

ICPE-9000

Shimadzu
Multitype ICP Emission Spectrometer





Higher accuracy analysis and easier operation
show we've put a lot of thought into the basics
of our analytical devices

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Higher accuracy analysis and easier operation show we've put a lot of thought into the basics of our analytical devices

ICP emission spectrometers are analytical instruments used in a broad range of fields. They feature high ppb level detection ability, broad 5-6 digit analysis concentration ranges, and batch analysis of multiple elements. Recent wider usage has resulted in an increased demand for shorter analysis times and improved high-matrix sample detection. As a result, we have developed two models - a "multitype" using a semiconductor detector to shorten analysis times, and a high-resolution sequential type for improved detection.

Shimadzu's ICPE-9000 multitype ICP emission spectrometer includes our new ICPEsolution software, a radical departure from conventional thinking.

Making full use of the ICPE-9000's multitype performance, problems with measurement samples can be evaluated in a number of ways. The Assistant Function automatically carries out wavelength selection for measured elements and interference correction for coexisting elements, tasks that typically relied on the skill of the analyst. Simple and accurate measurement is possible even with hard-to-measure high-matrix samples.

MULTITYPE ICPEsolution

Assistant software simplifies plasma emission spectroscopy

Non-interfering wavelengths are automatically distinguished from multiple wavelengths for each measurement sample

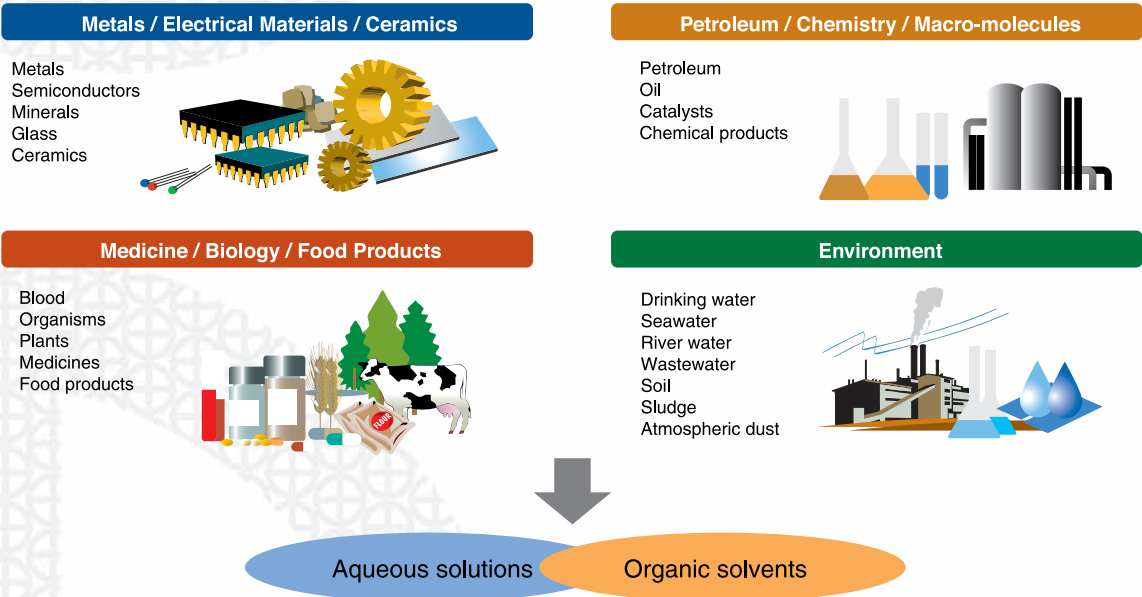
Multifaceted diagnosis of coexistent element interference quantities
Methods are automatically corrected, based on determining the necessity of each type of correction

Simple
and Accurate

Simply
and accurately measure
all types of samples

Ultra-Trace Element Detection and Component Analysis for Highly Precise Analytical Results

In addition to standard high-precision elemental analysis for R&D, Shimadzu's ICPE-9000 multitype emission spectrometer can also be used in application stages requiring high-precision analytical assessments, including elemental analysis of important major elements for production control, activities requiring environmental management analysis such as water quality control, ultra-trace element analysis and high-concentration component analysis.



ICPE-9000 element analysis

1 ppb and below

Between 1 and 10 ppb

Between 10 and 100 ppb

100 ppb and above

1a	2a	3b	4b	5b	6b	7b	8			1b	2b	3a	4a	5a	6a	7a	0
H ¹																He ²	
Li ³	Be ⁴											B ⁵	C ⁶	N ⁷	O ⁸	F ⁹	Ne ¹⁰
Na ¹¹	Mg ¹²											Al ¹³	Si ¹⁴	P ¹⁵	S ¹⁶	Cl ¹⁷	Ar ¹⁸
K ¹⁹	Ca ²⁰	Sc ²¹	Ti ²²	V ²³	Cr ²⁴	Mn ²⁵	Fe ²⁶	Co ²⁷	Ni ²⁸	Cu ²⁹	Zn ³⁰	Ga ³¹	Ge ³²	As ³³	Se ³⁴	Br ³⁵	Kr ³⁶
Rb ³⁷	Sr ³⁸	Y ³⁹	Zr ⁴⁰	Nb ⁴¹	Mo ⁴²	Tc ⁴³	Ru ⁴⁴	Rh ⁴⁵	Pd ⁴⁶	Ag ⁴⁷	Cd ⁴⁸	In ⁴⁹	Sn ⁵⁰	Sb ⁵¹	Te ⁵²	I ⁵³	Xe ⁵⁴
Cs ⁵⁵	Ba ⁵⁶	* L ⁵⁷	Hf ⁷²	Ta ⁷³	W ⁷⁴	Re ⁷⁵	Os ⁷⁶	Ir ⁷⁷	Pt ⁷⁸	Au ⁷⁹	Hg ⁸⁰	Tl ⁸¹	Pb ⁸²	Bi ⁸³	Po ⁸⁴	At ⁸⁵	Rn ⁸⁶
Fr ⁸⁷	Ra ⁸⁸	** A ⁸⁹															

