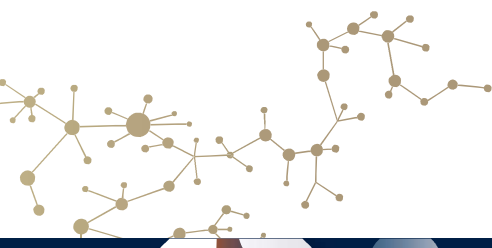


Hitachi Polarized Zeeman Atomic Absorption Spectrophotometer

ZA4000 Series

HITACHI
Inspire the Next



ZA4000 Series



Science for
a better tomorrow

Taking Hitachi Atomic Absorption Spectrophotometers into a Next Stage

ZA4000 Series

Hitachi atomic absorption spectrophotometers have undergone a further evolution with upgrades to Hitachi's polarized Zeeman correction method technology, a unique technology that pioneered an era in spectrophotometry.

Hitachi offers high-precision background correction and high-sensitivity measurement by employing the polarized Zeeman correction method alongside the dual detector method.

The addition of a new rapid sequential mode* (supports the flame method) makes it possible to perform even higher throughput analysis, allowing for fast, precise, and highly reproducible measurements in a variety of fields, including research and quality management.

* A mode that sequentially analyzes multiple elements

ZA4000 Series

3 Polarized Zeeman Correction Method, Dual Detector Method

Baseline stability
Offers high-sensitivity measurement

5 Multi-elements Measurement NEW

Supports sequential measurement
Offers higher throughput with unique Hitachi technology

7 Flame

Voice guidance function
Auto start function

11 Graphite Furnace

Diagnosis system for low concentration analysis NEW
Automatic bump detection function
Reduced contamination with isolated atomizer unit

15 Software

Real-time display of atomizer profiles

17 Unwavering Performance

Cumulative number of installed units >10,000

Application



Environment

- Analysis of toxic metals in environmental water (sea water, river water) and factory wastewater
- Analysis of toxic metals in soil (extracted liquids, eluates)



Food

- Analysis of toxic metals, mineral components, and sodium (salt content) in foods and drinks
- Analysis of toxic metals in animal feed



Energy

- Analysis of lead in gasoline
- Analysis of main component metals and trace metals in lithium ion battery materials



Plating

- Analysis of main component metals in plating liquid
- Analysis of metal impurities in plating liquid



Materials

- Analysis of impurities and toxic metals in paint
- Analysis of plasticizers (metals) in materials



Pharmaceuticals

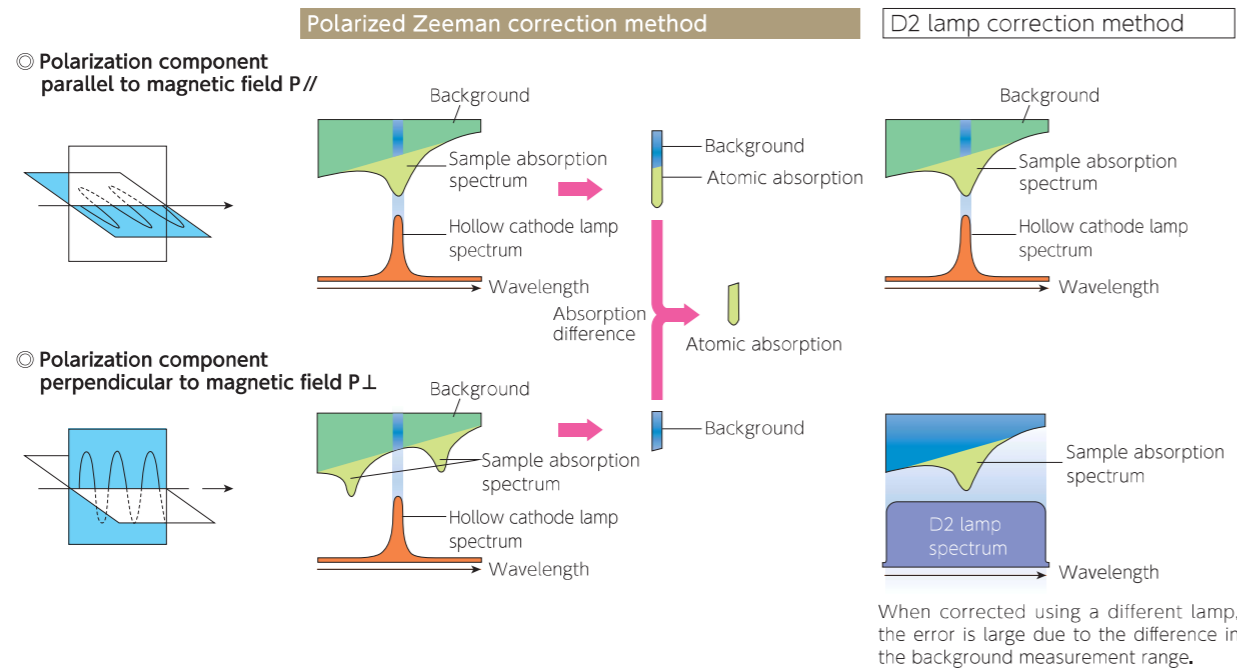
- Evaluation of residual amounts of catalyst metals in pharmaceuticals
- Evaluation of residual amounts of toxic metals in pharmaceuticals



Polarized Zeeman Correction Method

Background Correction Using Only Hollow Cathode Lamp

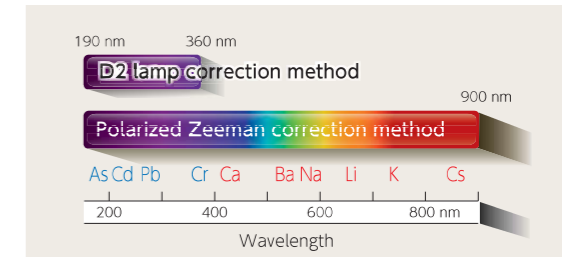
The polarized Zeeman correction method, which uses a permanent magnet, provides a stabilized baseline, suppresses the effects of coexisting materials that have absorption of adjacent wavelengths, and facilitates highly reliable analysis.



Wide Background Detection Range

All Elements are Covered by the Polarized Zeeman Correction Method

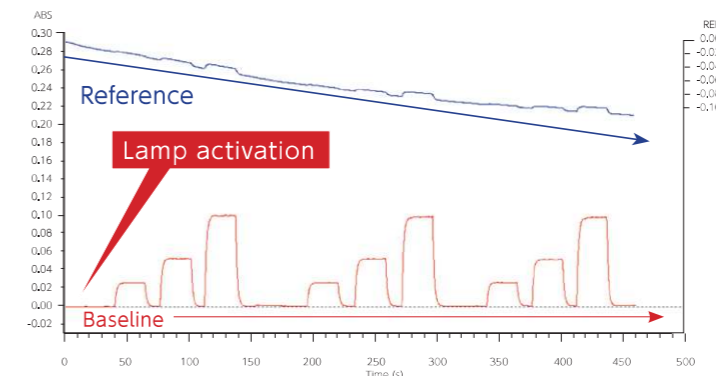
Background correction can be performed for elements that have absorption in the ultraviolet range or visible range. The polarized Zeeman correction method is one choice of correction method, and has the advantage that it does not need to be selected for each element. It can also correct elements that cannot be corrected by the D2 lamp correction method, such as sodium and potassium.



Baseline Stability

The Baseline is Stable Immediately after Lamp Activation

The polarized Zeeman correction method performs correction using a single line from a hollow cathode lamp, providing a stable baseline regardless of variations in lamp brightness. Even if there are many elements to measure, this baseline stability leads to reduced lamp stabilization time and faster analysis speed.

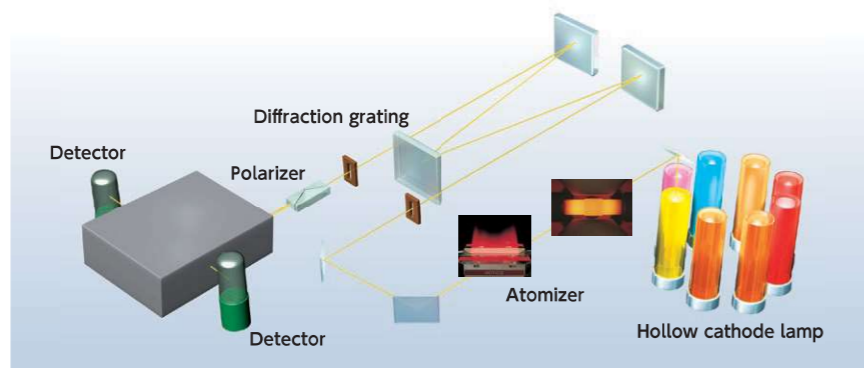


Since the baseline is stable despite variations in the reference signal (blue), measurement can be performed immediately.

