

# CS744 Carbon/Sulfur Determinator

## Specification Sheet



<b>Instrument Range*</b>	
Carbon:	0.002** to 60 mg
Sulfur:	0.002** to 17.5 mg
<b>Precision†</b>	
Carbon:	0.001 mg or 0.5% RSD, whichever is greater when converted to absolute units (mg)
Sulfur:	0.001 mg or 1.5% RSD, whichever is greater when converted to absolute units (mg)
<b>Calibration</b>	Standards (single or multipoint); manual
<b>Analysis Time</b>	40 seconds (nominal)
<b>Cycle Time</b>	130 seconds (nominal)
<b>Throughput</b>	27 samples per hour (nominal)
<b>Sample Size</b>	1 gram (nominal)
<b>Detection Method</b>	Non-Dispersive Infrared Absorption
<b>Chemical Reagents</b>	<ul style="list-style-type: none"><li>• Anhydrous Magnesium Perchlorate (MgClO<sub>4</sub>)</li><li>• Sodium Hydroxide on an Inert Base‡</li><li>• Rare Earth Copper Oxide‡</li><li>• Platinized Silica Gel</li><li>• Cellulose</li></ul>
<b>Gas Requirements</b>	Carrier: Oxygen, 99.5% pure, 35 psi (2.41 bar) ±10% Pneumatic: Compressed Air (oil, water free), 40 psi (2.76 bar) ±10%
<b>Gas Flow Rates</b>	Carrier: 3 L/min Pneumatic: 1 L/min
<b>Furnace</b>	2.2 kW Induction
<b>Operating Conditions</b>	Operating Temp: 15 to 35°C (59 to 95°F) Rel. Humidity: 20 to 80% (non-condensing)
<b>Physical Dimensions††</b>	33 in. H x 25.25 in. W x 29.5 in. D (84 x 64 x 75 cm) with touch-screen monitor
<b>Electrical Power Requirements</b>	230 V~ (+10/-15% at Max Load); 50/60 Hz, single phase, 25 A; 5,500 BTU/hr‡‡
<b>Weight (approx.)</b>	308 lb. (140 kg) with monitor 292 lb. (132 kg) without monitor

### Part Numbers

CS744-C Carbon/Sulfur Determinator with Windows®-based software and external PC

### Options

NOTE: Multiple configurations of options are available. Please contact your local LECO Sales Engineer for more details.

- Optional mounted touch-screen monitor package (M)
- Optional automatic cleaner and tube removal package (H)
- Optional performance package (P)

\*Use the following formula to calculate element concentration:

$$\% \text{ element concentration} = ((\text{absolute element mass in mg}) / (\text{sample mass in mg})) * 100$$

\*\*Lower range is calculated as 2  $\sigma$  instrument blank deviation. Method range may differ due to factors such as sample type and method parameters.

†Calculated as 1  $\sigma$  instrument blank deviation. Method precision may differ due to sample inhomogeneity or other external factors.

††Allow for a 6 in. (15 cm) minimum access area around all sides.

‡With optional Performance Package

‡‡Average output based on nominal operating parameters.

V~ denotes VAC.



