

AA500

ATOMIC ABSORPTION SPECTROMETER



PG INSTRUMENTS LIMITED



AA500

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The AA500 Atomic Absorption Spectrometer is a high performance automated instrument designed to meet the requirements of the modern laboratory. Due to its versatility and performance it can be used for a wide range of applications including:

- Agricultural
- Environmental
- Metal
- Geological
- Pharmaceutical
- Clinical
- Food
- Mining
- Petrochemical

The versatile instrument is available in three configurations:

AA500F - The instrument is equipped with a flame atomiser only. The positioning of which is fully controlled by the embedded computer system and AA-Win Pro software. Three flame options are available to the user with the Air/Acetylene being the standard configuration. This flame can be used for nearly all standard elements while the N₂O/Acetylene and the Air/LPG (Natural gas) are available as an option for the more demanding of elements. All three flame configurations offer coded burner for full safety protection.

AA500G -The instrument is equipped with a Graphite Furnace Atomiser only. The graphite head is fixed into the optical path to maximise performance and eliminate drift. The temperature of the transversely heated graphite tube is accurately controlled by means of a precision feedback system. Pyrolytically coated platform tubes are supplied as standard to improve the performance and eliminate many analytical problems associated with this technique.

AA500FG -The instrument is equipped with both Flame Atomiser and Graphite Atomiser as described above. Both configurations are installed into the instrument and can be changed over by a simple selection in the versatile AA- Win Pro software.



FEATURES & FUNCTIONS

- PC System is used to control the instrument. Pre-installed AA-Win Pro software, user manuals, cook book and Windows 7 professional operating system.
- AA-Win Pro software provides full control of the instrument and autosampler with easy method change for each technique.
- Automatic 8 Hollow Cathode lamp turret controlled and optimised by the AA-Win Pro software. Operating lamp current and warm-up lamp current can be individually controlled to eliminate drift commonly associated with lamp warming.
- D2 lamp background correction system fitted as standard to all configurations. High energy D2 lamp and adjustable beam splitter mirror are optimised by the AA-Win pro software.
- Self Reversal background correction system fitted as standard to all configurations. The high performance background system uses the same hollow cathode lamp as installed for the analysis. Minimum extra components are required and optical alignment is very simple. Self Reversal can be used for any element at any wavelength making it extremely versatile.
- High precision minimal optics ensures maximum light throughput to the computer controlled Czerny-Turner monochromator.
- A universal autosampler is available as an optional accessory which is conveniently mounted on the front of the AA500 instrument.
- Absorption and Emission modes are standard features in the AA-WinPro software as well as peak height, peak area, sequential and manual integration modes.

FLAME ATOMISER FEATURES

The flame atomiser offers three flame options:

Air/acetylene is the standard configuration with the N₂O/acetylene and Air/LPG as options.

Air/Acetylene

- The Air/Acetylene flame uses a 100mm single slot burner for the standard configuration.
- The high sensitivity (Cu 2ppm >0.280abs) is due to the efficiency of the fixed position glass nebuliser fitted as standard. An acid resistant replacement is available as an option.
- The flame can be easily set from blue lean flame through stoichiometric to fuel rich by means of computer control.

N₂O/Acetylene

- The N₂O/Acetylene flame uses a 50mm single slot burner and is available as an optional extra.
- This flame configuration is used to measure elements less prone to ionization such as: Aluminium, Tin, Titanium, Calcium, Vanadium and Molybdenum.
- Switching from Air/Acetylene to N₂O/Acetylene to Flame Off is fully controlled by the AAWinPro software.

Air/Propane(LPG)

- This flame uses a 3 slot burner and with the low pressure requirement it is also much safer to operate.
- Due to the low temperature of the flame it is ideal for analysing alkali metals such as: Potassium, Sodium and Lithium, especially when used in the emission mode.
- Some remote areas of the world have difficulty obtaining Acetylene gas of a high enough purity to operate the flame correctly, LPG can give a real alternative and offer comparable results for most elements throughout the wavelength range.



