

# The Analyzer 4 You

## novAA<sup>®</sup> 800

Atomic Absorption Spectrometry



**analytikjena**  
An Endress+Hauser Company

## novAA<sup>®</sup> 800 Series

novAA<sup>®</sup> 800 is the reliable all-rounder, making routine analysis of diverse samples efficient and cost-effective.

### novAA<sup>®</sup> 800 – The Analyzer 4 You

- **Efficient**  
High throughput thanks to integrated sampling and dilution
- **Simple**  
Easy handling with user friendly concepts
- **Cost effective**  
High performance at low investment and running cost
- **Reliable**  
Stable measurement conditions thanks to robust components and a clever design

### novAA<sup>®</sup> 800 F

AAS for flame and hydride technology

### novAA<sup>®</sup> 800 G

AAS for graphite furnace and hydride technology

### novAA<sup>®</sup> 800 D

AAS for flame, hydride and graphite furnace technology



# novAA<sup>®</sup> 800

The Analyzer 4 You



## The Analyzer 4 You: novAA<sup>®</sup> 800

novAA<sup>®</sup> 800 combines versatility, reliability and automation to be a highly efficient and cost-effective workhorse in your lab.



The novAA<sup>®</sup> 800 series of atomic absorption spectrometers (AAS) covers the complete range of AAS applications from flame to graphite furnace to hydride mode in just one instrument. It offers fast and reliable routine analysis for moderate sample loads over a wide concentration range, while being extremely easy to handle thanks to clever technology that is made in Germany.

### Reliable functionality

A rugged design guarantees both, long lifetime and excellent analytical performance that arise from a compact base plate, protection against humidity, lightproof encapsulation and coated reflective optics. An optional purge with purified argon or air improves UV transmission and operation in harsh environments, respectively.

An advantage we pass on to our customers: A long-term warranty of ten years is standard for our atomic absorption spectrometers!

### Improved workflows

The dual atomizer concept with swivel-mounted atomizers and automatic alignment simplifies operation and saves valuable working time, while an 8-lamp changer maximizes automation and sample throughput. An integrated RFID Chip allows working with coded lamps.

The novAA<sup>®</sup> 800 series can be operated in single and double beam mode with D2 background correction as well as in emission mode.

### Efficient analysis

Performance-enhancing accessories increase ease of use and productivity. A range of autosamplers benefit the sample throughput, while the Scraper and SFS 6.0 injection switch improve operation conditions and precision. The integrated USB camera for graphite furnace analysis makes light work of method development.

### Flame technique for simple and robust routines

Fast analysis, automated dilution, reliable quality monitoring, all with uncomplicated handling, are a must in routine element analysis. The novAA® 800 series surpasses expectations with clever accessories directly benefitting speed, precision, reproducibility and ease of use of the analysis.

#### Features:

- Autosamplers for sampling, over-range dilution and automatic preparation of standards and QC samples
- Automatic Scraper cleans burner head for improved safety and precision
- Segmented Flow Star, SFS 6.0, injection switch for segmented sample introduction and continuous rinsing for improved precision and reduced sample volumes

### Graphite furnace for cost-effective trace analysis

The novAA® 800 series comes with a transversely heated graphite furnace. Uniform temperature conditions all along the optical axis of the graphite tube guarantee optimal atomization and eliminate memory and condensation effects. Hence, the use of lower atomizing temperatures prolong tube lifetime.

#### Features:

- Sensorless temperature control for precise atomization conditions and improved lifetime of graphite tubes
- Suitable for wall tubes and platform tubes allowing full flexibility in applications
- Integrated USB camera for straight-forward method set-up and optimization

### Advanced analysis of Arsenic, Selenium and Mercury by hydride technique

A range of modular hydride systems for the novAA® 800 series allow the dedicated analysis of Mercury and hydride-forming elements, including Antimony, Arsenic, Mercury and Selenium in either flame or graphite furnace mode. Depending on your application, batch, flow or amalgamation set-up can be used. All hydride systems are fully compliant with DIN, ISO, EPA and ASTM methods for Mercury and hydride analysis.

