



ICPS-7000 Ver.2

Shimadzu
Sequential Plasma Spectrometer





Rapid Analysis, Compact Design, Easy Operation
ICPS-7000 Ver.2

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Ideal ICP Spectrometry Has Come True by the Introduction of ICPS-7000 Ver.2!

Since first commercialized in the latter part of 1970's, various types of emission spectrometers integrating the ICP (Inductively Coupled Plasma) as a light source have been introduced.

The ICP Emission Spectrometer having the following features is applied for a wide field of elemental analysis.

- High detecting sensitivity - ppb in detection limit
- Wide dynamic range
- Possibility of simultaneous analysis

In the meantime, with the expansion of the application field, however, the following problems have emerged.

- A great deal of argon gas is consumed.
- A large spectrometer is required to minimize matrix effect.
- Complicacy in operation for analysis.

For the settlement of the above problems, advanced functions as mentioned below have been embodied in the compact body of the ICPS-7000Ver.2.

- Rapid analysis by ASD (Active Stabilized Direct Drive.)
- Reduced consumption of argon gas by half.
- An all-in-one type bench-top spectrometer.
- Easy and efficient operability under Windows®.

The ICPS-7000Ver.2, which embodies a large capability in a compact body, characteristic of space saving and energy saving, is an instrument commensurate with the 21st century.

Main field of application

Drink water

Environmental water
Waste Water

Foods and Medicines

Biological samples

Best suited for elemental analysis of the following.

- Environmental Analysis: Monitoring regulated substances contained in drinking water, waste water or environmental waters
- Pharmaceuticals: Measuring active ingredients or testing for hazardous heavy metals
- Food Products: Testing for active ingredients in fortified food products or for hazardous heavy metals
- Organisms: Analyzing essential metals contained in blood or hair, etc.

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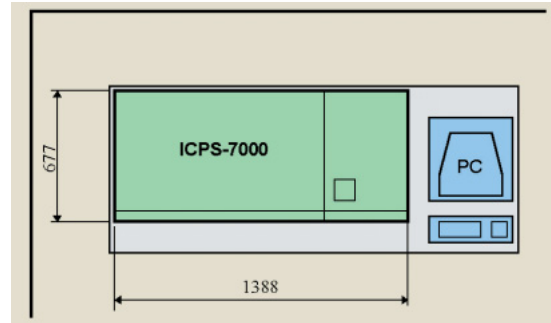
P 10 - Options

Really Compact This ICP Is!

A Real Bench-Top Type of Instrument.

The Shimadzu ICPS-7000_{Ver.2} is a real bench-top type, all-in-one (excepting a personal computer for data processing) ICP emission spectrometer. Most of the so-called bench-top type of ICP emission spectrometers so far put on the market have a separate radio frequency (RF) generator put on another bench or in the space under the table.

Shimadzu has succeeded in producing a hypercompact RF generator for use with the ICPS-7000_{Ver.2} that can be accommodated inside the main unit - an achievement of Shimadzu that has taken the initiative in developing a solid-state and compact RF generator.



Also the RF Generator Has Much Advanced.

The RF Generator of the ICPS-7000 Ver.2 Has the Following Features.

1. High efficiency and economy.

An all solid-state 40MHz RF generator. The development of the technology for 40 MHz power amplification difficult to do with transistors has materialized the energy-saving type of ICP spectrometer.

2. Stability of the plasma flame.

Fluctuation of the plasma torch, if any, is quickly synchronized, and stable power is supplied. Feed-forward control (patented) is performed with the unique auto-bias circuit.

