

# Cintra

UV-Vis Spectrometer





GBC Scientific Equipment commenced operations in 1978. GBC designs, manufactures and markets a range of award winning scientific instruments comprising quality analytical instrumentation.



### What is the GBC vision?

*GBC Scientific Equipment will advance people's knowledge and their capacity to enhance the quality of life for all humankind.*



### GBC's product lines...



AAS



HPLC



ICP-OES



ICP-TOFMS



Rheometry



UV-Vis



XRD



*You'll be enlightened by  
Cintra's outstanding  
optical specifications*

## **GBC AND THE NEW CINTRA SERIES**

The Cintra logo is displayed in a blue rectangular box. The word 'Cintra' is written in a white, bold, sans-serif font with a blue outline.

GBC's growth has been fuelled by its extensive expertise, innovative thinking and an obsession for quality and reliability. GBC now produces the widest range of quality analytical instrumentation. GBC has been the proud recipient of many international design and export awards, acknowledging the superior standard and world acceptance of both the organisation and the products. The company's head office is based in Melbourne and proudly Australian. The GBC network spans all sectors of the globe. Now more than 35 years after its inception, GBC is renowned as both progressive and successful.

**The New Improved Cintra Series**

# CINTRA IS STATE-OF-THE-ART IN UV-VISIBLE SPECTROMETRY

## **GBC's fourth generation of high performance UV-Vis Spectrometers demonstrate improved specifications**

The new Cintra Series consists of the Cintra 1010, 2020, 3030 and 4040 all with improved optical specifications. High performance features of the Cintra Series include:

- True Double Beam optics for excellent long term stability, guaranteeing accurate precise results.
- Innovative optical design which ensures uncompromised results, even from  $\mu\text{L}$  volumes.
- Satisfies all the performance criteria of a range of regulatory bodies. These tests for IQ/OQ, pharmacopoeias and other performance criteria may be easily performed by the use of the Cintral Software's automatic System Validation Module.

Cintral software is Windows 7<sup>®</sup> compatible and includes General, Quantify, Kinetics, DNA Melt, Colour Analysis, System Validation, Scripting and many other features.

### **Cintra 1010 the economical choice**

The Cintra 1010 is a budget priced entry level instrument. It is a true double beam spectrometer with low stray light and noise specifications. The Cintra 1010 accepts all non motorised accessories plus the auto sipper (both standard and water thermostatted versions).

### **Cintra 2020 for flexibility and power**

The Cintra 2020 will challenge many higher priced UV-Vis and UV-Vis-NIR instruments with its wavelength range of 190 to 1,200 nm and very low stray light and noise specifications. This true double beam spectrometer will suit routine lab work or more advanced applications reaching into the NIR regions. With a full range of accessories available including sample changers, auto samplers, peltier or water thermostatable temperature control, reflectance spheres capable of measurement up to 1,150 nm. The Cintra 2020 provides maximum flexibility and power for all applications.

### **Cintra 3030 for specialised and research applications**

The Cintra 3030 is a research grade spectrometer with enhanced sensitivity in the UV range. It has a variable slit width for best sensitivity and resolution, with improved stray light, noise and drift specifications. The Cintra 3030 accepts the full range of GBC UV-Vis accessories for its wavelength range of 190 to 900 nm making it the perfect instrument for specialised and research applications.

### **Cintra 4040 for the most demanding applications**

The Cintra 4040 is a true double beam, double monochromator spectrometer which offers the ultimate in resolution and sensitivity. Using a variable slit width from 0.1 to 2.0 nm, and dual Littrow monochromators in a Czerny Turner arrangement to achieve the highest resolution with extremely low stray light and photometric linearity of better than 1.2% at 5 Abs. The wide dynamic range and excellent other optical specifications make the Cintra 4040 the best performing UV instrument in its price range allowing for the most demanding applications.

**Capable of the Most Demanding Applications**

## OPTICAL SYSTEMS YOU CAN RELY ON

### High performance optical systems

The optical design is the heart of any spectrometer, and at GBC we have a long history of quality optical systems. The Cintra series provides unmatched optical performance. High-efficiency all-reflective optics with a minimal optical component count ensures maximum light throughput, utilising a monochromator designed for maximum efficiency at all wavelengths.

### Unparalleled optical stability

The Cintra family of instruments all have true double beam optics with a single detector providing excellent long-term stability. This ensures confidence in the reliability of your results, and also saves time as there is no need to continually re-define baselines or re-zero the instrument.

### Increased productivity with the world's fastest scanning spectrometer

Advanced design features allow distortion-free spectra at scan speeds of up to 10,000 nm/minute, reducing the time to scan a wavelength range by a factor of two when compared to other conventional scanning instruments. Not only does the rapid scan speed ensure increased productivity for your laboratory but also allows the measurement of rapidly changing systems often encountered in kinetics applications.

### Guaranteed reproducible optical performance

Precise, reproducible optical performance is achieved day after day, with no operator effort, through a fully automated instrument set-up. Every time the instrument is powered up, wavelength is calibrated and the source mirror optimised. Source changeover occurs automatically at an operator-set wavelength.

### High performance by superior optical design

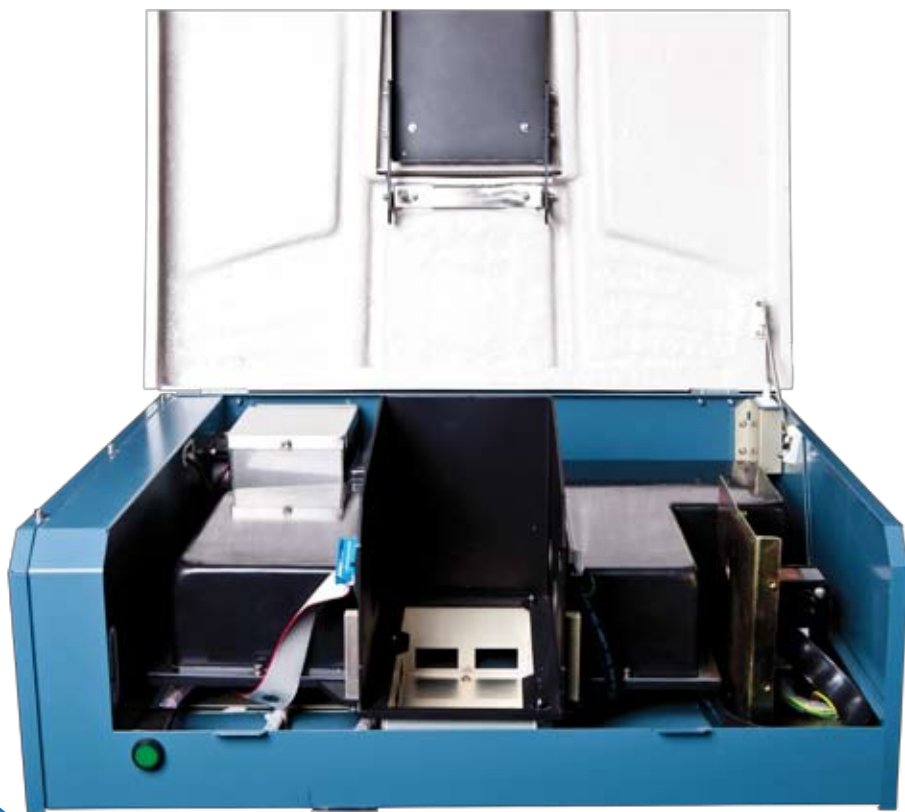
A totally new approach to UV-Visible design, incorporating high speed focused aperture chopping, achieves the optimum ratio of signal sampling time to scan speed with a minimum of lost measurement time during beam changeover. This means improved signal-to-noise ratios and more accurate results.

