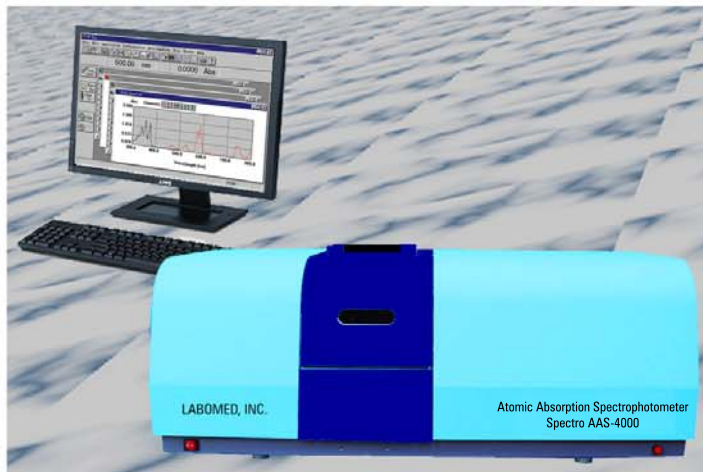




Atomic Absorption Spectrophotometer

Fully Automatic Combined Flame and Graphite Furnace System

Model AAS-4000



Atomic Absorption Spectrophotometer AAS-4000 is a superior instrument for the research laboratory, and is an advanced and affordable system with high sensitivity that generates accurate and reproducible measurements. The AAS-4000 spectrophotometer is accurate, reliable, and is an exceptional value. With its built-in, computer-controlled Air/Acetylene flame, titanium alloy burner and high-efficiency glass nebulizer design, the system provides optimal and reproducible results for micro and macro samples with high resolution.

Atomic Absorption Spectrophotometer AAS-4000 has a **powerful built-in software** which permits this instrument to be linked to a computer and a printer to display the photometric and spectral data on the PC monitor. **Atomic Absorption Spectrophotometer AAS-4000's** enhanced transmission and full reflection makes this atomic absorption spectrophotometer highly effective and reduces noise.

One of its advantages is its accurate wavelength, ease of operation, versatile software applications, and effortless optional accessory installation. This instrument provides for automatic switching between the flame and graphite furnace, and is widely used for analyzing samples for **Agricultural, Food, Geological, Clinical, Metal, Petrochemical, Environmental, Mining and Pharmaceutical applications.**

It is easy to manipulate, and is fully automated, allowing for automatic adjustment of the lamp current and position, the burner head position, the negative voltage, and the gas flow. Safety is our primary concern, and the **Atomic Absorption Spectrophotometer AAS-4000** allows for constant monitoring of the burner head, the flame, the ignition, air pressure, and drain status, to ensure the optimum functioning of the instrument.

Atomic Absorption Spectrophotometer AAS-4000 has a highly effective nebulizer, the sensitivity of the Cu $2\mu\text{g/ml}$ is more than 0.28Abs.. Labomed, Inc. is certified by ISO-9001-2013, has CE Conformity and is FDA Licensed.

Features

FEATURES AND FUNCTIONS:

The instrument has a motorized 8 hollow cathode lamp turret which allows the automatic positioning and optimization of each hollow cathode lamp by the software. The control of the gas flows for the fuel gas (C_2H_2) of the burner is also carried out directly from the software, thus allowing optimization of the instrument for the best analytical parameters for a selected analysis.

Two methods of background correction are available. The first utilizes a Deuterium Arc lamp and the second is the proven method of Self Reversal.

High precision minimal optics ensures maximum light throughput to the computer controlled Czerny-Turner Monochromator.

The location of the wavelength and peak selection is automatically controlled from the software.

The spectral bandwidth is automated and is available with a choice of five slit sizes.

The electronic parameters for the photomultiplier tube detector, the hollow cathode lamp current and the balancing of the absorbance and background energies are controlled from the software.

The ignition of the flame is computer controlled and the various safety interlocks offer a very safe operating system.