3. A really hypercompact size of instrument (essential condition for a bench-top type).

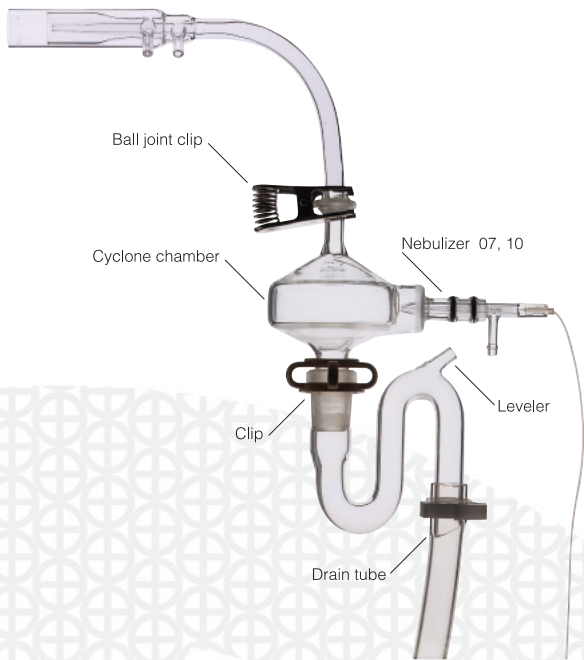
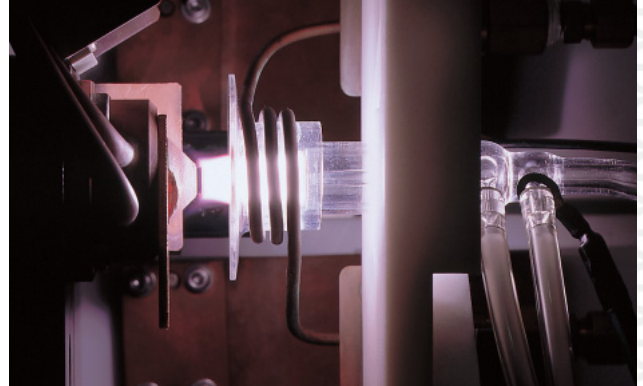
The RF generator including the matching box has been integrated into a compact package.

A high-efficiency shielding technology has enabled the mounting of the system from the stage through the power amplifier on a single cooling system.

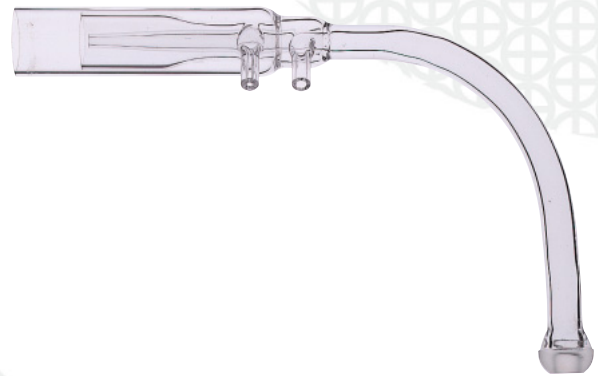


A Mini Torch Has Cut by Half the Consumption of Argon Gas.

A newly developed unique mini plasma torch (patent pending) is adopted for the light source. The new torch has reduced the consumption of argon gas by half in comparison with the previous torch without sacrificing the sensitivity.

