Atomic Absorption

SensAA

Spectrometer

Who is GBC Scientific Equipment?

GBC Scientific Equipment was founded in 1978 and is now one of the world's largest manufacturers of atomic absorption spectrometers with a sales and service network covering around 100 countries.

GBC's growth has been fuelled by its extensive AA expertise, innovative thinking and an obsession for quality and reliability. GBC now produces the widest range of AA spectrometers in the world, with options and accessories to suit every analytical requirement.

This innovative thinking is exemplified by the SensAA Dual and the single beam SensAA spectrometers, both of which utilize the revolutionary, patented Application Source to give multi-element capability with no compromise in performance.

The compact design of the spectrometer is perfectly complemented by an IBM-compatible computer and Windows® operating system. The system includes complete software for flame, furnace, vapour generation and high solids analysis. Simply add the SDS-270 autosampler for automated flame analysis and, optionally, the PS-270 prep station for totally automated sample preparation and dilution. The further addition of the System 3000 graphite furnace provides fully automated graphite furnace analysis. Other add-ons include the HG3000 for automated hydride generation or cold-vapour mercury analysis, the MC3000 for trace level mercury analysis and the HSA3000 for high dissolved solids analysis. The computer provides complete control of the spectrometer and accessories for simplified set-up and ease-of-use.

GBC customers benefit from our efficient and effective global organization. Access to information, applications support and technical service is never more than a phone call or email away.

ISO 9001 QUALITY ACCREDITATION

GBC has always placed a strong emphasis on quality in all aspects of our operation, from design and manufacture to the provision of service and support to our customers, and we are fully committed to continuous evaluation and improvement in all areas.

The GBC Quality Management System has been accredited to the ISO 9001 quality standard by Lloyd's Register Quality Assurance Limited. This certification is your assurance that the procedures and processes used to produce the goods and services which GBC provides comply with the relevant International Standard, and demonstrates our commitment to meeting the needs and expectations of our customers.

What is the GBC vision?

GBC Scientific Equipment

will

advance people's knowledge

and

their capacity to enhance the quality of life

for all humankind.

GBC's product lines...

| AAS | HPLC | ICP-OES | ICP-oTOFMS | Rheometer | UV-Vis | XRD |

Advanced features include:

- Automatic wavelength and slit setting for maximum convenience and error-free set-up.

- Optional automatic flame control system with a full range of safety interlocks and integrated liquid trap.

- The unique GBC HYPER-PULSE background correction system, included as standard with all models.

- The GBC performance guarantee - sensitivity and precision superior to that of any other instrument manufacturer.

- Data storage using a high capacity hard disk. Storage is provided for applications, results, graphics, sample labels, weights and dilutions, report headings, etc.

- Storage of signal graphics. Since graphics traces are stored, the operator can view the graphics for previous samples and zoom in for a close-up if necessary.

- Complete report presentation. This includes printing of operator-defined text, headings, sample labels, calibration graphs, operating conditions, results and statistics.

- Simple operation is ensured with the easy-to-use Windows® XP environment, together with an extensive on-line help facility.

No other AA spectrometer can offer the simplicity and user-friendly operation for your specific application.

GBC offers a full range of AA accessories to ensure the widest application.

- System 3000 Graphite Furnace
- SDS-270 Autosampler
- PS-270 Diluter/Sample Preparation
- FS 3000 Autosampler
- HG 3000 Hydride Generator
- HSA 3000 High Solids Analyser
- EHG 3000 Electric Hydride Heater
- MC 3000 Mercury Concentrator

GBC makes validation easy.

The GBC IQ/OQ/PQ procedure provides qualification of the Installation, Operation and Performance of your SensAA and SensAA Dual Atomic Absorption Spectrometer.

The SensAA offers touch screen technology for ease of use.

Touch screen technology

Optional features

## Automatic wavelength and slit setting for maximum convenience

The large, self-calibrating 0.33 metre (focal length) monochromator has been specifically designed to provide the high light throughput and stability needed for atomic absorption. Spectral bandwidth is continuously adjustable between 0.1 and 2 nm (in 0.1 nm increments) and, for furnace work, reduced slit height is available with all slit widths. You simply select the required element, and the wavelength, lamp current, slit width and slit height are set automatically. Graphical displays of wavelength scans are available for flame emission work or as a trouble-shooting aid. A wide-range photomultiplier tube covers the full wavelength range.

SensAA for maximum energy

The GBC SensAA uses the simplicity and high energy of single beam optics to provide the best possible performance/price ratio. An automatic baseline zero between samples allows the SensAA to be used for extended periods with flame or furnace autosamplers without the problem of baseline drift.

