

pg instruments



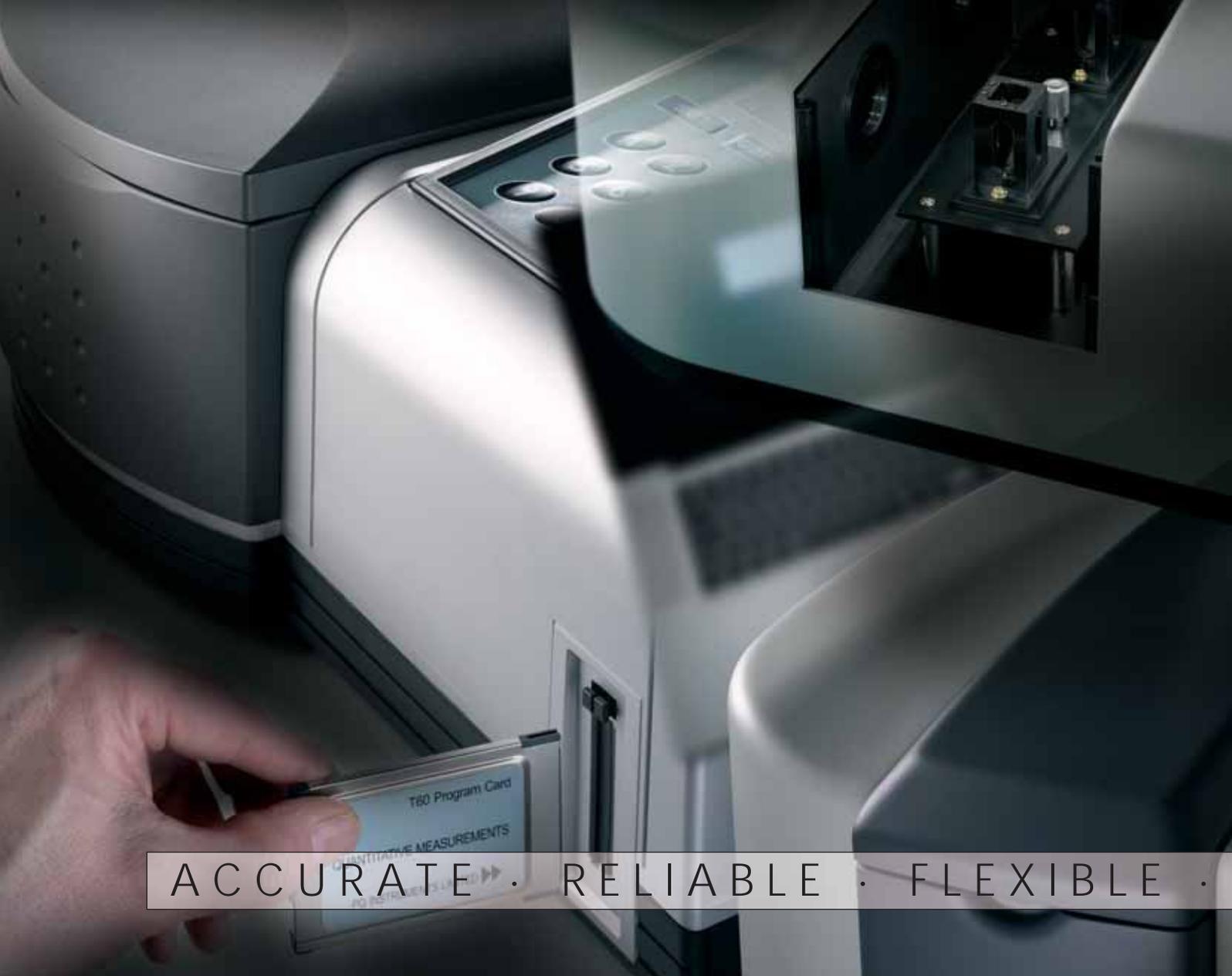
Analytical
Instruments
for
Science



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Analytical
Instruments
for Science



ACCURATE · RELIABLE · FLEXIBLE ·

Since its development in the 1950's the UV-Visible Spectrophotometer has evolved into an accurate and reliable analytical tool and it has become one of the most utilised instruments in today's scientific laboratory.

