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Find the *GE Healthcare / Amersham Biosciences Ultrospec 3100 Pro* at our website: *Click HERE*

product codes:
80-2112-31, 80-2112-32, 80-2112-37, 80-2112-38

Ultrospec 3100 *pro*

UV/Visible Spectrophotometer

Description

The Ultrospec™ 3100 *pro* UV/Visible spectrophotometer is the ideal instrument for the modern, yet demanding, life science laboratory where bench space is at a premium. It is available in a range of colours - classic, yellow, plum, apple - and has both exciting styling and design (registered design protection applied for) that place it at the forefront of its class. In addition, it uses xenon lamp technology so annual running costs are minimized.



Figure 1. Ultrospec 3100 *pro*

The instrument has a high-resolution display and an extensive range of built-in applications software that is enhanced by full graphics and scaling capabilities coupled with data manipulation. Reflecting the needs of current molecular biology research, there are stored protocols for nucleic acid quantification/ characterization (DNA, RNA, cDNA, oligonucleotide, theoretical Tm calculation) and protein determination (Bradford, Biuret, Lowry, BCA and UV methods) as well as basic modes. The common laboratory applications of wavelength scanning, multi- wavelength equation, reaction kinetics, standard curve and substrate concentration are also present.

Fifty user definable methods can be saved and with a range of output modes - direct to Microsoft™ Excel, control by SWIFT II software and output to a range of printers. With these features and self-test diagnostics for GLP purposes, the Ultrospec 3100 *pro* is an excellent addition to the laboratory bench.

Features	Benefits
Xenon lamp	Press to read system means low cost of ownership during product lifetime; a 3 year lamp warranty is offered
Available in four colours: classic, yellow, plum, apple	Increased customer choice
GLP self test diagnostics	Prove performance of instrument at any time at no extra cost
Integral VGA display with full graphics capability	Intuitive and easy to use Instantaneous display of graphics with manipulation of data before printing
Built in applications software that is complete	No additional expense for software modules No possibility of losing software cards
Stored methods for Nucleic Acid Quantification and Protein Determination	Easy nucleic acid and protein measurements
Base Sequence Input facility	Useful for primer characterization and quantification prior to PCR and sequencing
<3 nm bandwidth	Optimum resolution for scanning biomolecules
50 user stored methods	Ideal for multi-user situations

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Display and keypad

The 320 x 240 pixel high resolution, graphical, 1/4 VGA size liquid crystal display (LCD) provides the user with set up parameters and experimental results in either English, German, French, Spanish, Italian or Russian. The information bar at the bottom of the display contains user prompts and instrument status. The Ultrospec 3100 *pro* has a wide range of software options which are presented on the LCD in an index card format, with navigation using the four arrow keys, and accessed by pressing the **function** key for set up and utilities and the **mode** key for use in experiments. Text entry is very easy, since the keypad has an alphanumeric function at the appropriate menu options, and letter entry is in the same manner as when using a mobile telephone.

Nucleic acids

Stored routines for DNA, RNA and oligonucleotide samples ensure that the quantification and purity check of nucleic acids is both rapid and easy. Volumes as low as 7 µl can be routinely measured using the ultra micro-volume cell and cell holder accessory; dilution factor is accounted for automatically. Sample integrity of nucleic acid preparations or cDNA fluorescent probes used for microarray hybridizations can also be investigated using the nucleic acid scan routine; this provides a spectrum over the required wavelength range together with relevant information. Volumes as low as 3 µl and 7 µl can be accommodated using the capillary and the ultra-micro volume cell and the appropriate cell holder, respectively. In addition, the UViMicro UV transmitting disposable cell (volume 20 – 2000 µl, standard 15 mm optical height) is compatible. The Ultrospec 3100 *pro* also contains useful information for selecting the appropriate cell to use, formulae for mass to moles conversion and the codon dictionary.

The Tm or melting temperature characterises the stability of a nucleic acid hybrid formed between an oligonucleotide and its complementary strand and is essential information for design of effective Polymerase Chain Reaction (PCR) and sequencing primers and oligonucleotide hybridisation probes for Southern, Northern and dot blot analyses. Tm can be calculated theoretically on the Ultrospec 3100 *pro* by entering the oligonucleotide base sequence, the oligonucleotide concentration and the salt concentration. Molecular weight, conversion factor (µg/ml) and concentration in pmol/µl, useful for sequencing, are calculated also.



