

SPECORD®

Quality is the difference



More than 150 Years of Experience in the Field of Optical Systems

Analytik Jena has a long tradition in developing high quality and precision analytical systems which dates back to the inventions made by Ernst Abbe and Carl Zeiss. Today Analytik Jena is a leading manufacturer of high performance analytical instruments and one of the most innovative companies.

1874 First spectrometer

1924 First Pulfrich photometer – the basis for the development of spectrophotometry in Jena



1937 First flame photometer – Carl Zeiss establishes the methodology of flame photometry



1963 SPEKOL and SPECORD update the tradition of Pulfrich photometers in Jena

1969 Prototype of the first commercial flame AAS



1971 Launching of the first AAS 1 of Carl Zeiss Jena



1982 First simultaneously measuring UV VIS spectrometer with Multi Channel System (MCS)



1993 Introduction of the first Zeiss-AAS graphite system with transverse-heated graphite furnace

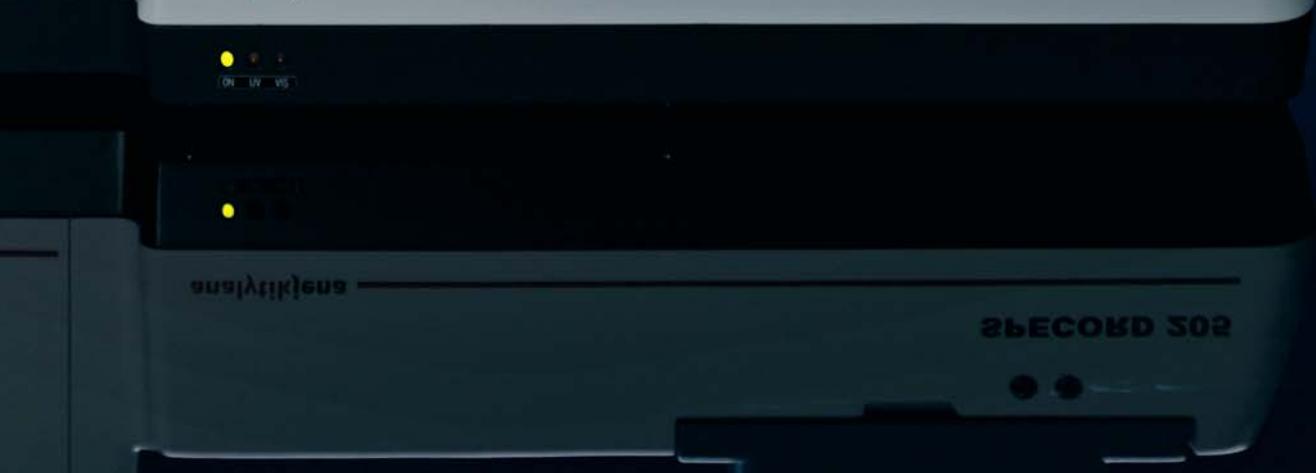
2000 AAS ZEE nit, the first transverse-heated Zeeman graphite furnace AAS instrument with variable magnetic field and 3field mode

2003 First high speed photometer with 50 cell changer and Diode Array Detector

2004 Analytik Jena AG presents the first High-Resolution Continuum Source AAS (HR-CS AAS) worldwide, a revolution in Atomic Absorption







SPECORD® series – wavelengths ahead

Quality is the difference

Our overriding goal is to provide high-performance analytical instruments with:

- Highest quality
- Optimum precision
- Innovative technology
- Durability

No compromises:

- Usage of certified high-end-components only
- Quartz coated optics
- Completely encapsulated optical systems

Meeting these high demands our customers primarily benefit:

Analytik Jena is the only company who offers a 10-year warranty on optical components.

High-end optics – guarantees high light throughput and excellent features

Superb-quality optical components meeting the highest performance and safety standards are the prime features of each of our spectrometers. We guarantee for best protection and exceptional durability. For many years now, our optical system designs have been governed by some important principles:

- Aspheric optics ensure ideal imaging conditions and minimized aberrations
- Thanks to encapsulation and quartz-coating the components are convincing also in aggressive laboratory atmospheres with durability
- The monochromator with its concave holographic grating, the MCS (Multi-Channel-System) or MMS (Monolithic-Miniature-Spectrometer), minimization of the number of optical components, and the use of aspherical optics contribute to the high precision of measurement results

A new generation for the whole range of UV VIS

Analytik Jena's spectrophotometer series sets new standards:

Variable slit width (SPECORD® 250/210/200) and fixed slit width (SPECORD® 205/50/40/30), monochromator or photodiode array spectrometers (SPECORD® S 600/S 300), high-end stand alone-version or PC system – the choice is yours.

Various configurations available:

SPECORD® 250 – Low stray light UV VIS spectrophotometer with doublemonochromator, variable spectral resolution and CDD (Cooled Double Detection)

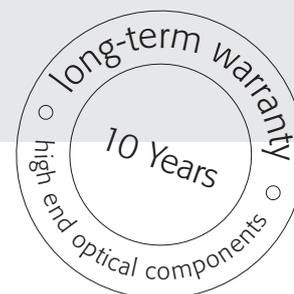
SPECORD® 210/205/200 – Powerful double-beam systems with variable slit width and CDD or with fixed slit width

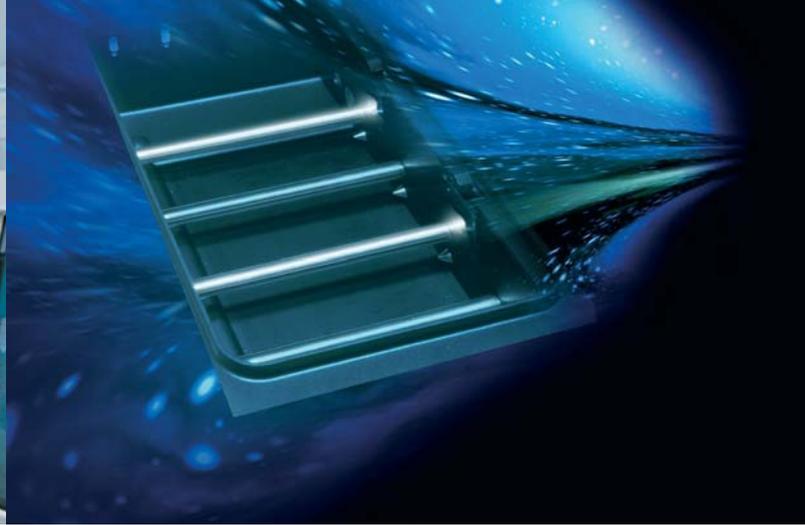
SPECORD® S 600 – UV VIS diode array spectrophotometer with high spectral and time resolution for UV to NIR range

