

**NAME:** High-frequency Infrared Carbon & Sulfur Analyzer

**TYPE:** CS996



### Introductions:

CS996 Type High-frequency Infrared Carbon & Sulfur Analyzer compatible applying with WF-L88 Type High frequency automatic inductive combustion furnace, can fleetly and exactly measure the carbon and sulfur in steel, iron, alloy, nonferrous metals, cement, ore and other materials. This equipment is a high-tech products integrate light, motor, electronic, computer and analysis technology, with features of wide measuring scope, strong anti interference, multiple function, easy to operate, accurate and reliable analysis result.

### Main Parameter:

#### Measure Range:

Carbon: w(C) 0.0001%-10.0000% (can be extended to 99.999%)

Sulphur: w(S) 0.0001%-3.5000% (can be extended to 99.999%)

## Sample weight:

standard 0.5g

## Analysis Error:

Carbon: accord with ISO9556 standard

Sulfur: accord with ISO4935 and  
D4239.

## Analysis Precision:

Carbon: RSD<0.5%

Sulfur: RSD<1%

## Analysis pool

Carbon: low carbon pool and high carbon pool

Sulfur: if the customer request,the high sulfur pool could be added

## Time of analysis:

25 to 60 seconds, could be adjusted. Around 35 seconds usually

## Sensitivity(The minimum readings):

C/s 0.1ppm

## Electronic scale:

Precision of read: 0.0001g

## Working Environment:

Room temp: 10 to 30 degree C,relative Humidity less than 75%

## Configuration of the instrument

### Infrared Detection Unit

Circuit Design:	The modularized design with double CPU for the whole frame is divided into the upper and lower levels while the electronic circuits are highly integrated stably and reliably; in the meantime the multilevel hidden-type isolated circuit is employed so that it is free from HF interference.
Power:	The linear close-coupled modular power block ensures stable output without fault.
Light source:	The tailor-made new model platinum infrared light source has lasting caloricity and efficient spectralproperty.
Analysis cell:	The gilded carbon & sulfur analysis cell is fit with the high precision TSC infrared detector ( $10^{-11}$ ); it is also possible to have the double-carbon cell or the double- carbon & double-sulfur cell fit out at the client's request.
Motor:	The special-purpose aviation modulation motor is applied with satisfactory thermal stability whose life expectancy exceeds 100,000 hours.

## High-frequency combustion system

Radio circuit:	The design of high-duty radio circuit and the application of 2.5KVA HF pliotron. frequency : 20MHz
	Military-purpose ceramic vacuum tubes and ceramic vacuum capacitors.
	HF control circuit: It is used for automatic detection of the electromagnetic valve, the elevation or descent of cylinder and the performance of HF unit.
	Automatic overtime/overflow alarming system enables the HF furnace to work under normal condition.
	The optional current/voltage/power regulator for furnace temperature control: It is applicable to samples of various materials.

## Analytical gas path system

Gas path:	The high precision flow controller ensures the stability of gas flow as well the gas intake system (such as electromagnetic valves, unions, cylinder hoists) for automatic leakage detection.
	Dual standard correction for solid and gas
De-dusting unit:	The combustion head self-cleaning device effective for reducing the influence of dust for the result of analysis; ash removing system for the inlet.
	0.4 $\mu\text{m}$ submicron metal filter secures thorough separation of dust from gas and can be used for a long time with no need of the ultrasonic cleaner.

## Input/Output System

Computer

Printer

Electronic

operational software

Operational software:	Adopt Deliph software compiler , WINDOWS XP english operating software.
Analysis channel:	Providing channel management features, the carbon and sulfur channels are free to increase, delete and edit, no limit. Preset the interface of low-carbon and sulfur, Can realize the software automatically change
Analysis function:	Analysis of the dynamic data, sampling every 20 times, improving the analysis sensitivity and analysis accuracy, providing sample management features, it can edit the sample name and logo, also can increase and delete samples, the software provides a user management system, the administrator setting different user permissions.
Display function:	The Carbon sulfur has a curve respectively,
Data processing function:	Adopt ACCESS data pool store the analysis results, can store all data and curve; Query the analysis results optionally, query according to the time, sample name, logo and operator. Provide some function as data storage, blank deduction, setting parameter, choosing channel, statistics, and curve Compare etc. In the software can create the work curve of carbon and sulfur, realizing the curve fitting.
Printing function:	Print mode is diversification, Provide two print modes of laboratory and testing, also can design printing formats
self-diagnose function:	System diagnosis function,can test furnace head and the gas chamber sealing by the software.

