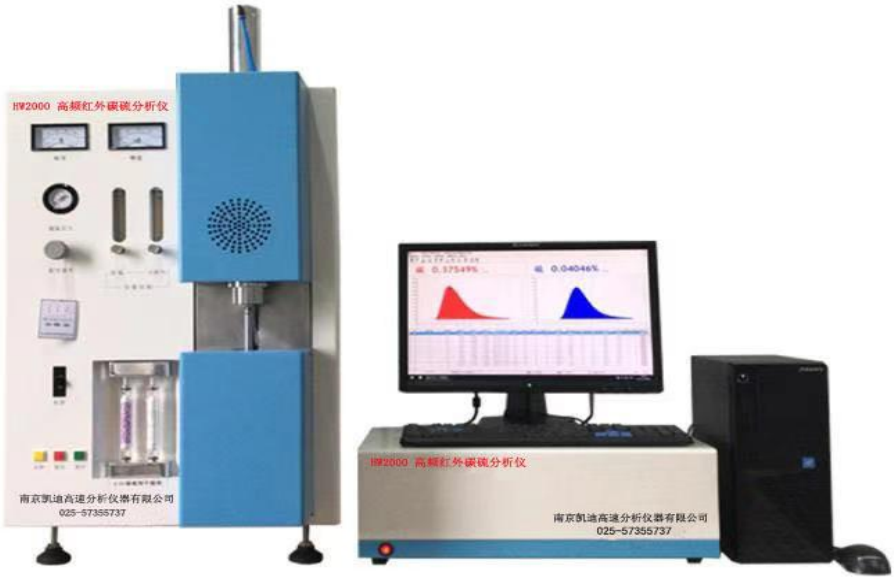
HW2000 High Frequency Infrared Carbon Sulfur Analyzer



1. Product Introduction

The HW2000 high-frequency infrared carbon sulfur analyzer is used in conjunction with the GP-2000 high-frequency induction combustion furnace, which can measure the mass fraction of carbon and sulfur in steel, iron, alloy, cast core sand, non-ferrous metals, cement, ore, glass, coke, batteries, catalysts and other materials quickly and accurately. This set of equipment has introduced advanced foreign technology and is a high-tech product integrated optical, mechanical, electrical, computer,

and analysis technology. It has the characteristics of wide measurement range, strong anti-interference ability, complete functions, simple operation, and accurate and reliable analysis results.

2. Infrared detection principle

Polar molecules such as CO2 and SO2 have permanent electric dipole moments, so they have structures such as vibration and rotation. The energy level of the split according to quantum mechanics can be coupled with the incident characteristic wavelength infrared light to produce absorption. The gas molecules have a selective absorption spectrum in the infrared light band. When infrared light of a specific wavelength passes through CO2 or SO2 gas, strong light absorption can be generated.

Since the detector converts optical signals into electrical signals, when the detector works in the linear region, selects a certain wavelength and determines the length of the analysis cell (absorbing cell), the concentration of the measured gas in the mixed gas can be calculated from the measured light intensity. This is the basic principle of infrared absorption method to measure the gas concentration quantitatively.

The measured wavelengths selected by this instrument are: CO_2 is 4.26um and SO_2 is 7.4um.

The analysis chamber includes a miniature infrared light source, a mirror, a modulation motor, an absorption cell, a filter and a detector. The micro infrared light source is heated to 800°C to generate infrared light. After being absorbed by CO_2 and SO_2 through the absorption cell, it is then passed through a narrowband filter to remove the energy of other optical radiation outside the above wavelength and incident on the detector. Then the light intensity corresponding to the concentration of CO_2 and SO_2 is detected on the detector. The photoelectric conversion of the detector into an electrical signal,then normalized calibration is performed by the microcomputer, and the integral is inverted to the percentage of carbon sulfur elements. A modulation motor is placed between the light source and the absorber, modulating the light signal into an alternating radiation signal of 64Hz. The center frequency of the detector output is 64Hz.