### Stable analytical signal

The unique design of the chopper system in the Cintra series automatically corrects for any beam movement caused by slight eccentricities in chopper wheel rotation, ensuring an extremely stable system.

### Improved linearity

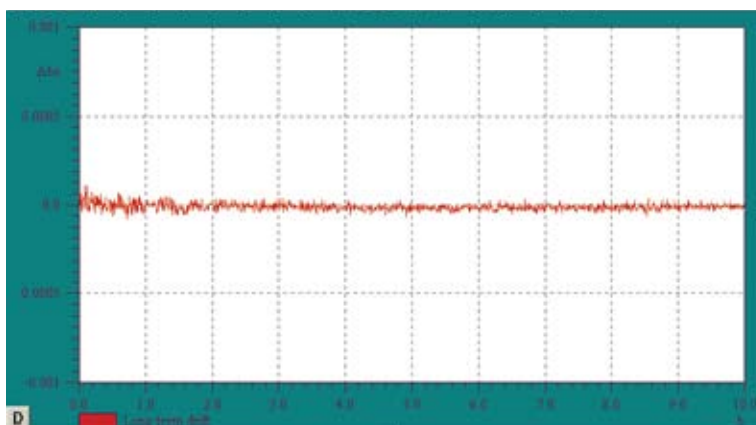
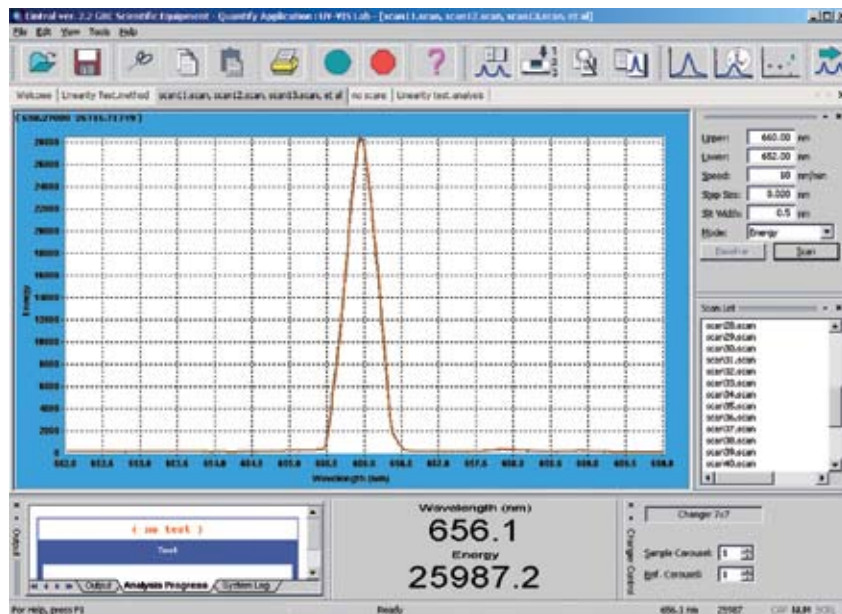
By measuring and correcting for detector dark current twice in every chopper revolution, errors due to dark current drift have been eliminated, improving measurement stability and linearity. The linearity is better than 1.2% at 5 Abs on a Cintra.



*The GBC cover conveniently opens upwards for easy and quick service access. A safety switch cuts power ensuring safety for the service person.*

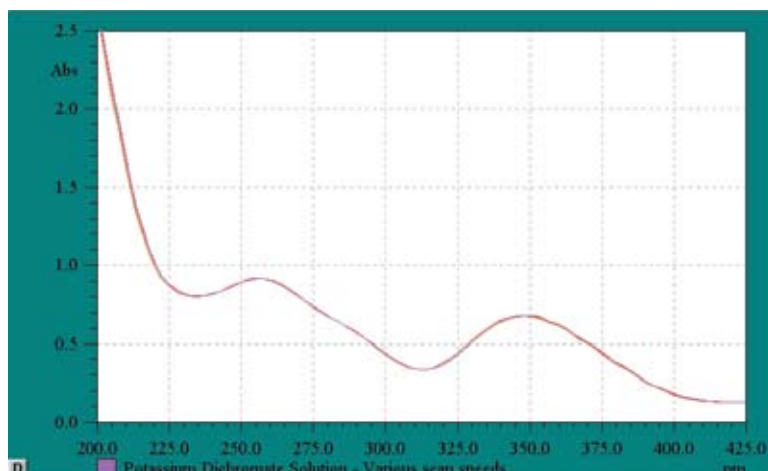
## OUTSTANDING STABILITY AND REPRODUCIBILITY

Forty overlaid measurements of the deuterium light source demonstrate the outstanding wavelength accuracy and reproducibility of the Cintra.



The impressive long term stability at 340 nm over 10 hours illustrates the drift-free optics of the Cintra series of instruments.

The rapid chopper-synchronized wavelength drive allows distortion free spectra at scan speeds up to 10,000 nm/minute. The screen shows overlaid scans of potassium dichromate solution, scanned at 5,000, 2,500, 1,250, and 625 nm/minute.



## Stability, Accuracy and Reproducibility

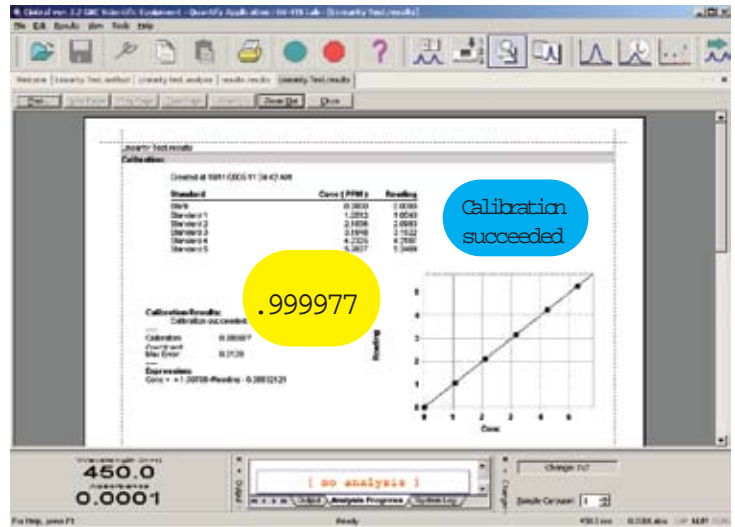
## EXPAND THE PHOTOMETRIC RANGE WITH THE CINTRA 4040

### Precise, accurate results even at high absorbance

Low stray light levels are achieved using a holographic grating so that photometric accuracy can be maintained over a wide absorbance range. Measure samples with confidence up to 4 Abs with the Cintra 2020 and Cintra 3030.