SAFETY:

The flame conditions are continuously monitored and should the flow rates change, an audible alarm sounds.

The pressure of the support gas (oxidant) is monitored constantly. If the pressure changes then the flow of the fuel gas will be stopped and the flame will be safely extinguished.

A sensor monitors the level of liquid in the drain and will prevent ignition if too slow. The flame will also be extinguished if the level of liquid in the drain changes significantly.

A flame sensor monitors the flame and safely turns off the gas flow to the burner if the flame suddenly extinguishes.

The burner is identified by a switch making it impossible to light without the burner being fitted.

An emergency flame off button is installed in case a problem is observed. The flame can be extinguished safely.



Atomic Absorption Spectrophotometer

Fully Automatic Combined Flame and Graphite Furnace System

Specifications of AAS-4000

| Optic System | |
|--|---|
| Wavelength Range: | 190nm - 900nm |
| Monochromator: | Czerny-Turner configuration |
| Spectral Bandwidth: | 0.1nm, 0.2nm, 0.4nm, 1.0nm, 2.0nm (5 steps. with automatic changeover) |
| Wavelength Accuracy: | ± 0.25nm |
| Wavelength Repeatability: | 0.15nm |
| Baseline Stability: | 0.005A/30 min |
| Grating Groove: | 1800/mm |
| Wavelength Resolution: | 0.2nm ± 0.02nm |
| Background Correction: | Deuterium Arc 1.0Abs Self Reversal 1.0Abs |
| Flame analysis | |
| Sensitivity (Cu): | 0.03 µg/ml/1% |
| Burner Head: | Titanium alloy burner |
| Nebulizer: | High efficiency glass nebulizer, Acid proof available as an option |
| Atomization Chamber: | Corrosion-resistant material |
| Position Adjustment: | Automatic changeover of flame and furnace Automatic setting of optimum height for flame burner |
| Safety: | Automatic ignition and of mixing air-acetylene gas with safety control |
| Flame Types: | Air/Acetylene |
| Characteristic Concentration: | Cu < 0.04 µg/ml/1% (Air/Acetylene) |
| Detection Limit: | Cu ≤ 0.006 µg/ml |
| Repeatability: | Cu < 1.0% (air - acetylene method). Ba < 1.0% (air - acetylene method). |
| Graphite furnace analysis | |
| Character Value (Cd): | 0.5Pg |
| Temperature Range: | Ambient - 2650 °C |
| Heating and Temperature | Voltage feedback control when drying and ashing; |
| Control: | Multi-Standard Calibration, Standard Addition, Interpolation |
| Heating program: | Up to 9 steps with choices of ramp, temperature increase and full-power heating |
| Detection Limit: | Cd ≤ 0.01ng/ml |
| Repeatability: | Cu < 3%, Cd < 4% |
| Heating Methods: | Advanced graphic furnace horizontal heating |
| Temperature Control Precision: | < 1% |
| Background correction | |
| Deuterium Lamp Back-ground Correction: | Deuterium Lamp Background Correction: >40 times (1Abs) and Self-Reversal Background Correction: >60 times (1Abs) |
| Data processing | |
| Analytical method: | flame, graphite furnace and hydride |
| Determination method: | calibration curves using 1 st , 2 nd and 3 rd order of fit, standard addition method |
| Repetitions: | 1-20 with calculations of average, SD and RSD |
| Result Printout: | output of parameters, data, spectra and calibration curves |
| Mainframe | |
| Light Source: | 8 hollow cathode lamp turrets with 2 lamps simultaneously lit (one lamp pre-heated) |
| Power Supply: | 220V/50Hz, 3 phase-4 lines with grounding 200W (mainframe) 5000W (graphite furnace) |
| Dimensions: | mainframe 110 cm x 50cm x 45cm graphite furnace 50cm x 50cm x 45cm |

NOTE:

The sensitivity of the Cu 2µg/ml is more than 0.28Abs..



