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Sunset Laboratory Semi-Continuous OCEC Carbon Aerosol Analyzer Model 4 Specifications (January 2006)

- 1) Physical dimensions
 - a. 17" x 15" x 10.5" Standard Rack mount cabinet
 - b. Wt; approximately 35 pounds
- 2) Power Requirements
 - a. 120 VAC/15 A or 220VAC/8A (Must specify at time of order)
- 3) Computer/Software
 - a. Optional computer provided with Win XP Professional and Sunset Laboratory Inc. proprietary software – specify laptop or small footprint desktop. User supplied computers shall meet the minimum specifications below.
- 4) Performance Characteristics
 - a. 8 LPM sample rate typical
 - b. Sample analysis time; 6 – 12 minutes depending on analysis method
 - c. Time resolution; depends on requirements but 1 hour is typical for a single instrument application (80% or better sampling duty cycle)
 - d. Sensitivity:
 - i. OC – 0.5 ugC/m³ total organic carbon for a 30 minute sample at 8 lpm (minimum).
 - ii. EC
 1. Thermal - 0.5 ugC/m³ total elemental carbon for a 30 minute sample at 8 lpm (minimum).
 2. Optical – 0.2 ugC/m³ total elemental carbon for a 30 minute sample at 8 lpm (minimum).
- 5) Measurement Method (User Configurable)
 - a. NIOSH 5040
 - b. Fast TOC with optical EC (BC)

- c. User defined
- 6) Calibration
 - a. External Standard – Uses 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.
- 7) Laser Correction; Transmission using a 30 mW temperature stabilized diode laser
- 8) Detection method - Non-dispersive IR
- 9) 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 a year or more. Repairs can be made by swapping out oven subunits through our exchange program or by having competent technicians make the repair on-site. An oven subunit repair program is in place to rebuild units with burned out coils and broken ovens. Replacement units are available as quickly as overnight to minimize down time. Contact Sunset Laboratory for details.
 - c. Quartz ovens – quartz ovens will operate for extended periods (> year) without replacement if care is taken during servicing and maintenance.
 - d. Filters – filters need to be replaced periodically to compensate for buildup of refractory materials accumulated during sampling. This will be site and source dependent. Typical replacement period is one week. In clean environments, this may be as long as a month. The instrument ships with 47mm filters and a punch. Additional filters can be purchased from Sunset Laboratory.
- 10) Support Gas Requirements are listed below. Note the recommended minimum cylinder sizes and cylinder/regulator fitting specifications. Be sure your gas vendor provides these correctly so that your regulators fit properly the first time.
 - a. OCEC Configuration
 - i. He (99.9999% or better) – Hydrocarbon and CO₂ < 1 ppm
 - 1. Recommended cylinder size – 300 F³.
 - 2. Typical Fitting type – CGA 580
 - ii. 5% methane in Helium Balance – He (99.995%), Methane CP grade, certification to 2%.
 - 1. Recommended cylinder size – 80 F³.
 - 2. Typical Fitting type – CGA 350
 - iii. 10% Oxygen in Helium Balance – (99.9999% or better)
 - 1. Recommended cylinder size – 300 F³.
 - 2. Typical Fitting type – CGA 590
 - b. EC/TC Configuration
 - i. 2% Oxygen in Helium Balance (He 99.9995% or better, oxygen 99.999%)
 - 1. Recommended cylinder size – 300 F³.
 - 2. Fitting type – CGA 590
 - ii. 5% Methane in Helium Balance – He (99.995%), Methane CP grade, certification to 2%.
 - 1. Recommended cylinder size – 80 F³.
 - 2. Fitting type – CGA 350
 - c. Gas suppliers – Sunset Laboratory has satisfactorily used Airgas Inc. and BOC Gases as suppliers for these materials in the US. Scott Specialty Gases and Scott Marin Inc. can probably also supply the calibration gas. All are national distributors. International gas supplies will have to be resolved by the customer. Check with your vendor before purchasing regulators to verify the appropriate fitting.

- 11) Sampling inlet – Sample inlet configuration is the obligation of the customer. Instrument has a 3/8” o.d. port for connection to the inlet system. An organic carbon denuder such as a parallel plate denuder is recommended to minimize positive artifact formation and can be supplied with the instrument as an option. Sampling flow rate is nominally 8 LPM. Sunset Laboratory recommends the use a cyclone or impactor designed for this flow rate to obtain the desired particle size cut point. These are also available as an option.
- 12) Installation - Sunset Laboratory Inc. can provide up to 2 days installation and training for an additional fee. A (not to exceed) cost estimate including travel and lodging expenses are provided as an option with the cost proposal.
- 13) User Provided Equipment
 - a. At a minimum, the computer shall include:
 - i. Windows XP Professional
 - ii. 2 GHz processor or better
 - iii. 512 Mb ram (1 Gb is highly recommended)
 - iv. Read/Write CD/Rom
 - v. 2 serial ports
 - vi. 15’ flat panel monitor
 - vii. Small footprint computer case
 - viii. 10BaseT network port
 - b. All support gases at the required purity. These shall be on-site prior to initial installation. Contact Sunset Laboratory for details.
 - c. Gas cylinder regulators – high purity stainless steel diaphragm regulators are required. Brass bodies are OK. Secondary pressure outlet 0 – 60 psi maximum (typical use pressure 10 – 15 psi). Be sure and specify the correct regulator fitting requirements noted under gas cylinder specifications. Secondary outlet fittings shall be 1/8” Swageloc tube fittings for connection to carrier gas tubing.
 - d. Carrier gas tubing from cylinder to instrument
 - i. 1/8” pre-cleaned GC grade copper - 1/8” pre-cleaned GC grade copper for all gases. We highly recommend Alltech part # 3040 with the accompanying Acetone wash service (# C-3001).
 - ii. Sample Inlet tubing – the sample inlet fitting is configured for 3/8” tubing. The user is obligated to provide sufficient pre-cleaned conductive tubing to connect to the desired sample source. Stainless steel tubing is highly recommended. Copper is OK. No plastic tubing of any kind is acceptable for sampling. The inlet should be solvent washed (inside) and dried to remove any processing oils and other contaminants. Pre-cleaned stainless steel tubing is available from local Swageloc distributors, from Accu-Tube Corp. (303-761-2258) and possibly from Restek or Alltech Corp.
 - e. Vacuum tubing for pump-to-instrument connections. 1/4” od. copper, Teflon or polyethylene tubing of sufficient length to connect the vacuum pump to the vacuum port on the back of the instrument.
 - f. An oxygen trap for the helium carrier installed just before the connection to the instrument is also recommended. Bench Space – 4’ 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.