



# **Portable Spectrometer for Metal Analysis**

# **1. Product introduction and configuration**

**1. Product name and model: Portable Spectrometer for Metal Analysis  
SISCO-PS-AGSW3000**

**2. product picture:**



## **3. Working conditions**

- Operating temperature: -35~ + 50℃
- Relative humidity: 80%

## **4. Product configuration:**

- (1) One host of X fluorescence spectrum analyzer;
- (2) A set of special test software for alloy analysis;
- (3) Lithium battery (two pieces);
- (4) A set of lithium battery charger;
- (5) 316 standard cap piece;
- (6) One copy of the user's manual;
- (7) Instrument factory inspection certificate;
- (8) Window protective film of five pieces;
- (9) a waterproof host protection box;

## 5. Technical Parameters and indicators:

[Weight] Basic weight: 1.4kg, after the battery: 1.5kg

[Dimension (height, x width, x length)] 300mm x 90mm x 220mm

[Excitation source] Four kinds of ray tube target materials are gold (Au), silver (Ag), tungsten (W) and palladium (Pd)

[Voltage, current and power] High-power micro-X-ray tube 50KV, 100MA, 4W

[Filter] Six optional filters can automatically adjust according to different physical objects

[Detector] High-performance, high-resolution Si-PinX-ray detector

[Detector refrigeration temperature] Peltier effect semiconductor refrigeration, refrigeration temperature-35

[Standard sheet] External 316 standard cap with test window protection function;

[Resolution] <180ev

[Power supply] 8 hours / 2 block of lithium power supply and AC power supply

[Processor] Intel 400MHz StrongArm processor

[Operating System] Mobile Windows CE system

[Compatibility] Bluetooth

[Software Standard Mode] Alloy

[Data processing] 8G large capacity data memory card: 40,000 sets of data and spectroscopy.

[Data Analysis] A variety of analysis modes, including basic parameters, Compton normalization, and empirical calibration modes.

[Data display] Focus on ppm and percentage (%) display, spectrum or peak intensity (count rate) or user-defined units

[Data Transfer] RS232 Serial cable, Bluetooth, EXCEL output.

[Display screen] Color, high-resolution 3.5-inch TFT industrial-grade touch screen, large icon graphical interface, clearly visible in any light conditions;

[Appearance design] integrated fuselage design, strong, waterproof, dust-proof and antifreeze, effective anti-vibration, suitable for field, wet or low temperature and other environments.

[Safe operation] One touch "trigger", the software automatically locks the protection function or automatically stop the test; close X ray automatically within 2 seconds after there is no sample at the test window

[Analysis elements] Can analyze all elements from Ti (titanium) to U (uranium), the machine standard elements:

Cr Chrome, Mn Manganese, Fe Iron, Ni Ni, Cu Copper, Zn Zinc, Pb lead, Se Selenium, Zr zirconium, Co cobalt, V Vanadium, Mo Mo, Ag Silver, Cd Cadmium, Sn Tin, Sb Antimony,

Ti Titanium, Hf Hafnium, Ta Tantalum, W tungsten, Re rhenium, Pd palladium, Au gold, Pt platinum, Rh rhodium, Ru ruthenium, Nb niobium, Bi bismuth and other elements;

[Test environmental conditions] Temperature- -20~ + 50°C, humidity <80% RH.

[Correction] The instrument has been corrected before delivery; but the instrument

still has the function of establishing a targeted correction curve, which is suitable for accurate testing of specific samples

[Result Report] The instrument is equipped with standard USB interface and Bluetooth wireless transmission, which can directly transmit data to computer or network storage device, and can directly download measurement data and X-ray spectrum in customized EXCEL format. You can set user rights, generate custom reports, and print analysis reports

[Radiation protection function] The radiation dose rate is  $<2.5 \mu\text{ Sv / h}$  in the instrument handle and 10~100 cm from the instrument shell.

[Element content analysis range] from 0.01% to 99.99%;

## **2. Product function, analytical accuracy, and stability**

### **(1) Analytable type of alloy composition**

(1) All elements between Ti (titanium) and U (uranium) can be analyzed.

(2) more than 2000 kinds of alloy plates, the machine has up to 300 kinds of alloy brand database,

At the same time, users can customize to add more than 300 kinds of gold medal number database.