SensAA Dual for true double beam stability

The genuine double beam optical system of the SensAA Dual measures the sample and reference signals every mains cycle to give the best correction for lamp noise and the most stable baseline possible.
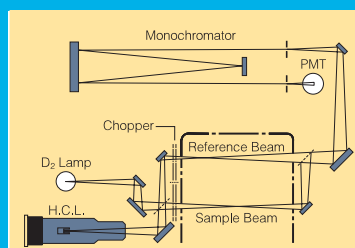
Unique Turn-Key Analytical Solutions

GBC's innovative technology provides optimum performance and sensitivity within a modest budget.

This unique combination of hardware and software provides efficient solutions to meet the specific needs of the analysts. In addition the SensAA and SensAA Dual offers the following:

• easy to operate single and multi-element sampling
• priority sample introduction for manual sampling
• fast flexible work flow for high productivity analyses

With just one mouse click on your desktop your application is underway. You can begin with preset optimised methods.

Application Source

The heart of the SensAA is the patented Application Source which brings unprecedented levels of simplicity, performance and cost savings to atomic absorption spectrometry. The Application Source or "Mini Turret" consists of six individual cathodes aligned in a circle within the one unit. The type of cathodes are user selectable and can be customized for various applications such as:

• environmental
• food
• petroleum
• clinical

It simplifies lamp handling, operation and alignment. Due to the unique design of the GBC Application Source there is no need to change lamps when changing elements. This provides additional cost savings.

The SensAA is versatile in that while offering unprecedented benefits the application source is interchangeable with older hollow cathode lamps allowing the use of extra lamps if required.

Protected optical system ensures long-term performance

The SensAA and SensAA Dual use mirrors throughout the optical system to ensure that correct focus and high energy throughput are maintained at all wavelengths. To protect the optical surfaces, a dust cover is fitted over the optical system and additional protection is provided by coating the mirrors with quartz.

Asymmetric Modulation reduces noise

GBC introduced asymmetric modulation for double beam instruments and continues it with the SensAA. Today, the technique has been optimised for the best possible double-beam performance, and further refined for use in the SensAA.

Most of the noise in an atomic absorption measurement comes from the sample beam. By spending more time measuring the sample beam (twice that of most conventional systems) the GBC SensAA reduces noise by up to 40%.
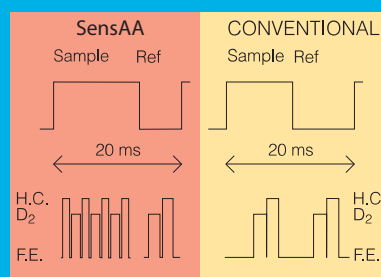
Unsurpassed innovation

Choice of flame

Hyper-Pulse background correction

The Hyper-Pulse background corrector, one of the fastest systems available, has been further improved by pulse interpolation. This allows for more accurate interpolation of "Transient Signals" such as GF and HSA 3000 signals.

With all background correction systems, there is a small time delay between the measurement of background and total absorbance. When the background is changing very rapidly, as is often the case with graphite furnace work, this delay can lead to an error in the background corrected reading. Systems with slower sampling rates and longer delay times show greater errors.

Most background correctors measure the background absorbance 50 or 60 times per second and the delay between the measurement of background and total absorbance can be as much as 10 milliseconds.

The GBC Hyper-Pulse system takes 200 (50 Hz) or 240 (60 Hz) sample measurements per second and the delay between the measurement of background and total absorbance is about 1 millisecond. This produces a dramatic reduction in background correction errors. Accuracy is further improved by interpolating between background measurements to calculate the background when the atomic signal is measured.

This system also allows correction for higher background levels than most systems-up to 2.5 total absorbance.

Extended Lamp Life

In addition, the design of the high intensity D2 lamp and associated power supplies ensures unequalled lamp lifetime. The GBC lamp will operate for 1000 hours even at full current. Compare this to some alternative brand instruments where the D2 lamp is guaranteed to last only 90 hours of operation, and add up the savings!

Guarantee of performance

GBC is so confident of instrument quality that it guarantees both sensitivity and precision. GBC's guaranteed performance is superior to that of any other company in the world - greater than 0.8 absorbance for 5 mg/L copper with an RSD less than 0.45% for ten 10-second integrations. This performance is achieved by an efficient blend of good design and durable materials.

Flame atomization system delivers reliability and performance

All materials in contact with the sample have been selected for maximum corrosion resistance.
The spray chamber is made from inert polypropylene. The burner is made entirely of titanium. The nebulizer has a platinum-iridium capillary and a titanium venturi.

The nebulizer also has an adjustable sample uptake rate, essential for optimum performance with refractory elements or organic solvents. The whole flame atomization system is easily removed for cleaning or for changeover to graphite furnace.