* L ⁵⁷	La ⁵⁸	Ce ⁵⁹	Pr ⁶⁰	Nd ⁶¹	Pm ⁶²	Sm ⁶³	Eu ⁶⁴	Gd ⁶⁵	Tb ⁶⁶	Dy ⁶⁷	Ho ⁶⁸	Er ⁶⁹	Tm ⁷⁰	Yb ⁷¹	Lu ⁷²	ICPE-9000 detection limits (ppb)
** A ⁸⁹	Ac ⁹⁰	Th ⁹¹	Pa ⁹²	U ⁹³	Np ⁹⁴	Pu ⁹⁵	Am ⁹⁶	Cm ⁹⁷	Bk ⁹⁸	Cf ⁹⁹	Es ¹⁰⁰	Fm ¹⁰¹	Md ¹⁰²	No ¹⁰³	Lr ¹⁰⁴	
<div> <div>1 ppb and below</div> <div>Between 1 and 10 ppb</div> <div>Between 10 and 100 ppb</div> <div>100 ppb and above</div> </div>																

Leading-Edge Proprietary Analysis Technology for Superior Reliability and Operability

Accurate calculation of interference element types and interference quantities

Spectral Interference Elements Database

Adds data on the interference amount due to adjacent coexistent element spectrums to the conventional wavelength database. This, in turn, allows accurate calculation of the extent of interference with analysis data from coexistent elements.

Information on interference amount for all interference elements

Accurate evaluation of interference amounts from coexisting elements

Simple selection of analysis elements

Method Development Assistant

After simply choosing elements for analysis from the qualitative results, the Method Development Assistant automatically selects the optimal wavelength from the interference element database. When necessary, correction information is automatically created by the Assistant, which means that the same high-level measurement conditions created by experienced analysts through trial and error can now be easily reproduced.

Automated setting of measurement conditions

Simple creation - simply select the analysis elements

Database calibration feature allows all-element calibration

Qualitative Database Calibration

The ICPE-9000 is equipped with qualitative database calibration functionality based on a mixed sample of multiple elements. Perform all-element calibration simply and quickly.

All-element batch calibration

All elements calibrated simply and quickly

Automatic selection of optimal analysis wavelengths

Automatic Wavelength Selection System

The ICPE-9000 automatic wavelength selection system completely automates the troublesome task of wavelength selection. After measurement, the optimal wavelength is selected for the measurement sample from all of the wavelengths registered, and the measurement results are then displayed. Further, the optimal wavelength is selected for each measurement sample, ensuring reliable results, even with unanticipated spectral interference.

Fully automatic analysis wavelength selection

**Automatic selection of the optimal wavelength for each measurement sample
Can also handle spectral interference**

Automated sample investigation after measurement

Method Diagnosis Assistant

In many multitype ICP spectrometers, measurement may be possible even without a pre-measurement evaluation of the analysis sample, but evaluation after measurement is extremely difficult. Depending on the sample, if a time-consuming evaluation is not carried out, accurate results may not be obtainable. The ICPE-9000 offers a key advantage over other spectrometers with its Method Diagnosis Assistant, which automates the troublesome work of evaluation, corrects incomplete methods, and determines accurate values through recalculation.

Automation of post-measurement evaluation

Easy method correction and recalculation

Simplifying Measurement and Utilizing Ideas for Maintaining

The ICPE-9000 is a high-performance high-throughput ICP, with all of the features required of an ICP emission spectrometer, including reduced running costs,

highly stable performance, high sensitivity and low contamination.

Shimadzu's accumulated experience has been utilized to minimize error sources arising in

Echelle spectrometer and CCD detectors

High Throughput

A large-scale 1-inch CCD detector with a large number of elements has been adopted, together with an Echelle spectrometer, providing high-speed measurement. Measurements that would take five minutes or more with a sequential-type device are now completed in only a few minutes. In addition, evaluation and recalculation is simple, as all-element and all-wavelength data is acquired during measurement. If the Assistant is used, the evaluation is completed quickly and automatically.

Adopting a vacuum spectrometer

Eliminates the Need for Spectrometer Purge Gas

The ICPE-9000 utilizes a vacuum spectrometer, the first of its kind in an ICP emission spectrometer equipped with semiconductor detectors. A vacuum spectrometer does not require high-purity gas for internal gas purging.