SAFETY FEATURES

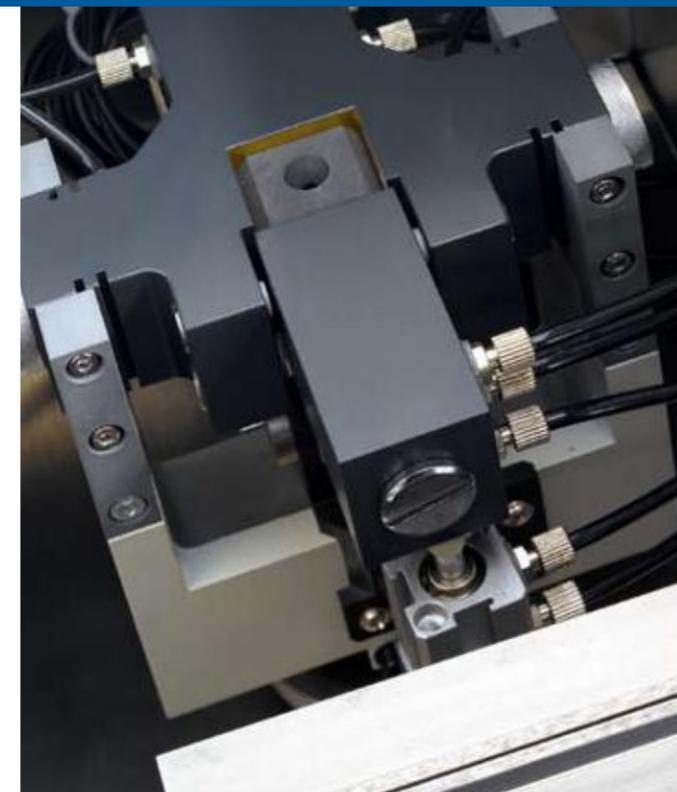
- Pressure monitoring for all gases
- Burner Identification
- Flame sensor
- Drain Trap level Sensor
- Gas Leak Detector
- Over Pressure in Premix
- Safety Cut off Switch

GRAPHITE ATOMISER FEATURES

- The integrated Graphite Furnace Atomiser is available in two instrument configurations.
- In the AA500G instrument the graphite furnace head is fixed into the light path so alignment with the optical path is simple and accurate.
- In the AA500FG instrument the graphite furnace head is fixed behind the flame atomiser assembly and is motorised into position by a simple operation in the AA-WinPro software. The positions for the flame and graphite are saved making it easy to swap between modes for different analysis.

FEATURES & FUNCTIONS

- The temperature of the transversely heated graphite tube is accurately controlled by means of a precision feedback system and has been designed to reduce analytical problems normally associated with this type of technique.
- Pyrolytically coated graphite tubes are used as standard and are manufactured to improve performance as well as increase the analytical life.
- Platform graphite tubes are supplied as standard and will accept volumes up to 20ul. Non-platform graphite tubes are also available as an optional extra.



SAFETY FEATURES

- Argon Gas pressure Sensor
- Water flow sensor
- Over Temperature Sensor
- Broken graphite tube protection

- Up to 10 heat stages are available for the programming of the graphite atomiser. These can be set and stored within the AA-WinPro software.
- The graphite tube is held in position by means of a gas piston. Replacement of the graphite tube is performed by a simple command in the AA-Win Software.
- The graphite tube is efficiently cooled by an additional water circulation system (supplied separately).