Interlocked flame control

This system allows the flame to be ignited only if a burner is installed, the liquid trap is full and an air-acetylene flame is selected. Changeover to the nitrous oxide-acetylene flame is allowed only if a nitrous oxide-acetylene burner is present. Push-button flame ignition is included.

GCM (Gas Control Module)

This system is interlocked to protect against faults in gas supplies, burner type, flame detector, mains power, liquid trap, nebulizer bung and relief bung. It provides a programmed ignition and shutdown sequence - if nitrous oxide-acetylene is selected, an air-acetylene flame is first established and then the acetylene flow is automatically boosted before automatic changeover to the nitrous oxide-acetylene flame.

Guaranteed performance

GBC SensAA software

GBC has earned a world-wide reputation for superlative AAS software. Easy for the first-time user to operate, it has the power to handle the most demanding applications.

The software comprises six individual modules which simplify analysis and setup, so that only one mouse click is required to initiate an analysis. Operation is further simplified by an extensive context-sensitive on-line help system which includes tutorials on analytical technique.

The system provides fully integrated software for instrument and accessory control, graphics, data acquisition, storage and reporting - there is no need to switch to add-on software packages.

Advanced features of SensAA software

- *High resolution graphic display for methods development and quality control*

  The graphics signal is linked to individual sample readings, allowing atomic and background traces to be displayed simultaneously.
  For graphite furnace work, graphics are overlaid with the furnace temperature program, simplifying method development.

- *Choice of calibration routines to provide the most accurate results*

  The SensAA and SensAA Dual allow for automatic preparation of calibration curves using up to ten standards. Choose an exact fit to the calibration points, rational or linear least squares fit, or linear least squares fit through zero. You may also calibrate using standard additions or bracketing standards.

- The software is available in a wide range of international languages.
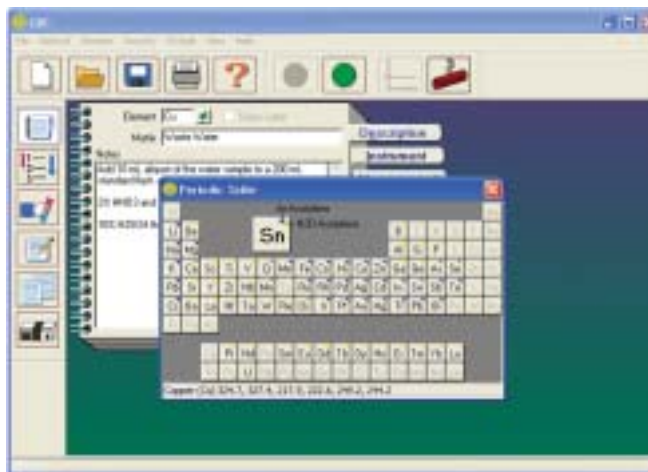
Element selection is made easy with SensAA software

Fast and powerful

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GBC SensAA software

- *Storage of signal graphics provides a valuable quality assurance aid*

  To aid in method development and quality assurance, signal traces for all analyzed samples are stored with the corresponding numerical result. If a problem is suspected, simply clicking on the suspect replicate will display the graphical result on the same page. Zoom and cross-hair facilities also enable a close up inspection that can be used to quickly diagnose any problem.

- *Choice of measurement mode enhances productivity*

  Choose from peak height, peak area, integration or running mean. The automated running mean mode provides a significant reduction in measurement time since the measurement is completed when the required precision is achieved.

- *Results editing facility means that samples need to be run only once*

  To ensure that samples and calibrations do not need to be repeated, the software features full editing capabilities for individual replicates as well as the ability to delete complete samples or standards. To prevent unauthorized editing, all results are password protected to ensure data integrity.

- *Status Panels*

  The user can monitor or access information on their samples or instrument parameters and conditions by using status panels. The user can select from nearly 400 parameters to incorporate into their own personalized status panels.