## Standard Accessories

### 1. Carbon/Sulfur analyzer

Item	Description	Q'ty
1	Main unit <b>CS996</b>	1
2	High frequency automatic inductive combustion furnace	1
3	Electric Balance	1
4	Computer	1
5	Printer	1

### 2. Spare parts list

No.	Name	Specification	Unit	Quantity	Note
1	Relieve Valve		pcs	1	Including special connector
2	Tungsten Fluxing Medium	Low blank of C & S	bottle/kg	1	
3	Pure Iron Fluxing Medium	Low blank of C & S	bottle	2	
4	Quartz Combustion Tube		pcs	2	
5	De-dusting Tube		pcs	2	
6	Copper Crucible Holder		pcs	1	
7	Quartz Crucible Holder		pcs	2	
8	Ceramic Crucible	1000pcs/carton	carton	1	
9	Stainless Steel Round Brush		pcs	3	
10	Steel Wire Brush		pcs	1	
11	Forceps		pcs	1	
12	Sampling Spoon	Big, Middle, Small	Set	1	Stainless Steel
13	Fluxing Medium Spoon		pcs	1	
14	Tool		set	1	
15	PVC pipe	4mm*6mm	Meter	10	
16	Silicon Ring	Red	pcs	2	
17	O-Ring	11mm*2.5mm	pcs	4	
18	O-Ring	37mm*3.1mm	pcs	4	
19	Vacuum Silicone Grease		bottle	1	
20	Fuse	10A	pcs	4	
21	Fuse	32A	pcs	4	
22	Multi-socket	10A	pcs	1	
23	Desiccant	125g	bottle	1	
24	CO2 Absorbent	125g	bottle	1	
25	USB Line	Special	pcs	1	
26	Optical Fiber	Special	pcs	1	

27	Balance Line		pcs	1	
28	Power Line		pcs	1	
29	Discharging Dust Tube	silicon rubber	pcs	1	
30	Y type triplet		pcs	1	
31	Mouse Pad		pcs	2	

### Packing & Transportation

- Wooden packing in conformity to GB15464-95
- shipping by sea or air transport

### Other items

Overall repair warranty for **2 years**, together with lifelong maintenance, free installation and commission and free training the lab technicians on site as well as providing the analysis methods.

### Acceptance terms

#### Preparations

When the instruments arriving, user should prepare install place, power (earthing cable) oxygen, dynamic gas and indoor environment

With the above conditions, please written notice to Party B of the installation engineer to the site installation and commissioning.

#### Open-package inspection instruments

1. The instruments should with packing list, the instrument should is new and no breakage.
2. Confirm the all equipment accessories according to the scope of supply.
3. The installation engineer of party A should in when open the package, if the equipment is shortages, the engineer should confirm and complete in 30 days.

#### acceptance standard

##### 1. Repeatability

Select steel of one standard sample (Carbon mass fraction in 0.400% - 1.000%,sulfur content in 0.020% - 0.080%) operating according to instrument instructions, with high-frequency furnace continuous testing 7 times, The difference between the maximum and minimum of test results should be less than or equal to 1.5r. The r with the following formula to calculate:

Carbon :  $\lg r = 0.52121 \lg \omega - 1.9617$  sulfur :

$\lg r = 0.62212 \lg \omega - 1.9965$

the **r** mean repeatability, **ω** mean the value of the material under test.

##### 2. Accuracy

Select steel or iron of standard sample(carbon mass fraction in 0.003% - 4.500%, sulfur mass fraction in 0.002% - 0.100%) take the high, medium and low three kinds of samples, operating according to the instruction of high-frequency furnace and correction, after correction every standard material test 3 times, taking the average, carbon and sulfur should be less than or equal

to the \_\_\_\_\_ calculated values of

$CrD95X - X_0$

,see the following formula:

$$CrD95|\bar{X} - X_0| = \frac{1}{\sqrt{2}} \sqrt{R^2 - \frac{r^2(n-1)}{n}}$$

$\bar{X}$  mean the average

$X_0$  mean the value of the material under test

$n$  mean test times

$r$  mean repeatability

$R$  mean reproducibility

The reproducibility with the following formula to calculate: carbon :

$$\lg R = 0.58221 \lg \omega - 1.4558$$

$$\text{sulfur : } \lg R = 0.68878 \lg \omega - 1.3693$$

$\omega$  mean the value of the material under test.

## Training

### Scene technical training

Party A is responsible for party B of the operation and maintenance, daily breakdown training, ensure the worker of party B can operate instrument independently.

### System training

The party B can send staff to party A system training, two staffs, five days(Training specific time agreed both sides) transport, accommodation self-care. Training includes:

- Principles and methods of instrumental analysis
- The structure and features of the instrument
- Quantitative analysis of instrument (iron and steel material)
- Analysis conditions set, the working curve, correction, etc.
- Daily breakdown exclusion
- Instrument Maintenance

## Installation of the instrument

### Preparation before the installation

1. Analyzing room: be far away from the erosion gas such as acid, alkali, dust, vibration, testing disturbance.
2. Analyzing room size: > 3×3m ;
3. Working condition: Room temperature: 10-30°C, Relative humidity: < 75% ;
4. Power supply: well earthing is required, Voltage: AC220V±5%, Frequency: 50Hz±2%, No disturbance from harmonic wave
5. Voltage stabilizing equipment: Power: 5kW, Voltage stabilizing precision < 2% ;  
Note: If there is disturbance from intermediate frequency furnace in the work power supply, the equipment should be equipped with AC Regulated Power Supply.
6. Gas: Oxygen: purity≥99.5%
7. Power gas: Nitrogen or Compressed air (Purified: without water, oil and contamination)
8. Tool: Box opening tool and regular tools.