Atomic Absorption Spectrophotometer

Fully Automatic Combined Flame and Graphite Furnace System

Model AAS-4000

ADVANCED GRAPHITE FURNACE:

The unique design of the graphite furnace reduces the chemical interference effects and memory effects by uniformly heating the graphite electrode.

The computer controlled heating program allows the user to select the best heating program for the analysis.

The optical temperature during the atomization stage ensures the rapid heating and rapid analysis. This helps to extend the life of the graphite tube and enhances analytical accuracy.



PROVEN SAFETY FEATURES:

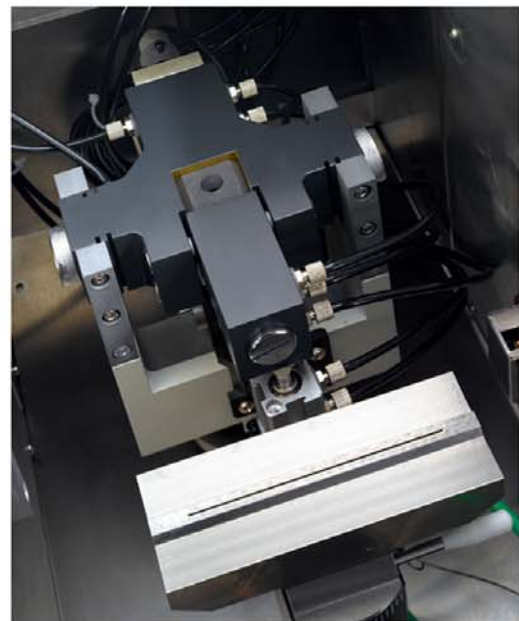
The flame conditions are continuously monitored and should the flow rates change an audible alarm sounds.

The pressure of the support gas (oxidant) is monitored constantly. If the pressure changes then the flow of the fuel gas will be stopped and the flame will be safely extinguished.

A sensor monitors the level of liquid in the drain and will prevent ignition if too low. The flame will also be extinguished if the level of liquid in the drain changes significantly.

The argon pressure for the graphite furnace is constantly monitored and should it change the heating cycle for the graphite electrode will immediately cease and the graphite electrode will be de-energized.

Cooling water flow rates for the graphite furnace are also monitored for changes and should changes occur the heating program will cease. If the graphite tube should fracture during the heating program the heating will cease.





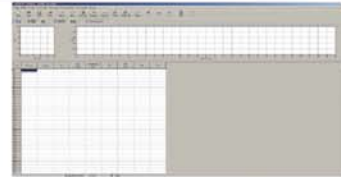
Atomic Absorption Spectrophotometer

Fully Automatic Combined Flame and Graphite Furnace System

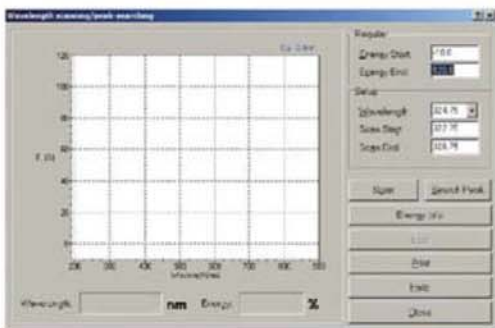
Model AAS-4000

Software Specifications

AA-Win Pro Software is a powerful and intuitive software product designed to allow control and data acquisition from the Spectro AAS-4000 Atomic Absorption Spectrophotometer. The AA-Win Pro software allows the Analyst to control all aspects of their analytical method whilst providing an extensive range of tools for data collection, storage and interpretation.



