

SPECTROLAB

LAVM11

Performance Meets Flexibility:

The Best in Metal Analysis





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The SPECTROLAB's housing includes storage space to hold required tools. The ergonomic working height enables productive operation. The height-adjustable PC table with swiveling keyboard provides easily accessible USB connections and a dust free cabinet for the computer.

The SPECTROLAB is well established in the high performance segment for demanding metal analysis. Its worldwide success in all areas of the metal industry is based mainly on the analytical function of the group of components made up of source, optic and readout system. Surpassing the operational potential is nearly impossible. The flexibility guarantees optimal analytical performance in the entire range of metal analysis applications.

Once again, the new SPECTROLAB generation offers an increase in analytical performance specs. Operation of the instrument has also been simplified with additional functions and a further reduction in maintenance requirements. The fast, efficient and understandable documentation and storage of measurement results is now an integral part of the instrument software, which has been enhanced by the Result Manager. Together with lower argon consumption and faster measurement results, these advances lead to definite economic advantages.



Analysis

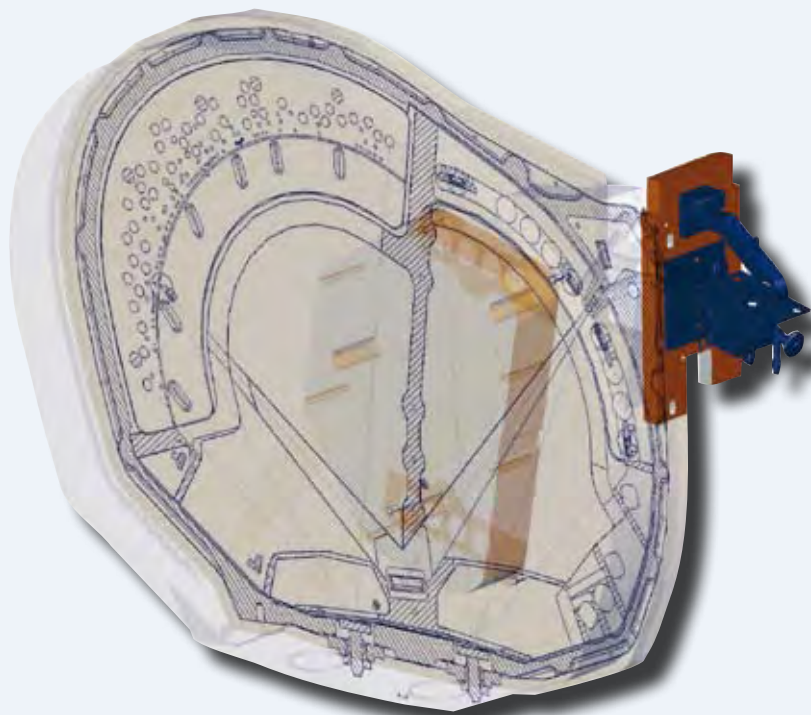
Depending on the individual requirements, the analytical scope can be custom designed with any combination of the ten standard matrices, Fe, Al, Cu, Ni, Co, Mg, Ti, Sn, Pb and Zn, or, as an alternative, from the five precious metal matrices, Au, Ag, Pt, Pd and Ru. An unlimited number of CCD element channels, for any wavelengths in the range between 120-780 nm, together with up to 108 fixed high performance analog channels with micro-integration for ultra-trace analysis and single spark evaluation, are available for the measurements. In fact, any analytical requirement can be optimally fulfilled; without compromise.

Equipped with the most modern technology and high quality components, the SPECTROLAB was conceived for sophisticated analytical requirements. With its outstanding performance and flexibility, it is well suited to routine analysis in process control, to monitoring predetermined specifications during quality control, to conducting special assignments in research and development as well as many other applications in the metal producing, processing and recycling industries.