UV-Visible spectroscopy is a mature and well established analytical technique used extensively in many industry sectors including Environmental Analysis, Pharmaceutical Testing, Food and Beverage Production to name but a few. PG Instruments manufacture an extensive range of UV and Visible Spectroscopy instrumentation guaranteed to meet the needs of your application. Further information on the UV-Vis product line along with a brief introduction to UV-Vis Spectroscopy can be found in this brochure.

UV-Vis Spectroscopy

UV-Vis Spectroscopy is an analytical method used to measure the absorbance of ultra-violet or visible radiation through an analyte. The molecular

absorption of the analyte corresponds to both excitation of valence electrons and excitation of electrons in different atomic orbitals.

UV-Vis Spectroscopy is an effective technique for both qualitative and quantitative analysis of organic and inorganic compounds.

UV-Vis Spectroscopy is based on the Lambert-Beer principle which states that the Absorbance of a solution (A) is directly proportional to its pathlength (l) and its concentration (c) when the wavelength of the incidence light remains fixed.

This is summarized in the following equation, where ϵ is the molar absorptivity

$$A = \epsilon lc$$



ACCESSIBLE · ANALYSIS

UV-Vis Spectrophotometer

The UV-Vis Spectrophotometer is the analytical instrument used for the UV-Vis spectroscopic analysis. Spectrophotometers are available in different configurations however most can be categorized into either single beam, split beam or double beam types depending on the design of their optical system. Such types of instrument comprise the following components in their constructions:

- Light Source
- Monochromator
- Cell Compartment
- Detector
- Signal Processing System

Split Beam Spectroscopy

The Split beam approach to UV-Vis Spectroscopy uses a single beam of light separated into Sample and

Reference beams by means of a beam splitter using a separate detector for each. Split beam instruments have a reference detector housed inside the instrument optics offering the advantage of optical stability as in double beam spectroscopy whilst using the single beam measurement technique.

Double Beam Spectroscopy

The double beam approach to UV-Vis spectroscopy requires two beams of light, both having the same intensity to measure the Absorbance through sample and reference positions simultaneously. The Sample position is used for measurement of the analyte, whereas the reference position is used for the correction against a blank solution or sample matrix.

A clear advantage of the double beam optical system is the improvement in measurement stability and drift precision as a result of having a real-time feedback of both the reference and sample signals.

T60

UV-VIS SPECTROPHOTOMETER





The T60 is a high performance compact split beam spectrophotometer with a fixed 2nm spectral bandwidth.

The T60 range consists of two models:

T60U (UV-Visible) operating within a wavelength range of 190-1100nm. T60V (Visible) operating within a wavelength range of 325-1100nm.

The instrument has a switched mode power supply accepting voltages in the range of 95-240V AC and supplied with either universal path length 5 cell changer or fixed path length 8 cell changer as standard.

The T60 delivers the functionality and accuracy of an advanced instrument at an affordable price.

FEATURES & FUNCTIONS

- High performance fixed 2nm spectral bandwidth.
- Low stray light 0.05%T.
- Wavelength accuracy +/- 1nm.
- Holographic blazed grating 1200lines/mm.
- Local control software for photometric fixed wavelength measurement.
- Easily upgraded to include quantitative analysis, multi wavelength spectrum & kinetics.
- Built in cell holder storage.
- Robust modular design with a small footprint.
- Can be used with UV-WIN software (optional).



Fixed pathlength 8-cell changer

T60 continued

OPTICAL SYSTEM & COMPONENTS

High quality optical components ensure reliable analytical data with low stray light achieved using very low noise electronic circuits.