Figure 2. Ultrospec 3100 *pro* display and keypad

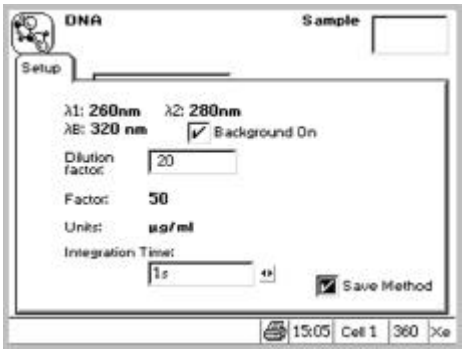


Figure 3. Nucleic acid quantification and purity check.

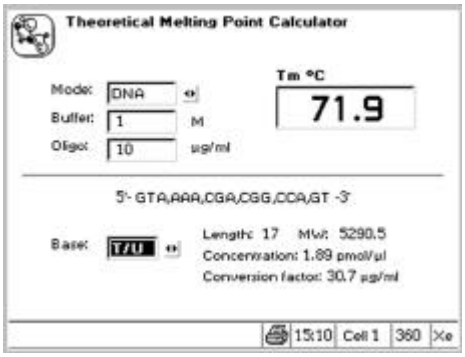


Figure 4. Tm calculation for primer.

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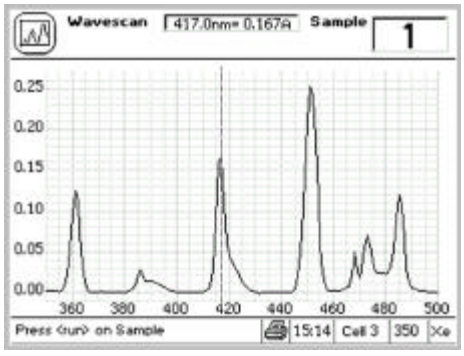


Figure 5. Typical wavelength scan.

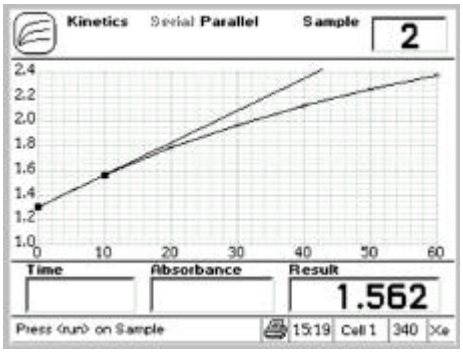


Figure 6. Typical enzyme kinetics assay.

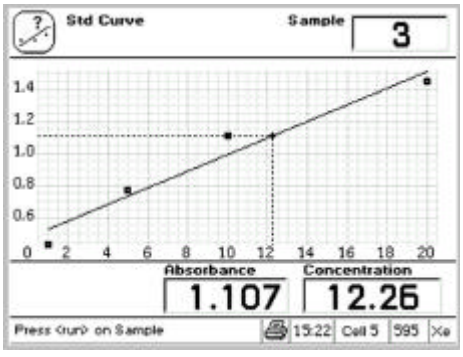


Figure 7. Typical standard curve experiment.

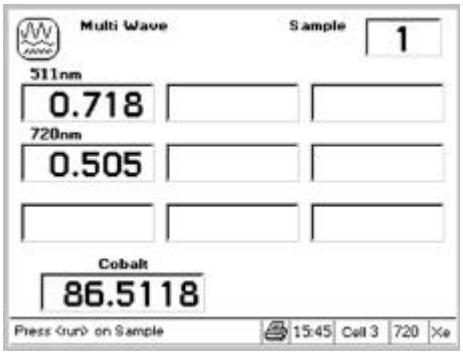


Figure 8. Multi wavelength equation entry.

Wavelength scanning

The measurement of sample absorption spectrum, together with identification of peak height and position can be done easily. With a survey scan speed of 3000 nm/minute and a wavelength range of 190–900 nm, the Ultrospec 3100 *pro* is ideal for scanning applications. In addition, the 1st, 2nd and 4th derivatives for the spectrum are only a key-press away, as is a peak identification routine.

Enzyme kinetics

The analysis of change in absorbance over time, particularly at 340 nm for NAD/NADH assays is one of the most powerful applications of the UV/Visible spectrophotometer. The Ultrospec 3100 *pro* allows the entry of lag time, reaction time and a slope conversion factor; assays can be carried out in serial or parallel and a customized method can be saved for future use. The progress of the reaction is monitored graphically, with a display of weighted average slope. Temperature can be controlled with either with water or Peltier heated accessories.

