

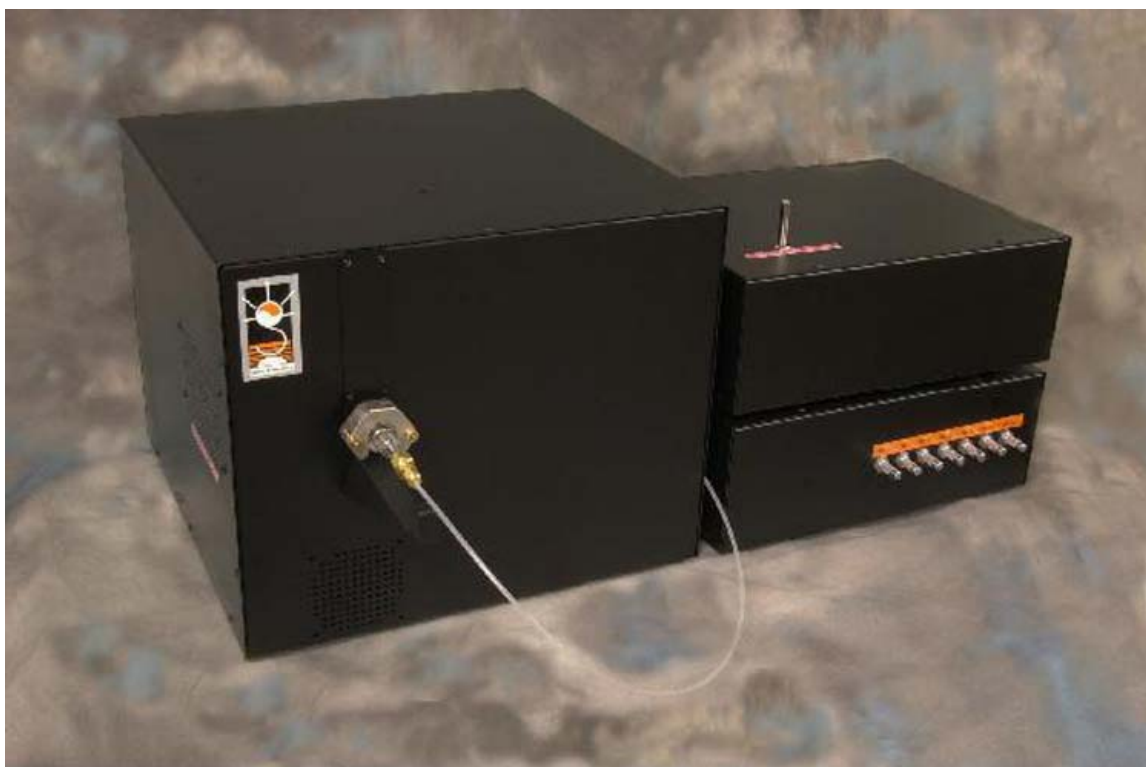


## Sunset Laboratory Inc.

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### Sunset Laboratory OCEC Carbon Aerosol Analyzer Specifications (02 November 2006)

- 1) Physical dimensions
  - a. Main Oven
    - i. 16" x 16" x 13.5"
    - ii. Weight – approximately 30 pounds
  - b. FID/ Valve Units (Combined stack)
    - i. 14" x 11" x 11"
    - ii. Weight – approximately 30 pounds
- 2) Power Requirements
  - a. 120/240 VAC; 12 A (Specified at time of purchase)
- 3) A PC-type is required for operation of the instrument and must have Microsoft **Windows XP Professional** installed as the operating system. Instruments delivered within the United States will be shipped with a new computer with the current software pre-installed and tested. Warranty on the computer shall be for 90 days only. Any repairs or damage after the warranty period shall be the

