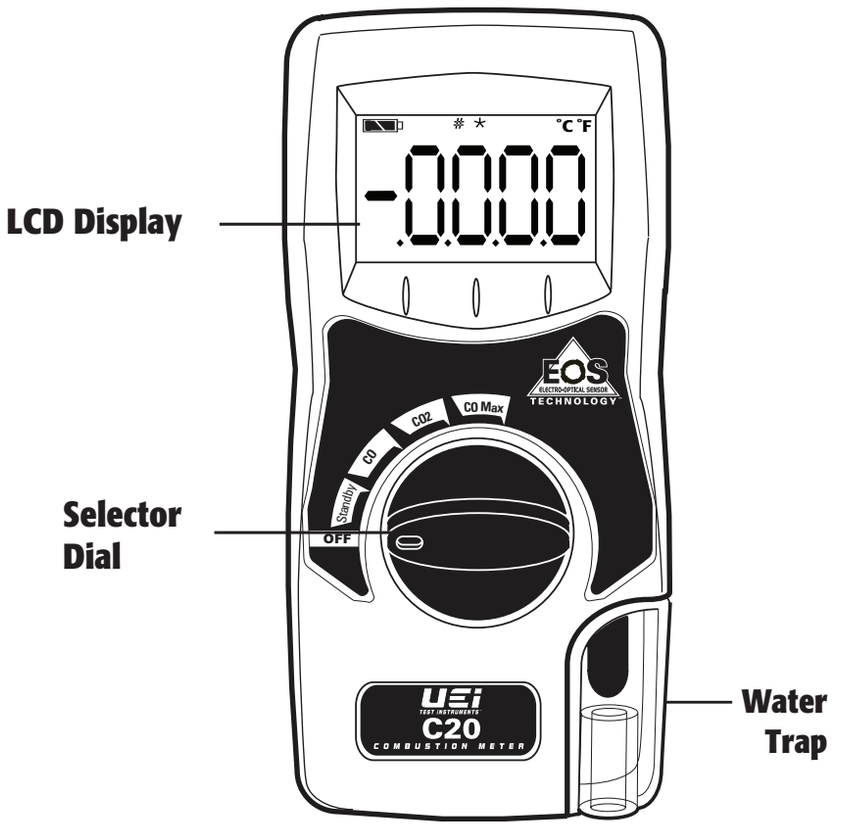
Finishing Up

- Remove the probe from the flue and allow the analyzer to purge with fresh air until readings return to zero.
  - CO2 to 0.0%, CO to Zero (Be careful as the probe tip will be HOT)
- Drain water trap
- Check particle filter
- Rotate selector to "OFF"
  NOTE: To protect the sensor "HIGH" will be displayed and the zero countdown will repeat until CO measured is less than 20 ppm.

C20 Overview



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General Maintenance

- Check calibration of 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.

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.

Annual Re-Calibration

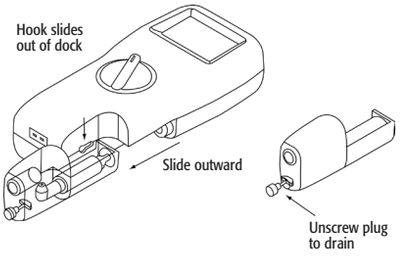
While the sensors have an expected life of more than five years in normal use it is recommended that the analyzer is re-calibrated annually. This is so that long-term drift can be eliminated. Local regulations may require more frequent re-calibration and users should check with appropriate authorities to ensure compliance with relevant guidelines.

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 & Cleaning the In-Line Water Trap

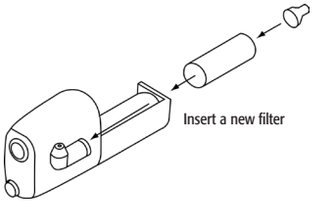
The in-line water trap should be checked and emptied on a regular basis. Water vapor will condense in the probe line, which may cause the water trap to fill suddenly if the probe is moved. Care should be taken at all times.
⚠ Carefully un-screw the plug from the bottom of the water-trap housing. Dispose 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. Note: CO2 reading will be low if the Water Trap Plug is not in place.



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 on the inner surface.

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.



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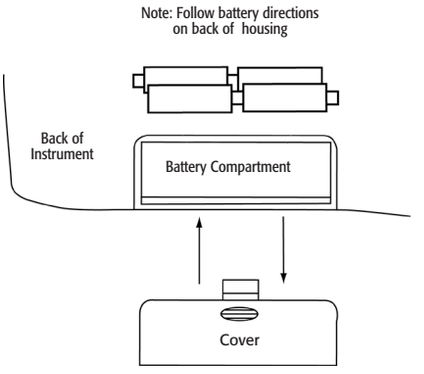
BATTERIES REPLACEMENT

This meter has been designed for use with alkaline batteries. No other types of batteries are recommended. The analyzer is supplied with 4 “AA” size alkaline batteries. These should be installed into the instrument as shown in the diagram to the right and indicated on the back of the unit.

CAUTION!

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



ELECTROMAGNETIC COMPATIBILITY (EMC)

This product has been tested for compliance with the following generic standards:
EN 50081-1, EN 50082-1 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 (August 2011), UEi 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.

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WHY TEST WITH THE C20

VERIFY PROPER OPERATION OF COMBUSTION EQUIPMENT

- To verify that equipment is operating as the manufacturer designed it to work.
  This includes installation tests for CO2 and CO.
  - A properly tuned combustion appliance will perform better, and reduce the likelihood of call-backs for no-heat.
- To verify that the maintenance work performed has corrected the problem.
- To detect any defects early – possibly at installation.
  - Higher efficiency equipment is running at peak only when properly adjusted. As the complexity of a system increases, so does the importance of proper adjustment of the combustion process.
- Improperly adjusted equipment not only fails to meet expected performance but could lead to future failures.
- To check that the equipment is supplied with enough combustion air, make-up air and has proper venting to exhaust the combustion by-products.
- To establish a base-line of desired performance -
  - By tracking the performance over time you are able to see changes before they lead to equipment failure.