Standard curve

The graphical display of the Ultrospec 3100 *pro* enables easy visualization of a plot of the absorbances of a series of standards (with replicates); the curve fitting methods of linear regression, linear interpolation and quadratic spline are all available. Samples are then measured against the appropriate standard curve to give quantitative results that, if required, can be printed out. Substrate Concentrations is a similar mode that can be used with reagent diagnostic kits.

Multiple wavelength/ equation entry

Many quality control and development processes require the use of absorbance values in equations to determine a meaningful parameter. The Ultrospec 3100 *pro* is able to measure absorbances at specified wavelengths and then use these values in a user defined equations; two separate equations can be used in one method, which can be saved and instantly recalled when needed. Thus post measurement calculations can be done automatically. This powerful facility enables customization of the instrument to suit individual user needs and the flexibility to change them as required.

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Protein determination

The Ultrospec 3100 *pro* has stored routines for the popular Bradford, Lowry, Biuret and BCA protein determination methods, and users can modify the protocols to suit their needs. Micro protein assay versions of these protocols where absorbance values are lower are easily carried out on the Ultrospec 3100 *pro* by increasing the integration (or measurement) time to minimize the effects of instrument electronic noise. The instrument also has stored routines for some UV protocols; Christian Warburg for protein impurity in nucleic acid preparations, and empirical methods at 280/205 nm and 225/215 nm. The instrument also contains useful information for factors relating absorbance to concentration for some common proteins and look up tables for amino acids.

Good laboratory practise

Being able to check that an instrument is working to its published specification is an essential pre-requisite for GLP. The Ultrospec 3100 *pro* performs GLP self-diagnostic tests for bandwidth, absorbance accuracy, wavelength accuracy and stray light and compares them with the values obtained during instrument manufacture (or last accredited engineer service).

UViMicro disposable cell

The use of disposable, UV transmitting capillaries is popular in sequencing labs, where primers and templates are available in high concentrations. The capillary is not ideal, however, for more dilute solutions. These require the longer pathlength of a standard cell.

UViMicro has been designed to address this need. A minimum volume of 20 µl can be accommodated in a 10 mm pathlength cell. The cells are supplied individually wrapped and are sterile and DNase/RNase free. Since expensive quartz cells are no longer needed, the tedious washing and autoclaving procedures to maintain sample sterility are eliminated. They are particularly attractive to scientists working with RNA but are also ideal for standard DNA and oligonucleotide quantification procedures since the maximum sample volume is 2000 µl.

UViMicro offers great flexibility to researchers, particularly since the 15 mm optical height of the cells has been designed to fit the light path of the majority of spectrophotometers available. The cells are self-masked, offering the advantages that no adapter is needed to use them and that the optical surfaces are protected against accidental fingerprints.

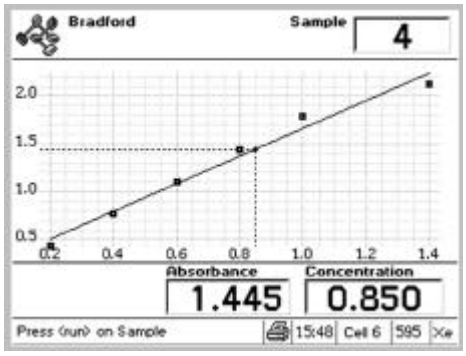


Figure 10. Protein determination using BCA method.

Ultrospec 3100 *pro* UV/Vis Spectrophotometer

Lab name . . . . . .

Instrument	Ultrospec 3100 *pro*	
Serial number	81012	
Software	4194 V1.0, Slave 4194 V1.0	
Last serviced	09/10/00 12:13	
Instrument state at calibration		
GLP Calibrated	09/10/00 at 12:56	
Calibration	Full UV/Visible	
Bandwidth	(2.0 - 3.0 nm):2.9 nm	PASS
Wavelength	(881.9 nm):881.9 nm	PASS
Absorbance at		
220nm	(0.996-1.006A):1.000A	PASS
340nm	(1.902-1.114A):1.102A	PASS
500nm	(1.201-1.123A):1.204A	PASS
Stray light at		
220 nm	(<0.050%T):0.008%T	PASS
Xe lamp:	97 % of original energy	
Current instrument state		
Accessory	Eight Position Cell Changer	
Xe lamp:	installed 14/08/00 13:35, use 5 hour	
baseline in use	14/08/00 13:38	
baseline stored	14/08/00 13:38	



Figure 11. UViMicro disposable cell.