### Expand the photometric range with the Cintra 4040

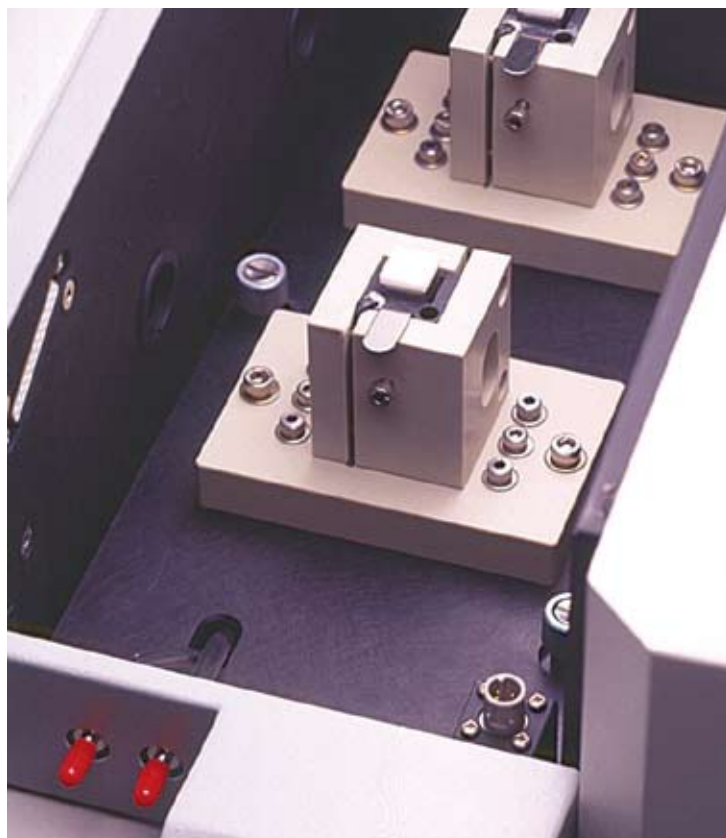
The Cintra 4040 is a true double beam, double monochromator spectrometer. Unlike some instruments which use a premonochromator and a main monochromator, the Cintra 4040 uses two Littrow monochromators in a Czerny-Turner arrangement. Utilising double monochromators results in high resolution with extremely low stray light, assuring precise measurement at greater than 5.0 Abs. The calibration curve shown displays very high linearity up to well over 5 Abs with an  $R^2$  value of 0.999977.



A convenient cell and sample holder is cleverly designed into the Cintra cover.

High Linearity

## EASY ACCESS FOR SAMPLING ACCESSORIES



### Versatile sample compartment with integrated accessory communications

The Cintra series boasts a large sample compartment capable of housing the complete range of available accessories without the need for additional sample compartment extensions. Accessory communication and control is accomplished via inbuilt ports located on the top of the sample compartment.

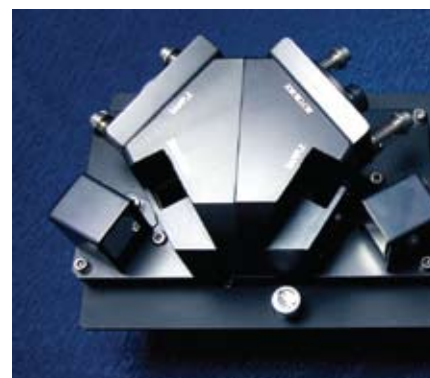
### High resolution and versatility with the Cintra 3030 and 4040

The Cintra 2020 provides a fixed 1.5 nm slit width which is ideal for the majority of applications. The Cintra 3030 and 4040 each provide a continuously variable slit enabling the selection of the optimum slit width for any sample.

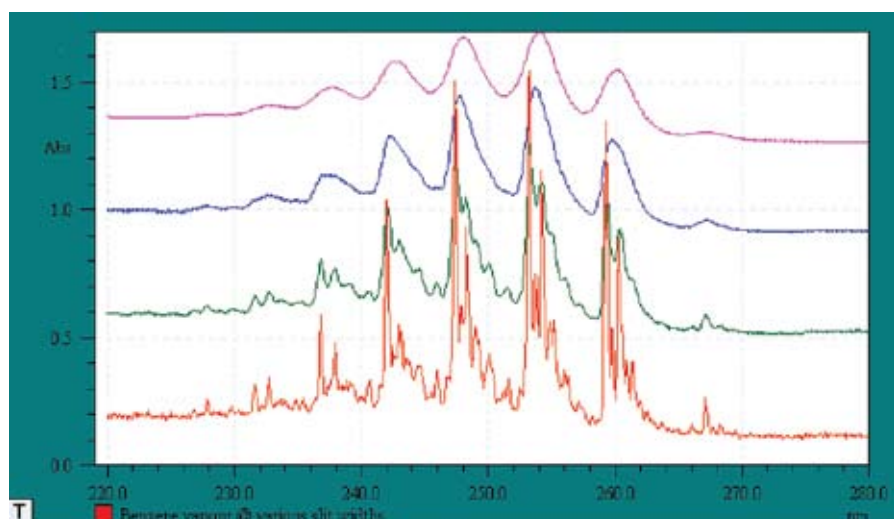
### Cintra 4040 Variable bandpass from 0.1 and 2.0 nm for high resolution and sensitivity

The high resolution Cintra 4040 allows variable bandpass as low as 0.1 nm. Overlaid scans of the SAME benzene vapour sample shown at 0.1, 0.5, 1.0 and 2.0 nm bandpass. Note that as the slit width decreases the 5 broad peaks are resolved to

many narrower peaks providing more information about the sample. Also the peak maxima increase by an order of magnitude showing increased sensitivity with decreased bandpass.



The unique DRS 1150 reflectance sphere allows unprecedented reflectance measurements up to 1,150 nm in a standard UV-Vis without the need to purchase an expensive NIR instrument. An ideal accessory for military and textile applications.