Delivering the Right Results

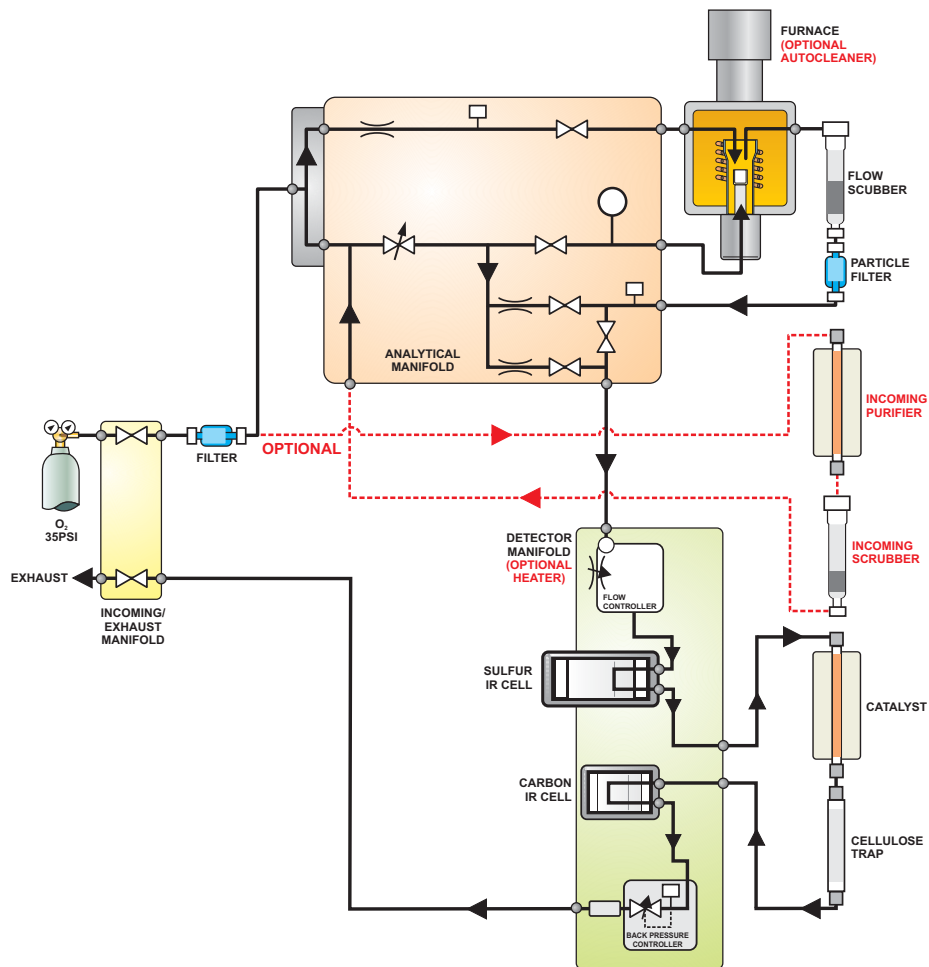
## Theory of Operation

The CS744 carbon/sulfur analyzer is designed for wide-range measurement of carbon and sulfur content of metals, ores, ceramics, and other inorganic materials. The instrument features custom MS Windows®-based software designed specifically for touch operation.

A pre-weighed sample of approximately 1 gram is combusted in a stream of oxygen using RF induction to heat the sample. Carbon and sulfur present in the sample are oxidized to carbon dioxide (CO<sub>2</sub>) and sulfur dioxide (SO<sub>2</sub>), and swept by the oxygen carrier through a drying reagent and then through a non-dispersive infrared (NDIR) cell, where sulfur is detected as SO<sub>2</sub>. The gas flow continues past a heated catalyst, where carbon monoxide (CO) is converted to CO<sub>2</sub> and where SO<sub>2</sub> is converted to sulfur trioxide (SO<sub>3</sub>), which is subsequently removed by a filter. Carbon is then detected as CO<sub>2</sub> by another NDIR cell. A pressure controller is used to maintain constant pressure in the NDIR cells so as to reduce interference from natural variations in atmospheric pressure. The final component in the flow stream is an electronic flow sensor, which is used for diagnostic purposes to monitor the carrier flow.

Non-dispersive infrared cells are based on the principle that CO<sub>2</sub> and SO<sub>2</sub> absorb infrared (IR) energy at unique wavelengths within the IR spectrum. Incident IR energy at these wavelengths is absorbed as the gases pass through IR absorption cells. The concentration of unknown samples is determined relative to calibration standards. To reduce interferences from instrument drift, reference measurements of pure carrier gas are made prior to each analysis.

## Flow Diagram



Specifications and part numbers may change.  
Consult LECO for latest information.

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