Deuterium and tungsten light sources deliver superior stability across the full wavelength range. Both types of lamp have self timers and are inexpensive and easy to replace when required.

The monochromator is completely sealed and the optical surfaces can be easily cleaned to maintain optimum reflectivity over the lifetime of the instrument.

A maintenance free high resolution direct stepper drive positions the grating precisely, which ensures reproducible wavelength scanning at different scan speeds, thus negating any wavelength peak shift.

The spectrophotometer shell is made from an environmentally friendly non corrosive material and a simple retaining mechanism on the base allows easy access for filter changes and routine maintenance.



Specifications

	T60U (UV-Visible)	T60V (Visible)
Optical system	Split beam ratio	Split beam ratio
Scan speed	Selectable	Selectable
Wavelength range	190 - 1100nm	325 - 1100nm
Wavelength accuracy	±1nm	± 2nm
Wavelength reproducibility	≤ 0.2nm	≤ 0.4nm
Spectral bandwidth	2nm	2nm
Photometric mode	Transmittance, Absorbance, Energy	Transmittance, Absorbance, Concentration
Photometric range	-0.3 - 3.0Abs	-0.3 - 3.0Abs
Photometric accuracy	0.002Abs (0 - 0.5A), 0.004Abs (0.5 - 1A) 0.3%T (0 - 100%T)	0.002Abs (0 - 0.5A), 0.004Abs (0.5 - 1A) 0.3%T (0 - 100%T)
Photometric reproducibility	0.001A (0 - 0.5A), 0.002A (0.5 - 1A) 0.15%T (0 - 100%T)	0.001A (0 - 0.5A), 0.002A (0.5 - 1A) 0.15%T (0 - 100%T)
Photometric noise	0.001A (500nm) 30min warm-up	0.001A (500nm) 30min warm-up
Baseline flatness	0.002A (200 - 1000nm)	0.002A (325 - 1000nm)
Baseline stability	0.001A/h (500nm,0Abs), 2hr warm-up	0.001A/h (500nm,0Abs), 2hr warm-up
Stray light	≥ 0.05%T	≥ 1.0%T
Standard Functionality	Photometric Measurement (Quantitative, Multi-wavelength, Spectrum and Kinetic measurements with program cards)	Photometric & Quantitative Measurement
Detector	Silicon photo diode	Silicon photo diode
Light source	Tungsten Halogen and Deuterium arc lamps	Tungsten Halogen
Display	Digital LCD display	Digital LCD Display
Printer	Mini Printer	Mini Printer
PC Interface	RS232	RS232
Software support	Local and UV-Win	Local and UV-Win
Power supply	Switch mode 95 - 250VAC 50 - 60Hz	Switch mode 95 - 250VAC 50 - 60Hz
Weight	11kg	11kg
Dimensions (Width, Depth, Height)	476(mm), 362(mm), 225(mm)	476(mm), 362(mm), 225(mm)

Each Unit is supplied with the following as standard:

- | | |
|---|------------------------|
| 1 x Certificate of conformity | 1 x Power cord |
| 1 Pair of quartz cells (T60U), glass cells (T60V) | 1 x Instruction manual |
| 1 x Quantitative program card (T60U Only) | 1 x Dust cover |
| 1 x Black block for dark current correction | 1 x Packing list |
| 1 x Fuse (2A) | |

T70

UV-VIS SPECTROPHOTOMETER





The T70 is a high performance split beam spectrophotometer available with a fixed (2nm) or variable (0.5, 1, 2, 5nm) spectral bandwidth, which is innovative in terms of instrument application, mechanical and optical design, electronic control and software whilst retaining features that are well established and accepted through the industry.

The T70 series of UV-Visible Spectrophotometers are able to carry out photometric measurement, spectrum scans, quantitative determination and DNA/Protein analysis. When interfaced to a PC using the UV-Win software, many more features are available including three dimensional spectrum, kinetic measurements, method and data storage, exportation of data in multiple formats and GLP administration features. Both instruments have a spectral range of 190-1100nm.