SPECTROLAB

- Unique hybrid optic with analog detectors and digital sensors
- Covers the complete spectrum from 120-780 nm for perfect line selection
- Digital plasma generator for exact control of the plasma conditions
- Low maintenance spark stand with very low argon consumption





The hybrid optic in the new SPECTROLAB processes the light directly from the spark stand with photomultiplier tubes (PMT) and CCD detectors simultaneously. The result: Extremely low detection limits and a flexible range of use.



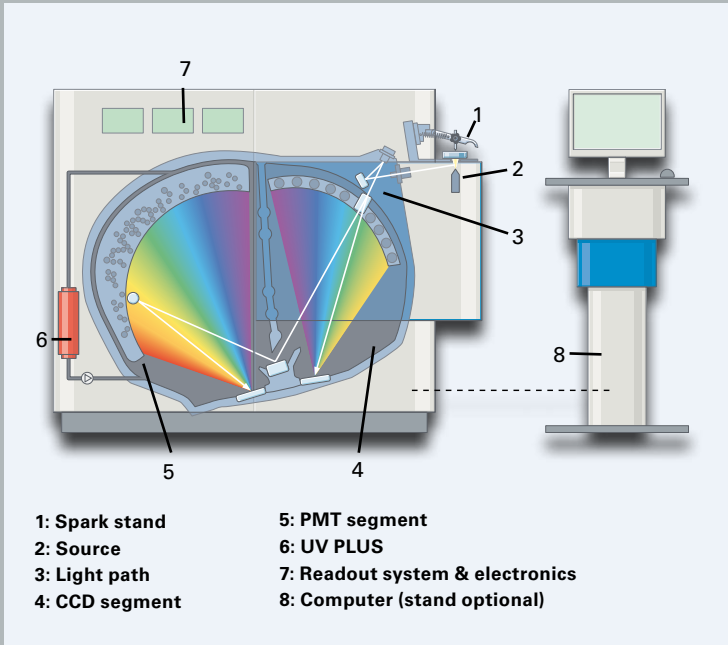
Optic with UV PLUS

The SPECTROLAB optical system uses the specific advantages of both types of detector systems: photomultiplier tubes and CCDs. With the optimized Paschen-Runge mount, it offers an extremely robust mechanical construction with simultaneously minimized volume. To make the system largely independent from environmental influences, the internal pressure and temperature are held constant. As a true hybrid, the housing for the optic contains two separate spectral modules with holographic master diffraction gratings: One equipped with PMT detectors and the other with CCD sensors.

An independent CCD air optic can be connected to extend the wavelengths into the upper range. The proven SPECTRO UV PLUS system is utilized in the SPECTROLAB for measurements in the UV range. The hermetically sealed inner optic chamber is filled once with argon making it transparent into the lowest ultraviolet wavelength regions without complicated technology.

The argon in the optic is circulated through the system - including a filter cartridge - by a membrane pump. Contamination of the optical components, typical for systems with vacuum or purge gas, are prevented and an excellent long-term stability ensured. Except for exchanging the filter cartridge every 12 to 15 months, the system is completely maintenance-free. The drastic reduction in operating costs is a clear advantage of UV PLUS in addition to the outstanding transparency in the wavelength range between 120 and 180 nm.

With the unique construction and the unrivaled UV PLUS concept, the novel SPECTROLAB optical system is able to simultaneously record the entire relevant spectrum from 120-780 nm in the first order with a very high spectral resolution of up to 9 picometers. This system forms an important basis for the SPECTROLAB's excellent analytical performance. The applicable and configured wavelength range is defined by the customer's application requirements.