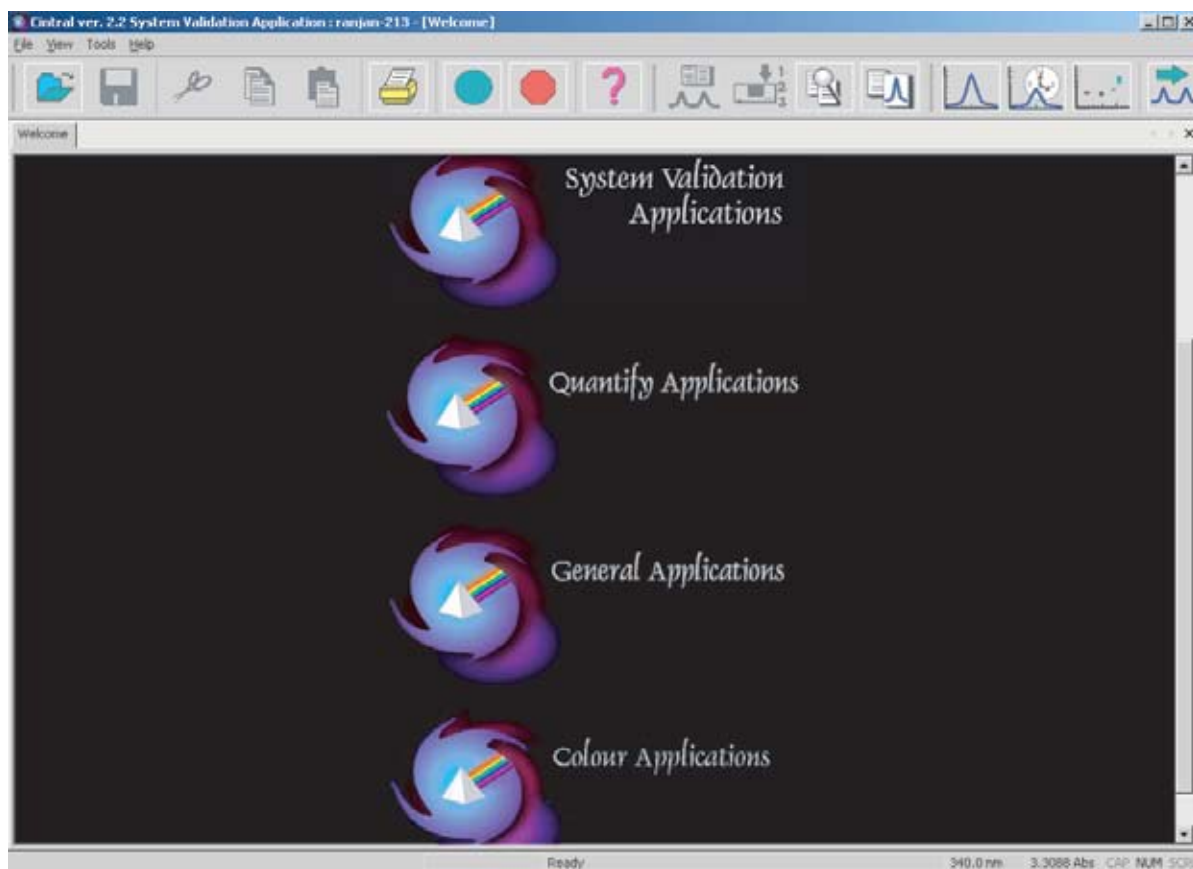
Versatility

## NEW CINTRAL SOFTWARE

The second generation Cintral software represents the latest in modular design and ease of use. Among the many features available, applications such as General, Quantify, Kinetics, DNA Melt, Colour, Scripting and System Validation Applications, are also included as part of the standard package.

Cintral's state of the art design using Windows® 7 and USB communications offers the user both ease of use and the power of a fully customisable user interface, intuitive booklet format method, and many other features such as:

- General Application
- Quantify Application
- Kinetics Application
- DNA Melt Application
- Colour Application
- Scripting Application
- System Validation Application for performance verification and IQ/OQ requirements.
- Fixed wavelength measurement (Single or multiple wavelengths)
- Wavelength Scanning
- Time Scanning
- Standard curve fitting
- Spectrum Transformation such as derivatives, sine, negating scans etc.
- Peak and Valley find feature.
- Scan Calculator allowing calculations such as addition and subtractions of scans, as well as derivatives, sine, etc.
- Full Quality Control parameters
- Report Generation and printing of results to any printer supported by Windows®.
- Data export to text format for importing to Excel or other data analysis packages or .xml format.
- Auto recognition of accessories when connected.
- Control of automatic cell changers - 6 x 1, 6 x 6, 7 x 7
- Control of Sipper and auto sampler - SDS720.



*Cintral software showing some of the applications available*

## REAL APPLICATIONS

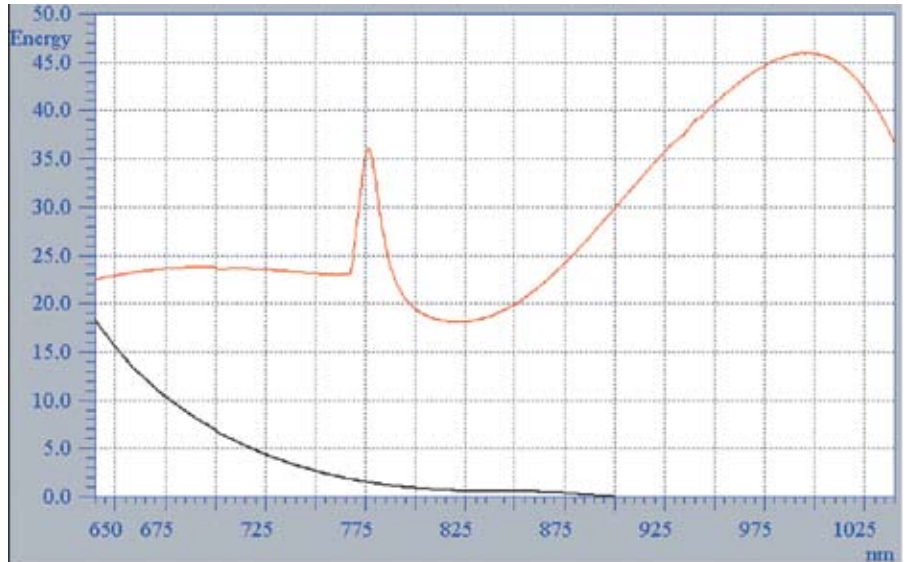
The outstanding optical specifications of the Cintra series allows applications which would not be normally available on such low cost instruments.

Here are only a few examples:

### Cintra 2020 - 0.2 ppb phosphorus detection limit!

The extended wavelength range of the Cintra 2020 allows more light in the important 650 to 1,025 nm range. The red scan is the raw light from a Cintra 2020 and the blue scan is the raw light from a PMT detector.

By using a method at 830 nm, the Cintra 2020 can measure phosphorus to 0.2 ppb! This cannot be done on a PMT type UV-VIS as there is virtually no light at this wavelength. Competitors quote phosphorus detection limits of 200 ppb using a 470 nm method. As well as giving 1,000 times better detection limit, the 830 nm method also produces complexes within 10 minutes which are stable for up to 24 hours allowing large batches of samples to be processed. The 470 nm method produces complexes after a long stabilization time and these are stable for only 1 - 2 hours. The 830 nm method gives sensitivity and ability to analyse large batches with confidence.

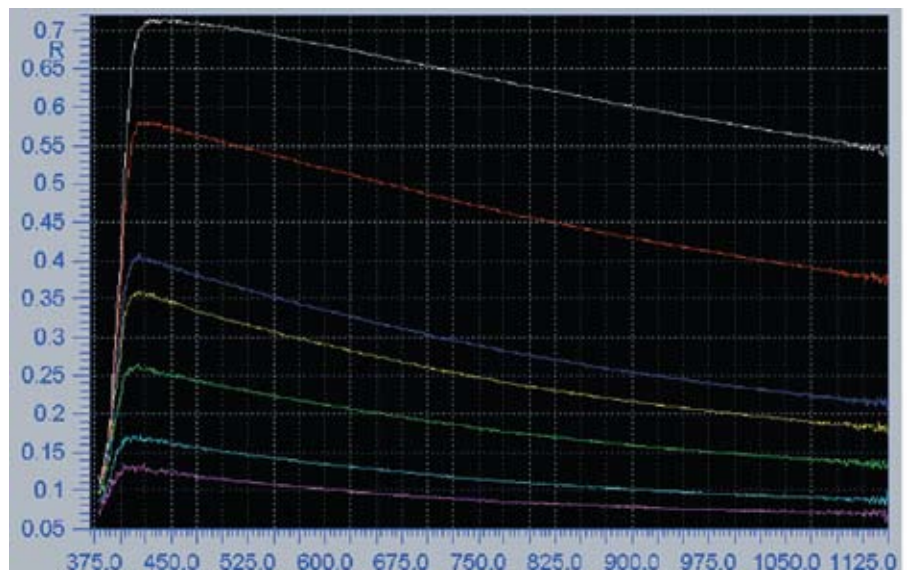


### Cintra 2020 and DRS 1150

#### Military reflectance application in the near infra red

The Cintra 2020 with the extended range DRS 1150 allows reflectance analysis from the visual region all the way up to 1,150 nm. Measurements in the region 800 nm to 1,150 nm are of particular interest for military imaging applications where it is desirable to know the reflectance due to natural light sources and infra red lasers.

This application has been successfully used in various military institutions to assist the research and development of Battle Dress Uniforms, military paints and other military items to be invisible to night vision devices and infra red lasers.



The series of scans above are from various military materials. Note the large variation in the NIR reflectivity.