The T70 range consists of two models:

T70 UV-Vis instrument offering a fixed bandwidth of 2nm.

T70+ UV-Vis instrument offering a variable bandwidth of 0.5, 1, 2 or 5nm.

FEATURES & FUNCTIONS

- High performance fixed (2nm) or variable (0.5, 1, 2, 5nm) spectral bandwidth.
- Wavelength accuracy +/- 0.3nm.
- Supplied with a motorised 8 cell changer and pre-aligned Tungsten and Deuterium lamps.
- Holographic blazed grating 1200 lines /mm.
- High degree of automation requiring minimal key depressions to start analysis.
- A number of optional accessories available which increase the flexibility of the instrument.
- Analysis for photometric measurement, spectrum scans, quantitative determination and DNA/Protein analysis.
- UV-Win software gives additional functionality including 3D spectrum analysis and compliance with GLP protocol.
- Simple mechanical structure and modular electronics make routine maintenance very easy.

T70 continued



OPTICAL SYSTEM & COMPONENTS

High quality optical components ensure reliable analytical data with low stray light achieved using very low noise electronic circuits.

The split beam ratio optics ensures good optical stability.

Pre-aligned Deuterium and tungsten light sources deliver superior stability across the full wavelength range. Both types of lamps are inexpensive and easy to replace when required.

The modular design allows easy access to all optical surfaces which can be easily cleaned to maintain optimum reflectivity over the lifetime of the instrument.



8 cell changer

Specifications

Instrument Type	T70	T70+
Optical System	Split beam ratio	Split beam ratio
Scan Speed	Selectable	Selectable
Wavelength Range	190 - 1100nm	190 - 1100nm
Wavelength Accuracy	± 0.3nm	± 0.3nm
Wavelength Reproducibility	≤ 0.2nm	≤ 0.2nm
Spectral Bandwidth	2nm	0.5, 1.0, 2.0, 5.0nm
Photometric Mode	Transmittance, Absorbance, Energy Concentration	Transmittance, Absorbance, Energy Concentration
Photometric Range	-0.3 - 3.0Abs	-0.3 - 3.0Abs
Photometric Accuracy	0.001Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)	0.001Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)
Photometric Reproducibility	0.001A (0 - 0.5A), 0.002A (0.5 - 1.0A), 0.15%T (0 - 100%T)	0.001A (0 - 0.5A), 0.002A (0.5 - 1.0A), 0.15%T (0 - 100%T)
Photometric Noise	0.001A (500nm) 30min warm-up	0.001A (500nm) 30min warm-up
Baseline Flatness	0.002A (200 - 1000nm)	0.002A (325 - 1000nm)
Baseline Stability	0.001A/h (500nm, 0Abs), 2hr warm-up	0.001A/h (500nm, 0Abs), 2hr warm-up
Stray light	≥ 0.12%T (220nm NaI, 340nm NaNO ₂)	≥ 0.12%T (220nm NaI, 340nm NaNO ₂)
Standard Functionality	Photometric, Quantitative, Spectrum and DNA measurements.	Photometric, Quantitative, Spectrum and DNA measurements.
Cell Holder	Automatic 8 Cell changer	Automatic 8 cell changer
Detector	Silicon photo diode	Silicon photo diode
Light Source	Tungsten Halogen and Deuterium arc lamps	Tungsten Halogen and Deuterium arc lamps
Display	Digital LCD display	Digital LCD display
Printer	Not available	Not available
PC Interface	RS232	RS232
Software Support	Local and UV Win	Local and UV Win
Power Supply	Switchable 120 - 230VAC 50 - 60Hz	Switchable 120 - 230VAC 50 - 60Hz
Weight	25Kg	25Kg
Dimensions (Width, Depth, Height)	520mm, 420mm, 230mm	520mm, 420mm, 230mm