  Each parameter can be displayed as editable or non editable text, dial or slide meters, switches, buttons, graphs or scans further adding to the flexibility of the SensAA software. These paratmeters can be assigned to customizable status button.
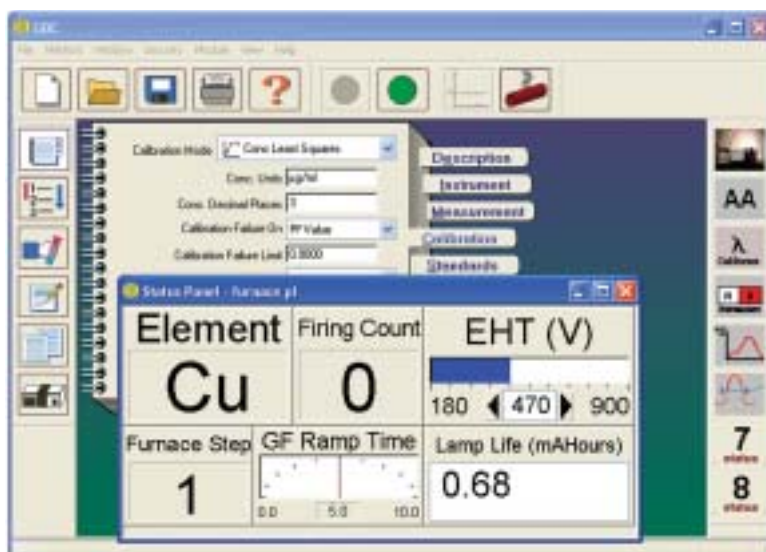
Customize selection via the status panel
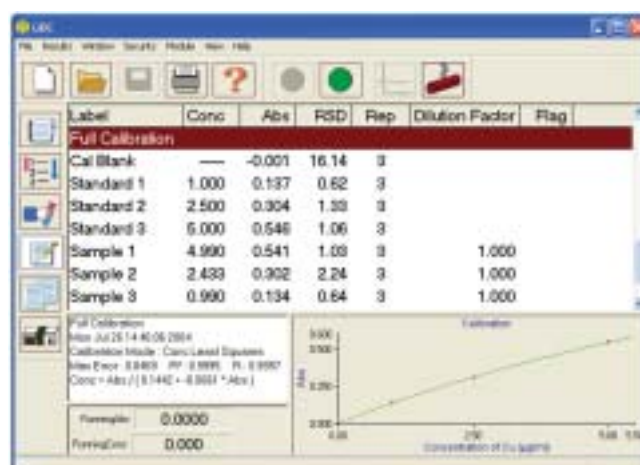
Results and graphics display

Fully integrated software

GBC SensAA Software

- *Analytical applications are stored for instant recall*

  When you select the element to be determined, the software automatically selects the recommended wavelength, lamp current, slit width and flame type. After selecting the other parameters for your application, all information may be stored in an application file for instant recall at any time.

- *All data is preserved on hard disk*

  All results are stored on disk and can be recalled for viewing or printing at any time, or transferred to another disk for archiving. The time and date of analysis is stored with the results, enabling you to monitor the progress of samples, identify batches of results and comply with the statutory regulations.

- *Reporting facility enables fully documented analyses*

  Produce printed reports in comprehensive single element or summarized multi-element formats. Single element reports can contain any combination of information including replicates, sample labels, calibration graphs, method parameters and weights and volumes. Reports can include page footers, headers and individual margins, and all columns and rows can be individually sized. A full selection of fonts and font sizes may be used. Connect an electronic balance to directly transfer sample weights to the weight and dilution table, or use a bar code reader to directly enter sample labels.

- *Help is instantly available*

  Context-sensitive on-line help explains all aspects of the hardware setup, including operation, safety and maintenance. Learning to use the instrument is made easy via multi-media tutorials. While running a tutorial or displaying context-sensitive help, you can work through the software to create an application using as much or as little help as is required.

- *Continuous display of concentration for rapid sampling*

  The digital concentration read-out on the results and graphics screens is continually updated, invaluable for optimization and rapid manual sampling.

- *Touch Screen Technology*

  Intuitive icons make operating the software both easy and user friendly.

  Works when operator is wearing gloves.

Comprehensive quality control protocols.

Valuable quality assurance

Regulatory compliance

GMP/GLP compliance

The SensAA and SensAA Dual hardware and software offer full GMP/GLP compliance for those analyzes requiring certification.

- AA certification procedure package - ISO9001 accredited
- Automatic wavelength calibration software
- Calibration failure control using calibration algorithm statistics
- Comprehensive Quality control software suite
- Concentration range checking

- QC check samples including a full range of fail actions
- Automatic spike recoveries allowing enhancement & suppressive interference checking
- Password protection allowing user access control
- Full date & time stamping of results
- Method linked to results - eliminates confusion and enforces traceability

- Real time data export to any LIMS, allowing enhanced flexibility
- Y2K compliance certificate provided with software

Regulatory Compliance

- Full compliance with USA Food and Drugs Authority, CFR 21, part 11 "Electronic Records and Signatures"
- Security Menu to provide Electronic Records and Signatures
- Tamperproof Audit Trail File
- User levels with password log on to provide method security

Compliance

System 3000 graphite furnace for ultra-trace analysis

The System 3000 graphite furnace suits applications requiring the measurement of very low concentrations.