SPECORD® S 300 UV VIS or S 300 VIS – Diode array spectrophotometer for UV or VIS range

SPECORD® 50 – Powerful UV VIS spectrophotometer with double-beam mode due to SBT (Split-Beam Technology)

SPECORD® 40/30 – Robust single-beam spectrophotometers for spectral region from UV to NIR





Excellent photometry and wavelength accuracy

The excellent wavelength accuracy and repeatability of the SPECORD® series is due to:

- an internal holmium oxide filter for automatic wavelength calibration
- special scanning capabilities (Step-/Scan mode)
- self-adjustment of the photometric linearity
- automatic correction of the stray light (SPECORD® S 600/S 300).

Easy to use

The spacious sample compartment allows for repeated addition of reagents, even during measurements, with speed and ease. Samples and accessories may be swiftly changed.

Touch and go

The SPECORD® 250/210/205/200 double-beam systems are available as stand alone-versions with high-performance touch screen. These systems combine the newest computer and spectrophotometer technology in the most confined of spaces – an innovation in molecular spectroscopy.

Qualified installation and operation

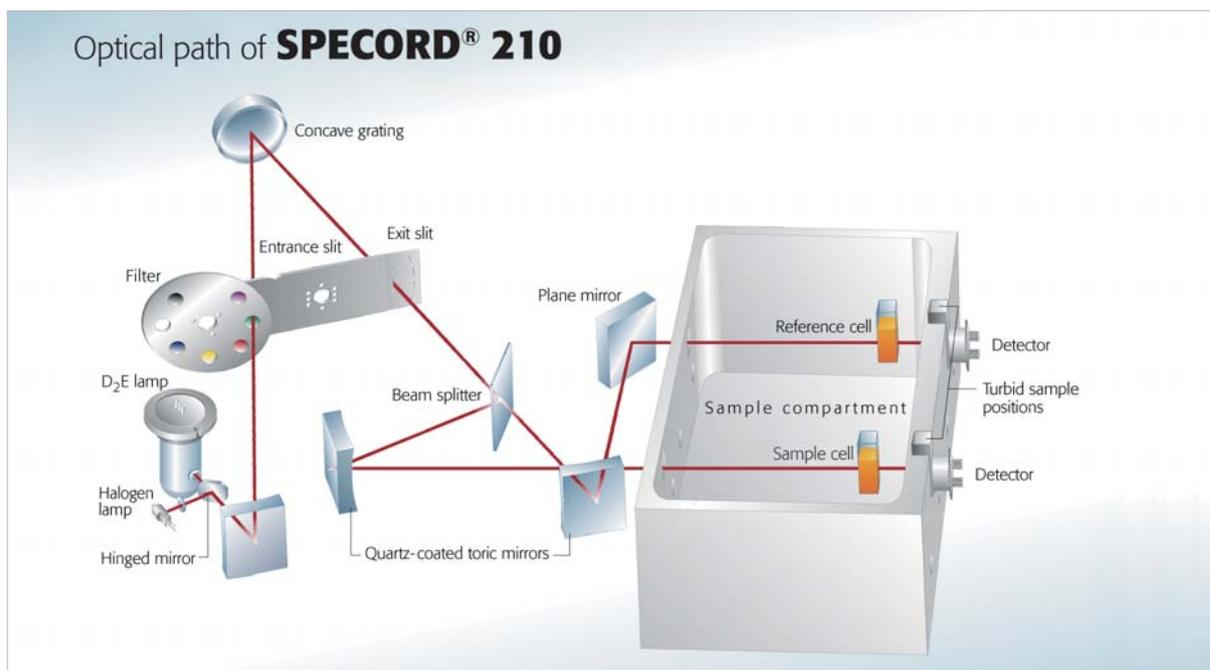
Upon request, our expert staff will install your SPECORD® at your location to Installation Qualification (IQ) standards and verify its Operation Qualification (OQ). Installation Qualification means that the main instrument and its peripherals have been properly installed. A certificate of Installation Qualification is provided.

Operation Qualification means that your spectrophotometer has been certified to satisfy the performance specifications guaranteed by Analytik Jena. Validation tests are conducted for stray light, resolution and many other parameters with certified photometric standards, to ensure that analytical measurement results conform to the highest standards of reliability, accuracy and precision.

WinASPECT® – A software package that is a cut above the rest

WinASPECT® is a high-performance, new generation 32-bit software, which is fundamental to the complete control, monitoring and data recording of all processes – from the spectrometer to the accessories. Its extensive control capabilities are vital to future-oriented technologies in Molecular Spectroscopy. WinASPECT® guarantees operation conforming to GLP and satisfying FDA requirements, WinASPECT® provides the conditions for operating the system in compliance with 21 CFR Part 11.

SPECORD® series – an excellent analytical performance



Best quality

To satisfy the rigid standards of pharmaceutical regulation, instrument designs must be exacting to the last detail. With its array of compelling performance features, the SPECORD® series readily qualifies.

Lamp change with exceptional ease

The light sources of the SPECORD® series are prealigned, easily accessible and above all, readily interchangeable.

Switching between the deuterium and halogen lamps is easily done and has a wide range of programmability. With striking simplicity, both lamps can be switched on or off via the software menu.