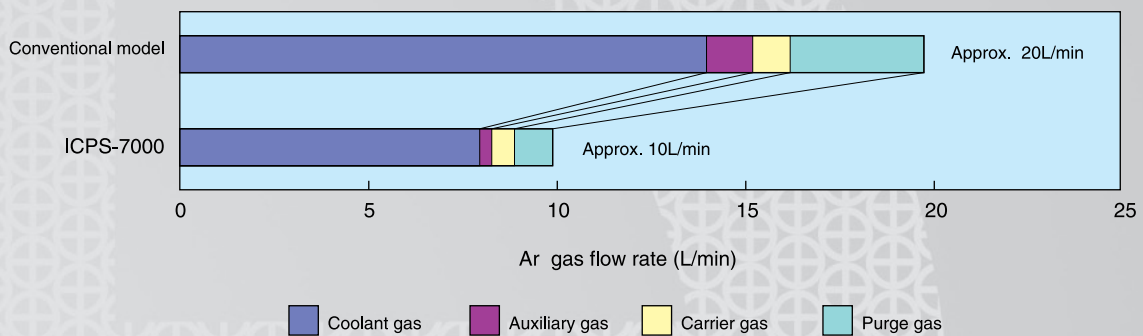


Sample Introduction System



Mini torch

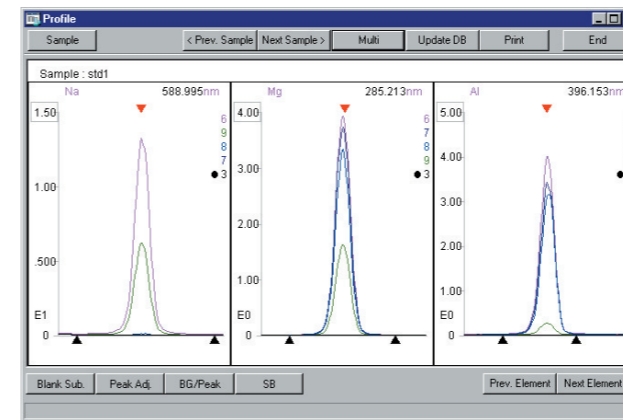
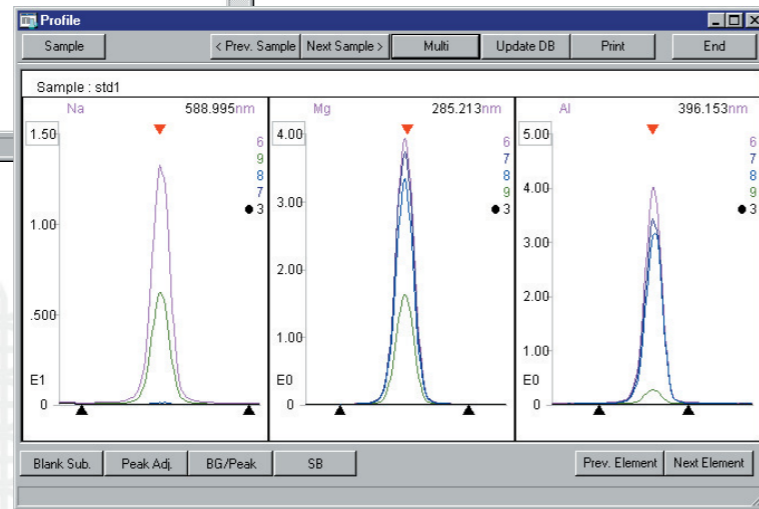
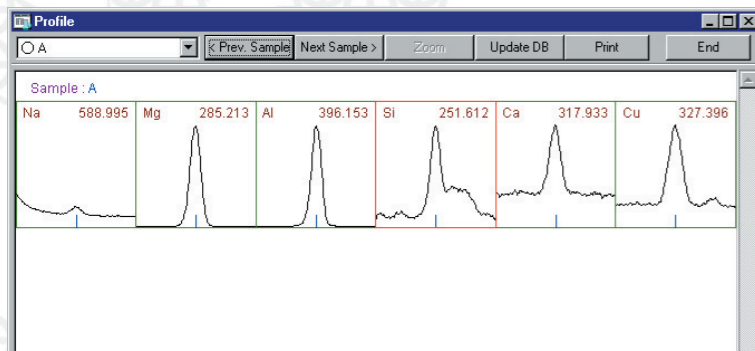
Comparison of Argon Gas Consumptions



How Easy to Operate This ICP Is!

Operation is in the user-friendly Windows environment, of course.