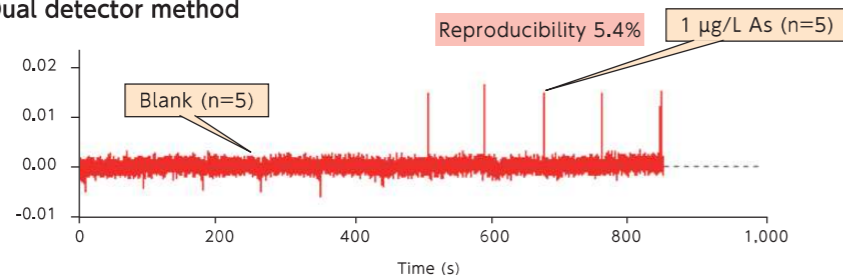
Dual Detector Method

Increases the Amount of Sampled Light and Reduces Noise

The dual detector method, by which the sample light and reference light are sampled by independent detectors, reduces the baseline noise. The two lights are also detected simultaneously, which increases the accuracy of corrections.



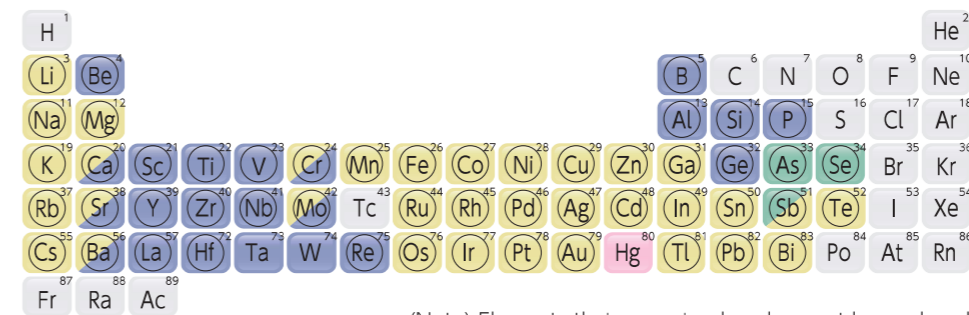
Dual detector method



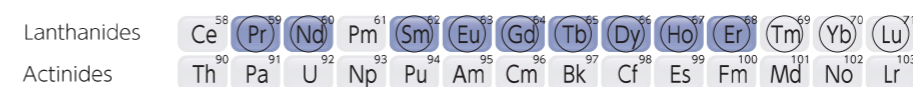
Support for Multiple Elements

The Polarized Zeeman Correction Method Can Also Be Used with Measurements Using Accessories

The polarized Zeeman correction method and dual detector method are employed for measurements using any of the flame method, graphite method, or hydride method.



(Note) Elements that are not colored cannot be analyzed.



High-Accuracy, High-Speed Measurement by Rapid Sequential Mode NEW

Offering Sequential Measurement of a Maximum of 12 Elements and Faster Speed

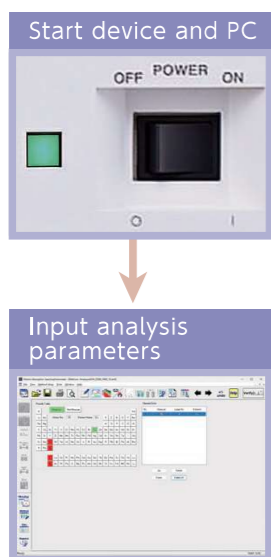
Hitachi has achieved even higher speed in measurements by combining the existing polarized Zeeman correction method with a newly developed diffraction grating drive mechanism. This provides much faster measurements for users who are measuring multiple elements in the same sample using the flame method.

Rapid Sequential Flame Model

ZA4800

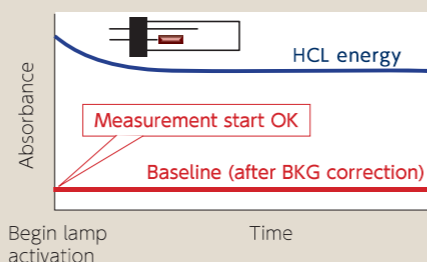


Rapid Sequential Mode



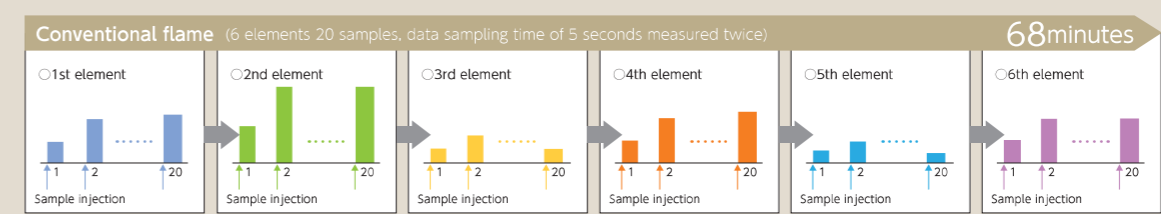
Lamp activation Baseline Stability Through Polarized Zeeman Correction Method

With the polarized Zeeman correction method, which performs measurement using only a hollow cathode lamp, measurement can start without waiting for the lamp stabilization time. Even if multiple element lamps are activated at the same time, since the baseline is stable regardless of the type of lamp, this correction method can exploit the advantages of sequential measurement.



Measurement Increased Measurement Speed with Newly Developed Diffraction Grating Drive Mechanism

High-speed measurement has been realized by employing a new optical system that increases the drive speed of the diffraction grating. A maximum of 12 elements can be sequentially measured by activating 4 hollow cathode lamps at the same time.

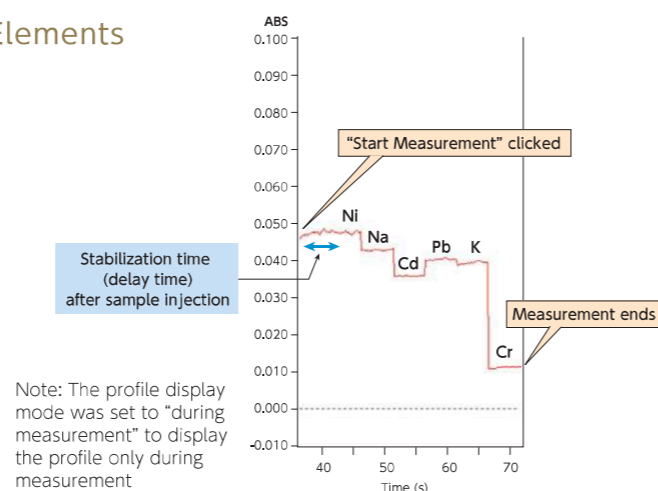


Rapid Sequential Measurement

Sequential Measurement of Multiple Elements with a Single Sample Injection

When 6 elements are measured in rapid sequential mode, the absorbances of the 6 elements are measured sequentially while the diffraction grating is driven at high speed, with only one sample injection needed. The measurement results for the 6 elements can be output simultaneously by performing this measurement repeatedly.

The profile on the right is the atomizer profile of each of the 6 elements when measured with a data sampling time of 5 seconds.



Reduced Running Costs

Reduced Running Costs with Fast Startup and Short Measurement times

Using the polarized Zeeman correction method for rapid baseline stability and the rapid sequential mode, the lamp-on time and flame operation time can be reduced, thereby reducing running costs.

Worker-Friendly Process Flow

Reduced Repetitive Sample Injection Tasks

Since the rapid sequential mode measures multiple elements with a single sample injection, there is no need to frequently change the sample. For example, measuring 6 elements in 20 samples would normally require 120 sample injections. However, with the rapid sequential mode, the measurement is completed with only 20 injections.

Tandem (Flame and Graphite Furnace) Model

ZA4000



Flame Model

ZA4300



Rapid Sequential Flame Model

ZA4800



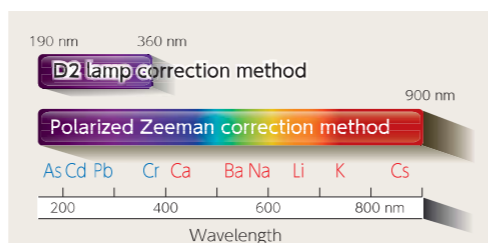
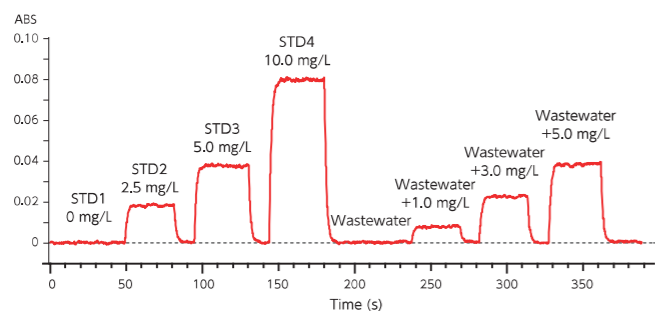
Background Correction by Polarized Zeeman Correction Method that is Unique to the Technology of Hitachi

ZA4000 ZA4300 ZA4800

Providing High-Precision Background Correction Across All Wavelengths

High-precision background correction can be performed, even for elements like cesium, which has a long absorption wavelength (852.1 nm).