Reliability

The SPECORD® series are highly dependable with a minimum of moving parts. Computer-controlled stepper motors drive the filter wheel, the slit unit, the lamp switching mirror and the linear grating actuator.

Stability

The cast aluminum base plate is a solid foundation for high optical and mechanical stability. The innovative CDD technology of the SPECORD® 250/210/200 in real-time mode and voltage-stabilized radiation sources, guarantees accurate measurements immediately upon start up, and over many hours, of use.



SPECORD 210

▲ Cell carousel for 15 positions

Compensation anytime

The SPECORD® series, being genuine double-beam photometers, can compensate for absorbance changes of the reference sample during the measurement sequence.

Maintaining the full capabilities of the Windows-based WinASPECT® software, these spectrophotometers are also available in space-saving design with integrated PC and touch screen.

Variable spectral resolution

Different spectral slit widths allow the SPECORD® 250/210 and SPECORD® 200 to be optimized for every application. Via the software, high energy may be selected for applications with weak measurement signals, or high spectral resolution may be chosen to detect minute details of the spectrum.



▲ SPECORD® 210 with touch screen

High-Speed

High scan speeds of up to 6000 nm/min in the scan mode throughout the spectral range are achieved with the aid of a linear actuator controlling the grating. In kinetic measurements at one wavelength, analytical time is resolved to 0.1 s.

Step Scan – From NIR to UV

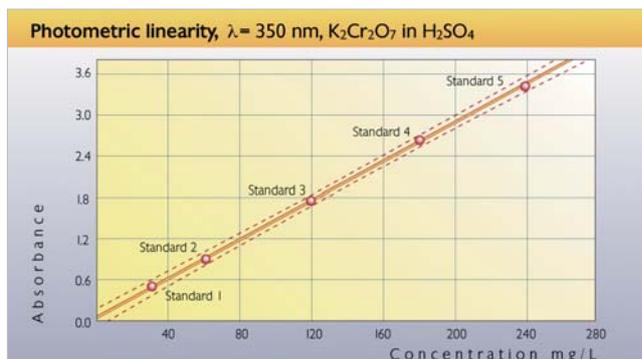
The spectrophotometers of Analytik Jena provides superior measurement precision with the grating at standstill – sample and reference measurements are parallel to each other. An additional NIR to UV scanning function ensures correct spectral information even with light-sensitive samples.

Turbid samples – No problem

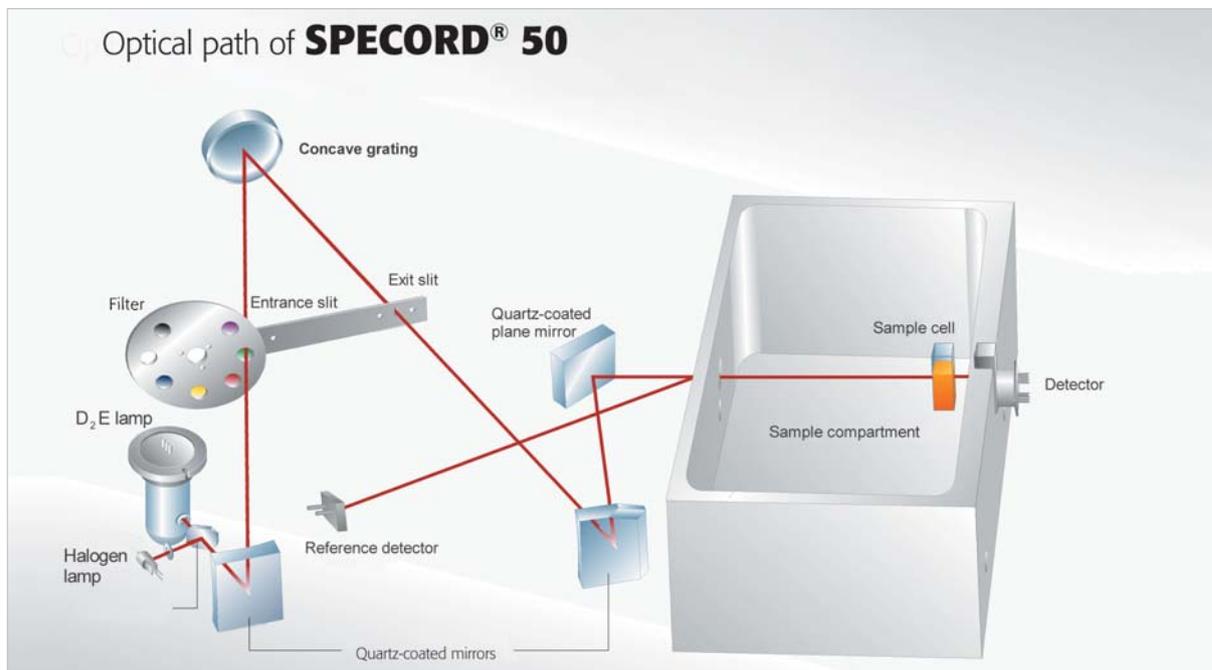
An additional cell position for turbid samples which keeps energy losses at a minimum is a standard feature with all spectrophotometers of the SPECORD® series.

	Ph. Eur.	SPECORD® 210*)
Wavelength	± 1 nm ± 3 nm (VIS)	(UV) ± 0.3 nm ± 0.3 nm
Photometry (K ₂ Cr ₂ O ₇)	± 0.01 A	± 0.01 A
Stray light	> 2 A	> 2.3 A
Resolution toluene in n-hexane	A _{269 nm} / A _{266 nm} > 1.6	A _{269 nm} / A _{266 nm} > 2.1

*) Typical measurement results obtained with the SPECORD® 210



SPECORD® 50/40/30 – ideal for daily routine



Reliable, versatile and robust

What counts in spectrometry are results you can rely on.

SPECORD® 50 – The new concept behind the SPECORD® 50 combines the high energy throughput of a single-beam spectrophotometer with the stability of a double-beam instrument.

All this is due to the Split-Beam-Technology (SBT). Unlike the classical double-beam spectrophotometer, by far the greater part of the source energy is used for the sample beam.