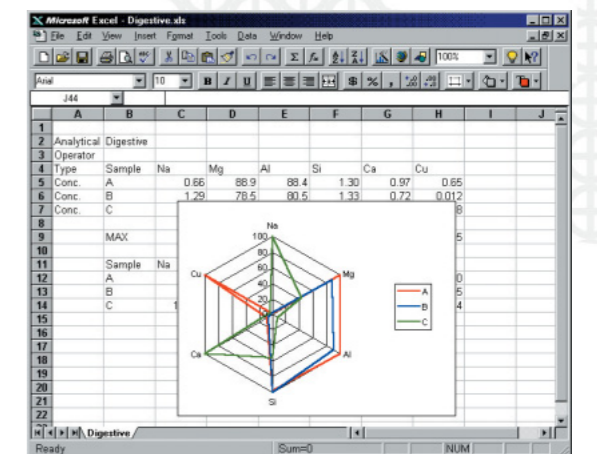
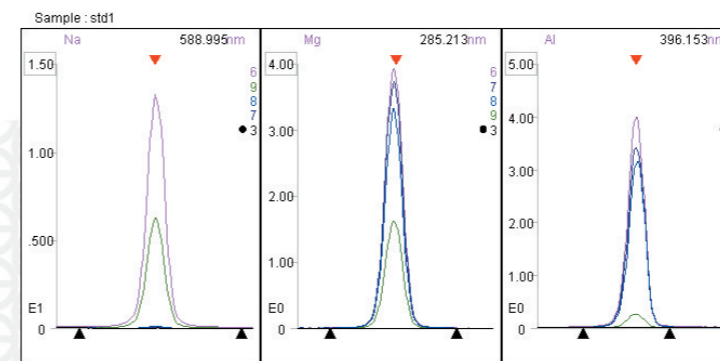
Even during automatic analysis using the autosampler, it is possible to see the results of the preceding analyses. It goes without saying that expansion or overlaying of profiles is freely made.



Analytical Name	Operator	Type	Sample	Na	Mg	Al	Si	Ca	Cu
7/16/98 11:54 AM		Conc.	A	858641	88.9000	88.4045	1.30002	966.297	651.274
7/16/98 12:02 PM		Conc.	B	1.28646	78.5000	80.5083	1.30002	712.05	01.0033
7/16/98 12:06 PM		Conc.	C	52.1071	37.9000	6.70702	743.002	12.0070	01.7849

Copying to a spread-sheet tabulation format.

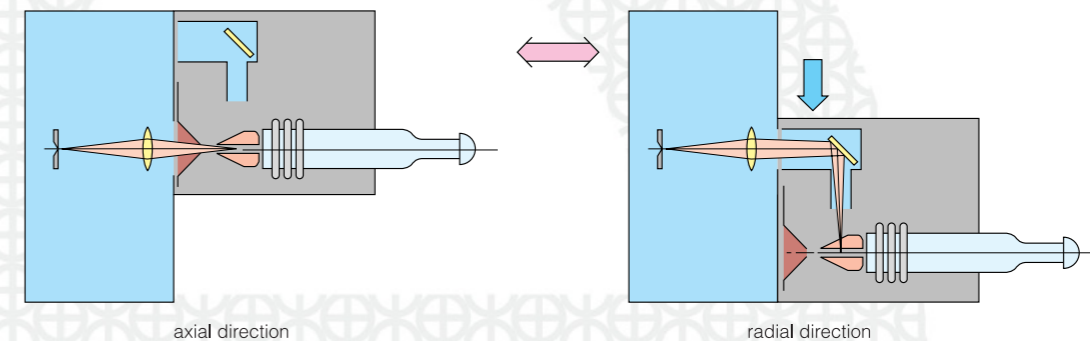
Data transfer on to a word processor document.



Processing of analytical results to easy-to-see comprehensible reports.

Observation of the plasma in the axial direction or in the radial direction.

By observing the plasma either in the axial direction or in the radial direction selectively, it has become possible to analyze samples of various concentrations ranging from trace samples to high concentration ones. The ICPS-7000Ver.2 is provided with both modes of plasma observation as standard. No special tool is needed for the selection of the modes, and it can be done easily and in a short time.