This system achieves state-of-the-art performance enabling most elements to be determined at sub-part-per-billion concentrations. It blends all of the latest developments in graphite furnace technology into a fully integrated system. The GF3000 power supply and PAL3000 autosampler are both controlled from the AA computer. The superb System 3000 incorporates all of the features expected in an advanced graphite furnace:

Rapid heating (2000°C/sec) under full control

The unique GBC temperature control system uses true power feedback to ensure reproducible analytical conditions. This system has a fast response and is independent of fluctuations in mains voltage or conductivity of the graphite components and covers the full temperature range.

Flexible temperature program

The temperature program allows any number of steps, enables performance to be optimized for even the most complex samples.

High performance furnace assembly

The furnace enclosure allows the graphite tube to be surrounded by a carefully controlled flow of inert gas.

The tube itself is designed for optimum performance, with raised sections ensuring that all samples are safely confined to the central part of the tube.

## Total pyrolytic graphite platform for reduced interferences

Chemical interferences can be a problem in many graphite furnace applications. Sensitivity is often reduced and complex sample treatment schemes are required to overcome the interferences. The platform for the System 3000 eliminates or reduces most chemical interferences.

Programmable gas selection

The provision of two gas supplies gives maximum flexibility for handling the widest range of samples.

The GF3000 graphite furnace workhead
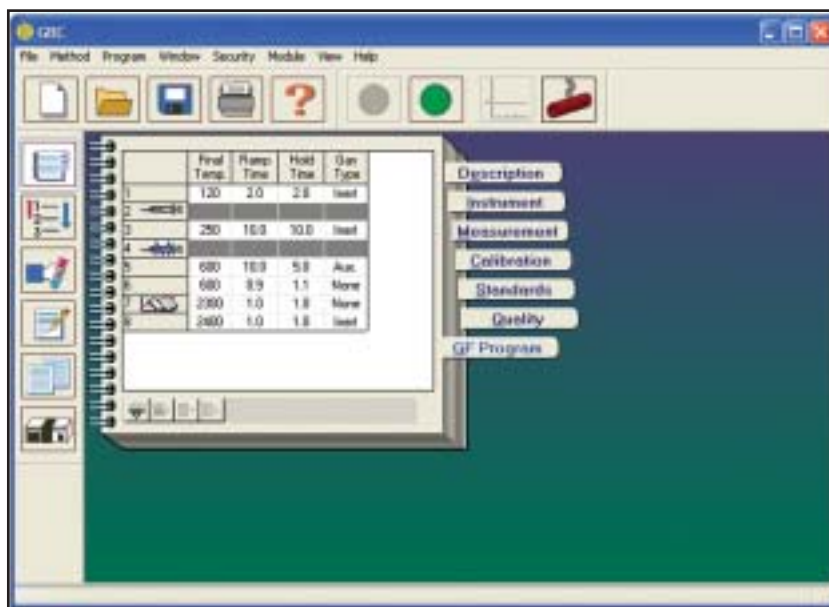
Simple furnace program interface

Performance

Automatic furnace sampler

Performance

The System 3000 is designed to achieve state-of-the-art sensitivities and detection limits. Approximately 50 elements can be determined, most at sub part-per-billion concentrations. The typical characteristic mass for some of the elements is shown in the following table. (Characteristic mass is the mass of the element required to give an absorbance of 0.0044).

Element	Charac. Mass (pg)	Element	Charac. Mass(pg)
Ag	0.9	Fe	1.5
Al	5	Mn	0.7
As	6	Mo	8
Au	4	Ni	5
Ba	12	Pb	2.5
Cd	0.25	Se	20
Co	4	Ti	45
Cr	1.5	V	20
Cu	2.5		

Top view of the PAL3000 autoloader

The PAL3000 Programmable Auto Loader provides automatic calibration with up to 10 standards and automatic analysis of up to 40 samples. Any sample volume between 1 and 100 µL may be selected.

Automatic mixing of standards saves time and improves reliability

The PAL3000 will automatically prepare a series of up to 10 standards from a single stock solution and can also automatically prepare standard additions from the stock solution. This procedure eliminates errors in the preparation of standards, reduces the likelihood of contamination and saves considerable time.

Automatic dispensing of chemical modifier eliminates the need for manual sample treatment

With many applications, the addition of a chemical modifier to the sample improves sensitivity, reduces background absorbance or reduces chemical interferences. The PAL3000 can automatically add a specified volume of chemical modifier to each sample and standard.

Automatic dilution

Manual dilution is time and labour-intensive and is also prone to errors and contamination. The PAL3000 eliminates these problems by automatically diluting any over-range samples to bring them into the calibration range.

Multiple injections for automatic pre-concentration

Several aliquots of a sample may be injected and dried prior to atomization. This allows the effective sample volume to be increased and permits very low concentrations to be measured without the need for chemical pre-concentration procedures.