Only a minor share of the radiation energy is branched off, via a beam splitter, and focused on a reference detector.

From the two detector signals, the measuring system of the SPECORD® 50 establishes the photometric result. This means that changes of the single-beam signal, due to variations in the light yield of the source, are compensated. Such variations may occur during source warm-up or ambient temperature changes.

SPECORD® 40 – The approved, versatile single-beam spectrophotometer for the measurement of 190-1100 nm conforms to Ph.Eur. quality

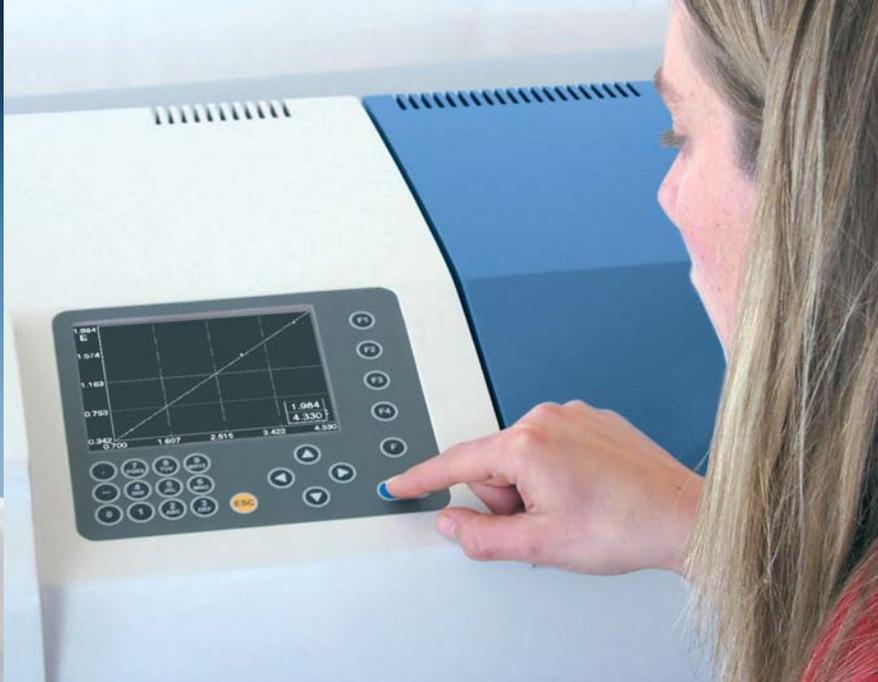
SPECORD® 30 – The robust single-beam spectrophotometer for spectral region from UV to NIR

The benefits are impressive:

- Excellent signal-to-noise ratio
- Incredibly fast measurements
- Exceptionally low identification limit
- High short-term and long-term stability
- No warm-up phase
- Scanning of spectra, as well as measurements at fixed wavelengths



▲ User-friendly through touch screen



▲ Simple operation in stand alone-mode (SPECORD® 50/40/30)

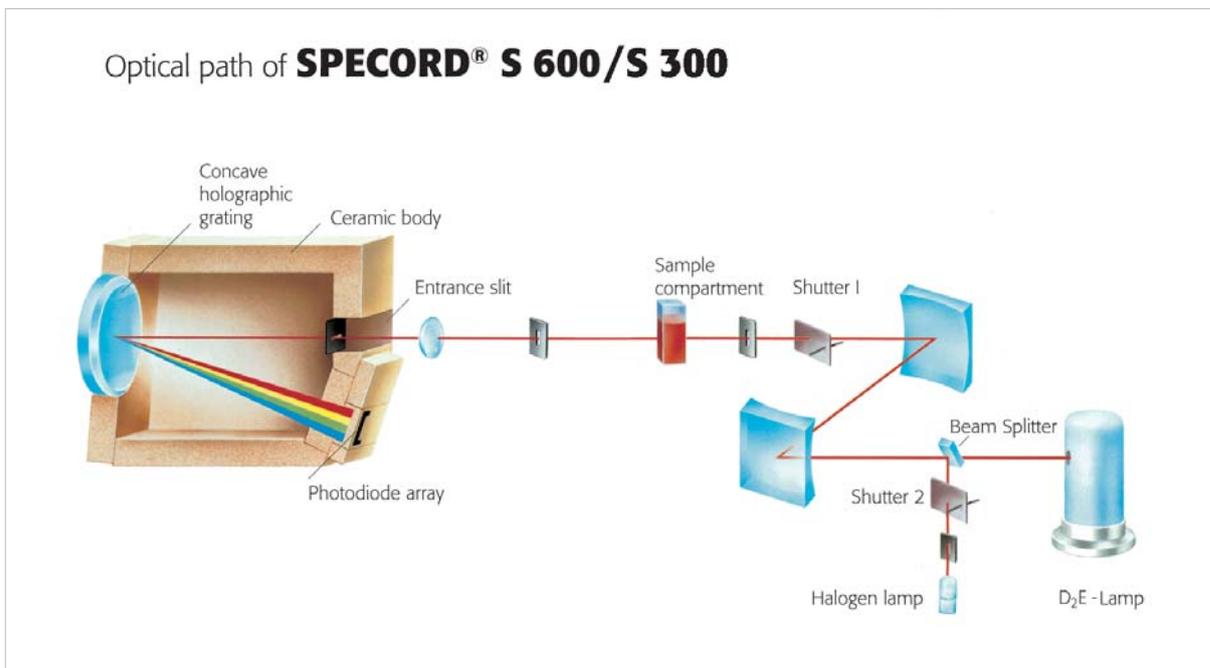
Tailor-made software packages for all solutions

- Measurement of transmittance, absorbance or concentration via factor or simple standard
- Spectrum scanning; kinetic fixed wavelength scans with one or two additional reference wavelengths
- Measurement with up to ten wavelengths, and combination of results by mathematical operations
- Linear and nonlinear calibration and concentration assessment
- Method development
- Printing and saving of methods and measurement results
- Colorimetric
- DNA-/RNA-Analytic