#### Features:

- Improved detection limits for both, flame and graphite furnace applications
- Flow and batch mode for high throughput and lowest detection limits, respectively
- Amalgamation module for best detection limits of mercury

novAA® 800 F with autosampler AS FD for flame technique



# Improve the Efficiency of Routine Analysis

Simplify sample handling, improve your precision and gain higher sample throughput as well as lower cost per sample.

Performance-enhancing accessories, such as the Segmented Flow Star (SFS 6.0) or the Scraper help you face the challenges of complex matrices in flame analysis. In graphite furnace analysis the transversely heated graphite tube design improves atomization conditions, tube change and adjusting the sampler pipetting tip, while the integrated USB furnace camera allows monitoring and optimization of atomization conditions.

## Autosamplers

The autosamplers AS-F, AS-FD and AS-GF provide a unique flexibility and efficiency in routine analysis. Functions, such as intelligent dilution and pre-concentration, automated dosing of modifiers, and automatic depth adjustment, combined with high-dosing precision, make unattended over-night operation a mere routine and guarantee high sample throughputs.

Sample preparation is reduced to a minimum, hence reducing cost per sample and increasing profitability. AS-FD allows fully automatic sample dilution down to a factor of 1:800 for a single dilution step.

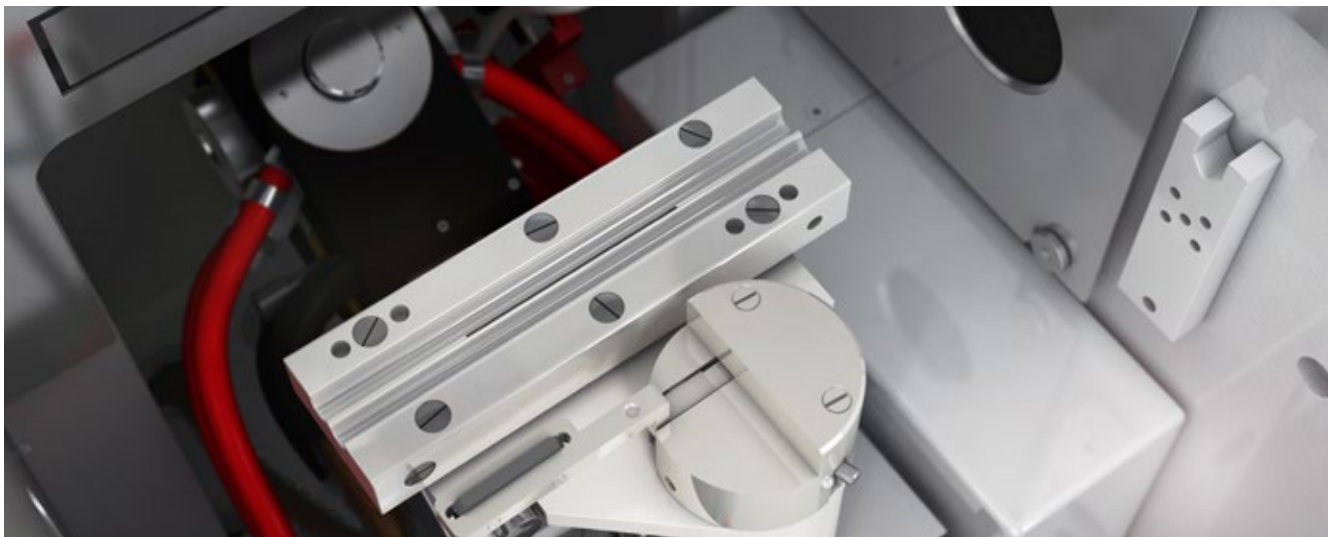
## SFS 6.0 – injection switch

The Segmented Flow Star, SFS 6.0, continuously rinses the sample introduction system and the burner head, hence allowing the segmented introduction of smallest sample volumes and reduced carryover in case of high salt and matrix content and the risk of burner head clogging.

## The Scraper

The Scraper, an intelligent cleaning device for the burner head improves routines, especially when working with the acetylene-/nitrous oxide flame. It automatically cleans the slot before each measurement and in standby mode, thus guaranteeing a continuous and reproducible measuring cycle. It further contributes to lab safety and precision of results.

Burner head with Scraper and lowered graphite furnace (novAA 800® D)



# Simplicity meets Compliance

User-friendly concepts let AAS become child's play. Software functions and modules help meeting all statutory requirements and standards.