(3), used for stainless steel, alloy steel, tool steel plate identification and composition, content detection, including the common stainless steel grade 201,203,301,304,316,321 and other hundreds of kinds.

(4), used for copper alloy brand and composition testing, including brass, bronze, purple copper, pure copper and so on.

(5) For the composition and detection of various mixed alloys, including titanium alloy, tin alloy, lead alloy, tungsten alloy and zinc alloy

Gold, aluminum alloy, nickel alloy, and so on.

(6) For precious metal detection. Contains gold, silver, platinum, rhodium, palladium.

### **(II) Analytical accuracy and stability:**

#### **Analytical accuracy and stability:**

1. The detection limit of metal content is 0.01%. The stable reading difference of the test and analysis of these metals has reached the following standards:



A. The test read difference between stable elements with more than 5percentage was less than 0.1 to 0.2% of  $\pm$

B. The test read difference between the elements stable in 0.5 to 5% was up to  $\pm$  0.05% to 0.1%

C. The test read difference with stable elements ranging from 0.1 to 0.5% reached  $\pm$  0.01 to 0.03%

D. The read change rate of less than 0.1% is  $\pm$  10 to 15%

2, can detect and analyze the state of the sample: bulk, solid, powder.

### (3) Instrument data plate number database:

The instrument comes with more than 250 kinds of number database, and the instrument can add 300 sets of number database.

<b>The I-CHEQ Alloy Analyzer has a proprietary label database</b>				
<b>ferroalloy</b>			<b>nickel-base alloy</b>	
201	Alnico VIII	tool steel	Ni	Inco 718
203	AL6XN		80-20	Inco 722
301	AMS 350	A2	B-1900	Inco 738
304	AMS 355	A6	B-1900 Hf	Inco 750
309	CD4MCU	A7	Inco 617	Inco 792
310	Custom 450	Al0	Inco 625	Inco 800
316	Custom 455	D2, D4	C-1023	Inco 801

317	Duplex 2205	D7	GMR 235	Inco 825
321	Elgiloy	H12	GTD 222	Inco 901
329	Ferallium 255	H13	Hast B	Inco 903
330	Greek Ascology	L6	Hast B2	Inco 909
347	Hy Mu 80	01	Hast C -4	Mar M 002
410/416/420	Kovar	06	Hast C -22	Mar M 200
410 Cb	Invar 36	07	Hast C -276	Mar M 246
422	Maraging C200	M1	Hast C -2000	Mar M 247
430/440	Maraging C250	M2	Hast F	Mar M 421
431	Maraging C300	M42	Hast G	Monel 400
434	Maraging C350	M4	Hast G-2	Monel 411
441	N 155	S1	Hast G-3	Monel 500
446	Ni-hard #1	S7	Hast G-30	MP35N
12L14	Ni-hard #4	T1	Hast N	Mu Metal
13-8Mo	Nitronic 40	low content alloy	Hast R	Nichrome V
15. 5 PH	Nitronic 50		Hast S	Nickel 200
17-4 PH	Nitronic 60		Hast X	Nim 101
19-9DL	RA333	chrome-molybde num steel	Hast W	Nim 263
19-9DX	RA330		Haynes 25	Nimonic 75
20Cb3		Carbon steel	Haynes 36	Nimonic 80A
20Mo4		1 1-4 Cr	Haynes 214	Nimonic 90
20Mo6		12L14	Haynes 230	Ni-Span 902
25-4-4		13-8 Mo	Haynes 188	Rene 41
254SMO		15-5 PH	Haynes 556	Rene 77
21-6-9		17-4 PH	HR-160	Rene 80



26-1		19-9DL	IN 100	Rene 95
29-4			Inco 600	Rene 125
29-4-2			Inco 601	Super therm
904 L			Nim 101	Udimet 500
A 286			Nim 263	Udimet 520
Alloy 42			Inco 690	Waspaloy
Alloy 49			Inco 702	
Alnico II			Inco 706	
Alnico V			Inco 713	