Spectrometer System

Wavelength range	185nm -910nm
Light Source	Hollow cathode lamp (HCL), Deuterium Arc lamp (D2)
Modulation	Square Wave Pulse
Modulation frequency	100Hz Self reversal (SR) background, 400Hz Deuterium Arc (D2) background

Monochromator

Grating	1800 grooves/mm diffraction grating
Blazed Wavelength	250nm
Focus	300nm
Bandwidth	0.1nm, 0.2nm, 0.4nm, 1.0nm, 2.0nm (Software selectable)
Scan mode	Automatic
Photometric Type	Single Beam
Wavelength Accuracy	± 0.15nm
Wavelength Resolution	0.2nm ± 0.02nm
Wavelength Reproducibility	< 0.05nm
Baseline Stability	0.005Abs/30min
Background Correction	Deuterium Arc (D2) 1.0Abs, Self Reversal (SR) 3.0Abs

Flame Analysis

Flame Types	Air/Acetylene, Nitrous Oxide/Acetylene, Air/Propane (LPG)
Sensitivity (Cu)	2ug/ml Absorption >0.28Abs
Characteristic Concentration	Cu < 0.02ug/ml, Ba < 0.15mg/ml (N ₂ O/Acetylene)
Detection Limit	Cu < 0.004ug/ml
Repeatability	Cu < 0.7% (Air/Acetylene Flame) Ba < 1.0% (Nitrous Oxide/Acetylene Flame)
Burner heads	Titanium Alloy
Nebuliser	High efficiency glass, Acid proof available as an option
Pre-mix Chamber	Corrosion Resistant
Atomiser Selection	Automatic changeover (AA500FG), Manual (AA500F)
Safety Features	Burner identification, Flame Sensor, Gas Leak Sensor, Low Gas Pressure Sensor, Drain Trap Sensor, Power Loss Protection

Graphite Furnace Analysis

Graphite Head	Transversally Heated
Temperature Range	Ambient - 3000 °C
Heating Program	Up to 10 steps. Drying, Ashing, Atomisation, Cleaning
Feedback	Voltage and Optical temperature control feedback
Sensitivity (Cu)	50ng/ml Absorption > 0.40Abs
Detection Limit	Cd < 0.004ng/ml
Repeatability	Cu < 2.0%, Cd < 2.0%
Graphite Tubes	Pyrolytically Coated with Platform
Sample Size	Up to 20ul
Graphite Cooling	Water Circulator Available
Safety Features	Argon Pressure Sensor, Water Flow Sensor, Over Temperature Sensor, Broken Tube Protection

Data Processing

PC System	PC, Windows 7 Professional Operating System
Operating Program	AA Win Pro software
Analytical Methods	Flame AA, Flame AE, Graphite Furnace, Hydride Generation
Readout Mode	Continuous, Manual, Peak Height, Peak Area
Calibrations	Multi-Standard Calibration, Standard Addition, Interpolation
Data Storage	Analytical results, instrument and measurement parameters, signal profile, calibration curve

Power Requirements

Main Unit	220VAC 50/60Hz
Graphite Power Supply	220VAC 50/60Hz Instantaneous power 5KW Current rating 7KW

Dimensions

Main unit	110cm x 54cm x 54cm 75Kg
Graphite Power Supply	50cm x 54cm x 54cm 70Kg

Standard packaging

AA500F		AA500G		AA500FG	
1	Main unit	1	Main unit	1	Main unit
1	AA500 instruction Manual	1	AA500 instruction Manual	1	AA500 instruction Manual
1	Cook Book	1	Cook book	1	Cook Book
1	Safety Manual	1	Safety Manual	1	Safety Manual
1	System validation document	1	System Validation document	1	System validation document
1	Data coded Air/Acetylene burner	8	Hollow cathode Lamp Holders	1	Data coded Air/Acetylene burner
1	Glass Nebuliser	2	Power Cables	1	Glass Nebuliser
8	Hollow cathode Lamp Holders	1	Tool Kit	8	Hollow cathode Lamp Holders
2	Power Cables	1	Various Gas Fittings	2	Power Cables
1	Gas tubing Air	10	Graphite Tubes	1	Gas tubing Air
1	Gas Tubing Acetylene	1	Gas Tubing Argon	1	Gas Tubing Acetylene
1	Drain Trap and Tubing	1	Connection Cable (Graphite)	1	Drain Trap and Tubing
1	Tool Kit	1	Pipette	1	Tool Kit
1	Various gas Fittings	1bag	Pipette Tips	1	Various gas Fittings
				10	Graphite tubes
				1	Gas Tubing Argon
				1	Connection Cable (graphite)
				1	Pipette
				1bag	Pipette Tips

The AS500 Autosampler is an accessory specifically designed for the AA500 Atomic Absorption Spectrometer. The AS500 can be used to automatically introduce standard and unknown samples to the atomiser for analysis. It can be used with both flame and graphite furnace instruments.