axial direction

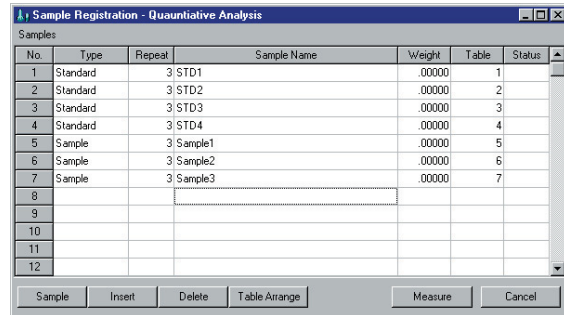
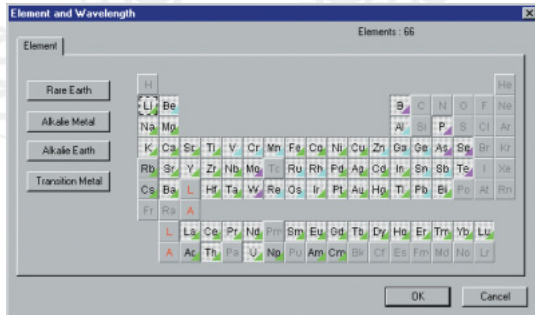
radial direction

How Fast Analysis Is Done On This ICP !

Cumbersome Setting of Analytical Conditions Is Unnecessary.

Setting of analytical conditions is not needed at all. Just enter the group name and sample name, and qualitative analysis is performed.

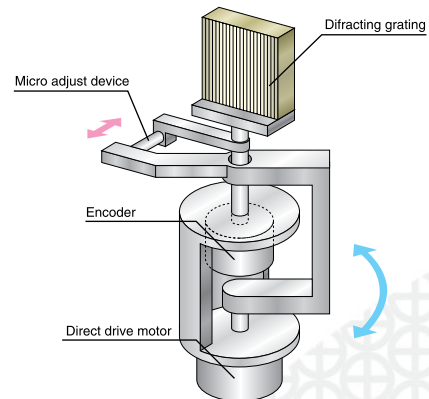
Concentration of the sample used for the calibration curve needs to be entered, but the analytical result can be obtained without any difficulty.



ASD Has Made Possible High-Speed Analysis.

In the Shimadzu ICPS-7000Ver.2, the diffraction grating is directly rotated by ASD (Active Stabilized Direct Drive) system. This system has made compatible the high-speed of the direct drive and high accuracy in wavelength setting by the sine bar system.

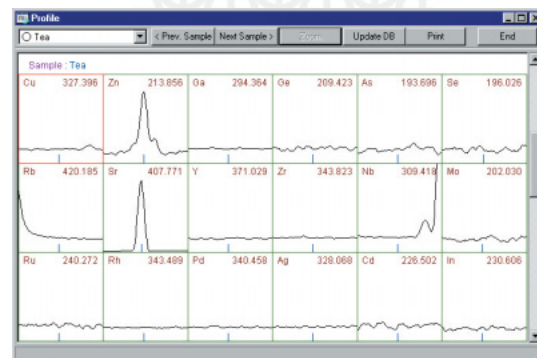
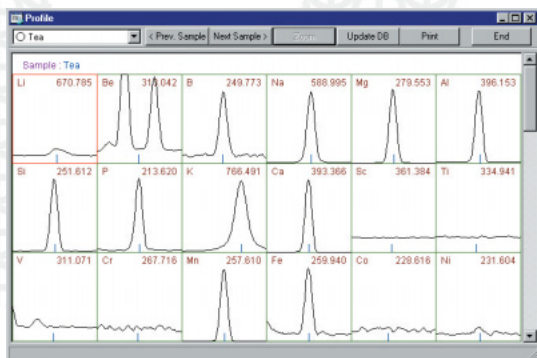
(Patent Pending)



Qualitative Analysis Is A Great Advantage of ICP Emission Spectrometry.

Not to speak of transition elements like Fe and Mn, most elements including B, Zr, and rare earth elements can be analyzed. Alkali metals can be analyzed with high sensitivity, too.

Speedy qualitative analysis, not to speak of quantitative analysis, is a great advantage of the ICP emission spectrometry. ICP-7000Ver.2 offers high-speed high-accuracy qualitative analysis based on an original data base.