## ASpect LS software package

Simple, routine handling on one hand, great flexibility on the other—ASpect LS meets both requirements with perfection. The clearly laid out user interface makes method development easy and straightforward.

The novAA® 800 series offers solutions for fast, automated routine operation, both in absorption and emission mode. To achieve optimum results by flame technique, fuel composition and burner height can be adjusted automatically to each sample. A fully automated Total Flow Gasbox ensures the settings and monitoring of all gas parameters.

## SOP's for easy method development

Ready-to-use SOP's are available to simplify method development. When working with the graphite furnace technique, a software tool for "Optimization of furnace parameters" makes light work of changing and adapting pyrolysis and atomization conditions depending on application demands.

## High safety precautions

As safe operation is a top priority, all safety-relevant parameters are constantly monitored and tracked by various sensors. For instance, flame ignition and automatic gas switch from air to N<sub>2</sub>O are closely controlled to prevent harm and ensure:

- Maximum operating safety in flame mode
- Electrical operating safety
- Automatic control of all gas flows
- Unattended over-night operation in graphite furnace mode
- Seamless operation with performance enhancing accessories, such as hydride system or the Scraper

## Good laboratory practice (GLP)

In view of today's statutory requirements, comprehensive quality assurance is a prime consideration of many labs, which is accounted for in the ASpect LS software, offering e.g.:

- Range of control charts for statistical quality control
- Alarms and notifications when defined limits are reached or exceeded
- Data recording and automatic printout from a selection of templates

Control chart for a QC sample regularly recorded on novAA® 800 by a pharma lab



## FDA 21 CFR Part 11 compliance

Data integrity, audit trail, electronic signature and a user management certainly are part of a modern 21 CFR Part 11 module, such as that available with ASpect LS for the novAA® 800 series.



## novAA<sup>®</sup> 800 – Partner for Your Requirements

Quickly set-up with minimal effort, concentrations from high percentage to low ppm are measured in many industries.

### Food & Agriculture

An accurate measurement of the elemental composition in food and agricultural products is essential to ensure product safety and to maintain adequate levels of nutritional content.

Easy to operate and highly flexible, the novAA<sup>®</sup> 800 F allows fast routine analysis for diverse samples including fertilizers and grains as well as food supplements and beverages. In milk powder samples for example, typical elements such as Calcium, Iron, Potassium, Sodium and Zinc can be readily analyzed by a flame AAS routine.

Performance enhancing accessories like the SFS 6.0 and the AS-FD autosampler make light work of difficult samples, contributing to analytical precision and a high throughput in flame mode. The SFS 6.0 improves flame conditions and sample consumption. In addition, the AS-FD is capable of calibration standard preparation and automatic over-range dilution of highly concentrated samples.

For cost-effective trace analysis of toxic metals, such as Arsenic and Mercury, a hydride system may be attached to the flame. Here, flow and batch operation is possible when either throughput or maximum sensitivity is the major concern.

For even lower detection limits, the transversely heated graphite furnace technology of the novAA<sup>®</sup> 800 G will be the better choice. Its sensitivity advances into the sub- $\mu\text{g}/\text{kg}$  range, making it the trace technique with the lowest cost.

However, for laboratories with moderate sample loads interested in both, the high and the low concentration ranges, the fully automatic atomizer change of the novAA<sup>®</sup> 800 D offers the highest degree of flexibility.





## Environment

A healthy environment is a fundamental prerequisite for life. Therefore, continuous monitoring of industrial and communal waste as well as of soil, surface and drinking water is becoming more and more important globally, as industrialization and population rise.

Typical elements to be analyzed by industrial QC labs in sewage sludge or effluents using flame AAS are Copper, Chromium, Nickel, Zinc and others.

Here, the novAA® 800 F allows simple and highly precise analytical routines with great method robustness even in harsh environmental conditions. A range of performance enhancing accessories, such as the Scraper or the SFS 6.0 switching valve will further benefit safety and precision for heavy sample matrices.

Higher sample throughput and reduction of wet-chemical sample preparation can be achieved when using the AS-FD autosampler with over-range dilution and automatic preparation of calibration standards.

