Carbon / Sulfur Analyzer CS-2000

General Information

ELTRA's CS-2000 is the only analyzer on the market for the determination of carbon and sulfur in organic as well as inorganic samples. For this purpose, the CS-2000 is equipped with both an induction and a resistance furnace (ELTRA Dual Furnace Technology), covering the full range of carbon and sulfur analysis.

The CS-2000 is available with up to four independent infrared cells, which allow the precise and simultaneous analysis of high and low carbon and/or sulfur concentrations. The sensitivity of the cells can be customized individually by selecting the length of the IR-paths to ensure the optimum measuring range for each application.

Application Examples

alloys, ashes, carbides, cast iron, cement, ceramics, coal, coke, copper, glass, gypsum, iron, limestone, metals, minerals, oil, ores, plant materials, refractory metals, rubber, sand, soils, steel, titanium, tobacco, ...

Product Advantages

- full flexibility due to combined induction and resistance furnace: ELTRA Dual Furnace (EDF) Technology
- analysis of organic and inorganic samples
- due to ELTRA Dual Furnace (EDF) Technology: fractional analysis of carbon and sulfur
- up to four independent infrared cells with flexible measuring ranges
- due to gold IR path, increased cell live time for analysis of halogen or acid containig samples
- automatic induction furnace cleaning
- wide range of materials (organic and inorganic) can be analyzed
- rapid, precise, accurate and reliable element determination
- powerful (2.2 kW) induction furnace for temperatures above 2,000 °C
- temperature of resistance furnace adjustable up to 1,550 °C in steps of 1 °C
- effective, easily accessible dust trap
- single and multipoint calibration
- simultaneous calibration of carbon and sulfur
- low maintenance
- robust design allows usage in production control and laboratory
- simultaneous carbon and sulfur determination with minimal sample preparation

Features

Measured elements	carbon, sulfur
Samples	inorganic, organic
Furnace alignment	horizontal (resistance furnace) and vertical (induction furnace)

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Sample carrier	ceramic boats / crucibles
Field of application	agriculture, chemistry / plastics, coal / power plant, construction materials, engineering / electronics, environment / recycling, geology / mining, glass / ceramics, medicine / pharmaceuticals, steel / metallurgy
Furnaces	induction furnace, above 2,000 °C resistance furnace (ceramic tube), adjustable up to 1,550 °C (steps of 1 °C)
Detection method	solid state infrared absorption
Number of IR cells	1 - 4
Material of IR path	gold
Typical analysis time	induction furnace 40 - 50 s resistance furnace 60 - 120 s
Chemicals required	copper oxide, magnesium perchlorate, sodium hydroxide
Gas required	compressed air (4 - 6 bar / 60 - 90 psi) oxygen 99.5 % pure (2 - 4 bar / 30 - 60 psi)
Power requirements induction furnace	230 V, 50/60 Hz; max. 15 A, 3450 W
Power requirements resistance furnace	230 V, 50/60 Hz, max. heating up current 20 A
Dimensions (W x H x D)	88 x 80 x 60 cm
Weight	~ 150 kg
Required equipment	balance (resolution 0.0001g), monitor, PC
Optional accessories	Autoloader (for 36 or 130 crucibles), carrier gas purification, halogen trap, HTF-540 pre-heating furnace, voltage stabilizer 5 KVA

Function Principle

Operation CS-2000

In addition to the induction furnace (see CS-800) the CS-2000 also features a resistance furnace. The temperature can be selected in steps of 1 °C up to 1,550 C. The samples (such as coal) are weighed in ceramic boats. The weight is transferred from the interfaced balance to the PC or can be entered manually. The sample is then placed directly in the furnace for combustion, no accelerators are required. The typical analysis time is 60 to 180 seconds depending on the sample material. The combustion gases pass through the infrared cells for detection. There the signals are evaluated and the results are displayed automatically. Connection to a laboratory information management system (LIMS) is possible. The CS-2000

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requires minimum maintenance and the chemicals which need to be maintained are easily accessible.

Measuring principle CS-2000

The measuring principle of the induction furnace corresponds to that of the CS-800. In the additional resistance furnace of the CS-2000 the sample is combusted in a pure oxygen stream, causing sulfur to react to sulfur dioxide (SO2), and carbon to react to carbon dioxide (CO2). Any moisture in the combustion gas is removed by magnesium perchlorate and the gas then passes into the detection unit. There the detection of the sulfur dioxide takes place in infrared cells. The CS-2000 allows for the combination of cells with different sensitivities (high/low) which makes it easily adaptable to the user's requirements. After oxidation of sulfur dioxide to sulfur trioxide, SO3 gas is removed with cellulose wool. Subsequently the carbon content is determined by infrared cells with customized measuring ranges.

Order data

ELTRA CS-2000

(Please order PC, monitor, balance and consumables (starter-kit, anhydrone, sodium hydroxide, copper oxide) separately)