Heated injection reduces analysis time

The PAL3000 can be programmed to inject the sample after the graphite tube temperature has been raised above the boiling point of the solvent. The sample then dries as it is injected and the time-consuming drying stage is eliminated.

Simple set-up and storage of probe co-ordinates

The sampler capillary tip is conveniently aligned with the furnace tube sampling hole with the use of the cursor keys on the keyboard. Once established, the co-ordinates are stored in the computer, even when the power is switched off.

Accuracy and productivity

Specifications

SensAA

Optics

Single beam (SensAA) or double beam (SensAA Dual) with background correction and flame emission capability. The SensAA Dual has asymmetric modulation with 2:1 sample-to-reference ratio for noise reduction. All-reflective system with quartz overcoating on mirrors. Dust cover over optical system.

Monochromator

Ebert-Fastie design with 333 mm focal length and 175-900 nm wavelength range. 1800 line/mm holographic grating with dual-blazed profile and 1.6 linear reciprocal dispersion. Automatic wavelength selection and peaking. Continuously adjustable slits with 0.1 to 2 nm spectral bandwidth (0.1 nm increments). Reduced height for furnace operation available with all slit widths. Automatic setting of slit width and height. Automatic scanning. Selected wide range multi-alkali photomultiplier tube.

Choice of lamp types

Plug-in mounting for hollow cathode lamp or Application Source with vertical and horizontal adjustments for optimizing light throughput.

Lamp supply

Allows warm-up for next element using the Application Source.

Background correction

Hyper-Pulse background corrector takes 200 (50 Hz) or 240 (60 Hz) sample readings per second for correction of fast background peaks. With approximately 1 ms between pulses and interpolation between measurements, the best possible accuracy is assured. High intensity deuterium arc lamp provides 175 - 423 nm correction range. Corrects to 2.5 total absorbance.

Interlocked flame control

Flame ignition only on air based flames. Nitrous oxide ignition inhibited. Push button actuated glow plug ignition system. Safety interlocks on burner, nebulizer, pressure relief bung and liquid trap. Safety interlock system also prevents nitrous oxide selection with air-acetylene burner. Fast change selection of nitrous oxide-acetylene flame.

Integrated liquid trap

The liquid trap is now integrated into the spray chamber to enhance the safety of the instrument.

Gas control module GCM (optional)

Microprocessor controlled. Monitors gas pressures, flame and safety interlocks. Keypress selection of air or nitrous oxide-acetylene flames with automatic fuel enrichment for nitrous oxide flames. Automatic flame shutdown upon mains power failure.

Flame atomization system

Premix design with solid polypropylene mixing chamber. All-titanium burner construction. Nebulizer has platinum-iridium capillary and titanium Venturi. Liquid trap with liquid level interlock. Quick-change mounting to enable easy changeover to graphite furnace.

Footprint

Minimum bench space of 455 mm x 810 mm is all that is required

Performance guarantee

Greater than 0.8 abs for 5 mg/L copper with an RSD less than 0.45% for ten 10-second integrations.

SensAA

Specifications

AAS
SensAA

In-built computer

Touch screen interface computer incorporating Intel Pentium™ or AMD CPU technology. A minimum of 256 MB RAM, one parallel port, four USB ports, firewire port and a mimimum of 40 GB data storage capacity.

Software

Microsoft Windows®XP operating system for true multitasking. Controls SensAA and SensAA Dual Plus AAS, SDS-270 autosampler, PS-270 auto-diluter, GF3000 graphite furnace and PAL3000 furnace autosampler, HSA3000 high solids analyzer and MC3000 mercury concentrator.

Data processing

Analysis by atomic absorption or emission. Absorbance range to 2.5. Measurement by integration, running mean, peak height or peak area. Mean and RSD of up to 50 replicate readings. Calibration using up to 10 standards. Curve correction by linear least squares, linear least squares through zero, exact fit or concentration least squares (polynomial), plus standard additions or bracketing standards. Programmable rescale using a single standard or complete recalibration. Result editing to remove unwanted readings. Weight and dilution correction. All editing available either during or post-run.

Graphics

High resolution display of atomic absorbance and background signals, furnace temperature programs, calibration curves, peaking meters and wavelength scans. Different scales may be used for atomic and background signals. Signals may be displayed in the single shot, overlay or overview mode. Consecutive signals may be overlaid. Graphics cursor may be used to obtain numerical information from graphics traces. Zoom function allows graphics traces to be expanded.

Data storage

Storage is provided for signal graphics, applications, results, sample labels, weights and dilutions, and report headers.

Quality

Quality control software satisfying GLP and GMP is supplied as standard.

