### Instrument Range at 350 mg*
- **Sulfur**: 10 ppm or 0.001% to 26%
- **Carbon**: 50 ppm or 0.005% to 100%

### Precision
- **Sulfur**: ≤1% RSD or ±5.0 ppm, whichever is greater
- **Carbon**: ≤1% RSD or ±25 ppm, whichever is greater

### Readability
- 1 ppm

### Calibration
- Single-point; Multi-point (linear, quadratic, cubic polynomial)

### Analysis Time
- 90 seconds (nominal)

### Sample Size
- 350 mg for coal (nominal)

### Balance Readability and Range
- 0.0001 to 120 gram

### Detection Method
- Infrared

### Chemical Reagent
- Anhydrous Magnesium Perchlorate

### Gas Required
- Oxygen, 99.5% pure, 40 psi (2.8 bar), 3.5 lpm (purge flow); 2.5 lpm (analyze flow)

### Furnace
- 400° to 1450°C; 1350°C nominal

### Physical Dimensions†
- **Determinator**: 24 in. H x 21.5 in. W x 22 in. D (61 x 55 x 56 cm)

### Weights (Approximate)
- **Determinator**: 170 lb. (78 kg)
- **Total Shipping**: 220 lb. (100 kg)

### Nominal Operating Conditions
- **Operating Temp**: 59 to 95°F (15 to 35°C)
- **Relative Humidity**: 20 to 80% (non-condensing)

### Electrical Power Requirements
- 230 V~ (±10%; at max load), 50/60 Hz, single phase, 12A, 9,500 BTU/hr (idle), 19A, 15,000 BTU/hr (max)

### Part Numbers
- SC-144DRPC SC-144DR Sulfur/Carbon Determinator with Windows*-based Software, Current PC Tower, and Monitor

### Options
- 751-300-150 4-place Balance Kit
- 501-291 Oxygen Regulator

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*Adjusting sample size may extend instrument range.
†Allow a 6-inch (15 cm) minimum access area around all units.
V~ denotes VAC.
**Theory of Operation**

The SC-144DR Sulfur and Carbon Analyzer is a software-controlled instrument designed to determine the carbon and sulfur content in a wide variety of organic materials such as coal, coke, and oils, as well as some inorganic materials such as soil, cement, and limestone by combustion and non-dispersive infrared detection.

Analysis begins as a sample (0.350 g nominal) is weighed into a combustion boat. When Analyze is selected from the Samples menu, the sample is placed in a pure oxygen environment typically regulated at 1350°C. The combination of furnace temperature and oxygen flow causes the sample to combust. All sample materials contained in the combustion boat go through an oxidative-reduction process that causes carbon and sulfur bearing compounds to break down and free the carbon and sulfur. The carbon then oxidizes to form CO₂ and the sulfur forms SO₂. (The design of the combustion system prevents the atmosphere from entering the combustion zone.)

Sample gases are first swept through the boat stop to the back of the inner combustion tube, then forward between the inner and outer combustion tube tubes to remove moisture, through a flow controller that sets the flow of sample gases through the infrared detection cell.

The carbon IR cell measures the concentration of carbon dioxide gas. The sulfur IR cell measures the concentration of sulfur dioxide gas. The instrument converts these values to a percentage/ppm value, using an equation preset in the software that takes into account the sample weight, calibration, and known moisture value.

**Basic Flow Diagram**

![Diagram](image-url)