Analysis of cesium in wastewater



Analysis of cesium in wastewater

Sample name	Measurement result (mg/L)	Recovery rate (%)
Wastewater*	ND(≦0.04)	—
Wastewater+1.0 mg/L	1.06	106
Wastewater+3.0 mg/L	3.04	101
Wastewater+5.0 mg/L	5.15	103

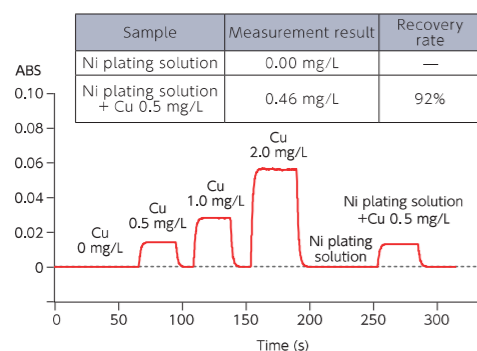
*Japan Environmental Measurement and Chemical Analysis Association JEMCA 0005-1

Providing High-Precision Analysis Even for High-Matrix Samples

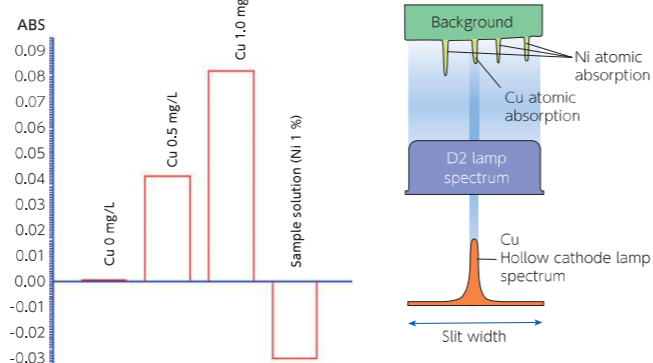
With the polarized Zeeman correction method, measurement is possible even if background absorption exists at nearby wavelengths.

Analysis of copper in nickel plating solution (comparison of measurements depending on differences in correction methods)

Polarized Zeeman Correction Method



D2 lamp correction method



High-Sensitivity Analysis

ZA4000 ZA4300 ZA4800

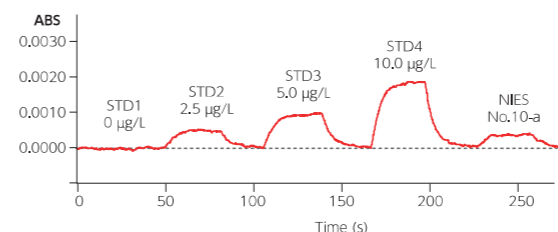
Achieving High-Sensitivity Analysis with Stable Baseline

A stable baseline is provided by the polarized Zeeman correction method, and low concentration analysis can be performed with high-sensitivity measurement without using any additional accessories.

Analysis of cadmium in brown rice

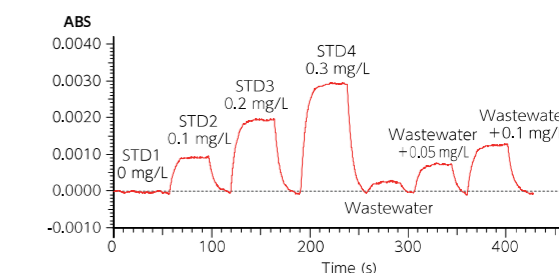
Sample	Certified value (μg/g)	Measurement result (μg/g)
NIES No.10-a	0.023 ± 0.003	0.021

Note: Sample measured at 10-fold dilution



Analysis of lead in wastewater

Sample	Measurement result (mg/L)	Recovery rate (%)
Wastewater (Certified value: 0.030 mg/L)	0.031	—
Wastewater + 0.05 mg/L	0.079	96
Wastewater + 0.1 mg/L	0.131	100



Supporting Measurement of Organic Solvents

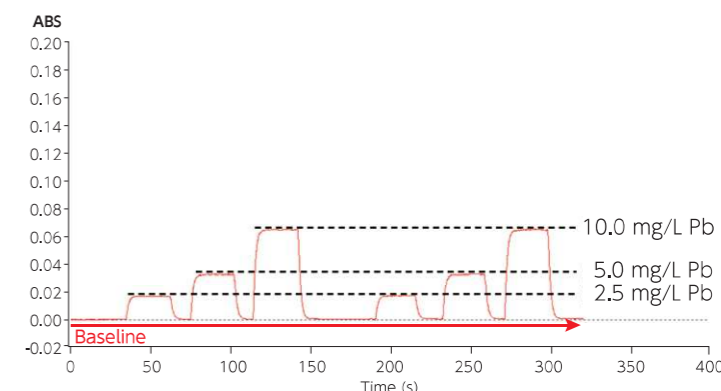
ZA4000 ZA4300 ZA4800

Providing Stable Analysis

Even for solutions based on organic solvents, the polarized Zeeman correction method is able to provide a stable baseline.

Even for the measurement of lead in a xylene base, the absorbance of the standard solution measured two times in a row is a good match even without making Auto-Zero adjustments.

Measurement of lead in xylene base



Oil-based standard solution diluted in xylene.

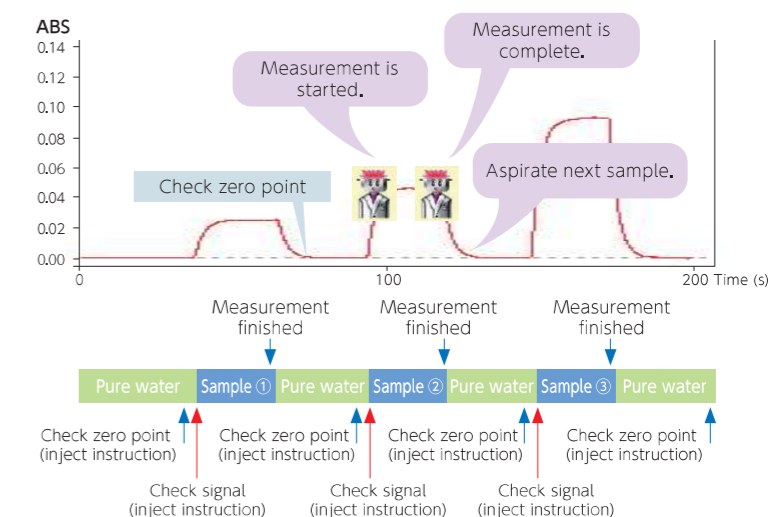
Auto-Start and Voice Guidance

ZA4000 ZA4300 ZA4800

Analysis Assistance Software

Drift is suppressed by the polarized Zeeman correction method, and the absorbance returns to near zero during blank absorption. Because of this, measurement can be performed by automatically determining the timings of sample injection, measurement start, and measurement end. The timing for switching out samples is notified by voice guidance.

This makes it possible for even those new to atomic absorption spectrophotometry to perform measurements stress-free.



Increased Usability with Switches on the instrument front

ZA4000 ZA4300 ZA4800



Enables Operation without Changing Positions

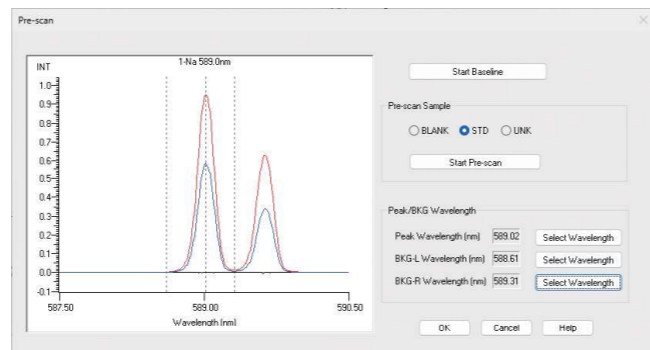
The front panel of the instrument is equipped with "Start Measurement" and "Auto-Zero" buttons, making it possible to perform a series of measurements without needing to operate the computer. By reducing the working range, this reduces the risk of knocking over samples or taking the wrong sample, making it easy to perform safe and secure measurements.

Emission Background Correction Function

ZA4000 ZA4300 ZA4800

Background is Also Corrected in Emission

The background intensity is measured near the measurement wavelength, and the background is corrected using the base emission intensity for each sample, making it possible to perform accurate measurements.



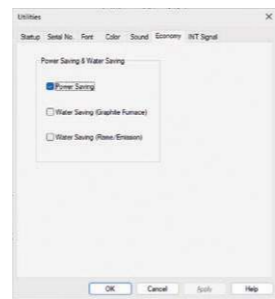
Environmental Considerations

ZA4000 ZA4300 ZA4800

Environmentally Friendly Analysis Using Water Saving and Power Saving Modes

When the standby time exceeds some fixed time, the cold water supply is stopped in water saving mode and the hollow cathode lamp is turned off in power saving mode. Water saving and power saving modes can be selectively enabled or disabled.

Note: Water saving mode is installed in the ZA4000 model.