CS-2000 for the use without Autoloader

Measuring ranges at 500 mg sample weight induction furnace || resistance furnace	
88100-1009	CS-2000 1xC 0.1 - 12% C || 0.3 - 40% C
88100-1010	CS-2000 1xS 0.001 - 0.3% S || 0.005 - 0.3% S
88100-1011	CS-2000 2xC 0.0002 - 0.1% C || 0.005 - 0.3% C 0.1 - 12% C || 0.3 - 40% C
88100-1012	CS-2000 2xS 0.001 - 0.3% S || 0.005 - 0.3% S 0.3 - 6% S || 0.3 - 13% S
88100-1013	CS-2000 1xC 0.1 - 12% C || 0.3 - 40% C + 1xS 0.001 - 0.3% S || 0.005 - 0.3% S
88100-1014	CS-2000 1xC 0.1 - 12% C || 0.3 - 40% C + 2xS 0.001 - 0.3% S || 0.005 - 0.3% S 0.3 - 6% S || 0.3 - 13% S
88100-1015	CS-2000 2xC 0.0002 - 0.1% C || 0.005 - 0.3% C- 0.1 - 12% C || 0.3 - 40% C + 1xS 0.001 - 0.3% S || 0.005 - 0.3% S
88100-1016	CS-2000 2xC 0.0002 - 0.1% C || 0.005 - 0.3% C 0.1 - 12% C || 0.3 - 40% C + 2xS 0.001 - 0.3% S || 0.005 - 0.3% S 0.3 - 6% S || 0.3 - 13% S

Further measuring range combinations on request

CS-2000 for the use with Autoloader

Measuring ranges at 500 mg sample weight induction furnace || resistance furnace

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88110-1009	CS-2000 1xC 0.1 - 12% C || 0.3 - 40% C
88110-1010	CS-2000 1xS 0.001 - 0.3% S || 0.005 - 0.3% S
88110-1011	CS-2000 2xC 0.0002 - 0.1% C || 0.005 - 0.3% C 0.1 - 12% C || 0.3 - 40% C
88110-1012	CS-2000 2xS 0.001 - 0.3% S || 0.005 - 0.3% S 0.3 - 6% S || 0.3 - 13% S
88110-1013	CS-2000 1xC 0.1 - 12% C || 0.3 - 40% C + 1xS 0.001 - 0.3% S || 0.005 - 0.3% S
88110-1014	CS-2000 1xC 0.1 - 12% C || 0.3 - 40% C + 2xS 0.001 - 0.3% S || 0.005 - 0.3% S 0.3 - 6% S || 0.3 - 13% S
88110-1015	CS-2000 2xC 0.0002 - 0.1% C || 0.005 - 0.3% C- 0.1 - 12% C || 0.3 - 40% C + 1xS 0.001 - 0.3% S || 0.005 - 0.3% S
88110-1016	CS-2000 2xC 0.0002 - 0.1% C || 0.005 - 0.3% C 0.1 - 12% C || 0.3 - 40% C + 2xS 0.001 - 0.3% S || 0.005 - 0.3% S 0.3 - 6% S || 0.3 - 13% S

Further measuring range combinations on request

Autoloader

14532	Autoloader for 36 crucibles
14530	Autoloader for 130 crucibles

PC, Monitor, Balance

71015	Computer with dual core processor, 300 GB HDD, 4 GB RAM, Windows operating system, DVD-ROM, keyboard, mouse
71016	Monitor, TFT
88600-0002	Balance (resolution 0.0001 g)
71002	Printer

Accessories

38001	TIC-Module
36999	HTF-540 crucible pre-heating furnace
11008	Halogen trap, without filling (integrated in analyzer, please order filling separately)
14844	Accelerator dispenser (double version)
14845	Accelerator dispenser (single version)
14870	Manual dispenser
72070	Oxygen regulator
21000	Carrier gas purification furnace, without filling (integrated in analyzer, please order filling and quartz wool separately)
71090	Voltage Stabilizer 5 KVA

Consumables

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Required consumables

88500-0002	Starter-kit for 1,000 analyses (500 crucibles, 2,500 g tungsten, 908 g pure iron accelerator, 50 g glass wool, 50 g cellulose, 50 g quartz wool, 50 re-usable boats, 500 disposable porcelain boats, 50 g iron phosphate)
90200	Anhydrone (magnesium perchlorate), 454 g
90210	Sodium hydroxide, 500 g
90290	Copper oxide, 100 g (required for analyzers with 1xC or 2xC)
90235	Filling for halogen trap
88400-0122	Filling for carrier gas purification furnace

Optional consumables

90149	Ceramic crucibles, premium, Ø 1”, foil-wrapped, 1,000 pieces
90160	Disposable porcelain boats 86x13x10 mm, 1,000 pieces
90153	Re-usable ceramic boats, premium, 58x22x14 mm, 500 pieces
90220	Tungsten, 2,500 g
90331	Glass wool, 454 g
90340	Cellulose, 100 g
90341	Cellulose, 50 g
90330	Quartz wool, 50 g
88600-0008	Combsolid, 100 g
90240	Copper accelerator, 1,362 g
90260	Pure iron accelerator, 908 g
92400-3010	Steel, chips, 100 g,
92610	Tube of high vacuum grease
92511-3020	Calibration standard - Coal, 50 g 0.5 - 1.0% S
90810	Calcium carbonate, 100 g

Spare and Wear Parts

11105	Metal dust filter
11180	Dust filter cartridge
11185	Paper filters, 10 pieces
13067	Combustion coil
14045	Cleaning brush for combustion tube
14130	Combustion tube
36101	Boat stop
75140	Safety ring A36x1.75 DIN 471
77501	Heating elements, 1 set (4 pieces)
90162	Combustion tube
71036	Cleaning brush for metal dust filter

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77210	Oscillator tube
11062	Reagent tubes 160x16 mm, 2 pieces
11064	Reagent tubes 280x16 mm, 2 pieces
11115	Plastic tube, 75 mm
14072	Ceramic heat shield for brush
14168	Pedestal
20040	Catalyst tube
09090	Reagent tubes 32x280 mm, 1 piece
36914	Thermocouple
77330	Capacitor 500pF
71031	Metal brush
71010	Brush