**Simplify Your Tasks**

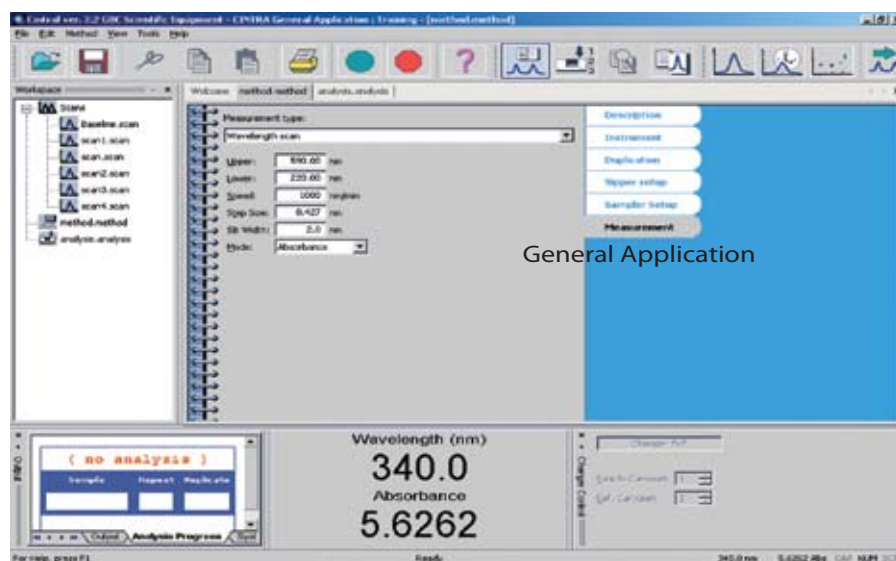
## SMART SOFTWARE FEATURES

The high specification and performance of the Cintra Series of UV-Vis Spectrometers and accessories allows unprecedented flexibility for any demanding applications. To complement the hardware a wide range of software applications are available to make common sample analysis tasks easier than ever. Software applications available include:

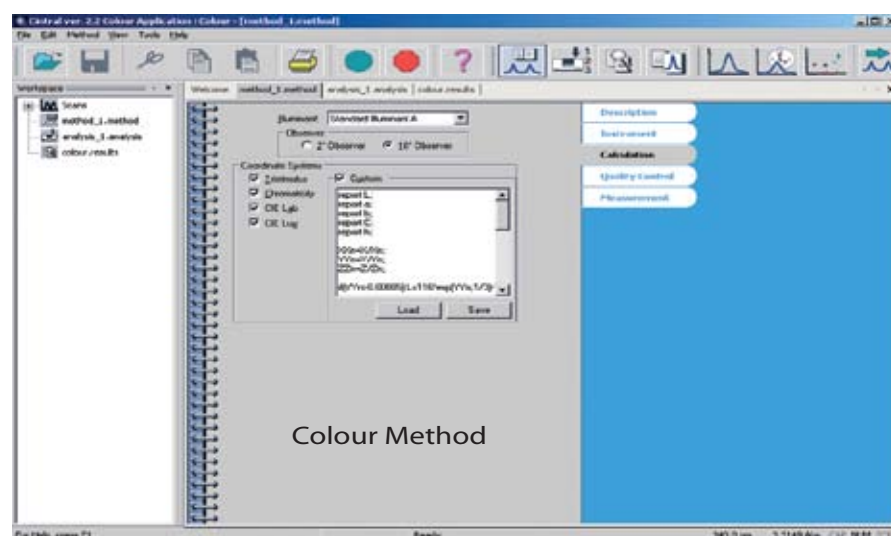
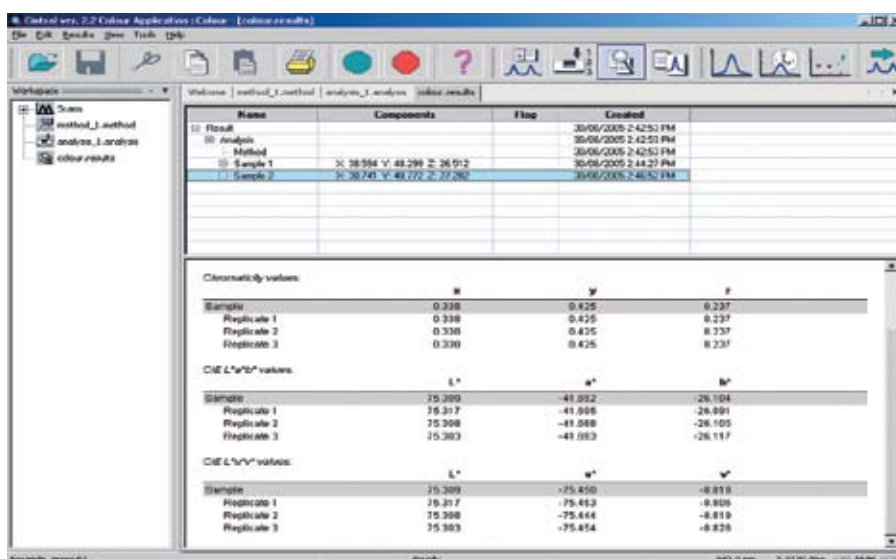
**General Application** - a general purpose application used for wavelength scanning, time scanning and fixed point measurements. Automation of these measurements and scan calculations and transformations are also available.

**Quantify Application** - for the quantification of a component in a sample using fixed wavelength(s), peak height, or peak area measurements.

**System Validation Application** - includes several automated test suites to allow users to perform tests which comply with Pharmacopoeia, GMP, or GBC's final test criteria. This application will also make IQ/OQ and instrument performance verification easier with the use of the final test suites.



General Application



Colour Method

**Colour Analysis** - calculates a range of colour co-ordinate schemes derived from tristimulus values.

**Kinetics / Time Studies** - performs photometric measurements including wavelength scans and multi-cell measurements as a function of time.

**Multi-component** - for the quantification of a number of components in an unknown sample mixture.

**DNA Melt** - performs photometric measurements as a function of temperature with standard calculations for the determination of Tm and %GC.