- responsibility of the purchaser. International purchases will include a computer as an option where allowed by United States export laws. At a minimum, the computer shall include:
- a. Windows XP Professional
  - b. 2 GHz processor or better
  - c. 512 Mb ram
  - d. Read/Write CD/Rom
  - e. 1 serial port
  - f. 15' flat panel monitor
  - g. Small footprint computer case
  - h. 10BaseT network port
- 4) Performance Characteristics
- a. Minimum Quantifiable total OC – 0.1 ugC
  - b. Minimum Quantifiable total EC – 0.1 ugC
  - c. Maximum instrument blank contribution – 0.1 ugC (typical < 0.01 – 0.05 ugC)
- 5) Optical configurations using 6 mW diode laser for pyrolysis correction
- a. Transmittance - Standard
  - b. Dual Mode – Simultaneous Transmittance and Reflectance (additional charge)
- 6) Measurement Methods (User Configurable)
- a. NIOSH 5040
  - b. EPA STN Method
  - c. IMPROVE
- 7) Data Reporting – as comma delimited text file
- a. Basic analytical results
    - i. OC – organic carbon in ugC/cm<sup>2</sup> plus error limits
    - ii. EC – elemental carbon in ugC/cm<sup>2</sup> plus error limits
    - iii. CC – carbonate carbon in ugC/cm<sup>2</sup> (user integrated Carbonate) plus error limits
  - b. Additional parameters
    - i. Individual peaks in ugC/cm<sup>2</sup>
    - ii. All calibration constants
    - iii. Laser correction constants
    - iv. Filter punch size
    - v. Optical EC in ugC/cm<sup>2</sup> based on optical absorbance
- 8) Calibration
- a. External Standard – Present configurations use an external standard calibration gas. A fixed-loop volume of this gas is injected at the end of every analysis. All calculated results are referenced against this external standard.
  - b. Primary calibrations are referenced against sucrose solutions or NIST traceable gas standards.
- 9) Detection method;
- a. Flame Ionization Detector (Standard)
- 10) Expendable Supplies
- a. Gases – check with Sunset Laboratory Inc. for gas consumption rates. Depending on configuration, the instrument can operate for 6 months or more without changing cylinders.

- b. Heating coils – heating coils do eventually burn out. Typical operation times are 6 months to a year. Repairs can be made by swapping out oven subunits or by having competent technicians make the repair on-site.
- c. Quartz ovens – quartz ovens will operate for extended periods (> year) with out replacement if care is taken during servicing and maintenance.
- d. FID models only - the methanator oven will have to be replaced approximately every 12 – 18 months (typical).
- e. Filters – Sample analysis on quartz filters only. Pall/Gelman TissueQuartz 2500QAT-UP or equivalent

11) Support Gas Requirements (FID Model) – Verify the fitting type with your gas supplier.

- a. He (99.999% or better) – Hydrocarbon and CO<sub>2</sub> < 1 ppm
  - i. Recommended cylinder size – 300 F<sup>3</sup>.
  - ii. Fitting type – CGA 580
- b. 5% methane in Helium Balance – He (99.995%), Methane CP grade or better, certification to 2%.
  - i. Recommended cylinder size – 200 F<sup>3</sup>.
  - ii. Fitting type – CGA 350
- c. 10% Oxygen in Helium Balance – (99.999% or better for both gases)
  - i. Recommended cylinder size – 300 F<sup>3</sup>.
  - ii. Fitting type – CGA 590
- d. Air (Grade 0.1 or equivalent)
  - i. Recommended cylinder size – 300 F<sup>3</sup>.
  - ii. Fitting type – CGA 590
- e. Hydrogen (99.995 or Better)
  - i. Recommended cylinder size – 300 F<sup>3</sup>.
  - ii. Fitting type – CGA 350

12) Primary equipment provided with initial order

- a. Complete main oven assembly
- b. Complete FID/Methanator oven assembly
- c. Complete valve/carrier gas control assembly
- d. Sample insertion spoon
- e. Calibrated sample punch (Nominal 1.0 cm x 1.50 cm)

13) Spare Parts – in addition to the complete instrument Sunset Laboratory Inc. provides the following spare parts with the initial order

- a. Main quartz oven
- b. Methanator oven
- c. Complete set of replacement heating coils
- d. Sample spoons – 2 spares

14) Installation - Sunset Laboratory Inc. provides 2 days installation and training as part of the basic instrument cost. However, due to wide disparity in travel expenses, air fare and lodging are not included. A (not to exceed) cost estimate of those additional expenses are provided with the basic cost proposal.

15) User Provided Equipment. Along with the support gases (see 11 above) the user is obligated to provide the following supplies. These must be secured and on site before the initial installation can be scheduled.

- a. Gas cylinder regulators – high purity stainless steel diaphragm regulators are required. Brass body regulators are OK. Secondary pressure outlet 0 – 30 psi maximum. (typical use pressure 15 – 20 psi)..

- b. Gas cylinder regulator fittings as required to connect to 1/8" o. d. carrier gas lines.
- c. Carrier gas tubing from cylinder to instrument - 1/8" pre-cleaned GC grade copper for all gases. We highly recommend Alltech part # 3040 with the accompanying Acetone wash service (# C-3001). Stainless steel tubing is OK but not required. We do not recommend Teflon.
- d. Oxygen trap for the helium carrier installed just before the connection to the instrument.
- e. Bench Space – 6' x 2.5' to accommodate instrument, computer and small work space for filter preparation

**Pricing: Contact Sunset Laboratory Inc. for a formal quote and delivery date.**