This reduces running costs since no gas other than the Argon used in the measurement is required.

Equipped with Mini Torch

Low Running Costs

The ICPE-9000's mini torch reduces consumption of argon gas to half that of conventional torches.

The mini torch's automatic radio frequency power source tuning provides approximately the same sensitivity as a conventional torch.

Performance quality is maintained even during long-term measurements

Extremely Stable Vacuum Spectrometer

Spectrometer stability is extremely important for stable measurement over extended periods. Spectrometer temperature is controlled to a highly precise ± 0.1 degrees Celsius, and since no gas with an impact on thermal control is used, the unit demonstrates stable performance even during long-term analysis.

In addition, since the vacuum spectrometer always maintains a vacuum, contamination does not occur. Even during long-term use, there is basically no reduction in sensitivity due to contamination.



Reducing Running Costs Performance Stability

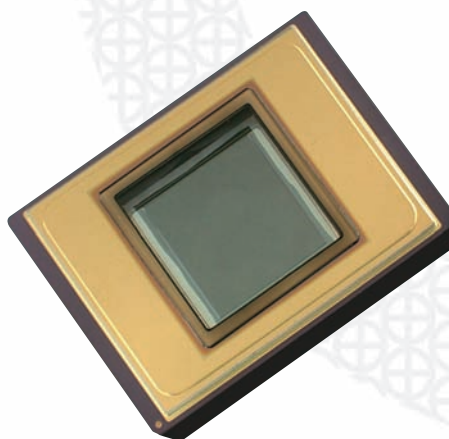
each of the device's components, from the light source ICP to the spectrometer and detectors. This ensures the ICPE-9000 is always stable, and measurements are always assured.

Low noise, high sensitivity

Large-scale 1-inch CCD

The ICPE-9000 is equipped with a large-scale 1-inch CCD. In multitype devices, semiconductor detectors with a large number of elements are indispensable for increasing resolution. However, with small-sized detectors, pixel size is reduced, which, in turn, reduces the amount of light captured by each pixel. With the ICPE-9000, a large-scale 1-inch CCD is used, eliminating this problem.

In addition, in comparison with conventional semiconductor detectors, the ICPE-9000 runs at a relatively high cooling temperature (-15 degrees Celsius), which shortens the initial stabilization period and provides long-term stability.



Large-scale 1-inch CCD

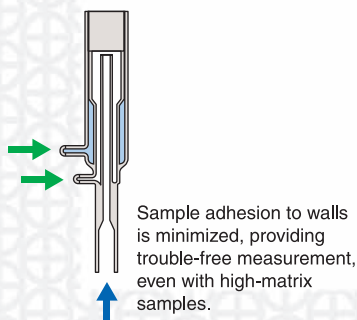
A vertical torch layout

Minimizes Contamination and Blockages, Ensuring even High-concentration Samples are Safe

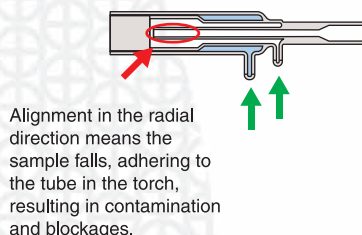
Standard ICP emission spectrometers with axial observation are not ideal for high-matrix samples. For this reason, options are used to reduce the quantity of sample introduced. Often, torch layout direction is the primary cause of contamination and blockages. With a radial-axis torch layout, gravity causes the sample to gradually fall while it moves through the torch, leading to adhesion to the walls, contamination and torch blockage.

With the ICPE-9000, a vertical torch orientation is used in order to solve these problems. As a result, even with high-matrix samples, contamination and torch blockages are minimized, ensuring stable measurement.

Vertical Orientation ICPE-9000



Radial Orientation Conventional device



Easily Perform Analysis From the

Once measurement elements have been determined, measurement with the Multitype ICPE-9000 is simple with the system method.

Even if element selection is incorrect, recalculation without remeasurement is simple, due to the storage of all elemental data.

Equipped with qualitative database calibration

Sample Measurement is Simple Using High-Precision Qualitative Analysis

Measurement of completely new samples is simple, even if both elements and concentrations are not known. The elements present and their concentrations can be easily determined using the ICPE-9000's all-element qualitative analysis method.

With the ICPE-9000, the qualitative database can be calibrated quickly and easily, resulting in consistently accurate qualitative results. Further, the use of an automatic wavelength selection system ensures accurate qualitative results are obtained with negligible impact from spectral interference.

ICPEsolution

High-precision qualitative analysis

Qualitative Database Calibration

Qualitative results are highly reliable thanks to the automatic wavelength selection system and fast calibration of the all-element qualitative database.



Highly reliable qualitative results, even from actual samples
No need for time-consuming comparative examination with a standard sample.

Soil Analysis (Conventional device)

1000mg/L =>	B 23	Zn 2.0		
1mg/L =>	Cr 144	Cd 156	Pb 300	
< 1ug/L				
Not Detected ug/L	As < 100			



With conventional ICP units, various elements are shown at incorrect values due to spectral interference from iron in the soil.

Soil Analysis (ICPE-9000)

1000mg/L =>				
1mg/L =>	B23	Cd 29		
< 1ug/L				
Not Detected ug/L	As < 100	Cr < 50	Pb < 80	Zn < 8



With the ICPE-9000, accurate values are shown due to wavelengths being unaffected by spectral interference from iron in the soil.