## SYSTEM VALIDATION APPLICATION (SVA)

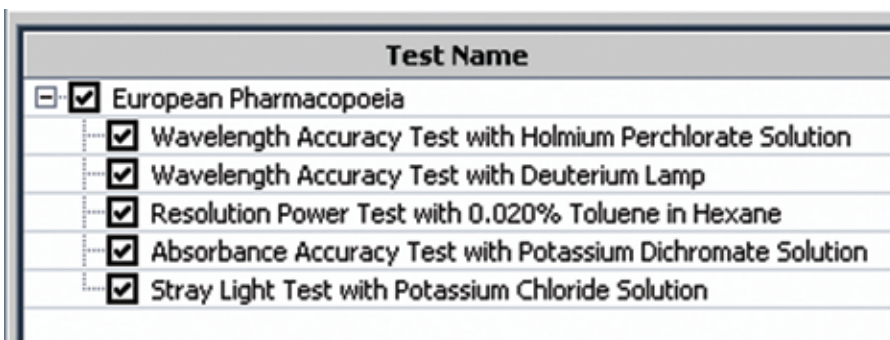
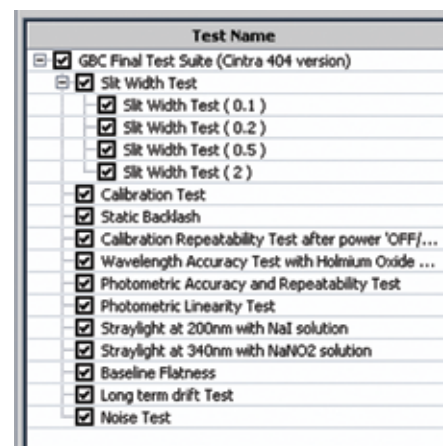
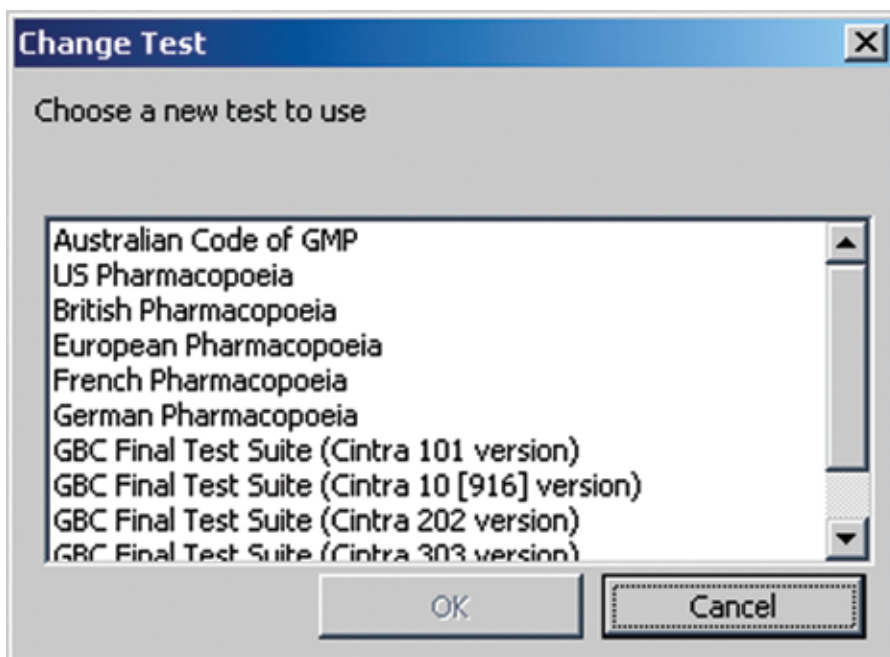
The System Validation Application (SVA) allows the user to test the Cintra to ensure that it meets any criteria set by Pharmacopoeia, GMP or GBC's final test criteria for IQ/OQ and performance verification. This wizard style application guides the user through each step of the test. Once the test is completed a report is generated which clearly shows test results and pass/fail criteria.

### Test suites available in SVA are:

- US Pharmacopoeia
- European Pharmacopoeia
- British Pharmacopoeia
- French Pharmacopoeia
- German Pharmacopoeia
- Australian GMP Tests
- GBC Final tests for service and IQ/OQ use

### Each of these test suites contain some or all of the following tests:

- Wavelength Accuracy
- Wavelength Repeatability
- Resolution
- Stray Light
- Photometric Accuracy
- Photometric Repeatability
- Baseline Flatness
- Photometric Linearity
- Noise at 0, 1, 2, 3 and 4 Abs



Meet Regulatory Requirements

## LIFE SCIENCE APPLICATIONS MADE EASY



*Sampling accessories are easily exchanged. Comms is via ports located at the top of the sample compartment away from corrosive spills. Note: there are no PCBs located under the sample compartment.*

### Enzyme kinetics made easy

The software provides a complete range of easy to use kinetics functions designed to meet the needs of the enzyme kineticist. Transform data and calculate enzyme activities, or determine substrate concentrations using the “end point” technique from a single mouse click. Choose from a number of standard graphical transformations for the determination of  $V_{max}$  and  $K_m$ , including Lineweaver-Burk, Eadie-Hofstee, Hanes, or Wolf.

### DNA Melt

A complete range of Peltier effect thermo cells is available, providing precise and accurate computer control of sample temperature. Sample immersion probes provide accurate measurement of the true sample temperature. Perform heating or cooling temperature ramps while collecting single wavelength or wavelength scans. Results can be evaluated using graphical or derivative methods to calculate  $T_m$ . Choose from the standard Marmur equations or a user-entered expression to derive %GC.

### Micro volume capability

The biggest problem facing the biochemist is the requirement to obtain accurate analysis from limited sample volumes. At GBC we recognise this problem and the innovative optical system is designed to meet this challenge. You can be assured of precise and accurate results even from  $\mu\text{L}$  volumes. Whatever your microsampling requirements, there is a configuration that will more than meet your needs. Measure a single sample with the micro-cell holder. Or, if high sample throughput is required, measure up to 12 samples simultaneously with an automated sample changer using volumes as low as  $5 \mu\text{L}$ .

## ACCESSORIES

### Modular drop-in accessories for quick and easy changeover

It takes only seconds to replace the standard cell holder with a specialised easy-to-use cell holder. Automated accessories plug directly into built-in ports in the sample compartment, and are automatically recognized by the instrument. There is no need for expensive add-on interfaces or structural extensions. Just drop in the accessory and start analyzing.

### 1 x 1 cell holders for specialised applications

- Micro-cell holder with simple adjustment of horizontal and vertical position for maximising light throughput.
- Variable path length cell holder for rectangular cells with path lengths between 5 and 100 mm.
- Cylindrical cell holder with simple spring clip action. Holds cells of up to 100 mm path length.
- Slide/solid sample holder for solid samples up to 10 mm thick.

### Sample changers for increased sample throughput

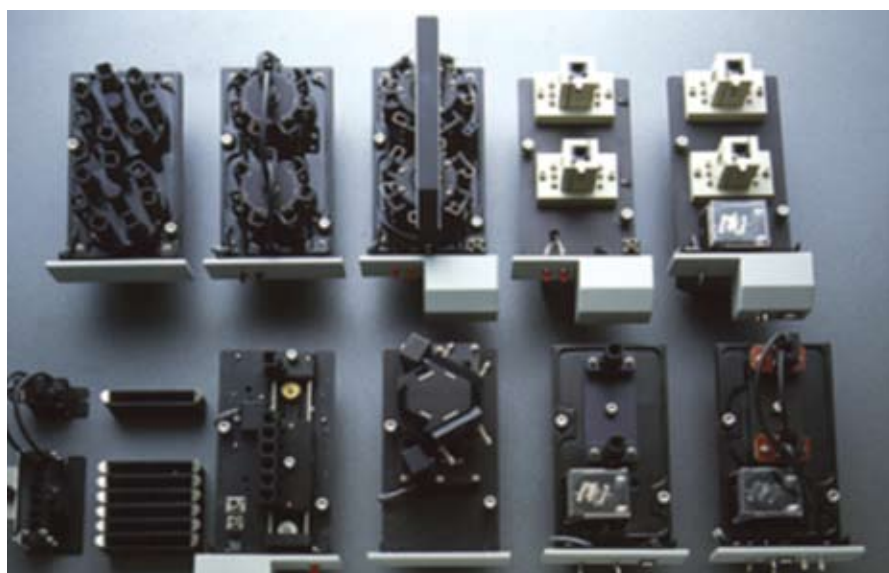
Two types of sample changer are available. They provide speed and precision in the positioning of your samples for fast and accurate measurements of sample batches.

All sample changers are fully computer controlled, providing random access to all positions, taking less than one second to move between adjacent cells.

### Dual Carousel sample changers

The 7 x 7 sample changer is available in standard and water-thermostatted versions. A 6 x 6 sample changer with a Peltier effect thermocell is also available for high stability temperature control, including temperature gradients. The dual carousel sample changer offers two modes of operation:

- 7 x 7 (or 6 x 6) mode for measuring 7(6) samples against 7(6) references.
- 12 x 2 (or 10 x 2) mode for measuring up to 12(10) samples in true double beam mode against 2 reference solutions.