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Output to printer

The Ultrospec 3100 *pro* prints to a range of popular printers with the Centronics interface, enabling a printed record of results, and GLP print outs, to be kept for filing. There are built in printer drivers enabling the output of graphics to generic printer types; Seiko DPU-414, Epson FX and similar, Epson Stylus and similar and HP DeskJet and LaserJet. The instrument combined with a printer stand and the Seiko DPU-414 thermal printer will be welcomed in those demanding laboratory environments which require high performance but where bench space is at a premium.



Figure 12. Ultrospec 3100 *pro* with printer and printer stand

Download to spreadsheet

The ability to download directly to Microsoft Excel from the Ultrospec 3100 *pro* is a very powerful feature. Results can easily be archived in this common format or exported to other compatible applications for presentation or further manipulation. Data is downloaded via a serial interface into a macro that has to be loaded onto the PC; both the cable and the macro are available as accessories.

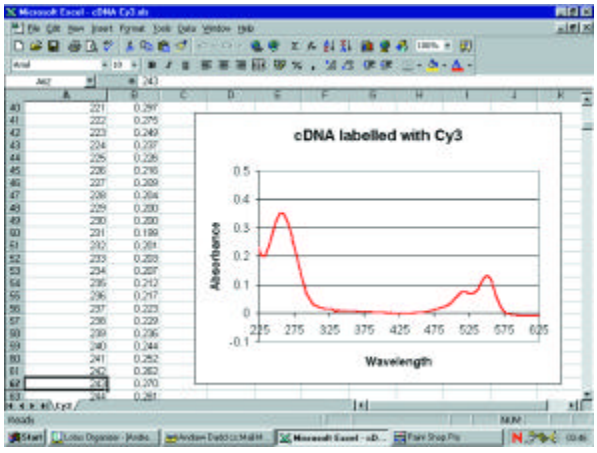


Figure 13. Download of a wavelength scan to Excel.

Control by SWIFT II software

Although Ultrospec 3100 *pro* is a stand-alone instrument for discrete measurements on the laboratory bench, it can also be controlled from a PC using SWIFT II software. SWIFT II is compatible with Windows™ 95, 98 and NT and comprises of sophisticated application software for Wavelength Scanning, Enzyme Kinetics, Time Drive, Quantification, Multi Wavelength and Fraction Analysis applications, providing extensive post run manipulations on date acquired using the spectrophotometer.



Figure 15. Ultrospec 3100 *pro* under PC control using SWIFT II.

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Technical specifications

Wavelength range	190–900nm
Monochromator	1200 lines/mm Aberration corrected concave grating
Maximum scanning speed	3000 nm/minute
Spectral bandwidth	< 3nm
Wavelength accuracy	± 1nm
Wavelength reproducibility	± 0.5nm
Light source	xenon lamp
Detectors	two silicon photodiodes
Photometric range	- 3.000 to 3.000 A, 0.01 to 9999 concentration units, 0.1 to 200 % T
Photometric accuracy	± 0.5% or ± 0.003A to 3.000A at 546 nm, whichever is the larger
Photometric reproducibility	within 0.5% of absorbance value to 3.000 A at 546 nm
Stability	± 0.001 A per hour at 340 nm at 0 A
Stray light	<0.05 %T at 220 nm using NaI and <0.05 %T at 340 nm using $NaNO_2$
Digital output	9 pin serial and Centronics parallel
Sample compartment size	210 x 140 x 80 mm
Dimensions	510 x 350 x 220 mm
Weight	13 kg
Power requirements	100–240 V AC ±10%, 50/60Hz, 80 VA

Specifications are measured after the instrument has warmed up at constant ambient temperature and are typical of a production unit. As part of our policy of continuous product development we reserve the right to alter specifications without notice. We supply support agreements which help you to fulfil demands of regulatory guidelines concerning GLP/GMP. These include calibration and certification using filters traceable to international standards by certificated engineers using calibrated test tools. The choice of agreement apart from break down coverage can include both preventative maintenance and certification. The manufacturer of this product designs and manufactures in accordance with an ISO 9001 approved quality system. The product is CE compliant.



Figure 15. The Ultrospec *pro* range is available in a choice of four colours

Ordering Information

Ultrospec 3100 *pro* UV/Visible Spectrophotometer

Classic	80-2112-31
Yellow	80-2112-32
Plum	80-2112-37
Apple	80-2112-38

Companion products

Seiko DPU-414 thermal printer	enquire
Printer stand	80-2112-13
UViMicro disposable cells (supplied in packs of 100)	80-2110-94

Companion literature

SWIFT II data file	18-1140-40
Accessories data file	18-1140-41

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