Safety

ZA4000 ZA4300 ZA4800

Safety Functions for Safe Analysis

- Ploys an aluminum-made manifold-type gas control unit
- Gas leak check on flame ignition
- Automatic stop of gas supply when flame extinguished
- Prevention of backfire caused by supporting gas buffer tank at power failure
- Monitoring by flame sensor
- Pressure monitoring of fuel gas and auxiliary gas
- High temperature burner interlock function
- Burner drain liquid level monitoring
- Cooling water flow monitoring
- Burner head cooling by cool water



Ignition switch that prevents incorrect operation

Flame Accessories

High-Temperature Burner Head Hose Set

Used for measurement of elements that have a high dissociation energy such as Al, B, Be, Ge, La, Nb, Si, Ta, Ti, V, W, and Zr. Should be used with a nitrous oxide-acetylene flame.

Optical path length: 5 cm.
Material: Titanium.
Includes dedicated hose set.



Glass Atomizer Set

This is also able to measure samples that contain aqua regia without corrosion.

Material: Glass only.



SSC-230 Flame Autosampler

Samples the target solution sample automatically using a random access sampler to reduce measurement time and minimize sample consumption.

- Can be loaded with up to a maximum of 80 samples.
- The random access function can be configured for each element, and automatic multi-elements measurement can be performed on up to 12 elements.
- Automatically extinguishes the flame after the measurement is complete and the burner chamber is clean.



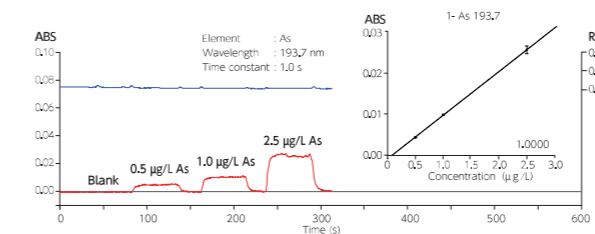
HFS-4 Hydride Formation System

- Elements such as As and Se can be analyzed with high sensitivity by using sodium borohydride.
- Employs a 4-rotor peristaltic pump that enables automatic mixing of potassium iodide.
- Provides a stable baseline using the polarized Zeeman correction method.

Elements to measure: As, Sb, Se.



Measurement of arsenic standard solution



Heated Quartz Cell with Support

When using the hydride formation system, it is mounted above the burner and heated using an air-acetylene flame.

Note: There is also a type without the cell holder [7J0-8861].



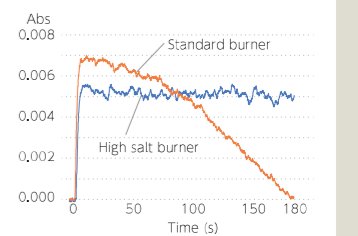
High Salt Burner Head

Used when measuring high salinity samples. Use with an air-acetylene flame.
Optical path length: 10 cm.
Material: Titanium.

Optical path length: 10 cm.
Material: Titanium.



Time change in measurement of Pb in 10% NaCl



PFA Dispenser

The PFA dispenser is used when analyzing samples that contain hydrofluoric acid.



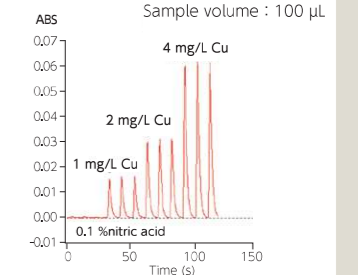
Micro-Sampling Kit

Enables flame measurement with samples of less than 0.5 mL. Prevents sample solutions from clogging the burner slot.



Measurement of copper standard solution

Element : Cu
Wavelength : 324.8 nm
Time constant : 1.0 s
Sample volume : 100 µL



Mercury Analyzer

Enables a reducing agent to be added to the sample solution to vaporize the mercury, and performs high-sensitivity analysis.

SnCl₂ is used as the reagent.

Note: Drying agent dehumidification type.



Tandem (Flame and Graphite Furnace) Model

ZA4000



Graphite Model

ZA4700

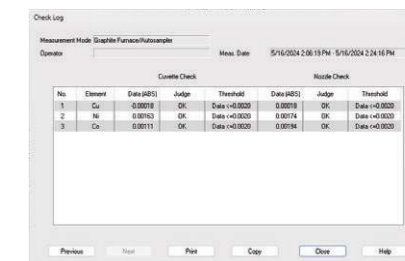


Diagnosis system for low concentration analysis NEW

ZA4000 ZA4700

Easy Confirmation of Contamination During Low Concentration Analysis

When low concentration analysis is performed using the graphite method, the correct analysis values cannot be obtained if there is any contamination in the electric furnace or sample transport fluid system. However, by using the "check for graphite atomizer contamination" function, which automatically performs the sequence of checking for contamination in the electric furnace including the cuvette and the auto sample transport fluid path, even those new to the analysis can easily perform low concentration analysis. Furthermore, the contamination state of the instrument can be determined quickly, which reduces the time needed for contamination checks.



Background Correction Using Polarized Zeeman Correction Method Unique to Hitachi technology

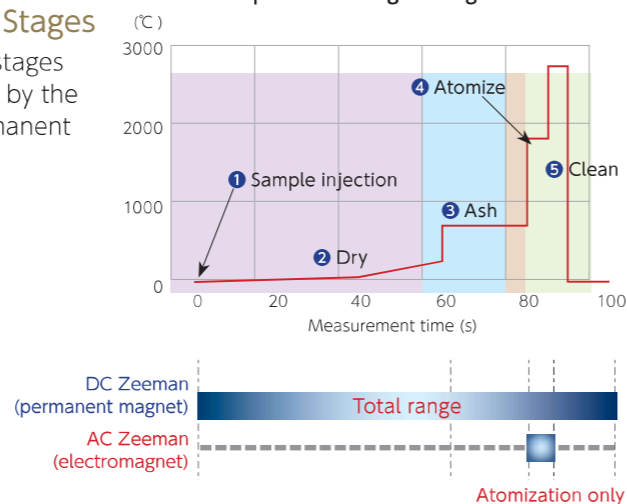
ZA4000 ZA4700

Performing Background Correction in All Stages

The background is monitored in all measurement stages (drying, ashing, atomization, cleaning, and cooling) by the polarized Zeeman correction method using a permanent magnet.

- 1 **Sample injection**
Sample is injected inside the cuvette by the autosampler
- 2 **Dry**
Removes the moisture contained in the sample
- 3 **Ash**
Removes coexisting materials contained in the sample
- 4 **Atomize**
Atomizes the target element (absorbance measurement)
- 5 **Clean**
Heats the cuvette temperature to the maximum to remove measurement residue

Cuvette temperature change during measurement



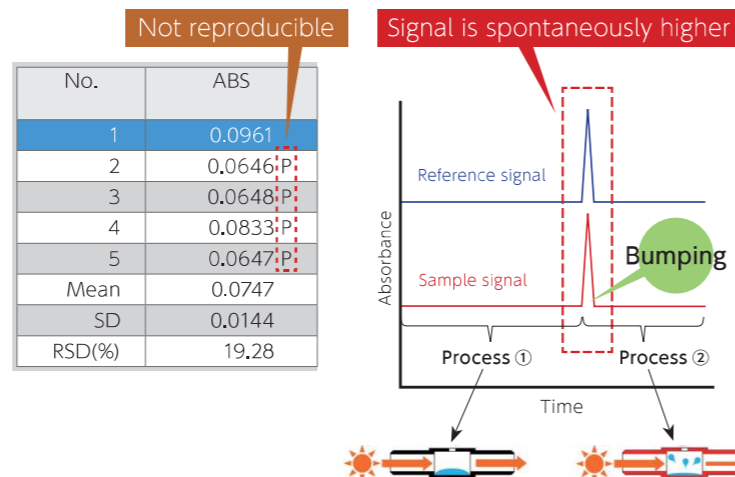
Automatic Bumping Detection Function

ZA4000 ZA4700

Ability to Verify Whether a Bump Occurred Even After Measurement

Bumps are detected by monitoring the background and absorbance signals during dry stage.

Measurement data values with a possibility of having been taken during a bump are marked with a "P".



Built-in Autosampler

ZA4000 ZA4700

Analysis is Assisted by a High Function Autosampler

- Can hold a maximum of 60 samples.
- Measures the sample specified by the random access function.
- Up to a maximum of 100 μ L of sample can be injected in steps of 1 μ L.
- Injection speed can be set to one of 5 values.
- Dilution (aliquot) of standard solution using an automatic dilution function.
- Can also handle organic solvent samples such as methanol and MIBK.
- Can use 96 microplates (optional accessory).

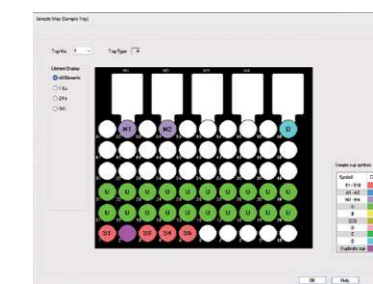


Autosampler Cup Layout Guidance NEW

ZA4000 ZA4700

Check the Layout of Samples at a Glance

The sample rack display screen can be displayed by changing the sample colors for standard solutions, chemical modifiers, etc. depending on the configured autosampler settings. The risk of incorrectly placing samples can be reduced by comparing this visual guide with the sample rack. This makes it possible to check the placement positions of samples at a glance, even for those new to the analysis.