First Sample

With sequential-type units, remeasurement is required, and measurement conditions must be checked a number of times prior to

measurement.
However, with the ICPE-9000, these measurements can all be done simply.

Method Development Assistant automatically generates measurement conditions Easily Set Accurate Conditions

The Method Development Assistant generates measurement conditions based on the results of the all-element qualitative analysis. If elements are selected from the qualitative results listed, the optimal measurement wavelength and information about the calibration curve sample are automatically created.
If interference cannot be avoided, correction information including BG Correction and IEC is also automatically generated.

Simple Element and Wavelength Selection Using the Method Development Assistant

Statistical values are shown for each elemental concentration from the all-element qualitative results for the measurement sample. Simply by selecting the elements requiring measurement, the optimal wavelengths for each element's concentration are automatically selected.

Selection of quantitative elements from the all-element concentration chart

Elem	Minimum Conc	Maximum Conc
36 Na	1.0 mg/L	1.0 mg/L
37 Nb	0.00 ug/L	16 ug/L
38 Nd	0.00 ug/L	37 ug/L
39 Ni	1.6 mg/L	1.6 mg/L
40 Os	68 ug/L	68 ug/L
41 P	0.00 ug/L	0.13 mg/L
42 Pb	2.1 mg/L	2.1 mg/L
43 Pd	3.2 mg/L	3.2 mg/L
44 Pr	0.00 ug/L	47 ug/L

Elem	Quant Lower	Quant Upper	Unit
1 As	0.100000	2.00000	mg/L
2 B	0.200000	3.00000	mg/L
3 Cd	0.200000	3.00000	mg/L
4 Pb	0.200000	3.00000	mg/L

Confirmation of the quantitative element's concentration range

ICPEsolution

Method Development Assistant
automatically creates measurement conditions

Method Development Assistant

Automatically creates **Measurement Wavelength** and **Calibration Curve Information**.

If interference is unavoidable,

Correction Information is also automatically created.



Simple and accurate setting of conditions

Automatic Generation of Measurement Wavelengths and Calibration Samples

The optimal measurement wavelength is automatically selected from the quantitative element concentration range. The Assistant also automatically generates the calibration sample.

Elem	Unit	Concentration Range	Cal	Cal
As	mg/L	0.10000 - 2.00000	0.100000	2.00000
B	mg/L	0.20000 - 3.00000	0.200000	3.00000
Cd	mg/L	0.20000 - 3.00000	0.200000	3.00000
Pb	mg/L	0.20000 - 3.00000	0.200000	3.00000

Automatically creates calibration sample information

Automatically Creates Interference Correction Information

The necessity of BG correction and IEC is evaluated from the quantitative element concentrations and the concentration of interference elements.

Elem	Unit	Concentration Range	Analysis Wavelength
As	mg/L	0.10000 - 2.00000	193.300 nm
B	mg/L	0.20000 - 3.00000	248.300 nm
Cd	mg/L	0.20000 - 3.00000	228.800 nm
Pb	mg/L	0.20000 - 3.00000	283.300 nm

Displays interference information

Elem	Unit	Concentration Range	Spectral Interference Element
As	mg/L	0.10000 - 2.00000	193.300 nm
B	mg/L	0.20000 - 3.00000	248.300 nm
Cd	mg/L	0.20000 - 3.00000	228.800 nm
Pb	mg/L	0.20000 - 3.00000	283.300 nm

Automatically creates IEC information

Easily Measure a Variety of Sample

Many samples have virtually no coexistent elements other than the elements to be measured, and wavelength selection is easy. However, when there are a large number of coexistent elements in addition to

the elements to be measured, a variety of interference occurs. Typical wavelengths can no longer be used and wavelength examination is required. Furthermore, when concentrations are high and the amount of

Equipped with an automatic wavelength selection system

Simplified Wavelength Selection

With conventional instruments, measurement of multiple types of samples under a single measurement condition (wavelength) is very difficult. Typically, the measurement method involves selecting multiple wavelengths. However, when measurements are made at multiple wavelengths, measurement results are obtained equal to the number of selected wavelengths, which then require wavelength examination. With the ICPE-9000, only a single optimal measurement result is shown, regardless of the number of wavelengths registered. All elements included in the measurement sample are monitored, and interference from the various wavelengths of the measured elements is automatically evaluated. The optimal wavelength for measurement is automatically selected, thereby obtaining accurate measurement results.

Echelle spectrographic method compatible database

Accurate Automatic Wavelength Selection with an Exclusive Database

The ICPE-9000 is equipped with an exclusive interference database. Interference elements and interference amounts for all measurement wavelengths are stored in a database. This means that interference elements and their interference amounts can be evaluated using only measurement sample data. As a result, optimal wavelengths having no interference can be accurately and automatically selected.