Each **Unit** is supplied with the following as standard:

- | | |
|---|------------------------|
| 1 x Certificate of conformity | 1 x Power cord |
| 1 x 8 position 10mm path length motorised cell holder | 1 x Instruction manual |
| 1 Pair 10mm Quartz cells | 1 x Dust cover |
| 1 x Black block for dark current correction | 1 x Packing list |
| 1 x Fuse (2A) | |

T80

UV-VIS SPECTROPHOTOMETER



The T80 is a high performance double beam spectrophotometer available with a fixed (2nm) or variable (0.5, 1, 2, 5nm) spectral bandwidth, which is innovative in terms of instrument application, mechanical and optical design, electronic control and software whilst retaining features that are well established and accepted through the industry.

The T80 series of UV-Visible Spectrophotometers are able to carry out photometric measurement, spectrum scans, quantitative determination and DNA/Protein analysis. When interfaced to a PC using the UV-Win software, many more features are available including three dimensional spectrum, kinetic measurements, method and data storage, exportation of data in multiple formats and GLP administration features. Both instruments have a spectral range of 190-1100nm.

The T80 range consists of two models:

T80 UV-Vis instrument offering a fixed bandwidth of 2nm.

T80+ UV-Vis instrument offering a variable bandwidth of 0.5, 1, 2 or 5nm.

FEATURES & FUNCTIONS

- High performance fixed (2nm) or variable (0.5, 1, 2, 5nm) spectral bandwidth.
- Wavelength accuracy +/- 0.3nm.
- Supplied with a motorised 8 cell changer and pre-aligned Tungsten and Deuterium lamps.
- Holographic blazed grating 1200 lines /mm.
- High degree of automation requiring minimal key depressions to start analysis.
- A number of optional accessories available which increase the flexibility of the instrument.
- Analysis for photometric measurement, spectrum scans, quantitative determination and DNA/Protein analysis.
- UV-Win software gives additional functionality including 3D spectrum analysis and compliance with GLP protocol.
- Simple mechanical structure and modular electronics make routine maintenance very easy.

T80 continued



Lamp compartment

OPTICAL SYSTEM & COMPONENTS

High quality optical components ensure reliable analytical data with low stray light achieved using very low noise electronic circuits.

The double beam optics ensure good optical stability. Pre-aligned Deuterium and tungsten light sources deliver superior stability across the full wavelength range. Both types of lamps are inexpensive and easy to replace when required.

The modular design allows easy access to all optical surfaces which can be easily cleaned to maintain optimum reflectivity over the lifetime of the instrument.



8 cell changer

Specifications

Instrument Type	T80	T80+
Optical System	Double beam	Double beam
Scan Speed	Selectable	Selectable
Wavelength Range	190 - 1100nm	190 - 1100nm
Wavelength Accuracy	± 0.3nm	± 0.3nm
Wavelength Reproducibility	≤ 0.2nm	≤ 0.2nm
Spectral Bandwidth	2nm	0.5, 1.0, 2.0, 5.0nm
Photometric Mode	Transmittance, Absorbance, Energy Concentration	Transmittance, Absorbance, Energy Concentration
Photometric Range	-0.3 - 3.0Abs	-0.3 - 3.0Abs
Photometric Accuracy	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)
Photometric Reproducibility	0.001A (0 - 0.5A), 0.002A (0.5 - 1.0A), 0.15%T (0 - 100%T)	0.001A (0 - 0.5A), 0.002A (0.5 - 1.0A), 0.15%T (0 - 100%T)
Photometric Noise	0.001A (500nm) 30min warm-up	0.001A (500nm) 30min warm-up
Baseline Flatness	0.0015A (200 - 1000nm)	0.0015A (325 - 1000nm)
Baseline Stability	0.0008A/h (500nm, 0Abs), 2hr warm-up	0.0008A/h (500nm, 0Abs), 2hr warm-up
Stray light	≥ 0.12%T (220nm NaI, 340nm NaNO ₂)	≥ 0.12%T (220nm NaI, 340nm NaNO ₂)
Standard Functionality	Photometric, Quantitative, Spectrum and DNA measurements.	Photometric, Quantitative, Spectrum and DNA measurements.
Cell Holder	Automatic 8 Cell changer	Automatic 8 cell changer
Detector	Silicon photo diode	Silicon photo diode
Light Source	Tungsten Halogen and Deuterium arc lamps	Tungsten Halogen and Deuterium arc lamps
Display	Digital LCD display	Digital LCD display
Printer	Not available	Not available
PC Interface	RS232	RS232
Software Support	Local and UV Win	Local and UV Win
Power Supply	Switchable 120 - 230VAC 50 - 60Hz	Switchable 120 - 230VAC 50 - 60Hz
Weight	25Kg	25Kg
Dimensions (Width, Depth, Height)	520mm, 420mm, 230mm	520mm, 420mm, 230mm