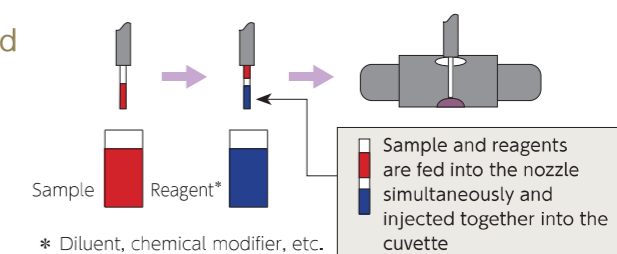


Batch Injection of Multiple Samples (Sequential Injection)

ZA4000 ZA4700

Even Low-Volume Samples are Injected with Good Reproducibility

The injection precision can be improved by sequentially injecting several microliters of sample together with chemical modifiers and diluent.



Temperature Program Development Function

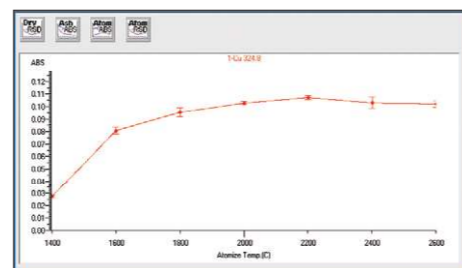
ZA4000 ZA4700

Assistance with Temperature Profile Creation

The absorbance can be measured by changing the drying, ashing, and atomization temperatures in a stepwise manner. The optimal temperature profile parameters can then be generated based on these results.

This process considers both the absorbance and its variation (relative standard deviation) at each stage.

Note: The graph on the right is a graph of atomization temperature for checking the maximum value of absorbance.

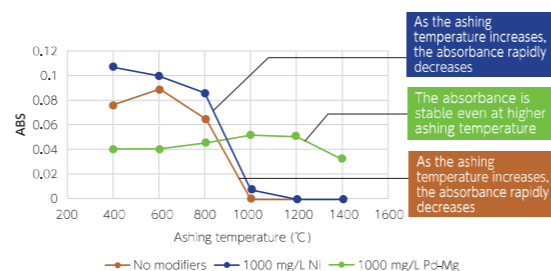


Addition of Chemical Modifiers

ZA4000 ZA4700

Automatic Addition of 4 Types of Chemical Modifiers

A maximum of 4 types of chemical modifiers can be automatically added by the autosampler. The order of addition can also be configured to before or after the sample. For example, the ashing temperature can be set higher by using a palladium-magnesium chemical modifier during the measurement of lead to suppress the effects of coexisting materials.



Effect of chemical modifiers on lead

Dustproof Cover

ZA4000 ZA4700

Split Dustproof Cover to Protect from Contamination

Dustproof covers are fitted on the graphite furnace and top of the autosampler to protect against dust and debris in the laboratory. Furthermore, the covers enable access to the autosampler side, which is frequently opened and closed, as a further measure against contamination of the atomizer.



LED Spot Light for Furnace

ZA4000 ZA4700

Ensures Visibility When Replacing the Cuvette

An LED spot light is used to illuminate the graphite furnace. This improves visibility when adjusting the autosampler nozzle position and when replacing the cuvette, facilitating easier maintenance.

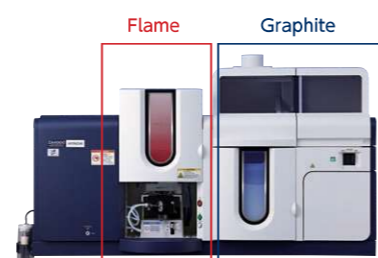


Independent Atomizer

ZA4000

Independent Flame and Graphite Atomizers Reduce Contamination

Contamination originating from samples measured by the flame method can be reduced when performing graphite measurement for analysis of low concentrations by making the atomizer independent of the flame measurement, which is used for analysis of high concentrations.



Graphite Furnace Accessories

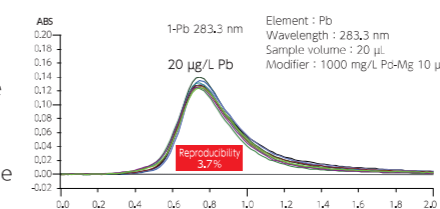
Cuvettes				
Name	Application / Temperature / Injection Volume	Shape	Features	Suitable fields
Pyro Tube C II HR [7J1-8540]	Up to 2,800 °C Up to 100 µL 10 per box		<ul style="list-style-type: none"> High atomizer temperature general-purpose cuvette Reduces formation of carbides 	<ul style="list-style-type: none"> Suitable for samples in all fields (Particularly optimized for high-sensitivity analysis)
Pyro Tube D II HR [7J1-8550]	For twin injection Up to 2,800 °C Up to 100 µL 10 per box		<ul style="list-style-type: none"> Reduces diffusion of sample solution and increases measurement accuracy through dispersion injection High atomizer temperature general-purpose cuvette Reduces formation of carbides 	<ul style="list-style-type: none"> Suitable for samples in all fields
Pyro Tube HR [7J0-8880]	Up to 2,800 °C Up to 100 µL 10 per box		<ul style="list-style-type: none"> High atomizer temperature general-purpose cuvette Reduces formation of carbides Recommended for measuring high melting point elements such as Mo and V 	<ul style="list-style-type: none"> Suitable for samples in all fields (Particularly optimized for high-sensitivity analysis)
Graphite Tube HR [7J0-8885]	Up to 2,800 °C Up to 50 µL 10 per box		<ul style="list-style-type: none"> Elements that require reducing nature 	<ul style="list-style-type: none"> Can be used in all fields
Cup-type cuvette HR [7J0-8890]	Up to 2,100 °C Up to 50 µL 10 per box		<ul style="list-style-type: none"> Large sample injection port with structure to prevent diffusion of sample solution Samples that contain a lot of organic material Useful for samples that foam at the Dry Stage Increases reproducibility 	<ul style="list-style-type: none"> Organic samples
OMEGA Platform Tube HR [7J0-8897]	Reduces chemical interference Up to 2,600 °C Up to 100 µL 10 per box		<ul style="list-style-type: none"> Single piece with Ω-shaped platform inserted into the tube in advance The tube interior reaches thermal equilibrium by heating of the sample by radiative heating before atomization, reducing interference with coexisting materials 	<ul style="list-style-type: none"> High-matrix materials
Ring (4PCS/SET) [7J1-8900]	Rings for attaching cuvette to the electrodes 4 per box		<ul style="list-style-type: none"> Support brackets 	—

Note: For high-concentration samples, Graphite Tube C II HR [7J1-8545] is also available, which offers reduced sensitivity compared to Graphite Tube HR [7J0-8885].

OMEGA Platform Tube HR

Makes it possible to perform high-precision analysis even for samples with a lot of coexisting materials. Interference from coexisting materials can be reduced by performing atomization of samples in a state of thermal equilibrium with the atmosphere inside the cuvette. This reduces interference from the matrix and makes it possible to perform high-precision analysis.

Reproducibility of lead in 1% nickel solution (n=10)

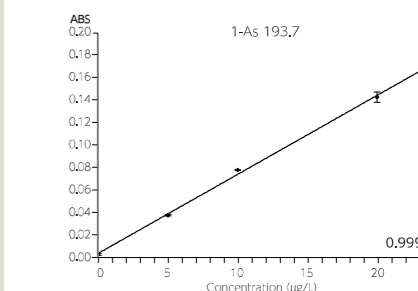
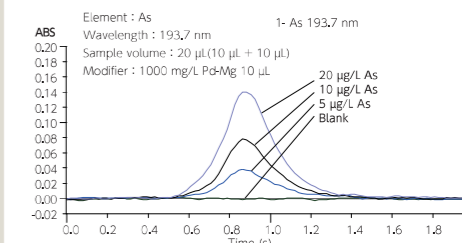


Pyro Tube D II HR

Makes it possible to more easily increase the sensitivity through injection of a larger volume of sample. This improves the efficiency of thermal conduction to the sample by dividing the sampling of the sample into two locations to increase the contact area with the cuvette. By doing this, the drying stage can be configured for a shorter period even in analysis of larger volume samples. This can reduce the analysis time by approximately 30% compared to using the concentrating function (comparison conducted by our company).



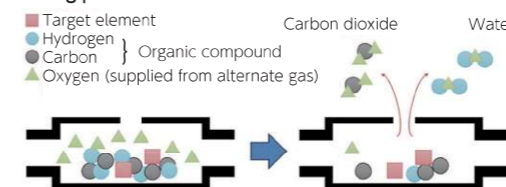
Measurement of arsenic standard solution



Alternate Gas Unit

Allows a gas sprayed into the cuvette to be switched to an alternate gas (argon gas mixed with oxygen) to promote the decomposition of organic material at the ashing stage. Interference with background and coexisting materials can be reduced by using argon gas that contains 5 to 10 % oxygen.