The thermally-releasing device is converted into an electrical signal through pre-amplification and post-amplification and then entered into

a microcomputer through digital-analog conversion. In the microcomputer, it is converted into a numerical value proportional to the CO2 and SO2 content through linear operation.

3. Technical specifications and indicators

1) Basic parameters: instrument performance and accessories

measure elements	Carbon and sulfur joint measurement
Analysis principle	High-frequency furnace combustion-infrared absorption method detection
Analysis range	Carbon: 0.00001%-10.0000% (can be expanded to 99.999%) Sulfur: 0.00001%-2.0000% (can be expanded to 99.999%)
Scale size (solid steel standard)	standard 0.5g
Analytical accuracy	Carbon: complies with ISO9556 standard; sulfur: complies with ISO4935 standard

Sensitivity (minimum reading)	C/S: 0.1ppm
Analysis time	20-100 seconds adjustable (usually around 35 seconds)
Working cycle	24h continuous operation
High frequency induction heating furnace	1. High-frequency furnace output power: greater than 2.5KVA; frequency: 20MHz 2. Automatic leak detection, outdated and overcurrent alarm 3. Current/voltage/power/select method to adjust the furnace temperature: suitable for samples of different materials 4. Gas circuit: High-precision flow controller ensures airflow stability and inlet gas circuit system
Dust filter	0.4 micron ultra-microporous metal filter to ensure complete separation of dust and gas
Heating the furnace head	increase the conversion rate of sulfur and stabilize the sulfur analysis results
Dust removal	Automatic cleaning: can reduce the impact of dust on

system	analysis results Ash discharge system: high-pressure ash discharge to completely remove pipe dust
Testing system	1. Circuit design: The whole machine adopts a modular design of dual CPU upper and lower computers. The lower computer uses Atmega162 as the control microcontroller. The electronic circuits are highly integrated, stable and reliable; 2. Sampling: Use a high-speed 24-bit ADS1224 sampling chip, with high sampling accuracy; 3. Communication: The upper and lower computers use USB2.0 interface to communicate, greatly improving the communication speed; 4. Connection: The infrared detection part is connected to the high-frequency furnace using Agilent 1521/2521 high-speed optical fiber, and is combined with a multi-stage concealed isolation circuit to completely eliminate high-frequency interference; 5. Power supply: Use military-grade integrated linear

	module power supply, stable output and no faults; 6. Light source: a special new platinum infrared light source with continuous heating and high spectral characteristics and efficiency; 7. Analysis pool: gold-plated carbon sulfur analysis pool and imported high-precision lithium tantalate pyrolysis electric infrared detector; 8. Motor: Stepper motor, good thermal stability, continuous service life of 100,000 hours.

2) Analysis software

Operation software	compiled using Deliph software, and WINDOWS operation software in Chinese language.
Analysis channel	provide channel management function, and carbon and sulfur channels can be added, deleted and edited by themselves, without limiting the quantity; pre-installed low-carbon and high-sulfur interfaces can realize automatic software switching.

Analysis function	Dynamic data points in the analysis process and 20 samples per second ,improving the sensitivity and accuracy of the analysis; it provides sample management functions, which can edit the sample name and logo, and add and delete the sample name; the software provides a multi-user management system, which can be set by the administrator.
Display function	Each carbon and sulfur has a curve frame, which dynamically displays the real-time data and carbon and sulfur release curves during the analysis process.
Data processing function	The analysis results are stored in ACCESS database, which can store all data and curves of carbon sulfur analysis each time; the analysis results can be queried at will, and can be queried according to time, operator, sample name, identification, etc.; it provides curve/data storage, blank deduction, parameter setting, channel selection, mathematical statistics, result correction, curve comparison and other functions; it can realize the generation of carbon sulfur working curves and perform curve

	fitting in the software.
Print functions	The print modes are diverse, providing two printing modes: laboratory and testing station, and the printed format can be designed by yourself.
Self-diagnosis function	The system diagnostic function can be used to detect the sealing of the furnace head and the air chamber by software.