Simple operation with touch screen

- Data transfer is accomplished by an integrated internal network card or by USB
- The unit can be operated either by touch screen or by external mouse and keyboard
- All features of the UV VIS WinASPECT® software are available and integrated into these systems
- High-resolution LCD VGA screen providing superb images and easy operation
- Water-proof touch-sensitive keyboard
- Internal hard disk for saving any method and result
- Simple program updating via floppy disk drive
- Export of data and methods via floppy disk
- Parallel printer port (Centronics)
- Serial RS 232 interface port
- The SPECORD® stand alone-version can be upgraded to a PC-version at any time

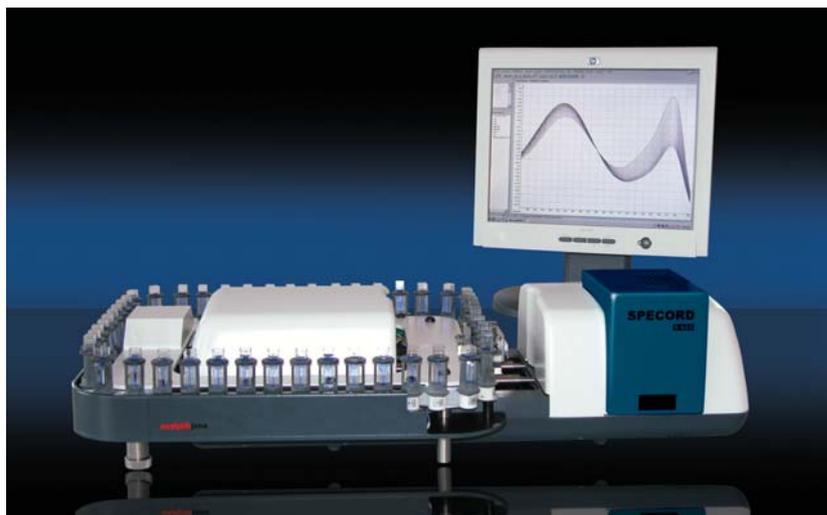
SPECORD® S 600/S 300 – precise, fast, simultaneous



Simultaneous high-performance diode array spectrophotometer

The UV VIS spectrophotometer SPECORD® S 600 and SPECORD® S 300 UV VIS or S 300 VIS combines the precision and convenient handling needed in laboratories with speed, reliability and superior optical performance.

The MCS optics (Multi-Channel System) or MMS optics (Monolithic-Miniatur-Spectrometer) have proven their worth based on lasting dependability in laboratory analysis as well as process analysis.



▶ SPECORD® S 600 in combination with the cell carousel

▶ 50 positions cell carousel

High-precision optics

This polychromator system, designed to work without any movable components, is the heart of the SPECORD® S 600/S 300. The high-precision optics consists of an aberration-corrected grating, a mechanical slit and the diode-array-detector. Encased in a rugged quartz-ceramic body, it is permanently adjusted, fixed and insensitive to external influences.

This design ensures extremely accurate and highly reproducible results. At the same time, the SPECORD® S 600/S 300 provides all the flexibility needed to solve most analytical problems. Ruggedness, thermal stability as well as its high light yield are additional advantages of the SPECORD® S 600/S 300.

High-speed spectrometer

Fast analysis with a minimum scan rate of 12 milliseconds, from a spectral range of UV to NIR, the SPECORD® S 600/S 300 offers extremely fast analyses.

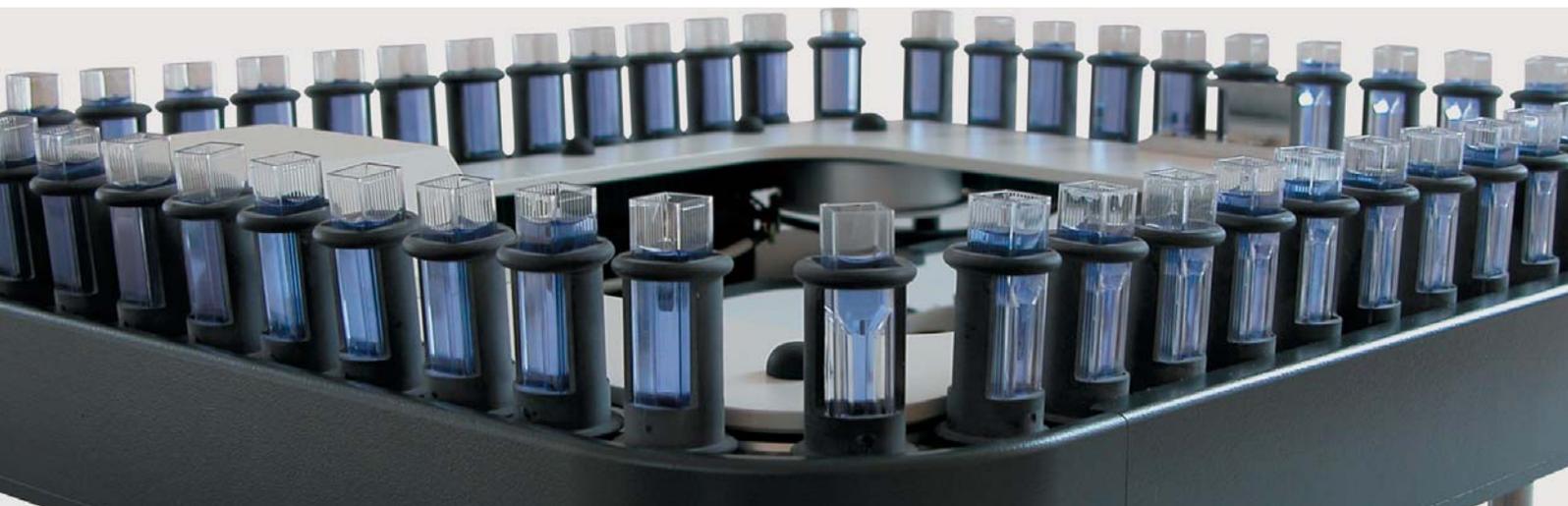
The analytical advantages:

- High precision polychromator systems – permanently adjusted and fixed with no moving parts.
- Open sample compartment which accommodates all available accessories of the SPECORD® series.
- Excellent spectral properties.
- Fast measurement of complete spectra in less than 12 milliseconds.
- A high throughput cell carousel with 50 positions.
- BIO Package for measurements of small sample volumes, determination of DNA-/RNA, preprogrammed methods like Bradford assays, Lowry assays, BCA assays, Biuret, Warburg-Christian and using a Peltier thermostatted cell holders.
- Self adjusting photometric linearity.
- Automatic stray light correction.
- Easily accessible and interchangeable light sources.