Schematic of ashing process

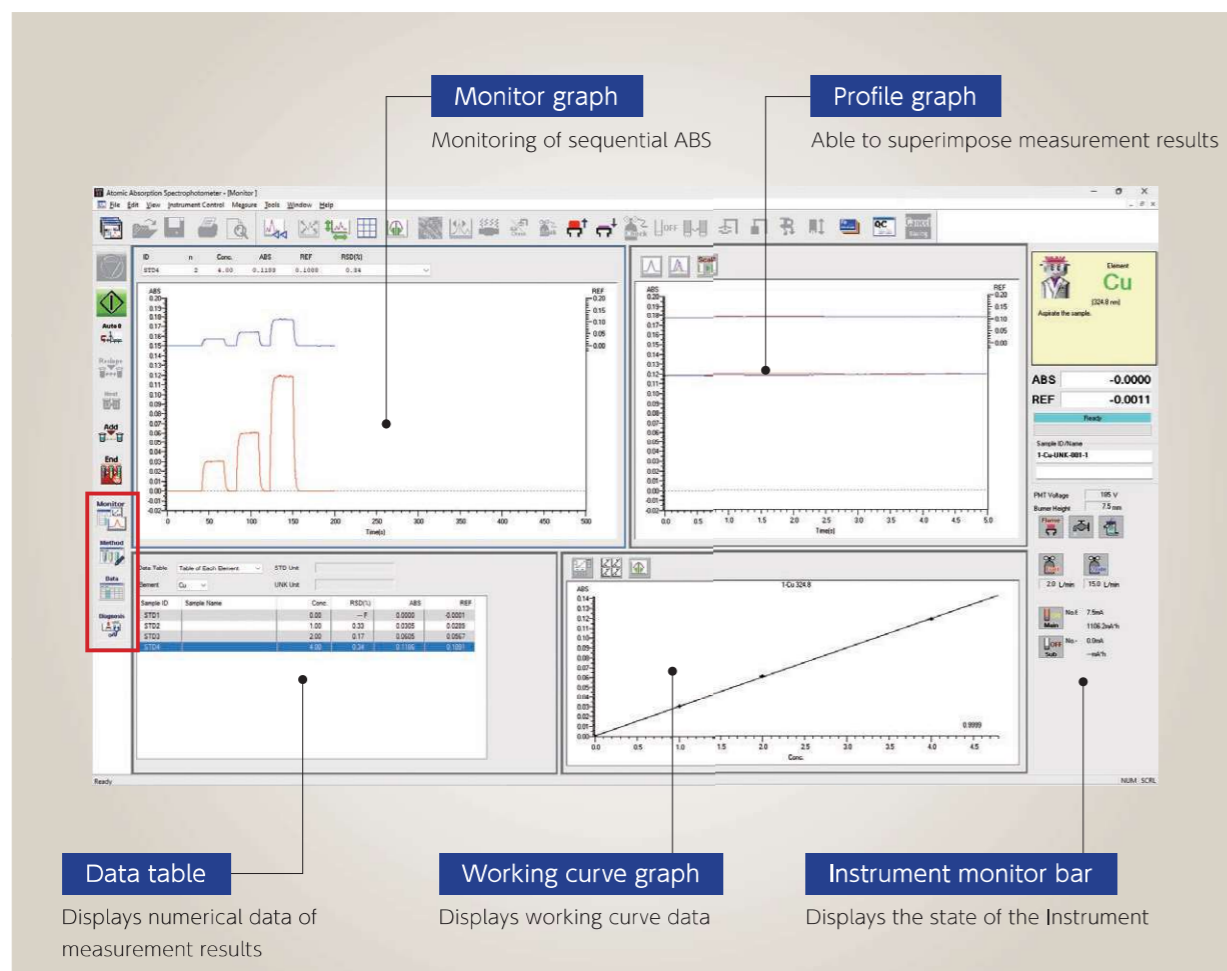


GA Autosampler PEEK Nozzle

A nozzle tip made of PEEK* material, which does not bend easily. (Cannot be used with samples such as concentrated nitric acid, which dissolve PEEK)

* PEEK is a registered trademark of VICTREX PLC UK in Japan and other countries.



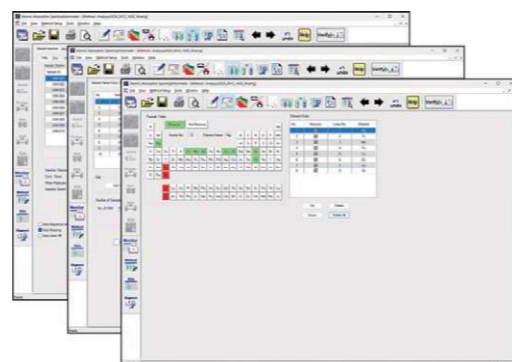


Wizard-based Parameter Settings

ZA4000 ZA4300 ZA4800 ZA4700

Easy for Even Those New to the Analysis to Configure Parameters

Users can navigate between screens in order by clicking the icons to easily set the measurement parameters. Screens can be displayed directly by clicking the various icons.



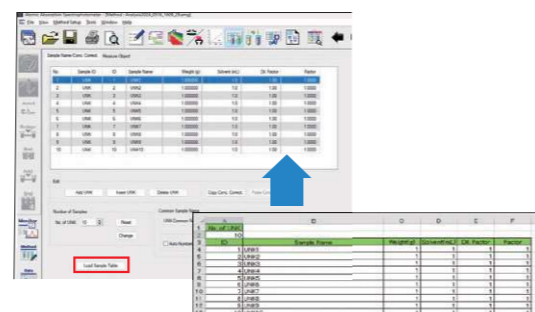
Load Sample Table Function

NEW

ZA4000 ZA4300 ZA4800 ZA4700

Batch Importing Data Such as Sample Names from Excel

Values can be imported from sheets created in Excel, allowing for the input of various data, such as "sample name", "weight", and "solvent". This is performed by the simple operation of clicking "Load Sample Table". This function is recommended for users who want to manage data using separate tables.



Monitor Screen

Displays analysis results data such as profiles and working curve on a single screen



Parameter Setting Screen

Wizard-based user-friendly parameter settings



Data Processing Screen

Viewing and editing measurement results saved by a single click during measurement



Automatic Device Diagnostics Function

Easily check wavelength precision, baseline stability, etc.

Diagnosis Function

ZA4000 ZA4300 ZA4800 ZA4700

Instrument State Can be Checked on the User Side

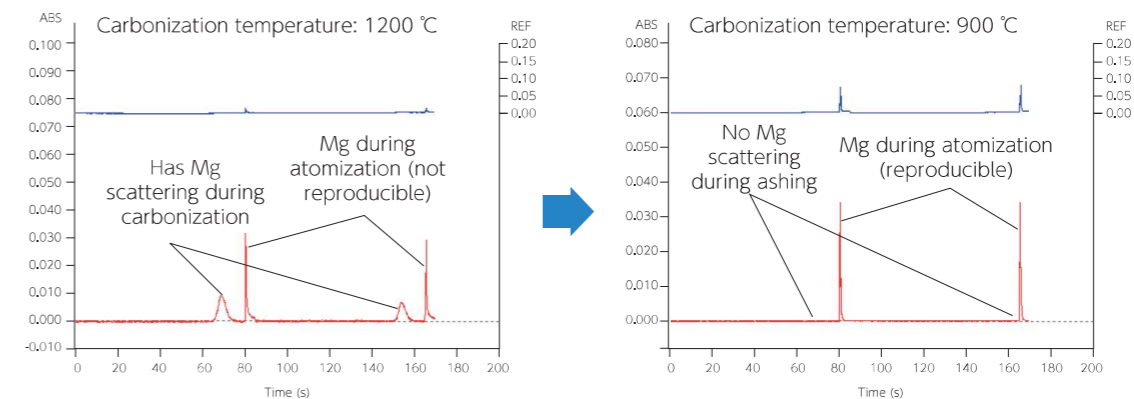
The wavelength precision, baseline stability, sensitivity, and reproducibility can be measured automatically, enabling the Instrument state to be diagnosed in a timely fashion. This is a convenient function for users who want to know the state of the instrument on a daily basis.

Continuous Monitoring

ZA4000 ZA4300 ZA4800 ZA4700

Batch Display of Atomizer Profiles

The absorbance and background signal are displayed as time elapses, making it possible to check for differences between samples at a glance. Regarding background measurement in particular, since background correction is applied even during the drying and ashing processes, the scattering of measurement elements can be monitored. The following diagram shows a profile confirming that magnesium is scattered at a ashing temperature of 1200 ° C. Scattering during ashing can be eliminated and absorbance with good reproducibility can be obtained by reducing the ashing temperature to 900 ° C. Users who want to configure the parameter settings in more detail can also consider the setting values from the drying and ashing background signals.