Report generation

Reports may be printed during a run or from stored result files. They may include headings, notes, operating parameters, calibration graphs, sample labels, results and statistics. Results from different runs (e.g., flame, furnace and vapour generation) may be combined into a single report. Reports may be printed sequentially by element or in a multi-element format.

Dimensions

Spectrometer module: 830 x 580 x 520 (WxDxH, mm)

Weight

Spectrometer module: Unpacked 48 kg, Packed 60 kg.

Electrical Requirements
110/220/240 volts AC, 50/60 Hz, 300 VA.

Options

Specifications

Accessories

System 3000 Graphite Furnace

Automated graphite furnace system. Comprises GF3000 graphite furnace power supply and workhead plus PAL3000 programmable automatic sample loader. Controlled by the AAS computer.

GF3000 furnace assembly

Furnace assembly includes graphite tube (and platform if required) mounted in enclosure with quartz windows. Permanently connected to power supply by umbilical cord carrying gas, cooling water and electrical supplies. Inert and auxiliary gas supplies. Temperature range ambient to 3000°C. Computer-controlled maximum heating rate of 2000°C/sec. Temperature program has unlimited number of steps, each with ramp and hold, gas selection, graphics display option and read option. Temperature controller monitors current and voltage and uses power feedback to provide accurate control over the full temperature range, and during both ramp and hold stages. Interlocked to inert gas and cooling water pressures. Corrects for changes in cooling water temperature.

PAL3000 furnace autosampler

Accommodates up to 49 samples and one stock solution or 40 samples and 10 pre-mixed standards or one stock solution for automatic mixing of up to 10 standards. Container volumes are 2 mL for samples and standards, 5 mL for automix standard, 10 mL for blank and chemical modifier.

Dispensed volume is 1–100 µL, programmable in 1 µL increments. All-PTFE capillary. 1 L rinse container. Probe set-up controlled by computer with co-ordinates stored in memory. Program options include automatic mixing of standards, automatic mixing of standard additions, automatic dilution of over-range samples, automatic injection of chemical modifier, multiple injection, heated injection, automatic rescale or complete recalibration, check sample and spike recovery.

Inert gas requirement

Argon or nitrogen at a pressure of 70–200 kPa (10–30 psi).

Dimensions

GF3000: 380 x 360 x 290 (WxDxH, mm.)
PAL3000: 220 x 209 x 140 (WxDxH, mm.)

Weight

GF3000: Unpacked 35 kg, Packed 45 kg.
PAL3000: Unpacked 7 kg, Packed 10 kg.

Electrical requirements

208/220/240 volts AC, 50/60 Hz, Rated current 15A, surge current 40A.

SDS-270 sample delivery system

The SDS-270 sample delivery system is a full random access X-Y-Z autosampler providing unmatched productivity, capacity for up to 270 samples and ten standards, and a small footprint.

Samples are contained in three separate racks allowing for different tube sizes within a batch. The SDS-270 is controlled by the AAS software, providing random access, micro-sampling capability and standard additions analysis, plus check samples and quality control limits, plus programmable measurement time, delay time, rinse time, re-slope and re-calibration rates, number of samples, number of standards and number of replicates. A built-in diaphragm pump provides a continuous stream of clean rinse solution.

Dimensions

260 x 160 x 290 (WxDxH, mm)

Weight

Unpacked 7 kg, packed 10 kg

Electrical requirements

110/220/240 volts AC, 50/60 Hz.

SDS-270 Sample Delivery System

Full range of AA accessories

Specifications

Accessories

PS-270 Prep Station

The PS-270 is used in combination with the SDS-270 auto-sampler, removing the need for manual standard and sample preparation and sample dilution for flame and hydride applications. The PS-270 is totally controlled through the AA software enabling true fully-automated analysis. Simple and reliable automation of standard additions and spike recovery, or sample matrix modification through the addition of up to two chemical modifier solutions provides hands-off operation and versatility.

Dimensions

300 x 200 x 370 (WxDxH, mm)

Weight

Unpacked 5 kg, packed 11 kg.

Electrical requirements

110/220 volts AC, 50/60 Hz

FS3000 autosampler

For flame and hydride use only. Carousel holds 10 standards and 60 samples. Separate positions for rinse, blank and rescale standard.

Dimensions

420 x 230 x 380 (WxDxH, mm)

Weight

Unpacked 12 kg, packed 19kg

Electrical requirements

110/220/240 volts AC, 50/60 Hz, 120 VA

HG3000 automatic hydride analysis

The HG3000 hydride generator is an automatic continuous flow system. Coupled with the SDS-270 autosampler, it provides totally automated analysis of arsenic, selenium, and the other hydride forming elements at part-per-billion levels. It can also be used to determine mercury by the cold vapour method. The optional EHG3000 electric heater provides controlled heating of the hydride cell to temperatures up to 1000°C, allowing hydride analysis to be performed without the use of a flame. With a precision of around 1% at ppb concentrations and a sample throughput of 60 samples per hour, the HG3000 provides the ultimate in fast, accurate and convenient hydride analysis.