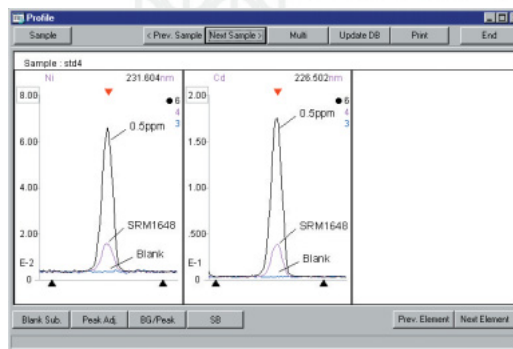
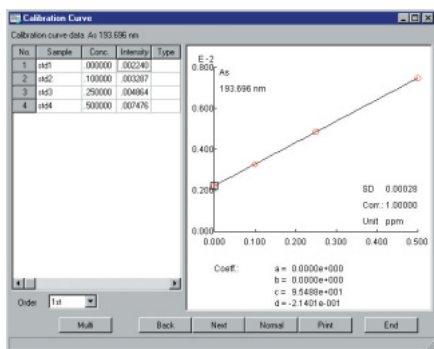


From Trace Elements to High Concentration Elements

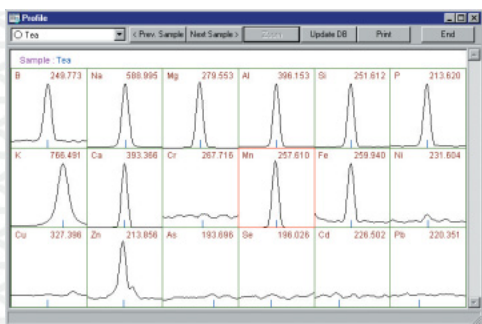
Multielement analysis on batch mode is applicable to various kinds of samples including environmental samples requiring very high analytical sensitivity, foods containing minerals in high concentrations, and medicines, with simple pretreatment. The ICPS-7000Ver.2 has cleared the very high sensitivity required for the

analysis of waste water through the adoption of a 40MHz RF generator and a plasma observation method in the axial direction. The environmental standards and the Water Law requiring higher detectability can be met with by the use of an optional supersonic nebulizer.

Analysis of environmental samples/Analysis of airborne particles



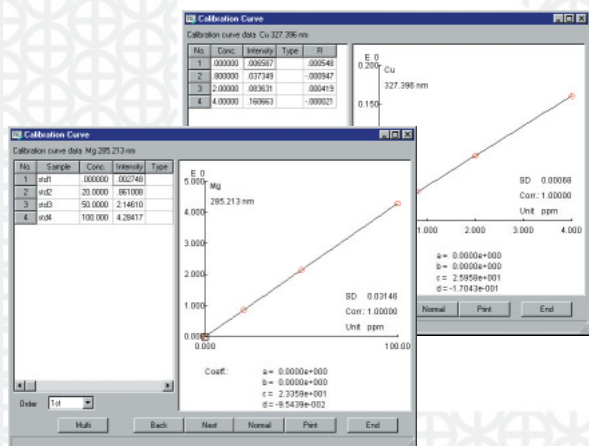
Analysis of foods/Analysis of tea



Result of determination

Higher than 10 ppm	Mg 11	K 37				
Higher than 1 ppm	Na 7.2	Al 6.1	Si 2.4	P 9.5	Ca 9.7	Mn 3.0
Higher than 0.1 ppm	B .11	Fe .11				
Below 0.1 ppm	Ni .033	Cu .015	Zn .046	As .037	Se .075	Pb .016
Undetectable	C .0010	Cd .0040				

Analysis of medicines/Analysis of a digestive



Result of quantitation

Element	Na	Mg	Al	Si	Ca	Cu
1st analysis	.625	89.5	88.6	1.29	.956	.649
2nd analysis	.621	88.8	88.0	1.30	.962	.649
3rd analysis	.625	88.4	88.6	1.30	.970	.643
Mean	.624	88.9	88.4	1.30	.962	.643

(ppm)

Optional Accessories

Ultrasonic Nebulizer

UAG-1

P/N 205-09295



Specially designed for obtaining high sensitivity in ICP spectrometry, this nebulizer utilizes ultrasonic energy in nebulizing samples solutions instead of the negative pressure of the carrier gas utilized in the conventional nebulizers. Ultrasonic nebulization provides extremely fine sample particles, ensuring 10 to 100 times as high sensitivity as conventional nebulizers. One cooling water system is required. If the CA-2600 cooling water recirculation system will be shared with the main ICP unit, a cooling water recirculation system installation kit is required.