Hollow Cathode Lamps

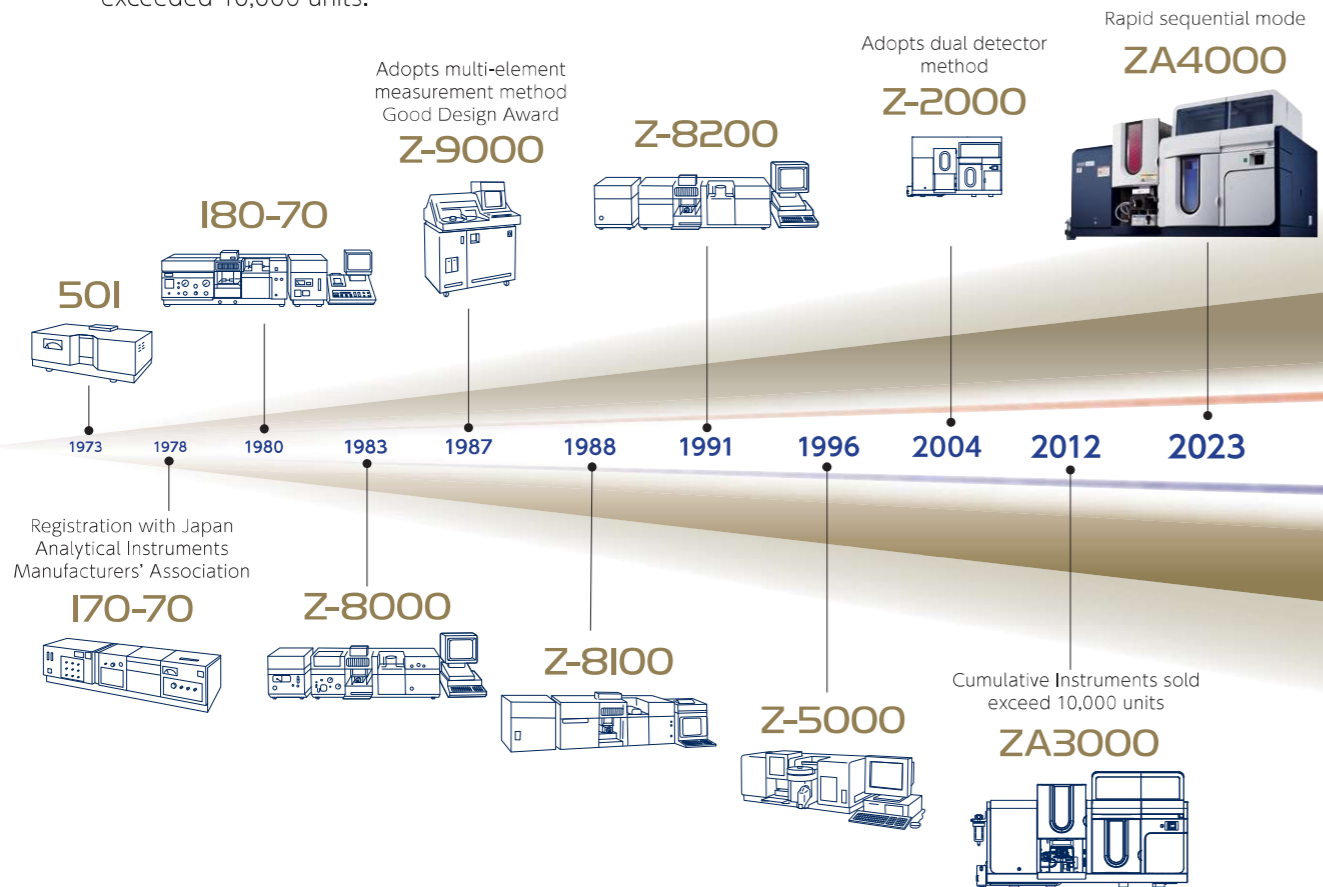
ZA4000 ZA4300 ZA4800 ZA4700

Single element lamps									
Element symbol	Product name/element name	Element symbol	Product name/element name	Element symbol	Product name/element name	Element symbol	Product name/element name	Element symbol	Product name/element name
Ag	Silver	Co	Cobalt	K	Potassium	Pd	Palladium	Ta	Tantalum
Al	Aluminum	Cr	Chromium	La	Lanthanum	Pt	Platinum	Te	Tellurium
As	Arsenic	Cu	Copper	Li	Lithium	Rh	Rhodium	Ti	Titanium
Au	Gold	Fe	Iron	Mg	Magnesium	Ru	Ruthenium	Tl	Thallium
B	Boron	Ga	Gallium	Mn	Manganese	Sb	Antimony	V	Vanadium
Ba	Barium	Ge	Germanium	Mo	Molybdenum	Sc	Scandium	W	Tungsten
Be	Beryllium	Hf	Hafnium	Na	Sodium	Se	Selenium	Y	Yttrium
Bi	Bismuth	Hg	Mercury	Nb	Niobium	Si	Silicon	Yb	Ytterbium
Ca	Calcium	In	Indium	Ni	Nickel	Sn	Tin	Zn	Zinc
Cd	Cadmium	Ir	Iridium	Pb	Lead	Sr	Strontium	Zr	Zirconium

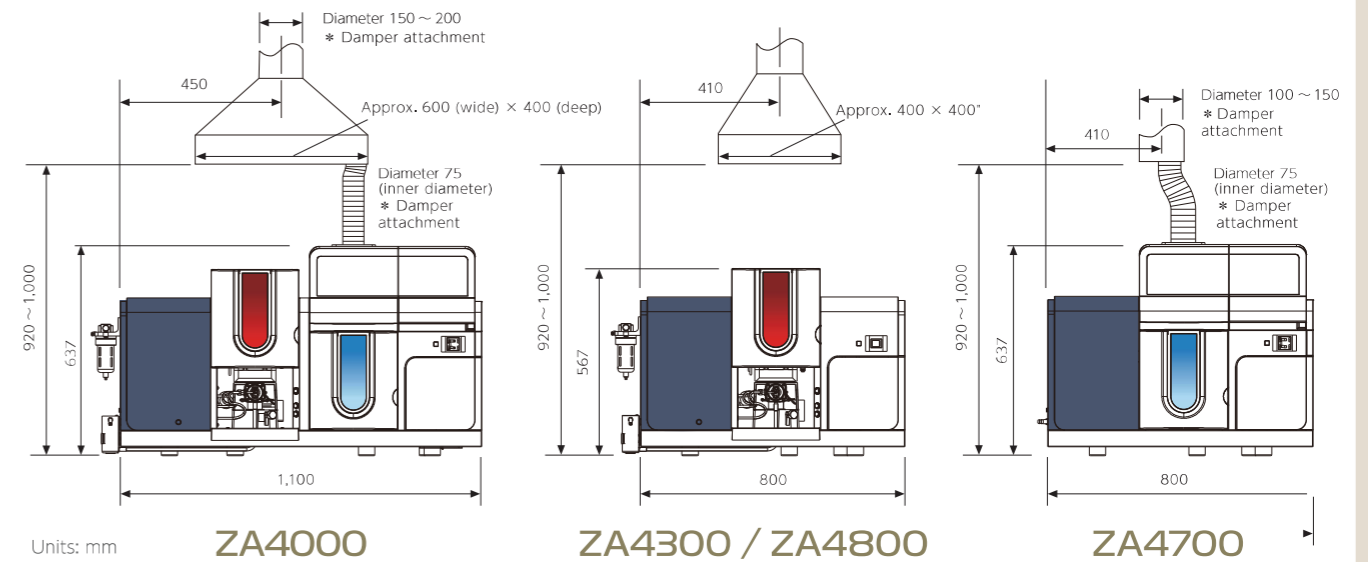
Multi-element lamp				
Ca-Mg	Cd-Pb	Cd-Zn	Cu-Fe-Ni	Fe-Mn-Ni
Cu-Fe-Mn	Cr-Cu-Mn	Cu-Mn-Si	Cr-Cu-Fe-Mn-Ni	Co-Cr-Cu-Fe-Mn-Ni

History of Polarized Zeeman Atomic Absorption Spectrophotometers

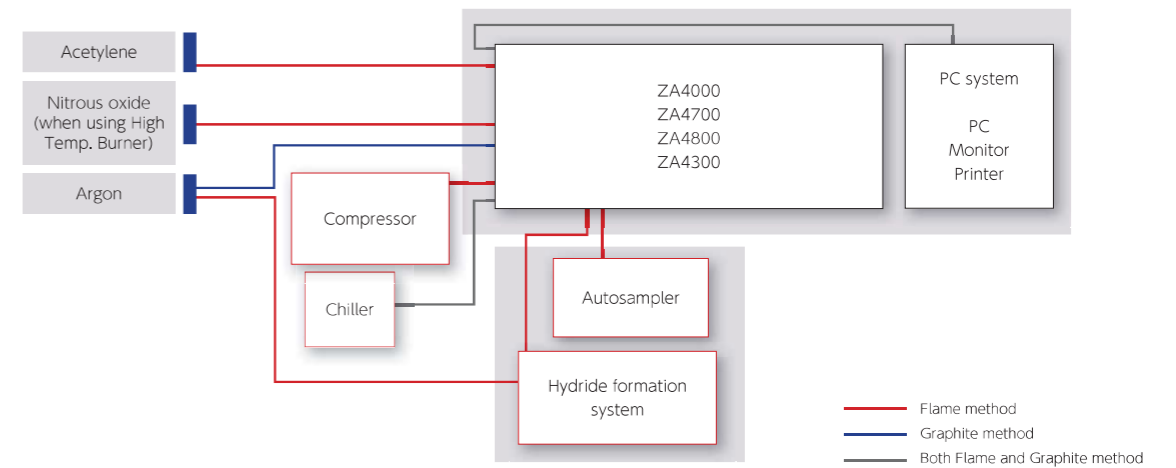
In 1978, Hitachi Limited led the world with the development of the 170-70 polarized Zeeman atomic spectrophotometer. Since then, many different series have been released and cumulative sales have exceeded 10,000 units.