Fields of application:

- Chemical and biological laboratories performing qualitative and quantitative determinations.
- Process laboratories where routine sample batches need to be analyzed at high sample throughput.

Certainly it is possible to use the SPECORD® S 300 for working either in UV or VIS range in combination with all advantages of the diode array technique.



WinASPECT® – comfortable new generation software, versatile and user-friendly

Analysis as easy as possible

WinASPECT® is an impressively versatile and convenient software program which allows the spectrometer and all accessories to be controlled from the PC.

It provides a wide variety of spectrum presentation and processing modes with individual color selection, and simple shifting, copying and multi-plotting of spectra.

Data exchange with other Windows applications is no problem at all.

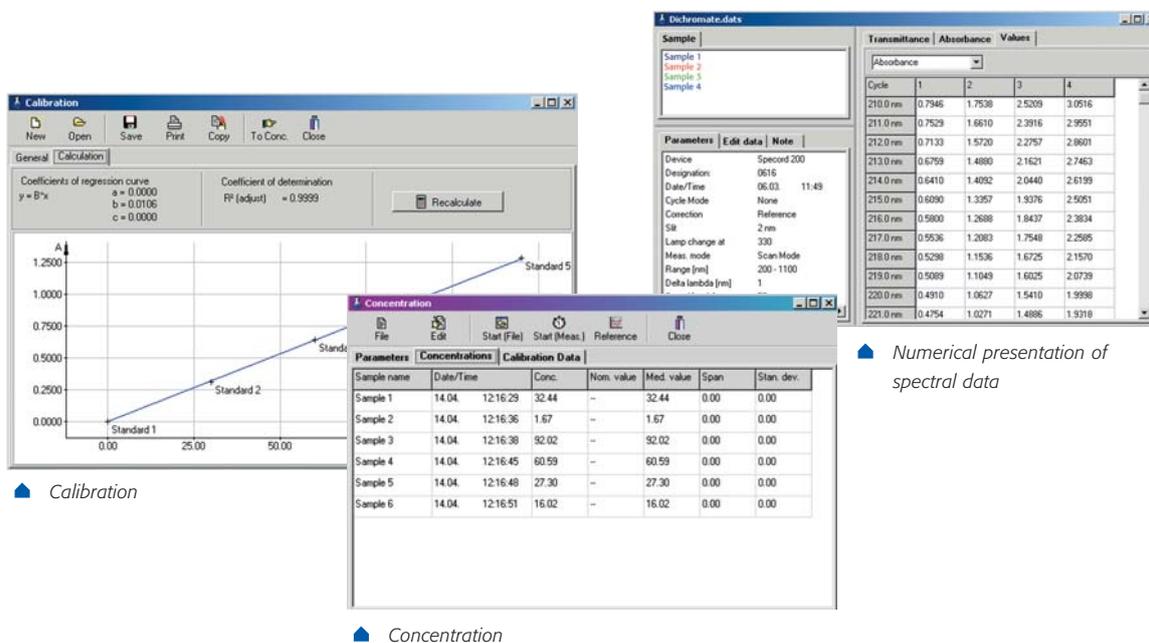
Quick help

In case you get stuck, don't worry: the context-sensitive on-line help will immediately provide information on how to proceed.

Special modules

- Data treatment such as: addition, subtraction, peak finding, smoothing, derivatives, interactive wavelength election and integration
- BIO
- Kinetics
- MPL (Method Programming Language)
- Quantitative analysis with statistical functions
- Film thickness measurement
- Colorimetry
- Multi-component analysis
- Brewery analysis
- Water analysis with fixed-program methods and calibrations for Merck quick tests
- Validation
- Service check
- On-line updating function

With a basic package and separate special modules, the software can be matched to your specific application.



▲ Calibration

▲ Concentration

▲ Numerical presentation of spectral data

Validation – you will like

Provides tests of device parameters of your SPECORD® in compliance with internal or external quality standards, such as Ph.Eur, USP, TGA and ASTM.

To ensure correct and accurate results, the WinASPECT® UV VIS software may be upgraded with the optional Validation module. You are thus free to decide whether to perform device validation yourself or have it done by qualified experts of Analytik Jena AG.

The following parameters can be tested individually or together:

- Zero transmission
- Baseline stability
- Baseline noise
- Photometric precision in UV and VIS range
- Wavelength accuracy
- Wavelength reproducibility
- Stray light
- Resolution
- Long-term stability



Secondary standards for validation of spectrophotometers

And regarding documentation you are free to choose among brief protocol, electronic record, or complete measurement protocol.

Filter	440	405	546	590	635
Nominal value [A]	0,273	0,24	0,243	0,261	0,262
Actual value 1 - Measure [A]	0,274	0,2414	0,2446	0,2628	0,2637
Actual value 2 - Measure [A]	0,2736	0,2411	0,2442	0,2624	0,2634
Actual value 3 - Measure [A]	0,274	0,2415	0,2447	0,2628	0,2638
Mean value [A]	0,2739	0,2413	0,2445	0,2627	0,2636

Software validation, results, parameter of the validation and limits

Preferences

General | Limit values | VIS | UV | Wavelength | Stray light | Resolution

Operator: Carl Mustermann
Note: Validation

Selection of measurements to be performed:

- Transmission zero
- Baseline stability
- Baseline noise
- 100% Transmission, uncorrected
- VIS Photometry
- Wavelength tests
- Stray light at 200 nm
- Stray light at 220, 240 nm
- Stray light at 340 nm
- Resolution
- Long-term stability

Cancel | Help

Preferences

General | Limit values | VIS | UV | Wavelength | Stray light | Resolution

Default values | Values from file

New | Save | Open

Operator	Analytik Jena AG
Transmission zero	0,1
Baseline stability [A]	0,001
Baseline noise [A]	0,0002
100 % Transmission, uncorrected - Min	70
100 % Transmission, uncorrected - Max	180

OK | Cancel | Help

Special solutions for Pharmacy and Biochemistry

The choice is yours

between the PC-version (compatible with almost any PC) and the stand alone-routine version.