Multiple displays of measurement results

Conventional Echelle instrument measurement

Element and Wavelength	Sample A	Sample B
1. Cd 226nm	5.6	78.5
2. Cd 228nm	37.9	7.1

Units: ppm

Multiple results with different values are displayed since the presence of interference cannot be determined. Depending on the device, a simple average of these values may also be displayed. An analyst's skill is required for a correct

Display of only a single measurement result

ICPE-9000

Element and Wavelength	Sample A	Sample B
1. Cd 226nm	5.6	—
2. Cd 228nm	—	7.1

Units: ppm

Measurement results are automatically evaluated, and unnecessary data is not displayed. Anyone can accurately measure samples.

ICPEsolution

Multiple wavelength selection is possible

Automatic Wavelength Selection System

Automatically selects the optimal wavelength for analysis

Wavelengths are selected with no respective interference from multiple samples



Wavelength evaluation and selection are not required

ICPEsolution

All measurement wavelength interference elements and interference amounts are stored in a database

Interference Database

ICPE-9000 exclusive database
Additional measurement of interference element standard samples is not required.



Accurate evaluation of interference quantities

Types

interference is excessive, a high-resolution sequential-type device is required for accurate measurement.

With the ICPE-9000, combining an automatic wavelength selection system with the IEC

ensures accurate measurement is simple, even for samples requiring wavelength examination and even for samples with many matrix components that require a high-resolution sequential type unit.

Method Diagnosis Assistant checks the causes of errors

Confirmation of Measurement Results is Easy

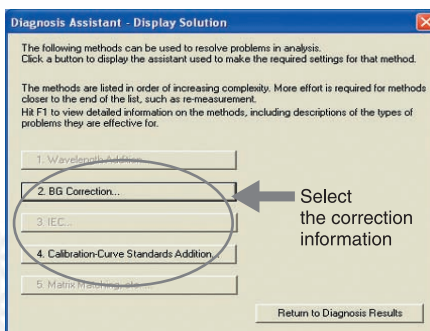
With ICP emission spectrometers, measurement errors can have a number of causes, including physical interference, ionization interference and spectral interference. For this reason, a determination of whether or not the measurement results are truly the correct values is sometimes required. The ICPE-9000's Method Diagnosis Assistant, however, evaluates the causes of errors for each measurement sample. The solution method is displayed so that the optimal method is used, based on the results of the diagnosis, allowing simple adjustment of the method.

Method diagnosis results

No.	Sample Name	Problem	Elem
1	6 Y-2	There are elements for which the BG differs.	Al
2	6 Y-2	There are elements for which the sensitivity is insufficient.	Al
3	6 Y-2	There are elements for which the quantitation upper limit is exceeded.	Cu
4	6 Y-2	There are elements for which the quantitation upper limit is exceeded.	NI
5	6 Y-2	There are elements for which the BG differs.	Se
6	6 Y-2	There are elements for which the sensitivity is insufficient.	Se
7	6 Y-2	There are elements for which the BG differs.	Sn
8	6 Y-2	There are elements for which the sensitivity is insufficient.	Sn

Methods are evaluated for each element and each sample. If there are differences from the analysis values, the problem point is indicated.

Solution method



Calibration information is added to the method simply by selecting the solution method in the sequence shown. Method is automatically modified.

ICPEsolution

Diagnosis Assistant checks error causes

Method Diagnosis Assistant

Diagnosis of error causes for each measurement sample
Error correction solutions are displayed
and method is easily modified



Accurate measurement results with minimal errors

The Method Diagnosis Assistant automatically generates IEC information


















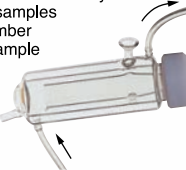


High-precision Measurement is Simple with IEC


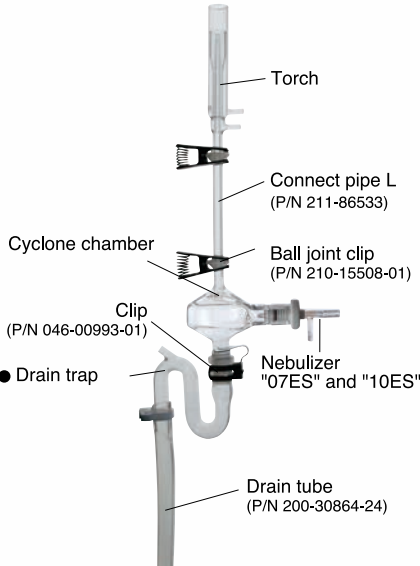




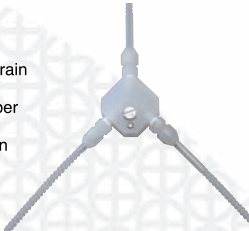




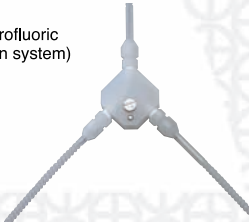
For samples with multiple matrix components, spectral interference occurs at all wavelengths, and accurate analysis may not be possible. For this type of sample, a high-resolution sequential-type analyzer has been the logical choice. The ICPE-9000, however, utilizes IEC to ensure accurate measurement.

In general, IEC requires specialized knowledge for creating calibration curve samples and for calculating correction factors. However, with the ICPE-9000, only a single sample is required in order to add a calibration sample to the calibration curve sample. Further, if the Method Diagnosis Assistant is used, both correction information and calibration sample data are automatically created, allowing the simple implementation of IEC.