Each Unit is supplied with the following as standard:

- | | |
|---|------------------------|
| 1 x Certificate of conformity | 1 x Fuse (2A) |
| 1 x 8 position 10mm path length motorised cell holder | 1 x Power cord |
| 1 Pair 10mm Quartz cells | 1 x Instruction manual |
| 1 x Black block for dark current correction | 1 x Packing list |

T90+

UV-VIS SPECTROPHOTOMETER



The T90+ is a high performance double beam scanning spectrophotometer with a variable (0.1, 0.2, 0.5, 1.0, 2.0, 5.0nm) spectral bandwidth.

The Czerny-Turner Monochromator with a holographic grating keeps stray light to a minimum and offers excellent optical resolution.

The use of a photomultiplier tube as detector delivers exceptional sensitivity.

The true double-beam optical system coupled with an efficient and well proven electronic control system ensures high stability and low background noise.

FEATURES & FUNCTIONS

- Czerny-Turner Monochromator with high resolution holographic grating.
- High performance variable (0.1, 0.2, 0.5, 1.0, 2.0, 5.0nm) spectral bandwidth.
- Wavelength accuracy +/- 0.3nm.
- Stepped Monochromator Drive.
- Excellent Performance.
- Excellent baseline stability.
- High Resolution.
- UV-Win software is supplied as standard for spectral, kinetic, photometric and quantitative analysis.

T90+ continued



OPTICAL SYSTEM & COMPONENTS

The double beam optical design combined with a high specification holographic grating gives excellent wavelength separation allowing the user to measure close adjacent wavelengths with excellent sensitivity.

The modular design of the sample compartment allows for ease of use of a wide range of optional accessories ensuring accurate analysis of various sample types including liquids, thin films and powders.

The user friendly design of the lamp compartment allows easy replacement and simplified routine maintenance of the Deuterium and Tungsten lamps.

The variable bandwidth features allow for high wavelength resolution with spectral bandwidth settings as low as 0.1nm.

The T90+ series spectrophotometer offers full connectivity to the UV-Win software for instrument control, data acquisition and interpretation of measurement results. For more information please refer to the UV-Win section of this brochure.