*Automated accessories are interchangeable, controlled and automatically identified by the software package when connected.*



*Sample and reference cell holders for single sample measurements are available in a variety of configurations.*

**Meeting Your Needs**

### Thermostatable cell holders for temperature-sensitive analyses

Water-thermostatted cell holders are available in single cell or sample changer (linear or carousel) configurations. When connected to a constant-temperature circulating water bath, these cell holders ensure constant temperature.

For precise and rapid temperature control, a range of Peltier effect thermocells is available in single cell or sample changer (linear or carousel) configurations. Peltier effect controllers are useful in applications where an accurate constant temperature or an accurate controlled temperature ramp is required. Optional sample immersion probes are available for accurate monitoring of the true sample temperature.

### High speed SDS720 auto sampler for increased productivity

Used with the auto-sipper, the SDS720 autosampler provides high speed automated analysis. Samples are contained in four racks, permitting different tube sizes within a batch. The autosampler is totally controlled by the software via an easy-to-use interface. A built-in variable speed peristaltic pump provides a continuous stream of clean rinse solution.



*Thermostatable cell holders are available in a range of configurations*

### 6 x 1 Linear Movement sample changer

The 6 x 1 linear movement sample changer provides the ultimate in sample changer flexibility. Allowing up to 6 samples to be measured in batch mode against a single reference solution, the sample changer can be fitted with a range of 6 x 1 cell holders, including standard, variable path length, water thermostatted and Peltier effect thermocell versions.

### Auto Sipper for automatic sample introduction

The auto-sipper removes the need for cell handling. Sample introduction is as easy as a simple button press. The accessory features computer controlled pump times, and the ability to be used with a number of flow-cell types, including micro-cells. Standard, water-thermostatted and Peltier effect thermocell versions are available.

### Total Integrating Sphere

The total integrating sphere is ideal for measuring the total reflectance from solid samples such as plastics, paper, textiles and coated surfaces. The sphere provides a transmission position, making it suitable for the measurement of turbid or scattering samples. Spheres are available up to 800 nm for standard DRS applications and the DRS 1150 for NIR applications up to 1,150 nm.



*SDS720 allows 10 standards and 360 samples to be analysed.*



*Total Integrating Sphere for reflectance and colour measurements*

## HARDWARE SPECIFICATIONS

	<b>Cintra 1010</b>	<b>Cintra 2020</b>	<b>Cintra 3030</b>	<b>Cintra 4040</b>
Instrument Format	Spectrometer module with external PC USB communication	Spectrometer module with external PC USB communication	Spectrometer module with external PC USB communication	Spectrometer module with external PC USB communication
Photometric System	Double-beam, direct ratio recording system	Double-beam, direct ratio recording system	Double-beam, direct ratio recording system	Double-beam, direct ratio recording system
Light Source	Tungsten-halogen lamp and deuterium lamp	Tungsten-halogen lamp and deuterium lamp	Tungsten-halogen lamp and deuterium lamp	Tungsten-halogen lamp and deuterium lamp
Light Source Changeover	Automatic Source change-over at user selectable wavelength	Automatic Source change-over at user selectable wavelength	Automatic Source change-over at user selectable wavelength	Automatic Source change-over at user selectable wavelength
Wavelength Range	190 - 1,100 nm	190 - 1,200 nm	190 - 900 nm	190 - 900 nm
Monochromator	Czerny-Turner mounting with holographic grating and automatic lamp peaking	Czerny-Turner mounting with holographic grating and automatic lamp peaking	Czerny-Turner mounting with holographic grating and automatic lamp peaking	Czerny-Turner mounting with holographic grating and automatic lamp peaking
Spectral Bandpass	1.5 nm	1.5 nm	0.2 nm to 5.0 nm in 0.1 nm steps	0.1 nm to 2.0 nm in 0.1 nm steps
Scanning Speed	60 to 3,200 nm/min	5 to 10,000 nm/min	5 to 10,000 nm/min	5 to 10,000 nm/min
Slow Speed	6,000 nm/min	15,000 nm/min	15,000 nm/min	15,000 nm/min
Detector	Silicon Photodiode	Silicon Photodiode	R446 side-on photomultiplier tube	R928 side-on photomultiplier tube
Electrical Requirements	110-120 or 200-240 VAC, 50/60 Hz	110-120 or 200-240 VAC, 50/60 Hz	110-120 or 200-240 VAC, 50/60 Hz	110-120 or 200 - 240 VAC, 50/60 Hz
Sample Compartment	150 x 125 x 280 mm (WxDxH)	150 x 125 x 280 mm (WxDxH)	150 x 125 x 280 mm (WxDxH)	150 x 125 x 280 mm (WxDxH)
Dimensions	695 x 640 x 350 mm	695 x 640 x 350 mm	695 x 640 x 350 mm	695 x 640 x 350 mm
Weight	42 kg (unpacked) 86 kg (packed)	42 kg (unpacked) 86 kg (packed)	42 kg (unpacked) 86 kg (packed)	42 kg (unpacked) 86 kg (packed)

## TYPICAL PHOTOMETRIC SPECIFICATIONS

	<b>Cintra 1010</b>	<b>Cintra 2020</b>	<b>Cintra 3030</b>	<b>Cintra 4040</b>
Stray Light @ 220 nm (10g/L NaI) @ 340 nm (50g/L NaNO <sub>2</sub> )	<0.02%T	<0.0001%T <0.0009%T	<0.00077%T <0.00008%T	<0.00003%T <0.000005%T
Wavelength Accuracy	± 0.16 nm	± 0.01 nm	± 0.01 nm	± 0.01 nm
Wavelength Reproducibility	± 0.05 nm	± 0.019 nm	± 0.019 nm	± 0.018 nm
Photometric Accuracy (NIST 930D standard filter, 0 to 0.5A)	± 0.001A	± 0.0004A	± 0.0003A	± 0.0001A
Photometric Accuracy (NIST 930D standard filter, 0 to 1.0A)	± 0.001A	± 0.0008A	± 0.0006A	± 0.0003A
Photometric Repeatability (0 to 0.5A)	± 0.001A	± 0.000061A	± 0.000022A	± 0.000015A
Photometric Repeatability (0 to 1.0A)	± 0.001A	± 0.000068A	± 0.000023A	± 0.00002A
Photometric Noise (500 nm, 2 nm SBW, 1 sec smoothing)	< 0.0002A	<0.00002A@0A <0.00004A@1A <0.00029A@2A	<0.000023A@0A <0.000038A@1A <0.000190A@2A <0.000262A@3A	<0.000023A@0A <0.000045A@1A <0.000199A@2A <0.000364A@3A <0.000191A@4A
Photometric Drift (340 nm, 2 nm SBW, stable ambient temp, 1 hr warm up)	< 0.0003A/hr	< 0.00012A/hr	< 0.00013A/hr	<0.00017A/hr
Photometric Linearity		<0.6%@3Abs	<0.2%@3Abs	<0.3%@4Abs <1.2%@5Abs
Baseline Flatness (baseline corrected across entire wavelength range)	<0.003A	<0.0013A	<0.00059A	<0.00055A

## ACCESSORY SPECIFICATIONS

### Auto Sippers

Standard four-roller peristaltic pump based system with quick release tubing. Connects directly to the instrument's inbuilt accessory port in the sample compartment. Controlled by software with control of flow speed, timing and direction. Flow through or sample return modes. Can be used in conjunction with an autosampler for high speed unattended analysis. Pump speed: 0–16 rpm. Fill/empty time: 1–150 s. Pump direction: forward and reverse. Provided with standard 1 x 1 cell holder for use with 10 mm cells. Compatible with: 1 x 1 cylindrical cell holder, 1 x 1 micro cell holder, 1 x 1 variable path length cell holder. Flow cell must be ordered separately.