**The I-CHEQ Alloy Analyzer has a proprietary label database**

<b>cobalt-base alloys</b>	<b>copper base alloy</b>	<b>titanium base alloy</b>	<b>Mixed alloy</b>	<b>alufer</b>
Co	Cu	Ti 10-2-3	97-3	AL-1100
F-75	70-30	Ti 13-11-13	Cb 103	AL-2011
FSX 414	80-20	Ti 15-3-3-3	CP Ta	AL-2024
HS-1	90-10	Ti 3 2-5	Densalloy	AL-2098 or AL-2195
HS-4	CDA 110	Ti 5-2-5	Tungsten	AL-2219 or AL-2519
HS-6	CDA 314	Ti 5 Sn 2 1-2	Carbide	AL-2618
HS-12	CDA 360	Ti 6-2-1-1	Zir 702	AL-3003
HS-19	CDA 544	Ti 6-22-22	Zir 705	AL-319



HS-21	CDA 630	Ti 6-2-4-2	Zir caloy	AL-356
HS-25 (L605)	CDA 706	Ti 6-2-4-6	2, 4	AL-380
HS-31	CDA 836	Ti 6-4	Zr	AL-5052
Haynes 188	CDA 863	Ti 6-6-2		AL-5083
Jetalloy	CDA 875	Ti 8-1-1		AL-5086
Mar M 302	CDA 903	Ti Beta C		AL-6061
Mar M 509	CDA 932	Ti-17		AL-6063
MP 35N	CDA 937	Ti-8		AL-6262
Star J	CDA 954	Ti 6-2-1-1		AL-7039
Ultimet	CDA 955			AL-7050
	CDA 8932			AL-7072
				AL-7075
				AL-7149

### **3. Product advantages and software description**

#### **(one).product superiority**

- 1, using high performance Si-Pin detector with higher detection accuracy.
2. Realize the on-site, fast, non-destructive and accurate detection, and display the alloy plate, element and percentage content in 2-3 seconds.
3. The 50KV, 100 mA and 4W X-ray tube technology is adopted to make the instrument have better detection lower limit and radiation safety guarantee.
- 4, the use of intelligent beam (Smart Beam) can Ti, V accuracy can reach 0.02%, can well distinguish stainless steel 304 and 321, chromium alloy P91 and 9 chromium, titanium alloy 7 grade titanium and pure titanium and so on.
- 5, lower detector temperature, ultra-low temperature working state of-35°C, make the



instrument with excellent resolution.

6, higher detection accuracy, the average statistical function of multiple tests can effectively improve the detection accuracy of the instrument.

7. Intelligent detection of irregular or small samples, such as thin hair (0.06MM), can also be immediately tested and identified.

8. Automatic stop function, there is no measured object in front of the window, and the starting instrument will automatically stop the test after 2 seconds.

9, can be extended probe to the pipe wall, weld, small parts and other usually difficult to contact positions.

10. The instrument comes with HD resolution display screen, which can specify, view and edit test information and results at will.

11, you can add, edit and delete the alloy brand without the help of a computer.

12, the instrument uses aluminum alloy has a stronger heat dissipation ability, anti-vibration ability, automatic anti-amplitude radiation insurance device.

13. Using user-friendly one-button button design, the user does not need to press the button during the test process.

14. The test results can be connected to the computer for output and printing, and the instrument has the standard test result version, which is greatly convenient for customers to edit and print the result information.

15. The instrument can realize the remote monitoring function, and the maintenance engineers can remotely install and maintain the instrument software through the Internet, and ensure that the customer machine does not go down for 24 hours.

16. The instrument adopts the Windows CE operating system to ensure that the instrument operating system is more stable and more powerful.

17, the instrument comes with a standard block, each time to boot the instrument automatically standardized, standardization through, the instrument can be used normally. If the standardization does not pass, the instrument cannot be used.

Ensure that the instrument is within the normal accuracy guarantee range of each use.