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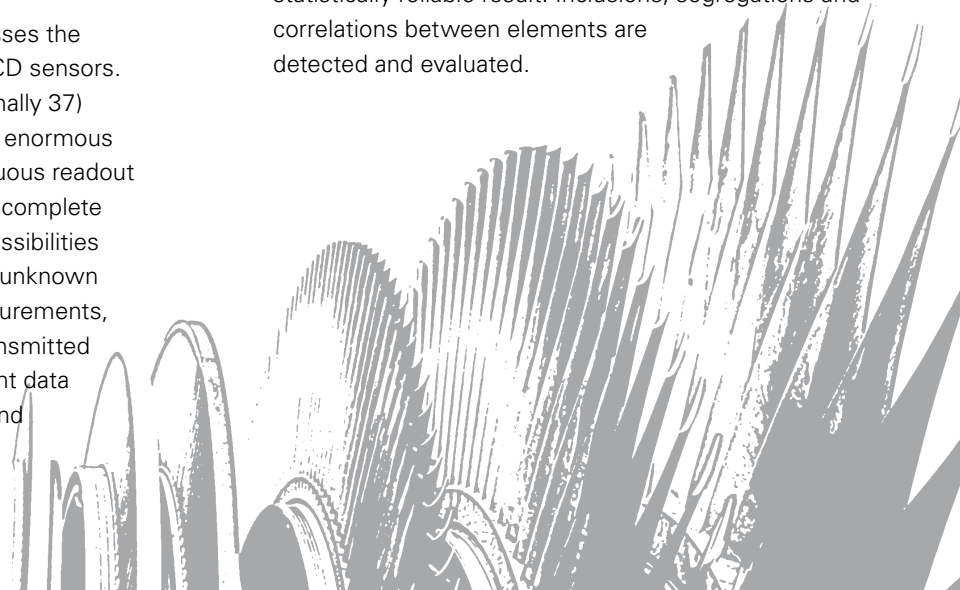
Plasma Generator

The further developed SPECTRO plasma generator is one of the most robust excitation systems available. An extremely stable discharge is generated to excite the sample in an argon atmosphere. With the completely digital excitation process and control, it is possible to define the energy of the plasma with extreme resolution and high fidelity. For standard applications, the results are available in less than 18 seconds, allowing sample throughput to be increased and process control accelerated.

Readout System

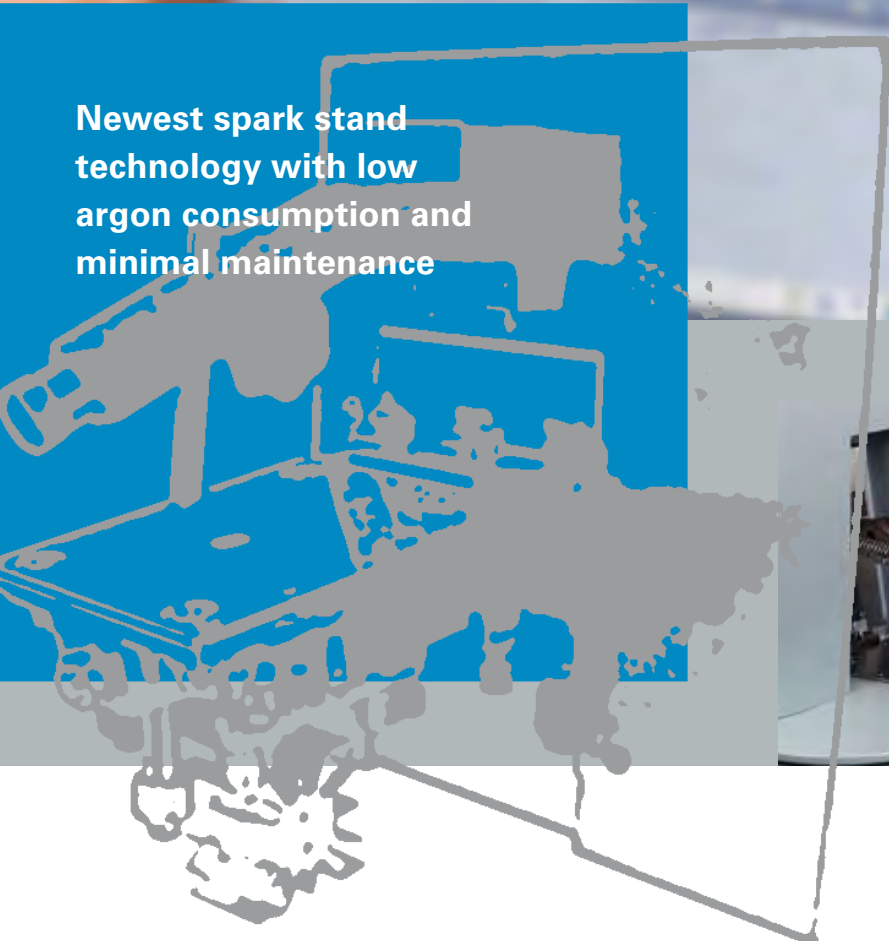
The readout system simultaneously processes the signals from the PMT detectors and the CCD sensors. The optic can be configured with 22 (optionally 37) CCDs each with 3800 pixels. The resulting enormous amount of data collected during the continuous readout can be displayed, after measurement, as a complete wavelength scan. This offers many new possibilities for R&D, as well as vast information about unknown materials and new alloys. For routine measurements, only the "Regions of Interest" (RoI) are transmitted from the complete spectrum. This intelligent data reduction allows a real time transmission and evaluation of the transient data.