Flame Analysis

- 38 sample positions (6 for standard samples, 32 for unknown samples).
- Sample vial size 6ml
- Standard sample vial size 12ml
- Pressure protection for wash
- Position adjustment by AA-Win Pro software
- Reproducibility Cu < 0.6% (air/acetylene) Cu < 1.0% (air/LPG)
- Ba < 1.0% (nitrous oxide/acetylene)

Graphite Analysis

- 76 sample positions (10 for standard samples, 6 for modifier solutions, 60 for unknown samples)
- Sample vial size 1.5ml
- Modifier vial size 12ml
- Pressure protection for wash
- Up to 3 modifier additions
- Position adjustments by AA-Win Pro software
- Reproducibility Cu < 2.0%, Cd < 2.0%

Nitrous Oxide/Acetylene Burner(500-023)



- Titanium alloy construction
- 50mm single slot
- Coded for safety
- Direct replacement for standard burner
- Designed for higher temperature flame
- Adjustment of burner rotation for sensitivity optimisation

Acid resistant Nebuliser(500-010)



- Resistant to most acid samples
- Higher uptake rate for improved high solids samples
- Higher air pressure required
- Robust construction
- Fixed flow for easy installation

Air/Propane(LPG)Burner(500-030)



- Titanium Alloy construction
- 3 slot burner
- Coded for safety
- Direct replacement for standard burner
- Designed for lower temperature flame
- Adjustment of burner rotation for sensitivity optimisation

Graphite Tube Without Platform(500-006)



- Pyrolytically coated graphite tube
- No platform fitted giving a faster response for refractory elements
- High quality long life tubes
- Can be used for larger samples < 20ul

Hydride Unit(500-007)

- Universal design
- Full reaction cycle from press of start button
- Supplied with temperature controlled heated absorption cell
- Cell is easily installed with burner attachment
- Can be used for Mercury cold vapour analysis
- Sensitivity for most elements < 1ng/ml
- Only 2.0ml - 2.5ml per sample required
- RSD < 3%
- Quick analysis < 30 seconds per measurement

Acetylene Flame Arrestor(GS-004)



- Direct fitting to gas regulator output
- Required for acetylene gas
- Non-resetting easy to replace

Gas Regulators (GS-001,GS-002,GS-006,GS-007)



- Direct fitting to gas cylinder
- Comply to British Standards
- Supplied with hose fitting and crimp
- Various gas cylinder fittings available
- Regulators for Air, Acetylene, Nitrogen, Argon, Nitrous Oxide, LPG
- Specify fitment to European standard

Hollow Cathode Lamp



- Sharp line source
- About 5000 milliampere-hours

Water Circulator(GS-005)



- Cooling capacity 2000W
- Temperature range 0-50°C
- Temperature accuracy 1°C
- Maximum input power 1000W
- Fuse 10A
- Power 220V 50Hz
- Work Pressure 0~0.6MPa
- Rated flow rate 3.5L/min
- Rated lift 10M
- Tank capacity 32L
- Noisiness < 65
- Dimension(L×W×H) 600×400×900
- Weight 50Kg

Air Compressor(GS-003)



- Rated discharge pressure: 0.3Mpa
- Output rate: 0.3-0.9m³/h (adjustable)
- Noise: smaller than 55dB
- Power supply: AC220V 50HZ
- Dimension: 400×300×620(mm)
- Ambient condition: ambient temperature less than 35°C Relative humidity less than 80%