Accessories, Option

Note) Purchase items individually for sample types without a part number (P/N)

Sample Type	Item	Nebulizers	Sample Take-up Tubing	Chambers
Standard Set ICPE-9000 Standard Accessories		Nebulizer, 10ES (P/N 046-00092-02) Designed for high-concentration samples, with high-efficiency nebulization. (Sample take-up rate approx. 1 ml/min)  Sample take-up tube ASSY, S-075 Connector, QSM (P/N 046-00092-09) Tube adaptor, 0735 (P/N 046-00092-10) These are included. 	take-up tube, S-075 (P/N 046-00092-06) For "10" and "07" nebulizers. 	Cyclone chamber, HE (P/N 046-00093-02)  Locking screw, 0152 (P/N 046-00093-92) Seal, 0237 (P/N 046-00093-93) These are included.
For Small Amounts of Samples		Nebulizer, 07ES (P/N 046-00092-01) A nebulizer with high-efficiency nebulization. (Sample take-up rate approx. 0.6 ml/min)  Sample take-up tube ASSY, S-075 Connector, QSM (P/N 046-00092-09) Tube adaptor, 0735 (P/N 046-00092-10) These are included. 	take-up tube, S-075 (P/N 046-00092-06) For "10" and "07" nebulizers. 	Cyclone chamber, HE (P/N 046-00093-02)  Locking screw, 0152 (P/N 046-00093-92) Seal, 0237 (P/N 046-00093-93) These are included.
High Salt Samples (Used to inject high salt concentration samples)		Nebulizer, 10ES (P/N 046-00092-02) (Sample take-up rate approx. 1 ml/min)  Sample take-up tube ASSY, S-075 Connector, QSM (P/N 046-00092-09) Tube adaptor, 0735 (P/N 046-00092-10) These are included. 	take-up tube, S-075 (P/N 046-00092-06) For "10" and "07" nebulizers. 	Cyclone chamber, HE (P/N 046-00093-02)  Locking screw, 0152 (P/N 046-00093-92) Seal, 0237 (P/N 046-00093-93) These are included.
Organic Solvent Samples (Injection systems for organic solvents)		Nebulizer, 10ES (P/N 046-00092-02) (Sample take-up rate approx. 1 ml/min)  Sample take-up tube ASSY, S-075 Connector, QSM (P/N 046-00092-09) Tube adaptor, 0735 (P/N 046-00092-10) These are included. 	take-up tube, S-075 (P/N 046-00092-06) For "10" and "07" nebulizers. 	Chamber drain straight (P/N 211-80437-01)  Nebulizer holder kit type 2 (P/N 211-48062) Includes organic solvent resistant O-rings. They are attached to each chamber other than the cyclone chamber, and are used to support nebulizers. 
Organic Solvent Samples (Water-cooled chamber) (Controls evaporation of solvents)				Water-cooled chamber kit (P/N 211-43472) This increases injection efficiency of organic solvent samples by cooling the chamber and suppressing sample evaporation within the chamber.  *Cooling water circulator is necessary.
Hydrofluoric acid sample injection system (P/N 211-42853-03) (Used for hydrofluoric acids)		Hydrofluoric acid nebulizer (P/N 046-00092-14) Includes sample take-up tube.  PTFE Tube, 1.27 x 1500L (P/N 046-00092-03) Tube adaptor, 0735 (P/N 046-00092-10) These are included.		Chamber ASSY (P/N 205-07778-02) 

Torches		Drains	Other
Mini torch (P/N 211-81448) 		 <p>(Cyclone chamber assembly)</p>	Orifice ASSY L (P/N 211-84352-91)
Mini torch (P/N 211-81448) 			Water bubbler (P/N 204-19281) Used to prevent blockages in the nebulizer when analyzing samples containing large amounts of sodium. Inserted in the carrier gas pathway. 
Torch for high-concentration salt solution samples (P/N 204-74323) Used when introducing an undiluted solution of a sample where the base element is of the % order of concentration. 			Orifice ASSY (P/N 211-43740)
Torch (P/N 204-70272) 	Drain kit (P/N 211-86140-91) Used for chamber drain (straight), water-cooled chamber kit and hydrofluoric acid sample injection system. Can also be used for organic solvents. 	Radial view unit (P/N 211-86200-91) Used for measurement of organic solvent samples and hydrofluoric acid samples. Used for measurement of organic solvent samples and hydrofluoric acid samples. *If installing the ICPE-9000 for the first time, please purchase a unit equipped with the axial/radial switching function.	Extension pipe L (P/N 211-86533)
Organic solvent torch (P/N 204-77296) Used when analyzing organic solvent samples that are difficult to inject into the plasma. 	Drain kit (P/N 211-86140-91) 	Low-temperature thermostatic chamber NCB-1200 (SP) for water-cooled chambers (P/N 044-01910-01) Radial view unit (P/N 211-86200-91) Used for measurement of organic solvent samples and hydrofluoric acid samples. *If ordering this unit with ICPE-9000, please purchase a ICPE-9000 equipped with radial view unit. (P/N 211-86000-93) 	Extension pipe L (P/N 211-86533)
Demountable torch (P/N 205-09627-01) 	Drain kit (Included in the hydrofluoric acid sample injection system) (P/N 211-86140-91) 	Radial view unit (P/N 211-86200-91) Used for measurement of organic solvent samples and hydrofluoric acid samples. (Not included in the hydrochloric acid sample injection system. Please purchase separately.) *If ordering this unit with ICPE-9000, please purchase a ICPE-9000 equipped with radial view unit. (P/N 211-86000-93)	Connect pipe HFS (P/N 211-84175) (Included in the hydrofluoric acid sample injection system.)