### Water-thermostatted

As per standard auto-sipper but includes built-in water-thermostatted cell holder for temperature control. Suitable for use with 10 mm cells. Requires constant temperature water recirculator for temperature control.

### Peltier Effect Thermocell\*

As per standard auto sipper but includes built-in 1 x 1 Peltier effect thermocell for precise control of temperature. Suitable for use with 10 mm cells. Peltier effect thermocell is controlled by software with control of temperature, ramp rate and temperature stability. Steady state and temperature ramp modes. Optional sample immersion probes for monitoring sample temperature. Peltier element is air cooled. Temperature range: 5–100°C. Heating/cooling rates: 0.1–10°C/minute. Temperature control accuracy:  $\pm 0.5^\circ\text{C}$ . Temperature control precision:  $\pm 0.5^\circ\text{C}$ . Temperature stability: User selectable in the range 0.1–5°C. Note that the achievable lower temperature limit depends upon the ambient temperature.

### Peltier Effect Thermocell Accessories\*

Available in 1 x 1, 6 x 1 and 6 x 6 configurations. Peltier effect thermocell is controlled by software with programmable temperature, ramp rate and temperature stability. Steady state and temperature ramp modes. Peltier element is cooled by external water supply. Optional sample immersion probes for monitoring sample temperature. Temperature range: (Water temperature dependent)  $-15^\circ\text{C}$  to  $100^\circ\text{C}$ . Heating/cooling rates: 0.1–10°C/minute. Temperature control accuracy:  $\pm 0.5^\circ\text{C}$ . Temperature control precision:  $\pm 0.5^\circ\text{C}$ . Temperature stability: User selectable in the range 0.1 to  $5^\circ\text{C}$ . Note that the achievable lower temperature limit depends upon the temperature of the external water supply.

## Reflectance Spheres\*

The reflectance spheres are a barium sulfate coated, integrating sphere, with light detection by a built-in photo multiplier tube for the standard sphere, or a silicon photodiode for the DRS 1150. The accessory is fitted with 10 mm cell holders and solid sample holders for both sample and reference beams. Capable of measuring total %transmittance, absorbance and reflectance. Sample incident angle 8°. Supplied with a pair of Spectralon reference disks. Connects directly to the instrument's built-in accessory ports in the sample compartment.

Sphere diameter: 63 mm. Port/sphere area ratio: 8%.

Total Integrating Sphere: Wavelength range: 200-800 nm. Detector: R446 side-on photomultiplier tube. Corrected baseline 200-800 nm: 0.002 A. Photometric noise at 500 nm (0 Abs): <0.0005 A RMS.

DRS 1150: (for use with Cintra 2020 only) Wavelength range: 450-1150 nm. Detector: silicon photodiode. Corrected baseline 450-1150 nm: 0.006 Abs. Photometric noise at 900 nm (0 Abs): <0.0005 A RMS.

## Linear Movement Module\*

Linear movement based sample changer for controlled movement of up to six samples within the sample compartment. Connects directly to the instrument's built-in accessory port in the sample compartment. May be fitted with standard, variable path length, water thermostatable and Peltier effect thermocell 6 x 1 cell holders. Six sample beam cells. One reference beam cell. 6 x 1 cell holder must be ordered separately.

## 6 x 1 Cell Holders\*

6 x 1 standard cell holder suitable for use with 10 mm cells. Minimum path width 4 mm.

6 x 1 variable path length cell holder suitable for use with 5, 10, 20, 30, 40, 50 and 100 mm pathlength cells. Minimum path width 4 mm.

6 x 1 water thermostatted cell holder for use with 10 mm cells. Minimum path width 4 mm. Control of sample and reference temperatures. Requires constant temperature water recirculator for temperature control.

6 x 1 Peltier effect thermocell for use with 10 mm cells. Minimum path width 4 mm. Computer control of sample and reference temperatures. Requires external water supply for heat transfer.

## Dual carousel sample changers - 7 x 7 and 6 x 6\*

The dual carousel sample changer comprises automated twin carousels, capable of holding 7 (6) sample/reference pairs or up to 12 (10) samples and 2 reference cells in true double beam mode. Connects directly to the instrument's built-in accessory port in the sample compartment. Standard and water thermostatable versions are available for the 7 x 7 dual carousel sample changer. Peltier effect thermocell version is available for the 6 x 6 dual carousel sample changer. Suitable for use with 10 mm cells. Minimum path width 4mm. Seven (six) Sample beam cells. Seven (six) Reference beam cells. Operation modes 7 x 7 (6 x 6 Peltier) or 12 x 2 (10 x 2 Peltier).

## SDS720 Sample Delivery System\*

X-Y-Z autosampler with capacity for up to 720 samples and ten standards with continuous flow rinse via a built-in variable speed peristaltic pump. Supplied with four 60 position sample racks to hold 240 samples. PTFE and PEEK metal free liquid flow path. Software controlled probe height, control of sipper flow speed, timing and direction, as well as rinse time, air slug capability and measurement delay time. Flow through or sample return modes. Requires auto-sipper for operation. Connects to serial port of computer. Optional racks for 21, 24, 40, 60 or 90 samples. Optional Clean Enclosure available.

Power Requirements: 100-240 VAC, 50/60 Hz. Dimensions: 520 x 250 x 482.

\* not available on Cintra 1010

## GBC Cintra 1010, Cintra 2020, Cintra 3030 and Cintra 4040 Ordering Information

### UV-Vis Spectrometers

Cintra 1010 with Cintral Software	99-0593-00
Cintra 2020 with Cintral Software	99-0594-00
Cintra 3030 with Cintral Software	99-0595-00
Cintra 4040 with Cintral Software	99-0596-00

Each Cintra UV-Visible spectrometer is supplied complete with a standard dual 10 mm pathlength cell holder, Operation Manual, USB cable and software.

### 1x1 Cell Holders

1x1 cylindrical cell holder	99-0175-00
1x1 micro-cell holder	99-0176-00
1x1 water-thermostatable cell holder	99-0190-00
1x1 Peltier-controlled thermo-electric cell holder	99-0191-11
1x1 variable pathlength cell holder (up to 100 mm)	99-0177-00
1x1 slide/solid sample holder	99-0222-00

### Sample Changers

7x7 dual carousel	99-0178-00
7x7 water-thermostatable dual carousel	99-0179-00
6x6 Peltier-controlled thermo-electric dual carousel	99-0343-11
Linear movement module (without cell holders)	99-0181-00

Accessories for linear movement module:

6x1 cell holder	99-0183-00
6x1 water-thermostatable cell holder	99-0184-00
6x1 Peltier-controlled thermo-electric cell holder	99-0185-11
6x1 variable path length cell holder (up to 100 mm)	99-0208-00

#### Auto-sipper

Auto-sipper with water-thermostatable cell holder	99-0189-00
Auto-sipper with Peltier-controlled thermo-electric cell-holder	99-0214-00
SDS720 Sample Delivery System	99-0205-11

Supplied complete with test tubes, teflon coated probe, cables, tubing and four 60-position sample racks

### Other Accessories

Total Integrating Sphere	99-0188-00
DRS 1150 Diffuse Reflectance Sphere ( for use with Cintra 2020)	99-0521-00
Certified Filter Kit	95-0623-00
Certified Reference Kit	95-0551-00

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GBC reserves the right to change specifications without prior notice

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### GBC SCIENTIFIC EQUIPMENT

Manufacturer of world-class scientific instruments and accessories—

AAS, HPLC, ICP-OES,  
ICP-TOFMS, Rheometry, UV-Vis  
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