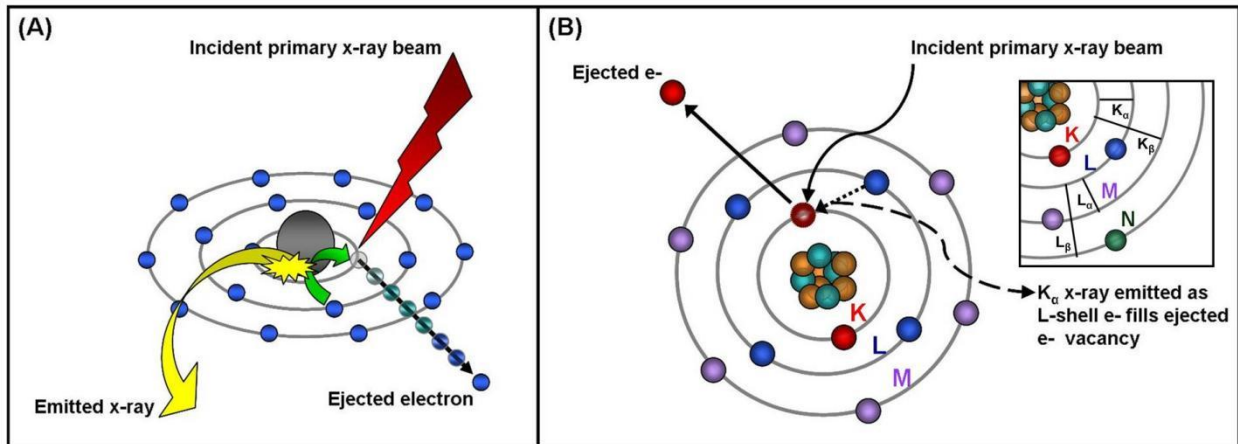
18. The instrument adopts the basic parameter method (FP Method), which does not need to know the type of the test sample before the test, and does not need to select the test curve.

19. The test results can be converted to Excel output, or they can be directly

transmitted to the personal computer or using Bluetooth to the notebook computer for printing output and archiving.

## (2) Software description

### 1. Description of the working principle of the instrument



- The XRF is the X-ray fluorescence spectrum analyzer (X Ray Fluorescence Spectrometer). People usually make the secondary X-rays produced by the X-rays shining on matter called X-ray fluorescence, and the X-rays used to illuminate them are called the original X-rays.
- When the high-energy X-ray with electron binding energy above the inner layer collide with the atoms, a hole appears to expel an inner electron, making the whole atomic system in an unstable excited state, the lifetime of the excited atoms is about 10<sup>-12</sup>~10<sup>-14</sup>S, and then spontaneously transition from the high energy state to the low energy state.
- When the energy released by the outer electrons leaping into the inner hole is not absorbed in the atoms, but in the form of radiation, the X-ray fluorescence (characteristic X-ray) is generated, whose energy is equal to the energy difference between the two levels.
- Feature X-ray fluorescence generation: collision transition (high) hole transition (low)
- The characteristic X-ray fluorescence energy and wavelength of different elements are different, so the energy or wavelength can be measured, and qualitative analysis of the elements can be conducted. The line strength is related to the content of the element in the sample, so the strength can be measured for quantitative analysis of the element.

## **2. Software work**

**The spectrometer adopts the most advanced software algorithm in the world, the basic parameter method (FP). After nearly 10 years of development and improvement, the company has made the software have a perfect use of content, but also has a strong teaching and scientific research and development functions.**

### **Main handling of the spectrometer software algorithm**

- 1) The Smoothing spectral line is smooth treatment
- 2) Escape Peak Removal escape peak removal
- 3) Sum Peak Removal superimposed peak removal
- 4) Background Removal background tick out
- 5) Blank Removal empty peak site removal
- 6) Intensity Extraction intensity extraction
- 7) Integration of the Peak Integration maps
- 8) The Peak Overlap Factor Method-peak superposition factor method

## **3. Test interface**

The screenshot displays the i-CHEQ software interface. At the top, a blue header bar contains the i-CHEQ logo and navigation icons. Below the header, the main content area is divided into several sections:

- Left Panel:** Contains the text "Analytical Need to Standardize" and a set of four buttons: "Start", "Message", "Standardization", and "Mode".
- Central Panel:** A grid of six icons with corresponding labels: "Decision Condition" (green checkmark), "Grade Database" (globe), "Test result information" (blue info icon), "Trigger hardware setup" (CD/DVD), "Data output management" (laptop), and "Factory Setting" (wrench and screwdriver).
- Right Panel:** A vertical stack of five buttons: "Test Time", "Smart Beam /AI Mode", "LEAP", "RoHS Mode", and "User Factor".
- Bottom Panel:** A horizontal navigation bar with buttons for "Mode", "Analyze", "Result", and "Settings".
- Bottom Right:** A "Back" button.

## **4. Product warranty and after-sales service**

- 24 hours / 7 days of uninterrupted service
- Response response within 4 hours
- Remote online troubleshooting
- Long-term spare parts are kept in stock
- New machine free installation training
- The warranty period can be customized according to the customer's requirements
- New machine warranty for one year, software lifetime free maintenance