For trace metal analysis of Cadmium and Lead, however, the unique transversely heated graphite furnace technology of the novAA® 800 G and novAA® 800 D will provide exceptional detection limits at the lowest possible costs.

Results for a certified waste water (RVQ3D2) obtained by flame AAS on the novAA® 800 F.

Element	Concentration [µg/L]	Certified value [µg/L]
Pb	160.3 ± 19.7	157.4 ± 8.5
Ni	374.0 ± 3.7	360.0 ± 23.76
Cu	282.1 ± 8.6	289.6 ± 17.38
Zn	277.1 ± 10.2	297.3 ± 14.87
Cr	455.6 ± 7.0	457.5 ± 24.25



# novAA® 800 – Partner for Your Requirements

Quickly set-up with minimal effort, concentrations from high percentage to low ppm are measured in many industries.



## Chemicals & Materials

The Chemicals and Materials industry is one of the largest and most diverse with multiple analytical requirements and manifold applications. It covers the analysis of raw materials, plastics, fine chemicals or even packaging materials, cement and many more.

Here, qualitative and quantitative analysis of chemical elements is crucial to maintain quality and functionality, e.g., in regards to major elemental constituents, such as Calcium, Iron, Magnesium, Potassium and others. For this purpose, flame-AAS is still heavily used by production-related labs.

The novAA® 800 with its user-friendly concept and easy handling allows stable and reliable measurements for all typical elements in low and high matrix samples. An autosampler with integrated dilution function makes time-consuming wet-chemical sample preparation redundant and increases sample throughput.

The Scraper guarantees stable flame conditions, reproducible results and safety, especially when working with the high-temperature  $C_2H_2/N_2O$  flame, as e.g., for more refractory metals like Aluminium and Chromium. For high salt/matrix samples, elemental contents, e.g., of Sodium and Potassium can be measured in absorption and emission mode on novAA® 800 F and novAA® 800 D.



### Geology, Mining & Metals

Flame atomic absorption spectrometry is a simple, robust and cost-effective method used by many mining companies and smelters to quantify base metals (Cobalt, Chromium, Copper, Iron, Manganese, Nickel and Zinc) and precious metals (Silver, Gold) in ores and pre-concentrated metallic forms—over a wide concentration range from medium ppm (mg/kg) to high percentage (wt.%) values.

Here, the flame technique is highly regarded for the little training requirements and a design—such as that of the novAA® 800 series—built to withstand harsh environmental conditions comprising of dust, sand and corrosive fumes. Pre-configured methods (SOP's) and integrated software routines make metal analysis as easy as child's play.

Most base and precious metals can be measured down to sub-mg/L range with a flame set-up using C<sub>2</sub>H<sub>2</sub>/air gas mixture. For refractory metals, such as Chromium or Aluminium, the gas flow can be easily and safely switched to C<sub>2</sub>H<sub>2</sub>/N<sub>2</sub>O. For even lower detection limits, the transversely heated graphite furnace technology of the novAA® 800 G will be the better choice.

Element	Wavelength [nm]	Flame type	LOQ <sup>2</sup> [mg/L]
Ni	232.0	C <sub>2</sub> H <sub>2</sub> /air	0.09
Cu	324.7	C <sub>2</sub> H <sub>2</sub> /air	0.012
Zn	213.9	C <sub>2</sub> H <sub>2</sub> /air	0.003
Cr	359.3	C <sub>2</sub> H <sub>2</sub> /N <sub>2</sub> O <sup>1</sup>	0.153

<sup>1</sup> Cr as a refractory metal requires higher atomization temperatures, hence a C<sub>2</sub>H<sub>2</sub>/N<sub>2</sub>O gas mixture and a 50 mm burner head may benefit the Cr analysis

<sup>2</sup> Limit of Quantification (LOQ)

#### Key benefits of the novAA® 800 series for your application:

- Small footprint with full flexibility thanks to flame and graphite furnace technology on one platform with automatic atomizer change
- Stable measurement of high and low matrix samples in absorption and emission mode
- Significant reduction of wet-chemical handling and sample/standard preparation when using autosamplers AS-FD and AS-GF
- Range of other performance enhancing accessories, such as hydride systems, USB camera, Scraper and switching valve technology (SFS 6.0), for high efficiency and ease of use

novAA® 800 D for flame, hydride and graphite furnace technology



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