Peripheral Equipment

Autosampler ASC-6100F

(P/N 206-50100-30)
(P/N 206-50100-39)

After placing the samples in the autosampler, sample names and analysis conditions can be set via a PC, and multiple samples can be continuously analyzed.

Size: W330 x D295 x H320mm
Power supply: Single-phase 100V 50/60Hz 1A (-30)
200V 50/60Hz 1A (-39)

Turntable cover

(P/N 206-50295-01)



Ultrasonic Nebulizer UAG-1

(P/N205-09295)

This is a sample injection system developed for high-sensitivity ICP analysis. Unlike a standard nebulizer that uses negative carrier gas pressure, this nebulizer uses ultrasonic energy to nebulize a solution.

Ultrasonic energy produces large amounts of extremely fine particles. This enables the ICPE-9000 to perform analyses at a sensitivity 10 times higher than conventional nebulizers.

Size: Main unit W320 x D380 x H540mm
Power supply: W382 x D360 x H159mm
Power supply: Single-phase 100V 50/60Hz 10A

* A cooling water system utility is required.



Table ND (with casters) (P/N 219-96005) (included)
Size: W600 x D480 x H750mm

Hydrofluoric Acid Sample Injection System HFS-2

(P/N211-42853-03)

Samples composed primarily of silicates, such as rocks, soil, cement and ceramics, are insoluble or dissolve poorly even in strong acids. If hydrofluoric acid is used to dissolve these samples, normal glass injection systems cannot be used. A sample dissolved in hydrofluoric acid can be injected into the plasma directly by using an injection system made of fluorinated ethylene resin.

*For system design information, refer to pages 12 and 13.



Hydride Generator HVG-ICP

(P/N211-40981)

The elements within the sample are reduced and vaporized by the nascent hydrogen generated in the decomposition of sodium borohydride. Only the gas phase is injected into the plasma, providing high-sensitivity measurement.

Size: W333 x D210 x H195mm
Power supply: Single-phase 100V 50/60Hz 2A



Cooling Water Circulator CA-1112

(P/N 044-01809-03)

Size: W340 x D384 x H851mm 41kg
Power supply: Single-phase 100V 50/60Hz 15A

* When only the main unit ICPE-9000 is connected, the stand cooling-water valve kit (P/N 211-86152-91) is needed.

* When the ultrasonic nebulizer UAG-1 is also connected, the stand cooling-water valve kit (in combination with UAG-1) (P/N 211-86152-92) is needed.



Low-temperature Thermostatic Chamber NCB-1200(SP)

(P/N 044-01910-01)

Used by CCD detector.

Size: W210 x D430 x H639mm 29kg
Power supply: Single-phase 100V 50/60Hz 9.5A

* To connect with the ICPE-9000 the CCD cooling-water valve kit (P/N 211-86150-91) is necessary.



Peristaltic Pump

(P/N 211-88177-91)

Used in high-viscosity sample analysis. Fixed sample injection is possible.



Software PKG ICPE-9000(E)

(P/N 211-44263-92)

Accuracy Control Software Package QAQC ICPE

(P/N 211-44280-91)

QAQC (for accuracy management) optional software.

Radial View Unit

(P/N 211-86200-91)

Used for measurement of organic solvent samples and hydrofluoric acid samples.

Tap Water Connection Kit

(P/N 211-86153-91)

Required when tap water is used to cool the ICPE-9000.

Specifications

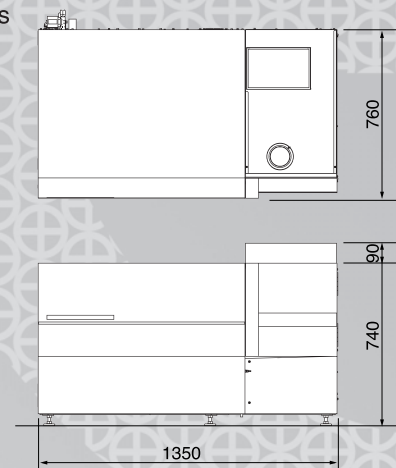
	ICPE-9000 (P/N211-86000-92)	ICPE-9000 with radial view unit (P/N211-86000-93)
Plasma Light Source		
Torch unit	Axial observation	Axial/radial observation
Sample misting chamber	Cyclone chamber	
Plasma torch	Either mini torch (standard accessory) or conventional torch can be used.	
Nebulizer	Coaxial type	
Radio Frequency Generator		
OscillatorSample	Crystal oscillator	
Maximum frequency output	1.6 kW	
Output stability	Within ± 0.3%	
Radio frequency circuit element	Transistor element	
Ignition method	Fully automatic	
Load matching	Automatic matching	
Spectrometer Unit		
Optical system	Echelle spectrometer	
Wavelength range	167nm to 800nm	
Detector	CCD	
Resolution	≤ 0.005nm @200nm	
Vacuum ultraviolet range compatibility	Vacuum spectrometer	
Spectrometer temperature	With thermal control	

