

AAAnalyst 600 and AAAnalyst 800 Atomic Absorption Spectrometers

System design

The AAAnalyst™ 600 and AAAnalyst 800 are the first fully-integrated benchtop design atomic absorption spectrometers, incorporating all spectrometer and atomizer components in a single instrument.

Optical system

Front-surfaced, reflecting optics with protective coating. Optical system sealed within protective cover.

AAAnalyst 800 Real-time double-beam optical system (single-beam for Zeeman furnace operation).

AAAnalyst 600 Single-beam optical system.

Monochromator Littrow design with motorized drive for automatic wavelength selection and peaking.

Wavelength range: 190-900 nm

Diffraction grating: 1800 lines/mm blazed at 236 nm and 597 nm

Grating area: 64 x 72 mm

Reciprocal linear dispersion: 1.6 nm/mm (nominal)

Focal length: 267 mm

Spectral bandwidths: 0.2, 0.7 and 2.0 nm, dual height (AAAnalyst 800 only);
motorized slit drive for automatic slit selection

Detector Wide-range segmented solid-state detector, including a built-in low-noise CMOS charge amplifier array.

Automatic Lamp Selection 8-lamp holder with built-in power supplies for hollow cathode and electrodeless discharge lamps. Computer-controlled lamp selection and alignment via WinLab32™ software. Operating parameters are automatically set when using PerkinElmer® Lumina™ hollow cathode lamps.

Flame system (AAAnalyst 800)

Gas Controls Fully computer-controlled with oxidant and fuel monitoring. Keyboard-actuated remote ignition system with air-acetylene. Acetylene flow is automatically adjusted prior to the oxidant change when switching to or from nitrous oxide-acetylene operation. TotalFlow™ control of the oxidant and fuel gases for constant fuel:oxidant ratio.

Safety Functions Interlocks prevent ignition if the proper burner head, the nebulizer/end cap, or the burner drain system are not correctly installed; the liquid level in the drain vessel is incorrect; or gas pressures are too low. Interlocks automatically shut down gases if a flame is not detected, or if any of the other interlock functions are activated. Safe shutdown in the event of a power failure.

Burner System Premix design that can be moved automatically into the sample compartment via software control and a motorized carriage. Alignment of the flame in the light beam is fully automatic and optimized, using a motorized burner mount for vertical and horizontal burner adjustments. The burner is equipped with a high-strength inert mixing chamber, angled to ensure proper drainage. Includes adjustable high-precision nebulizer and an all-titanium, 10-cm, single-slot burner head for air-acetylene operation.

Background correction

AC Zeeman-effect background correction using a modulated 0.8 Tesla magnetic field oriented longitudinally to the optical path. The magnet is automatically switched on during the atomization step only.

AAAnalyst 800 Built-in continuum source double-beam background correction for flame operation.

Graphite furnace

Built-in computer-controlled Transversely Heated Graphite Atomizer (THGA™). The graphite tube is transversely heated, providing a uniform temperature profile over the entire tube. An external protective gas stream around the graphite tube prevents the entrance of outside air to maximize tube life. An internal purge gas goes through the graphite tube to remove the volatilized matrix vapors during drying and thermal pretreatment. The two gas streams are independently computer-controlled. Pneumatic opening and closing of the furnace for easy tube change.

AAAnalyst 800 The graphite furnace can be moved automatically into the sample compartment and positioned via software control and a motorized carriage.

Furnace features

Program Flexibility Analytical programs with up to 12 steps can be set up. Each step can be programmed with the following parameters:

Temperature: Ambient up to 2600 °C in steps of 10 °C

Ramp and Hold Time: 1 to 9 sec. in steps of 1 sec.

Internal Gas Flow: 0, 50, or 250 mL/min; can be switched over to another type of gas

Required Inert Gas: Argon. Inlet pressure 300 kPa (3 bar) minimum. Maximum gas consumption is 700 mL/min.

Water Coolant: A circulatory cooling system is included with the AAAnalyst 800, optional for the AAAnalyst 600. When operating the AAAnalyst 600 without the circulatory cooling system, cooling water meeting the following specifications should be used: Sediment-free drinking water; 20-40 °C; flow rate not less than 2 L/min; pressure between 2.5 and 4.5 bar; pH between 6.5 and 7.5; hardness not greater than 14°dH or 100 ppm.

Furnace autosampler

Sampler Table Removable sample tray with 88 and 146 sampling positions and 1 overflow container for pipet washing. Minimum sample requirement: ca. 0.1 mL.

Dispensable Volume Sample and Reagent: 1-99 µL, selectable in increments of 1 µL

Electronics The autosampler is powered from the spectrometer and is software-controlled.

Fume extraction system

AAAnalyst 600 Optional built-in device that removes all sample fumes generated during furnace drying and pyrolysis steps.

Data control system

Complete PC control using WinLab32 software. Provides complete control of the instrument and its major accessories plus data handling and storage.

Data Handling Instrument readings linear in absorbance (-0.500 A to +2.000 A), concentration or emission intensity. Integration times are operator-selectable from 0.1 to 60 sec. in increments of 0.1 sec. Reading modes include time-averaged integration, non-averaged integration (peak area), and peak height measurement. Includes built-in statistics. Up to thirty (30) standards and a choice of calibration equations. Reslope of the analytical curve using a single operator-selected calibration standard. Built-in IEEE-488 interface for computer connection and use of optional accessories.

Dimensions

110 cm wide x 65 cm high x 70 cm deep (104 cm deep with furnace autosampler)

Weight AAAnalyst 600: 175 kg (without controller and cooling system)

AAAnalyst 800: 187 kg (without controller and cooling system)

Power requirements

230 V ($\pm 10\%$), 50/60 Hz ($\pm 1\%$), 5000 VA (maximum)

Electrical Protection As defined in EN 61010-1; Insulation Class I; Installation Category II; Pollution Degree 2.

Technical standards

Certification Designed and tested to be in compliance with the legal requirements for laboratory instruments. The instrument was developed and produced in compliance with ISO 9001. The WinLab32 software provides required control parameters for GLP and instrument performance verification.

Safety Standards EN 61010-1, EN 61010-2-061, CSA C22.2 No. 1010.1, CSA C22.2 No. 1010.2.061. The instruments bear the CE Mark and the CSA/NRTL Certification Mark.

EMC Standards EN 61326, EN 55011, EN 61000-3-2, EN 61000-3-3

Environmental requirements

Ambient Temperature +15 °C to +35 °C

Relative Humidity 20% to 80%, non-condensing

Cooling system

Self-priming recirculatory system with fan-assisted heat exchanger (standard with the AAAnalyst 800, optional with the AAAnalyst 600) for constant cooling of the graphite furnace. Water temperature during operation approx. 36 °C; water flow 2.5 L/min.

Power Requirements 230 V ($\pm 10\%$), 50/60 Hz ($\pm 1\%$); approx. 140 VA

Dimensions 20 cm wide x 375 cm high x 50 cm deep

Weight 18 kg with coolant

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