Specifications

Instrument Type	T90+
Optical System	Double beam
Scan Speed	Selectable
Wavelength Range	190 - 900nm
Wavelength Accuracy	± 0.3nm
Wavelength Reproducibility	≤ 0.1nm
Spectral Bandwidth	0.1, 0.2, 0.5, 1.0, 2.0, 5.0nm
Photometric Mode	Transmittance, Absorbance, Energy Concentration, All Using UVWin Software
Photometric Range	-4.0 - 4.0Abs
Photometric Accuracy	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)
Photometric Reproducibility	0.001A (0 - 0.5A)
Photometric Noise	0.0004A (500nm) 30min warm-up
Baseline Flatness	0.001A (200 - 1000nm)
Baseline Stability	0.0008A/h (500nm, 0Abs), 2hr warm-up
Stray light	≥ 0.12%T (220nm NaI, 340nm NaNO ₂)
Standard Functionality	No stand alone function
Cell Holder	Fixed position sample and reference
Detector	Photo multiplier tube
Light Source	Tungsten Halogen and Deuterium arc lamps
Display	No display
Printer	Not available
PC Interface	RS232
Software Support	UV Win
Power Supply	Switchable 120 - 230VAC 50 - 60Hz
Weight	43Kg
Dimensions (Width, Depth, Height)	545mm, 580mm, 270mm

Each Unit is supplied with the following as standard:

1 x Certificate of Conformity	1 x RS-232 Interface Cable
1 x Standard fixed position 10mm path length cell holder (sample & reference)	1 x Fuse (2A)
1 Pair 10mm Quartz cells	1 x Power cord
1 x Black block for dark current correction	1 x Instruction manual
1 x UV Win Software Disk	1 x Dust Cover
	1 x Packing list

A close-up photograph of a dark blue, textured component of a laboratory instrument. The component has a curved, ergonomic shape with a recessed handle area. The lighting is dramatic, highlighting the contours and texture of the material.

T92+

UV-VIS SPECTROPHOTOMETER



The T92+ is a high performance double beam spectrophotometer with a variable spectral bandwidth from 0.1-5nm, selected by a continuous variable slit.

The Czerny-Turner monochromator with a holographic grating keeps stray light to a minimum and offers excellent optical resolution. The use of a photomultiplier tube as a detector offers exceptional sensitivity.

The T92+'s true double beam optical system coupled with an efficient and well proven electronic control system ensures high stability and low background noise.

FEATURES & FUNCTIONS

- Photomultiplier tube detection provides exceptional sensitivity.
- Wavelength accuracy $\pm 0.3\text{nm}$ (Automatic Wavelength Correction).
- User selectable spectral bandwidth between 0.1-5nm.
- User friendly design allows easy light source replacement and routine maintenance.
- Sample compartment design enables use of a wide range of optional accessories.
- UV-WIN software offers many operational and data processing capabilities.

T92+ continued



OPTICAL SYSTEM & COMPONENTS

The T92+ features an advanced continuous variable bandwidth feature making it the instrument of choice for applications with a demand for precise and accurate control of wavelength resolution. This feature allows the user to specify exactly what bandpass is required in the range of 0.1-5nm.

The double beam optical design combined with a high specification holographic grating gives excellent wavelength separation allowing the user to measure close adjacent wavelengths with excellent sensitivity.

The modular design of the sample compartment allows for ease of use of a wide range of optional accessories ensuring accurate analysis of various sample types including liquids, thin films and powders.

The user friendly design of the lamp compartment allows easy replacement and simplified routine maintenance of the Deuterium and Tungsten lamps.

As with other bench-top spectrophotometers in the PG Instruments range, full instrument control, data acquisition and processing of measurement data is possible by means of the UV-Win software. For more information please refer to the UV-Win section of this brochure.



Specifications

Specifications	T92+
Optical System	Double beam
Scan Speed	Selectable
Wavelength Range	190 - 900nm
Wavelength Accuracy	± 0.3nm
Wavelength Reproducibility	≤ 0.1nm
Spectral Bandwidth	Continuous slit 0.1 - 5.0nm with 0.1nm interval
Photometric Mode	Transmittance, Absorbance, Energy Concentration, All Using UVWin Software
Photometric Range	-4.0 - 4.0Abs
Photometric Accuracy	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)
Photometric Reproducibility	0.001A (0 - 0.5A)
Photometric Noise	0.0004A (500nm) 30min warm-up
Baseline Flatness	0.001A (200 - 1000nm)
Baseline Stability	0.0008A/h (500nm, 0Abs), 2hr warm-up
Stray light	≥ 0.12%T (220nm NaI, 340nm NaNO ₂)
Standard Functionality	No stand alone function
Cell Holder	Fixed position sample and reference
Detector	Photo multiplier tube
Light Source	Tungsten Halogen and Deuterium arc lamps
Display	No display
Printer	Not available
PC Interface	USB
Software Support	UV Win
Power Supply	Switchable 120 - 230VAC 50 - 60Hz
Weight	43Kg
Dimensions (Width, Depth, Height)	545mm, 580mm, 270mm