Software

Wavelength automatic selection
Automatic generation of coexistent element information
Qualitative analysis
Quantitative analysis Can also store data for entire wavelength range
Accuracy control (optional)

External Dimensions

Unit: mm Weight: 270kg



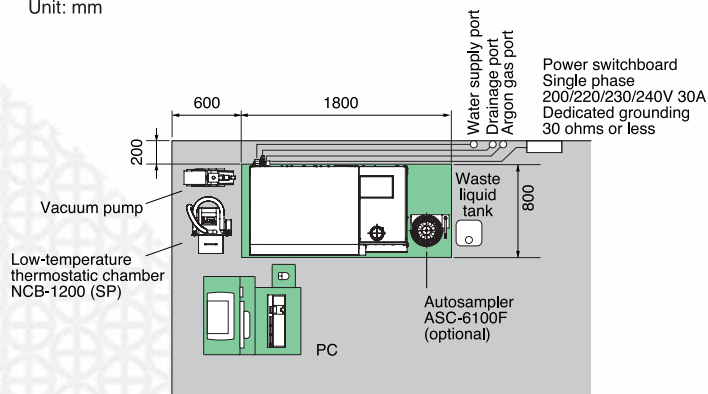
Installation

1. Installation room environment	Temperature: 18 to 28(rate of temperature change: 2 degrees Celsius /h or lower)
	Humidity: 20 to 70%
	Avoid locations with high levels of vibration or dust.
2. Power source	Main unit: Single-phase 200/220/230/240V $\pm 10\%$ (max 250V) 50/60Hz 30A
	Data processor unit: Please refer to the manual
	Options
	Laser printer: Please refer to the manual
	Autosampler ASC-6100F: Single-phase 100-240V $\pm 10\%$ 50/60Hz 1A
	Ultrasonic nebulizer UAG-1: Single-phase 100V $\pm 10\%$ 50/60Hz 10A
	Hydride generator HVG-ICP: Single-phase 100V $\pm 10\%$ 50/60Hz 2A
3. Grounding	All of the above are grounded and require 3-prong sockets.
	Check separately when using the cooling water circulator.
4. Gas installation	Resistance: independent grounding below 30 ohms
	Type: Argon gas of 99.95% or greater purity
5. Cooling water	Advjust so that argon gas supply pressure is 450 ± 10 kPa.
	Approximately one 7-cubic meter gas cylinder is required per 8 hours of operation.
6. Exhaust duct	Consumption rate of argon gas used in analysis is 0.74 cubic meters/h with the standard specifications.
	Plasma stand cooling water: Water temperature 5 to 30 flow rate 1L/min or more
7. Cooling water	CCD detector cooling water: Use Shimadzu's recommended cooler
	Note) UAG-1 requires separate cooling water supply.
8. Exhaust duct	Note) Cooling water circulator can also be used for plasma stand and UAG-1.
	Plasma stand and radio frequency power source exhaust duct
9. Exhaust duct	Exhaust gas from the plasma stand is primarily argon, however, be sure to install an exhaust duct, since this gas may also contain metallic vapors and solvents.

For details on other instruments, refer to the ICPE-9000 Installation Requirements Manual.

Installation Example

(ICPE-9000 and autosampler placed on a 1800 x 800 table)
Unit: mm



The following warning seals are affixed to this system.
Be careful when handling these areas.

1. At the gas purge tube



3. At the vacuum pump and valve



2. At the switch panel

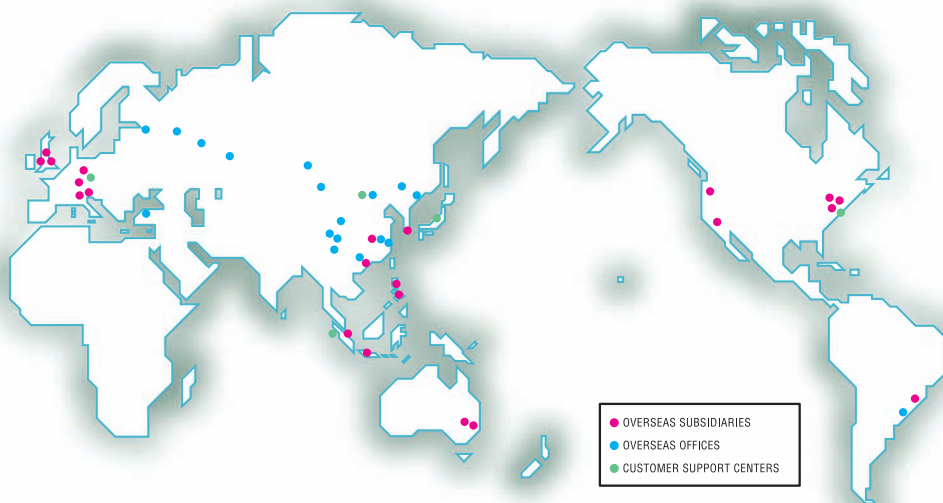


4. At the transformer



G L O B A L N E T W O R K

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JQA-0376

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