Depending on the application, certain spectral lines are measured with photomultiplier tubes. The photon current is processed with micro-integrators that enable readings in microsecond ranges. A single spark can thus be divided into 100 or more steps, making detailed information available at the end of the measurement about the course of the spark intensities for each installed spectral line. Within these individual spark discharges, it is possible to define integration windows with optimized dynamic range and the best signal to noise ratios for trace analysis. In contrast to conventional spectrometers, it is now possible to determine the light output for each individual spark, instead of integrating the total light over a fixed measurement time. With the large number of measured sparks, one quickly obtains a statistically reliable result. Inclusions, segregations and correlations between elements are detected and evaluated.





Newest spark stand technology with low argon consumption and minimal maintenance



Spark Stand

There is a direct light path from the SPECTROLAB spark stand to the optic with an additional fiber optic connection available for the optional CCD optic. The minimized inner chamber volume and a well-planned argon flow leads to lower argon consumption with simultaneously effective removal of the condensate formed. This is then bound in a two stage filter system with minimal maintenance requirements. Maintenance of the spark stand is also greatly reduced. The sample clamp can be swiveled to the right and left and has an integrated safety circuit. It enables rapid sample changing and can be used for widely varying sample forms. Special adapters accommodate unusual sample forms such as small parts, wires and thin sheets, to improve the accuracy and reproducibility of the analysis.

Sample Processing

SPECTROLAB's sophisticated design has minimized the required maintenance and control tasks; making the operator's work much easier. Routine analyses can be conducted with the simple push of a button. The entire analysis, including sample preparation, can be fully automated for high sample volumes. The diagnosis system, integrated into the SPECTRO Spark Analyzer Vision software, continuously checks and documents the operating status of the instrument. In addition, the software presents a simple and intuitive interface with comprehensive functions for the instrument parameters, for data exchange with external computers, for printing and evaluation of data as well as for the determination of the quality of the analysis. An integrated SQL database forms the basis for data management.



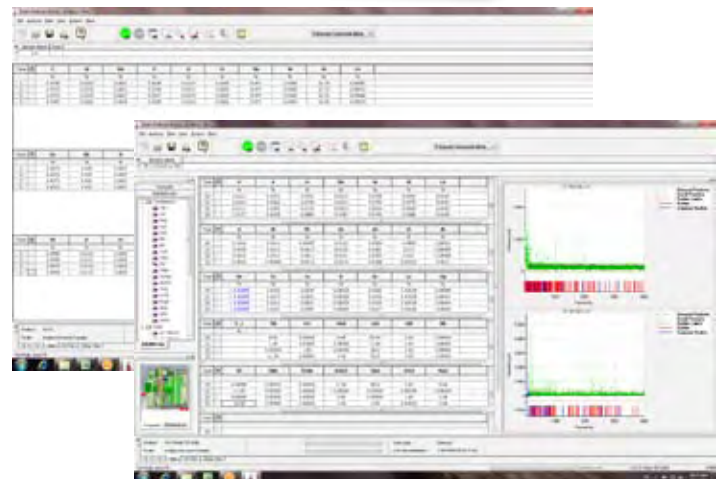
**SPARK ANALYZER
VISION – Comprehensive
instrument software with
calibration module and
Result Manager**

Software

A navigation bar enables access to the three main program modules: Analysis, Methods and Configuration. The Measure Window makes it possible to view multiple measurements and average values. Use the Windows Clipboard to quickly and easily copy the measurement results and other data into many Windows applications.

