

CS230 Carbon/Sulfur Determinator

Specification Sheet

Instrument Range at 1 gram*

Carbon:	4 ppm to 3.5%
Sulfur:	4 ppm to 0.4%

Precision**

Carbon:	2 ppm or 0.5% RSD, whichever is greater
Sulfur:	2 ppm or 1.5% RSD, whichever is greater

Readability†

Carbon and Sulfur:	0.1 ppm (DSP) 15 digits (PC)
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Calibration

DSP:	Linear, single point
PC:	Linear, multi-point

Analysis Time

Nominal 45 seconds

Sample Size

1 gram nominal

Detection Method

Solid-state infrared absorption

Chemical Reagents

- Anhydrous Magnesium Perchlorate
- Sodium Hydroxide on an inert base
- Platinized Silica
- Cellulose

Gas Requirements

Carrier Gas:	Oxygen 99.5% pure, 40 psi (2.8 bar)
Pneumatic:	Air, Nitrogen, or Argon; 40 psi (2.8 bar); <i>source must be oil and water free</i>

Gas Consumption

Measure - 3 liters/minute
Pneumatic - 1 liter/minute

Furnace

Induction, 18 MHz, 2.2 kW

Data Storage

DSP:	50 analyses, 10 weights, 5 methods
PC:	Limited only by hard drive space

Data Transmit**

RS-232 (included)

Keyboard

DSP:	Internal membrane (External optional)
PC:	External keyboard

Display

DSP:	LCD, 16 x 26 characters
PC:	Flat-panel monitor

Printer

DSP:	Dot matrix
PC:	Deskjet

Physical Dimensions††

Determinator with Crucible Box:	31.75 in. H x 36.0 in. W x 23.5 in. D (80.65 cm x 91.44 cm x 59.7 cm)
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Weights (approximate)

Determinator:	320 lb. (145 kg)
Total Shipping:	410 lb. (186 kg)

Environmental Conditions

Operating Temp:	50 to 86°F (10 to 30°C)
Rel. Humidity:	20 to 80%, non-condensing

Electrical Power Requirements

230 V~ (±10%; at max load),
50/60 Hz, single phase, 15 A,
11,800 BTU/hr

Part Numbers

CS230	Carbon/Sulfur Determinator, DSP model
CS230H	Carbon/Sulfur Determinator, DSP model w/Autocleaner
CS230C	Carbon/Sulfur Determinator, PC model
CS230HC	Carbon/Sulfur Determinator, PC model w/Autocleaner

Options

TBD‡	Dot Matrix Printer Kit (120V)
TBD‡	Dot Matrix Printer Kit (220V)
TBD‡	Deskjet Printer Kit
605-980	External Keyboard
751-000-120	LECO 050 Balance Kit (1.0 mg sensitivity)
751-300-150	LECO 250 Balance Kit (0.1 mg sensitivity)
CF10	CF-10 Gas Purification Unit
608-816	Balance Interface Kit
621-897	Autocleaner/Dust Removal Kit (requires 621-891)
621-891	Vacuum Cleaner Kit
766-036	Compressed Air Regulator
501-291	Oxygen Regulator
764-216	Inert Gas Regulator
621-895	PC Software Upgrade (Windows®-based software only)
621-896	PC Upgrade Kit (computer, monitor, keyboard, mouse, software)
625-513	Shuttle Loader Kit (without Autocleaner)
625-514	Shuttle Loader/Autocleaner Kit
615-763‡‡	SmartLine® Modem-Based Remote Diagnostics
710-198-B/O‡‡	SmartLine Internet-Based Remote Diagnostics

*The range may be extended by reducing sample weight.

**1 Sigma conformance tested by gas dose analysis.

†Display Capability.

††Allow 6-inch (15 cm) minimum access area around all units.

‡Please consult your LECO sales engineer or quotation for current part numbers.

‡‡PC Models only.

V~ denotes VAC.



Theory of Operation

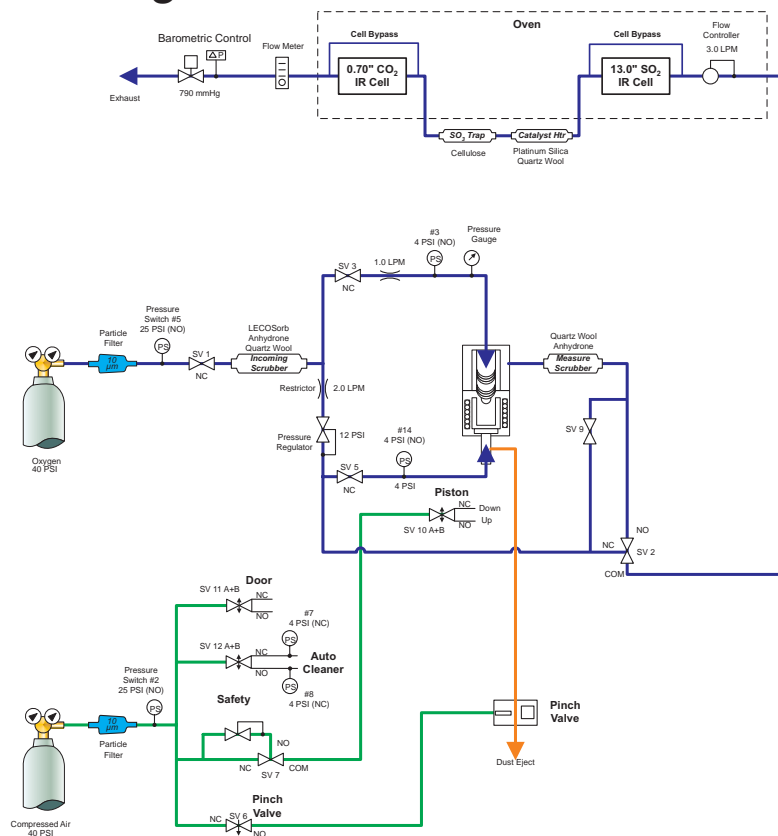
The CS230 Carbon/Sulfur Determinator is designed to measure carbon and sulfur content in metals, ores, ceramics, and other inorganic materials. The instrument is available with either a DSP or Windows®-based operating system.

A pre-weighed sample of ~1 gram is combusted in a stream of purified oxygen. The carbon in the sample is oxidized primarily to carbon dioxide (CO₂) with some carbon monoxide (CO) possibly being produced. The sulfur is oxidized to sulfur dioxide (SO₂). These gases are swept, along with oxygen, through a dust filter and drying reagent into an infrared cell (IR) where sulfur is detected as SO₂. The gases are then routed through a heated catalyst which converts CO to CO₂ and SO₂ to sulfur trioxide (SO₃). The SO₃ is removed by a filter and CO₂ is measured in a separate IR cell.

CO₂ and SO₂ absorb IR energy at precise wavelengths within the IR spectrum. Energy at these wavelengths is absorbed as the gases pass through respective IR absorption cells. Changes in energy are then observed at the detectors. The absorption of IR energy is attributed to only CO₂ or SO₂ (depending on the cell), and its concentration is then determined. Each IR cell serves as both a reference and measure chamber.

The optional autocleaner and autoloader systems reduce maintenance and operator time, and are ideal for high-volume applications.

Flow Diagram



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

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