Description	P / N
Cooling Water Recirculation System	211-81147

Hydride Generator

HVG-ICP

P/N 211-40981



Target elements are reduced-vaporized with the nascent hydrogen generated in the decomposition of sodium borohydride, and then the gas phase is isolated and introduced into the plasma torch, permitting highly sensitive determination. The amenable elements include As, Se, and Sb.

Autosampler

AS-9

P/N 211-43575-01



After placing the samples in the autosampler, and entering the samples names, analysis parameters and other information, various samples can be analyzed sequentially.

Cooling System-Related Parts

Please provide one of the following separately.

1. If a public water supply will be used

Description	P / N
Plumbing Connector Kit Cooling Water Interface Assembly	211-82019-91

2. If the cooling water recirculation system will be used only for the main unit

Description	P / N
CA-2600 Cooling Water Recirculation System Power Supply: 200V single phase 50/60Hz 15A	044-01804-13
Connectors (requires two) Bushings (requires two)	260-13500-04 035-52217
Connector Kit for CA-2600 System Cooling Water Interface Assembly Cooling System	211-82022-91

3. If the cooling water recirculation system will be shared by the main unit and the UAG-1

Description	P / N
CA-2600 Cooling Water Recirculation System Power Supply: 200V single phase 50/60Hz 15A	044-01804-13
Cooling Water Recirculation System Installation Kit	211-81147
Connector Kit for CA-2600 System Cooling Water Interface Assembly Cooling System	211-82022-91

Primary Consumable Parts

Description	P / N
Plasma Torch	211-46605
Nebulizer	046-00092-02
Cyclone Chamber (air cooled)	046-00093-04
Chamber O-Ring	046-00093-91
Sample Suction Tube	046-00092-06
Orifice	211-43740

Main Specifications

1. Spectrometer Unit

Optical system	Czerny-Turner mounting
Focal length	750mm
Number of grooves of the grating	2,160 grooves/mm
Wavelength range	190 - 380 nm (2nd spectra) 380 - 850 nm (1st spectra)
Reciprocal linear dispersion	0.22 nm/mm (2nd spectra) 0.42 nm/mm (1st spectra)

2. ICP Source

Torch section	Observation direction selectable(axial direction, radial direction) Cyclone chamber: Made of Pyrex glass Plasma torch : Made of quartz, mini torch Nebulizer : Coaxial type, made of Pyrex glass
Gas flow rate	Setting range
	Coolant gas 20 L/min max.
	Auxiliary gas 2 L/min max.
	Carrier gas 2 L/min max.
	Purge gas 3 L/min max.

3. Radio Frequency Generator

Oscillator	Crystal oscillator
Frequency	40.68 MHz
Circuit	Power MOS FET

4. Software

OS	Windows® compatible
Measuring wavelength to be set	Qualitative analysis 1 : 72 elements x 1 wavelength
	Quantitative analysis 2 : 216 wavelengths max. for 72 elements
	Quantitative analysis : 72 wavelengths max. for 72 elements
Database	Analytical wavelength data : 72 elements x 16 wavelengths max. Registration to data permitted.
Analytical card	100 cards.
Quantitative analysis	Standard samples for calibration curve creation : 16 samples max. / card
	Drift correction
	Internal standard correction (sequential correction of internal standard)
	Background correction
	Blank signal elimination

Windows® is a trade mark of Microsoft Corp., U.S.A.

Installation Requirements

[For the installation of the ICPS-7000Ver.2 Inductively Coupled Plasma Emission Spectrometer, the following are required.]