VERIFY SAFE OPERATION OF COMBUSTION EQUIPMENT

- Equipment that is not properly adjusted, or that has insufficient draft to vent combustion gases could produce carbon monoxide in deadly quantities. The UEi C20 can be used to test both flue gas and ambient CO.

- When customers complain about fumes it is usually an indication of improper operation. CO is a colorless, odorless gas so the fumes are not the CO, but an indication that a problem may exist.

IMPROVE YOUR PRODUCTIVITY & PROFIT

- The UEi **C20** combustion set-up meter gives a quick, continuous readout of the combustion process. Readings change in real-time as adjustments are made to help zero in on the proper setting. Compare this to spot tests or other methods, and you will see your productivity rise.
- Proper testing will help you provide the proper service or equipment replacement recommendations, and have the data to support this. Sales will increase because you are no longer guessing, and the work provided is proper for the needs of the customer.
- Customers on a service contract will be provided excellent service, and you will quickly diagnose failures and help keep the equipment up for the season.

IMPROVE CUSTOMER PERCEPTION OF YOUR SERVICES

- Provide your customers results of the performance of their equipment
- Reduce your customers energy expense by properly adjusting and maintaining their equipment
- Increase your confidence in the work performed and remember

IF YOU DON'T TEST, YOU DON'T KNOW

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WHAT RESULTS ARE GENERALLY ACCEPTABLE

ATMOSPHERIC GAS FIRED BURNERS

- **CO2** ..... 7.0 to 8.0% CO2
- **Stack Temperature** ..... 325 to 500°F
- **Draft** (Water Column Inches) ..... -.02 to -.04wc"
- **Carbon Monoxide** (parts per million) ..... <100ppm

GAS FIRED POWER BURNERS

- **CO2** ..... 6.0 to 7.0% CO2
- **Stack Temperature** ..... 275 to 500°F
- **Stack Draft** (Water Column Inches) ..... -.02 to -.04wc"
- **Overfire Draft** (Water Column Inches) ..... -.02wc"
- **Carbon Monoxide** (parts per million) ..... <100ppm

OIL FIRED BURNERS (#2 OIL FUEL)

- **CO2** ..... 6.6 to 8.0% CO2
- **Stack Temperature** ..... 325 to 600°F
- **Stack Draft** (Water Column Inches) ..... -.04 to -.06wc"
- **Overfire Draft** (Water Column Inches) ..... -.02wc"
- **Carbon Monoxide** (parts per million) ..... <100ppm
- **Smoke** 0
  (or manufacturer's recommendation)

POSITIVE OVERFIRE GAS & OIL

- **CO2** ..... 5.8 to 10.3% CO2
- **Stack Draft** (Water Column Inches) ..... -.02 to -.04wc"
- **Overfire Draft** (Water Column Inches) ..... +0.4 to +0.6wc"
- **Carbon Monoxide** (parts per million) ..... <100ppm

NOTE: Follow manufacture guidelines for the specific equipment being serviced.
- Temperature and draft targets are included for reference only.
The C20 does not measure these parameters

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METER PROBLEM SOLVING

If any problems are not solved with these solutions, contact us or an authorized repair center.

Fault symptom	Causes / Solutions
CO or CO2 too low	• Air leaking into probe, tubing, water trap or connectors.
CO or CO2 reading (- - - -)	• Meter was stored in a cold environment and is not at normal working temperature.
Batteries not holding charge	• Batteries exhausted.
Meter does not respond to flue gas	• Particle filter blocked. • Probe or tubing blocked. • Pump not working or damaged with contaminants.

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GLOSSARY

SELECTOR AND DISPLAY PARAMETERS

"ZERO"	Followed by decreasing numbers in the display during set-up
CO	(Carbon Monoxide) – Direct reading of the carbon dioxide sensor displayed in parts per million (ppm)
COMAX	Highest measured value of Carbon Monoxide since the instrument was powered on
CO2	(Carbon Dioxide) – Direct reading of the carbon dioxide sensor displayed in percentage (%)
BAT	Displays the Battery power available.
HIGH	Displays at standby/power off if CO levels are greater than 20ppm. *NOTE: If turning unit off countdown will resume once CO levels are lesser than 20ppm.*

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METER SPECIFICATIONS

(NOTE MAY BE SUBJECT TO CHANGE)

PARAMETER	RESOLUTION	ACCURACY	RANGE
GAS MEASUREMENT			
CARBON MONOXIDE *1	1PPM	±5PPM <100PPM ±5% RDG >100PPM	0-1999PPM
CARBON DIOXIDE *1	0.1%	±0.3%	0-30%
DIMENSIONS (APPROXIMATE) WEIGHT HANDSET PROBE	 1 LB 7" X 2" X 31/4" 4" X 1/4" STAINLESS STEEL SHAFT NOMINAL 36" NEOPRENE HOSE.		
AMBIENT OPERATING RANGE	+32˚F TO 104˚F 10% TO 90% RH NON- CONDENSING 850 TO 1100 MMHG ATMOSPHERIC PRESSURE		
BATTERY LIFE	4 AA CELLS >8 HOURS USING ALKALINE AA CELLS		

*1 USING DRY GASES AT STP
*2 CALCULATED
*3 CALCULATED ASSUMING FUEL LEAN COMBUSTION.

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