Exact, dependable measurement results with SPECORD® BIO. No matter which of the SPECORD® BIO models you choose, you have access to a variety of pre-programmed measuring methods. The capabilities of these bio-oriented photometers include fast measurement of optical density/absorbance, enzymatic analyses of DNA or proteins and much more. Even in their basic configurations, the instruments include the respective software; they can be upgraded by a wide variety of optional accessories.

Modul BIO – 2 in 1

The BIO Package consists of two modules: the Method Module, which allows selection from any pre-programmed methods of DNA and protein analysis, and the Formula Module, with which one can compile, store and reuse customized computation formulae.

Formula module – you can not be more flexible

If a customized method is necessary, the Formula Module provides the capability to quickly construct and store an analytical method for future use – the ultimate in flexibility.

Method module – wide selection

The following pre-programmed methods are available:

- Absorbance 260 nm
- DNA purity A260 nm/A280 nm
- Absorbance 260 nm, factor 33
- Absorbance 260 nm, factor 40
- Absorbance 260 nm, factor 50
- Warburg-Christian formula for DNA
- Warburg-Christian formula for proteins
- Absorbance 280 nm
- Absorbance 205 nm, factor 31
- Scopes formula
- Whitaker and Granum
- Absorbance 205 and 225 nm, factor 144
- Kalb and Bernlohr
- Absorbance 280 nm, factor 1.38
- Kalckar and Shaffran

Quantitative analysis module

The quantitative analysis module permits the construction of calibrations by measurements of a standard as well as unknown samples. With this module, the user can establish and save calibrations such as:

- Lowry protein method
- Bradford assay
- Biuret method
- BCA assay

A calibration curve, once established, is stored for use in subsequent analyses. The easiest way of measuring protein concentrations ever.



◀ Peltier-thermostated single cell holder with controller

▶ SPECORD® 205



Conforming to standards and rigorous requirements

Quality control and GLP

In view of today's statutory and in-house requirements, comprehensive quality assurance is a prime consideration implemented in the WinASPECT® software. According to GLP, all analytical data must be accessible and their accuracy ascertained and documented. Compliance with these requirements can be assured by a variety of measures for the fully automatic monitoring of the precision and accuracy of measurements.

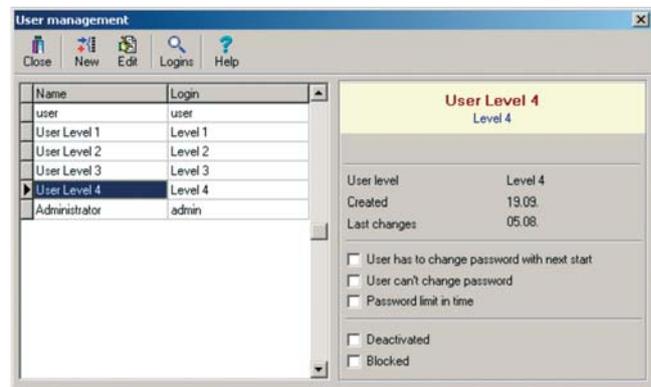
FDA 21 CFR Part 11

Conformity to FDA 21 CFR Part 11 is a must for modern analysis software. The functions integrated in WinASPECT® ensure data security as well as the reliability, lucidity and traceability of all actions throughout the measuring time. All processes are presented in easily comprehensible terms and with a clear layout. Comprehensive user management, an electronic signature facility and the Audit Trail satisfy the requirements of FDA 21 CFR Part 11.

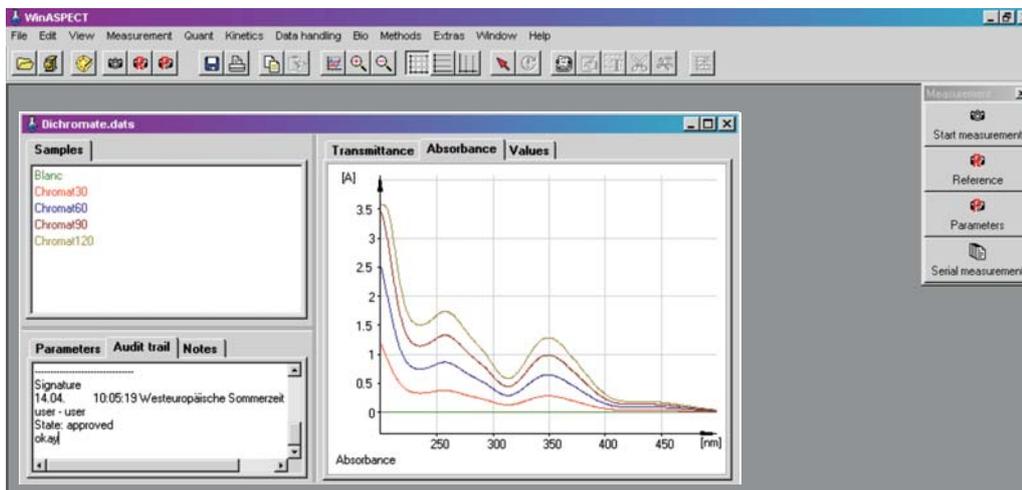
In the User Management function you can define the access rights of individual users. Passwords with specified runtimes guarantee data security.

In the Audit Trail, all actions and accesses during the run of a measurement are lucidly recorded. Together with the electronic signature, this allows every result to be traced back and prevents manipulations.