Lamp turret setup, operating and warm-up currents, along with the desired analytical wavelengths are easily selected in this configuration.



| No. | Method | Sample | Wavelength (nm) | Conc. (ppm) | Std. Dev. | Time | Type |
|-----|--------|--------|-----------------|-------------|-----------|------|------|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | | | | | |
| 16 | | | | | | | |
| 17 | | | | | | | |
| 18 | | | | | | | |
| 19 | | | | | | | |
| 20 | | | | | | | |
| 21 | | | | | | | |
| 22 | | | | | | | |
| 23 | | | | | | | |
| 24 | | | | | | | |
| 25 | | | | | | | |
| 26 | | | | | | | |
| 27 | | | | | | | |
| 28 | | | | | | | |
| 29 | | | | | | | |
| 30 | | | | | | | |

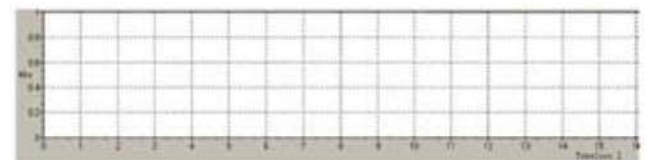
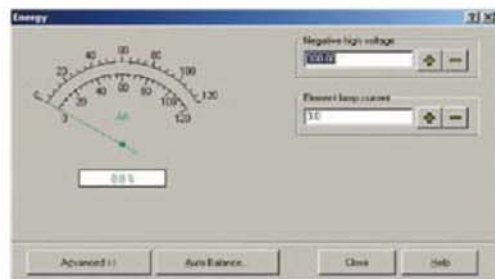
Use the sample table to perform quick measurements of both Standards and Samples. Easily append the sample table to add new samples or even revise calibration curves either by manual introduction or using an Autosampler.

Ensure optimal peak position at the chosen analytical line by scanning the emissions spectra.



Each stage of analysis setup is made quick and simple by means of the Sample Wizard.

View up-to-date calibration curves in 1st, 2nd, or 3rd order using a standard calibration or standard addition. Perform retrospective curve fits to ensure optimum correlation.



View real-time signal acquisition for flame, graphite furnace and hydride generation analysis.

Obtain reliable and accurate results by using the Energy control feature to manually optimize atomiser position and setup. Use the Auto-balance feature to ensure energy level, and optical alignments are optimized when using background correction.



Atomic Absorption Spectrophotometer

Fully Automatic Combined Flame and Graphite Furnace System

Model AAS-4000

Periodic table of chemical elements | Details

| 1A | 2A | 3B | 4B | 5B | 6B | 7B | 8 | 9 | 10 | 11 | 12 | 13A | 14A | 15A | 16A | 17A | 18 |
|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|----|
| H | | | | | | | | | | | | | | | | | He |
| Li | Be | | | | | | | | | | | B | C | N | O | F | Ne |
| Na | Mg | | | | | | | | | | | Al | Si | P | S | Cl | Ar |
| K | Ca | Sc | Ti | V | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr |
| Rb | Sr | Y | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I | Xe |
| Cs | Ba | La | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn |
| Fr | Ra | Ac | | | | | | | | | | | | | | | |

Legend:

- Flame: [White box]
- Furnace: [Blue box]
- Hydride: [Purple box]

Legend elements:

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu |
| Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr |

Elements that can be analyzed with the AAS-4000

Software

- The user friendly software requires a Windows platform and operates within Win95, Win98, Win NT, Win 2000 and WinXP. The system uses a number of software wizards to guide the operator through setting up procedures.
- The software controls the automatic switch over for the Hollow Cathode Lamps and automatically optimizes working parameters for the system. The software also allows manual input of data to ensure that the operator always stays in control. The software will automatically complete the configuration of the system for analysis.
- The user has the choice of two methods of background correction namely the self reversal system OR the traditional deuterium lamp background correction system.
- During the analysis cycle of both the flame and graphite furnace the software shows the entire measurement process. This includes measured values, temperature steps, time etc. all signal and temperature data is stored for future re-call and printout.
- Detailed reporting and QC control software is included within AAWin allows printout of spectra, standard calibration curves, analysis and signal data. Full printout of operating parameters is also available for user references.
- The following methods of analysis can be carried out using the AAS-4000 system Absorption, emission, graphite furnace analysis, hydride and cold vapour analysis.