Installation Conditions



Note: Use an installation table that can support the weight of not only the Instrument, but also the personal computer and printer.



Water supply / Drain	Cooling water	Diameter: 12 mm (outer diameter)
	Cooling Capacity	900 kcal / h or more
	Water flow rate	Water flow: 0.8 L / min (flame) Water flow: 2.0 L / min (graphite furnace)
	Water pressure	35 to 150 kPa
	Water supply port	Within 4 m
	Water drain port	Height: 100 mm or less, aperture diameter: 50 mm or more
Gas supply pressure* (Set secondary pressure)	Argon	500 kPa
	Acetylene	90 kPa
	Nitrous oxide	400 kPa
	Air	500 kPa
Usage temperature	15 to 35 °C	
Usage humidity	45 to 65% RH	

Note: The gas cylinder should be installed in a gas cylinder bay, with piping connected from the gas cylinder bay to the installation location.

Duct	Material	Stainless steel
	Dimensions	Approx. 600 (wide) × approx. 400 (deep) mm (ZA4000) [Here and in the next line, you could also just use the initial 'Approx.']
		Approx. 400 (wide) × approx. 400 (deep) mm (ZA4300 / ZA4800)
		Diameter: 100 to 150 mm (ZA4700)
Suction power	Flame	600 to 1,200 m³/h (ZA4000)
	Graphite furnace	600 to 1,200 m³/h (ZA4300 / ZA4800)
		10 to 25 m³/h (ZA4000) 10 to 25 m³/h (ZA4700)
Power supply	Model	Main unit
	ZA4000	220/230/240 V ± 5% 7.5 kVA (Power consumption under 4.1 kW) Single phase
	ZA4300/ZA4800	115/220/230/240 V ± 10% 0.2 kVA (Power consumption under 0.1 kW) Single phase
	ZA4700	220/230/240 V ± 5% 7.5 kVA (Power consumption under 4.1 kW) Single phase

Note: Acetylene gas cylinders that use dimethylformamide (DMF) cannot be used as a solvent.
 Note: Stainless steel piping with an inner diameter of 5 mm or more should be used for acetylene cylinders.
 Note: A flashback arrestor device should be installed in the acetylene gas piping. (High Pressure Gas Safety Act)
 Note: If the water pressure of the cooling water exceeds 150 kPa, provide and install a pressure reducing valve.
 Note: It is recommended that a cooling water recirculation unit be installed in the cooling water supply equipment.

Model	ZA4000	ZA4800	ZA4300	ZA4700
Analytical method	Flame/graphite furnace	Flame (rapid sequential mode)	Flame	Graphite furnace
Measurement mode	Atomic absorption and Emission			Atomic absorption
Measurement method	Double beam method (polarized Zeeman correction method)			
Background correction method	Polarized Zeeman correction method			
Replace sample chamber	Atomizer unit does not need to move	—		
Spectrophotometer	Mount/diffraction grating	Czerny-Turner mount / 1,800 lines/mm, 200 nm blaze		
	Wavelength range/setting method	190 to 900 nm / Automatic spectral peak setting		
	Focal length, reciprocal dispersion	400 mm / 1.3 nm/mm		
	Slit width	4 settings (0.2, 0.4, 1.3, 2.6 nm)		
	Detector	Photomultiplier tube × 2		
Flame unit	Number of lamps, turn-on current	8 lights (turret method) 2 a light simultaneously/ 1.0 to 20 mA (mean current value)	8 lights (turret method) 4 a light simultaneously/ 1.0 to 20 mA (mean current value)	8 lights (turret method) 2 a light simultaneously/ 1.0 to 20 mA (mean current value)
	Magnet for Zeeman effect	0.9 T permanent magnet *1		
	Burner	Premixed fishtail type		
	Burning condition setting	Automatic flow rate setting of combustion gas		
Graphite flame unit	Safety monitoring function	Optical flame monitoring, flame sensor error detection, fuel/auxiliary gas pressure monitoring, drain liquid monitoring, cooling water flow monitoring, flash-back shock absorption, safety fire extinguishing at power failure (buffer tank method), flow stop check at flame turnoff, prevention of restart at reconnection of power, N2O select safety mechanism		
	Magnet for Zeeman effect	1.0 T permanent magnet *1	1.0 T permanent magnet *1	
	Temperature control	50 to 2,800 °C, overcurrent prevention Clean stage only: 50 to 2,900 °C [Pyrotube C IHR, pyrotube D IHR]	50 to 2,800 °C, overcurrent prevention Clean stage only: 50 to 2,900 °C [Pyrotube C IHR, pyrotube D IHR]	
	Heating current control	Optical temperature control/ fixed current control	Optical temperature control/ fixed current control	
	Gas flow rate control	Sheath gas: Argon gas 3 L/min Carrier gas: Argon gas 0, 10, 30, 200 ml/min (4 values)	Sheath gas: Argon gas 3 L/min Carrier gas: Argon gas 0, 10, 30, 200 ml/min (4 values)	
Autosampler for graphite furnace	Safety monitoring function	Argon gas pressure monitoring/cooling water flow monitoring/ heating furnace temperature monitoring		
	Number of sample containers	60 (1.5 mL container) or 96 microplate (optional accessory)	60 (1.5 mL container) or 96 microplate (optional accessory)	
	Autosampler sample divided injection	Divided injection each sample/ sequential divided injection		
	Sample injection volume	1 to 100 µL		
	Sample injection speed	Selectable from 5 values		
	Applicable solvents	Aqueous solution, ethanol, methanol, acetone, MIBK	Aqueous solution, ethanol, methanol, acetone, MIBK	
	Carry over	10 ⁻⁵ or less (with aqueous solution standard sample)		
	Heated injection function	Capable		
	Concentration (inside furnace)/ dilution (inside furnace) of sample	1 to 25 times / 1 to 10 times		
	Personal computer	OS: Windows® 11 Pro, 64-bit edition *2		
Data processing functions	Signal type	Zeeman AA, sample, reference, and emission intensity		
	Working curve	Standard sample: Maximum 10 points/Working curve creation: Least squares method and Newton's method approximation formula: 3 types/sensitivity correction function/ standard addition method/simplified standard addition method *3		
	Data processing	Calculation mode/Peak width cutting height specification/deletion, recovery, and substitution of analysis results/change order of working curve/ sample blank processing/zero point correction of calibration curve/ baseline correction/statistical calculations (mean value, standard deviation, relative standard error, correlation function)/detection limit value/ measurement processing time region specification		
	Quality Control function	Sample check (detection limit), STD check, QC sample check, calibration curve check, recovery check *3		
	Analysis parameters/save analysis results/help function	Per-element analysis parameters, analysis parameters, analysis results, measurement signal/reference signal, device operational status/error data, error recovery process message display, analysis data		
External dimensions	Main unit (W) × (D) × (H)/Mass	1100 × 650 × 637 mm/188 kg	800 × 650 × 567 mm/104 kg	800 × 650 × 567 mm/104 kg
	Power supply	220/230/240V, 7.5kVA, 50/60Hz	115/220/230/240V, 0.2kVA, 50/60Hz	115/220/230/240V, 0.2kVA, 50/60Hz
	Power consumption	4.1 kW or less	0.1 kW or less	0.1 kW or less

* This product is not approved as a medical device under the Pharmaceutical Affairs Law.

*1 Users who have a pacemaker should not come within 1 m of this instrument, and should not handle the instrument.

*2 Windows® is registered trademark of Microsoft Corporation in the USA and other countries.

*3 Standard addition method and simple standard addition method are not available in Rapid Sequential mode on ZA4800.



*This logo is a registered trademark of Hitachi High-Tech Corporation in the US, the EU, the UK, China, Korea, Taiwan and Japan.

CAUTION: For correct operation, follow the instruction manual when using the instrument. Specifications in this catalog are subject to change with or without notice, as Hitachi High-Tech Science Corporation continues to develop the latest technologies and products for its customers.

NOTICE: The system is For Research Use Only, and is not intended for any animal or human therapeutic or diagnostic use. These data are an example of measurement; the individual values cannot be guaranteed.

* "Excel" and "Windows" are registered trademarks of Microsoft Corporation in the US and other countries.

Hitachi High-Tech Science Corporation

www.hitachi-hightech.com/global/hhs/

Head Office

Toranomon Hills Business Tower, 1-17-1 Toranomon, Minato-ku, Tokyo 105-6411, Japan



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