MC3000 mercury concentrator

Regulations for mercury analysis are pushing the required detection limits well below the level achievable using the standard cold vapour technique. The MC3000 mercury concentrator accessory for the HG3000 addresses this problem. By concentrating the mercury vapour on a gold foil, detection limits of 5 ppt can be readily achieved. The MC3000 accessory is fully controlled by the AAS software and unattended analysis can be carried out when used in conjunction with the SDS-270 sample delivery system.

HSA3000 high solids analysis

The HSA3000 high solids analyzer enables analysis of solutions containing high concentrations of dissolved solids. In conventional sample introduction, samples with more than about 2% dissolved salt can cause blockage of the nebulizer or burner. The HSA3000 allows analysis of samples containing up to 30% dissolved solids. Samples may be presented manually or automatically with the autosampler.

Requirements

Ordering Information

Model	Optics	Background	Flame Control	Part Number
SensAA Dual	Double Beam	Yes	GCM	99-0538-00
SensAA	Single Beam	Yes	GCM	99-0548-00
SensAA Dual	Double Beam	Yes	Interlocked	99-0539-00
SensAA	Single Beam	Yes	Interlocked	99-0540-00
SensAA G	Double Beam	Yes	None	99-0542-00

All SensAAs are supplied with an inbuilt P4 computer operating at 2.4 MHz, 256 MB RAM, 80 GByte Hard Disk, one parallel port, two serial ports, 4USB and firewire, 15 inch High Resolution Resistive Touch LCD, Sound Blaster Sound Card and Ethernet Card. The PC is loaded with Windows XP, SensAA software and touchscreen drivers.

The SensAA G is not capable of flame operation and is designed to operate with a graphite furnace or hydride generator only.

All SensAAs are supplied with operation manual and SensAA software.

All flame SensAAs are supplied complete with air-acetylene burner, spray chamber, adjustable nebuliser, gas hoses, and flame methods manual.

Accessories

Nitrous oxide – acetylene burner	99-0075-00
Recommended spares and consumables for 2 years operation	95-0637-00
Fume extraction system (complete) 220/240V, 50 Hz	99-0012-00
Fume extraction system (complete) 110V, 60 Hz	99-0012-01
Fume extraction system (complete) 220, 60 Hz	99-0400-00
Air compressor (oil filled) 110V, 60 Hz	75-0005-00
Air compressor (oil filled) 220/240V, 50 Hz	75-0006-00
Air compressor (oil filled) 220V, 60 Hz	75-0045-00
Air compressor (oil less) for high humidity or high altitude 220/240V	75-0049-00
Air compressor (oil less) for high humidity or high altitude 110V	75-0050-00
Nitrous oxide cylinder regulator with heater	99-0050-02
Air cylinder regulator	99-0099-00
Acetylene cylinder regulator	99-0100-00
Balston gas purifier	99-0284-00
Gas purifier maintenance kit	95-9912-00

Flame Autosampler

FS3000 Flame Autosampler	99-0106-00
Supplied complete with test tubes, beakers, stainless steel probes cables, tubing and 60 position sample rack	
SDS-270 Sample Delivery System	99-0326-11
Supplied complete with test tubes, PTFE–coated probes, cables, tubing, inbuilt wash pump, fixed wash reservoir and three 60–position sample racks	
PS-270 Sample Preparation System	99-0407-11
HSA3000 High Solids Analyser	99-0155-00
Sampler/accessory trolley	96-0021-00

Hydride

HG3000 Automatic hydride generator	99-0276-00
Recommended spares and consumables for HG3000	95-0016-00
EHG3000 Electric heater for hydride cell	99-0237-11
MC3000 mercury concentrator unit for HG3000	99-0245-11

Graphite Furnace

System 3000 automated graphite furnace system (complete)	99-0108-00
Comprises GF3000 power supply and workhead plus PAL3000 automatic sampler loader. Supplied complete with 10 Pyrollytically coated graphite tubes, 5 platforms, 500 sample vials, Furnace Methods Manual, beakers, hoses, cables and tubing	
Graphite Furnace Tubes, pyrollytically coated (pack of 10)	99-0059-00
Pyrolltic graphite platforms (pack of 10)	99-0060-00
Pyrollytically coated graphite furnace tubes with integrated platform (pack of 10)	99-0342-00
Pair of electrodes	99-0061-00
Sample vials for PAL3000 (pack of 500)	99-0022-00
Recommended spares and consumables for 2 years operation for System 3000	95-0015-00

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