A visual diagnostic and maintenance system continuously provides information about the correct operating status of the SPECTROLAB. It automatically calls attention to required and recommended maintenance that becomes necessary when given conditions are met (a certain number of measurements, for example). Faulty samples can be recognized and rejected. The pre-spark for homogenization of the burn spot before the actual analysis is also monitored and optimized by the system.

Documentation and storage of the measurement data is easier than ever before with the new Result Manager. It enables rapid processing of the data, suitable for audit trails, and fulfills all requirements for the traceability of measurement results and control measurements.



The complexity of the SPARK ANALYZER VISION software is adjustable in accordance with customers' requirements. It can add or remove additional information to or from the display as needed.

SPECTROLAB



Multi-Optic System

- Paschen-Runge mounting
- Rowland circle with 750 mm focal length (optional optic, 400 mm focal length)
- Stabilized against temperature fluctuations
- Gas filled UV optic for wavelengths < 200 nm
- Self-regulating purification system
- Argon flushed light path
- Holographic master gratings: 3600, 2924, 2400 grooves/mm
- Grating material: Zerodur
- Effective wavelength range: 120-780 nm, the applicable and configured wavelength range is based on the customer's application requirements
- Reciprocal dispersion:
3600 grooves/mm: 0.37 nm/mm (1st order)
2924 grooves/mm: 0.46 / 0.23 nm/mm (1st / 2nd order)
Optional optic
2400 grooves/mm: 1.04 nm/mm (1st order)

Spark Stand

- Open spark stand for high sample throughput
- Analysis of samples with various kinds of geometries
- Optimized Argon flow
- Minimized Argon consumption
- High up-time due to reduced cleaning intervals
- Spark stand plate easily exchangeable
- Temperature absorbent design, water cooling not required
- Integrated shutter system for optimum plasma viewing

Excitation System

- Fully digitalized plasma generator with digital discharge definition, digital pulse generation and digital offline pulse control
- 32 MHz micro-controller
- Sampling rate: 400 in 200 μ s-discharge
- Energy resolution: 125 mW
- Max. spark duration: 4000 μ s
- Max. spark power 4 KW

Software Readout System

- Parallel CCD and PMT Operation
- Parallel 12 Bit A/D Converters @ 1 MHz for each channel
- Automatic system and operation diagnostics
- SPECTRO Spark Analyzer Vision software with calibration module for Windows™
- User-friendly operator interface
- Integrated SQL database for processing, reporting and archiving of measurement results
- Visual diagnostic and maintenance system
- SATEUS (Safety Test of Usefulness) for the recognition of bad sample surfaces during the pre-spark
- SEREPS (Self Regulated Pre-Spark) for the optimization of the pre-spark time
- SETEME (Security Test for Measurement) for the recognition of bad samples during the integration time

Computer System

- External, state-of-the-art computer system with Windows™ operating system
- Keyboard and mouse
- TFT 22" flat screen
- Printer

Spectrometer Specifications

- 230 VAC – 15% +10%, 50/60 Hz
- 1.0 kVA during the measurement
- 0.5 kVA during standby
- Main Fuse: 16A slow blow
- Depth: 1674 mm / 66"
- Width: 771 mm / 31"
- Height: 1409 mm / 56"
- Weight: approx. 520 kg / 1150 lbs.

Environmental Conditions

- Room temperature: 15-30°C (59-86°F)
- Relative Humidity: < 80 % non-condensing
- Atmosphere: free of corrosive vapors and high dust pollution



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