1. Environmental Requirements

Room temperature	18 - 28°C, change rate : within ± 2°C/hour
Humidity	20 - 65%

2. Power Requirements

Single phase	200/220V ± 10%, 50/60 Hz, 6kVA
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3. Grounding

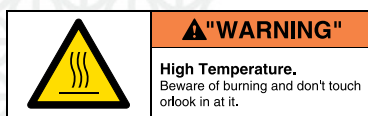
Single phase	Independent grounding with a resistance less than 30Ω.
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4. Argon

Argon	Purity 99.95 % or higher Pressure 350 kPa ± 10kPa
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Note : A 7m³ cylinder is usable for 10 hours.

The following warning seals are put on this instrument wherever necessary. Pay attention to the labels.



5. Cooling water (when using tap water)

Pressure	150 - 300 kPa
Flow rate	2 L/min or higher (at 5 - 30°C)

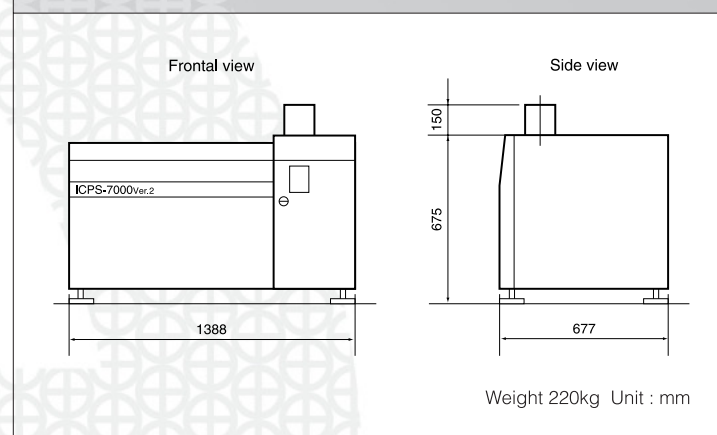
• A cooling water circulation device is optionally available.

6. Exhaust pipe (for the plasma torch)

As the exhaust gas, which is mostly argon, contains some metallic vapor or solvent vapor in it, install an exhaust pipe for removing such gases and vapors.

• For the details of installation, refer to the installation manual.

Dimensions of ICPS-7000Ver.2 main unit





LINEUP

Atomic Absorption Spectrophotometer

AA-6300



Sequential Plasma Spectrometer

ICPS-7510



Twin Sequential Plasma Spectrometer

ICPS-8100



Multitype Plasma Spectrometer

ICPE-9000



JQA-0376



SHIMADZU CORPORATION. International Marketing Division

3. Kanda-Nishikicho 1-chome, Chiyoda-ku, Tokyo 101-8448, Japan Phone: 81(3)3219-5641 Fax: 81(3)3219-5710
Cable Add.: SHIMADZU TOKYO

SHIMADZU EUROPA GmbH

Albert-Hahn-Strasse 6-10, 47269 Duisburg, F.R. Germany Phone: 49(203)7687-0 Fax: 49(203)766625

SHIMADZU (ASIA PACIFIC) PTE LTD.

16 Science Park Drive #01-01 Singapore Science Park, Singapore 118227, Republic of Singapore
Phone: 65-6778-6280 Fax: 65-6779-2935

SHIMADZU DO BRASIL COMÉRCIO LTDA.

Avenida Marquês de São Vicente, 1771. Barra Funda CEP: 01139-003-São Paulo-SP, Brasil
Phone: (55)11-3611-1688 Fax: (55)11-3611-2209

SHIMADZU (HONG KONG) LIMITED

Suite 1028 Ocean Center, Harbour City, Tsim Sha Tsui, Kowloon HONG KONG
Phone: (852)2375-4979 Fax: (852)2199-7438

SHIMADZU INTERNATIONAL TRADING (SHANGHAI) Co., LTD. SHANGHAI OFFICE

24th Floor, Shanghai Xin Hualian Building, No.755 Huaihai Zhong Lu, Shanghai, China
Phone: 86-21-6472-8442 Fax: 86-21-6472-8648

Overseas Offices

Istanbul, Beijing, Shanghai, Guangzhou, Shenyang, Chengdu, Moscow

URL <http://www.shimadzu.com>

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