Every audit will supply convincing proof that with these functions, WinASPECT® has the ideal tools you need for efficient work in everyday lab routine and yet conforms to FDA 21 CFR Part 11.



▲ User Management



▲ Grafic presentation of spectral data

Accessories for special applications

Extensive range of accessories

Especially in UV VIS spectroscopy, it is essential to have a wide range of accessories that make your spectrophotometer applicable to many different kinds of analytical jobs and provide further

automation. Whether cell holders, cell changers, flowcell systems, reflectance accessories or fiber coupling. Choose the right system for your individual analytical needs.



Holder for cylindrical cells
Holder for cylindrical cells with/without thermostating



Holder for solid samples
Holds foils, sample plates or similar solid samples for transmittance measurements



Thermostated and adjustable HPLC cell holder
Suitable for HPLC microcells of 1 cm pathlength



Adjustable cell holder for microcells
Accommodates micro- and ultramicrocells of small volumes



Cell holder for cells of up to 10 cm path-length
Provides measurement of strongly diluted samples or minimum concentrations in standard cells of up to 10 cm pathlength



Peltier-thermostated cell holder with PTC 100 control unit and temperature sensor
for the ranges from 5 to 105 °C or 10 to 60 °C; accurate to 0.1 °C (at 25 °C room temperature)
Designed for DNA melting studies and the measurement of enzyme kinetics



Holder for round cells
Accommodates round cells or ampoules with a diameter of 11 to 16 mm



Thermostated 6-cell changer with stirrer and 6 positions
(for 1-cm cells /Temperature control through water bath or Peltier element)
Specially designed for quantitative end-point determination and enzyme kinetics



Thermostated cell holder for 1 cm (or 5 cm) cells (optionally with stirrer)
Excellently suitable for enzyme kinetics and other thermally dependent reactions



Cell changer for cells of 1, 2 or 5 cm pathlength
(not thermostated and thermostated for cells of 1-cm path length)
Especially suitable for quantitative determinations

**High throughput cell carousel****

With 50 positions fully automatic quantitative and qualitative measurement for 50 samples in less than 2 min

**Cell carousel with 15 positions***

For maximum sample throughput in quantitative analysis

**8-cell changer or double 8-cell changer***

8-cell changer or 2x changer combination (with and without stirrer), not thermostated, water thermostated or peltier thermostated for cells of 1 cm pathlength

**Fiber coupling with transmission immersion probes and HELMA fiber adapter**

For measurements outside the sample compartment

**Absolute reflectance attachment**

V/W optical configuration for the determination of the reflectance at plane surfaces and layers

**xyz-autosampler with sample tray for 53 or 100 samples (optional)**

For fully automatic analysis

**11 to 60° variable angle reflectance attachment**

For the examination of solid surfaces, film systems and their interfaces

**SMA coupling**

Allows connection of optical fiber with SMA plug for analyses outside the sample compartment

**Reflectance attachment with spectralon integrating sphere**

For transmittance and reflectance measurements of solid, powdery and liquid samples

**Cassette sipper system**

For the analysis of liquid samples in continuous flow without change of sample cell

**SPECORD®-Dissolution**

All SPECORD® double beam systems and the SPECORD® S 600 are available as special version for dissolution

* for SPECORD® 200 series and SPECORD® S 600/S 300

** for SPECORD® S 600/S 300

Technical Service & Application Support

Premium quality from Analytik Jena

Our high-precision analytical systems, based on Carl Zeiss technology and produced according to a stringent quality management system, guarantee the premium quality our customers are used to obtain from us.

Before our high-performance instruments are delivered, all technical parameters are tested, the results recorded and entered in a test certificate. Only those instruments that have passed the complete range of tests, as confirmed by the inspector's signature, will be delivered.

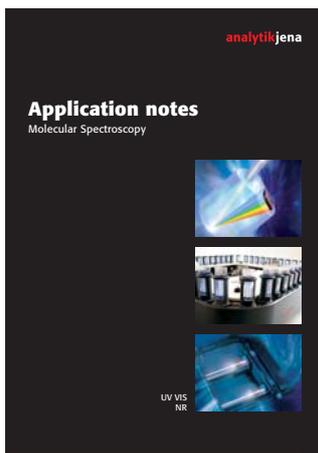
Reliability and certainty

Well-deliberated design concepts, the expertise of our staff, individual application consulting and comprehensive customer service ensure the certainty and reliability of your results. All service operations and safety tests are recorded in the device logbook. Software updated at regular intervals satisfies the requirements of the FDA for conformity to 21 CFR Part 11 and guarantees the safe and reliable electronic documentation of your data.

Our prompt delivery of parts and consumables allows you to work without losing time.

We take time for you

While installing the device, our specialists will intensively train your personnel in operating it, demonstrate the analytical performance of the device and record the obtained results. Our application specialists also provide comprehensive qualification of your personnel enabling them to solve specific analytical problems.



Technical Service

Our world-wide service network guarantees nearness to our customers thus ensuring quick response times, short travel times and low costs for you.

With comprehensive solutions, such as:

- Continuous quality control by our service engineers
- Individual maintenance and service contracts
- 24-hours advisory phone service via our hotline
- Documentation of performed service operations and safety tests in a logbook
- Continuous software update service
- Factory-trained staff employed by our subsidiaries and sales representatives

We provide total service support.

Application Support

A strong team of application specialists is available to you at any time to assist you in your everyday laboratory work.

With our services and staff giving you advice around the globe, we ensure optimum customer care and support at any time:

- Individual advice on specific questions of application
- Development of analytical method packages
- Validation of analytical systems
- Individual hands-on user training in specific applications
- Organization of user workshops
- Preparation of application newsletters

Our well-trained, globally active staff ensures optimum customer care and support at any time, as we are keenly aware that this, together with product quality, is the key to customer satisfaction.





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- For further information visit our website: www.analytik-jena.com

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Ecuador	Macedonia	Singapore	Zimbabwe

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Subject to changes in design and scope of delivery
as well as further technical development!