Each Unit is supplied with the following as standard:

- | | |
|---|--------------------------|
| 1 x Certificate of conformity | 1 x UV Win Software disk |
| 1 x Standard fixed position cell holder
(sample and reference) | 1 x Fuse (2A) |
| 1 x Pair Quartz cells | 1 x Power cord |
| 1 x Black block for dark current correction | 1 x Instruction manual |
| 1 x USB Interface Cable | 1 x Dust cover |
| | 1 x Packing list |

UV-Win

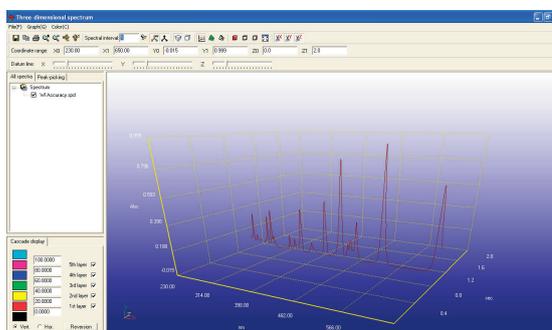
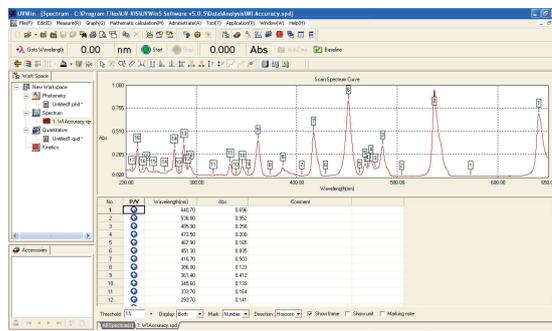
UV-Win 5 is a powerful, intuitive Software product used for connectivity to the PG Instruments range of bench top UV-Vis Spectrophotometers.

The UV-Win software offers complete instrument control along with data acquisition and a whole host of mathematical tools for interpretation of measurement results. The UV-Win software is separated into four key workspaces:

- Spectral Analysis
- Quantitative Analysis
- Kinetic Analysis
- Photometric Analysis

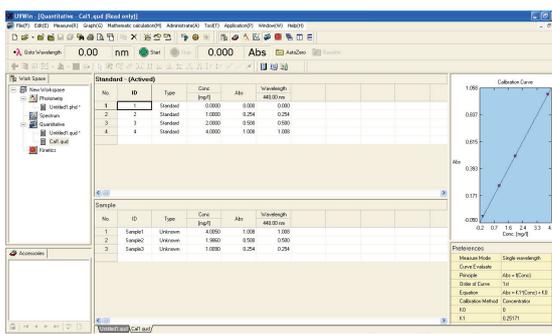
SPECTRUM WORKSPACE

- Use the spectrum workspace to scan across a user-defined spectral range measuring in either absorbance or transmission.
- Use the "Peak Pick" tool to determine the wavelength at which peaks and valley have occurred whilst also being able to determine their amplitude.
- View spectral overlay in the 3D display mode.
- Perform 1st, 2nd, 3rd and 4th order differentiation on sample scans for Derivative Spectroscopy.
- Export measurement data into Word, Excel, CSV and ASCII formats.
- Create method files for routine analysis whilst also being able to save measurement data.



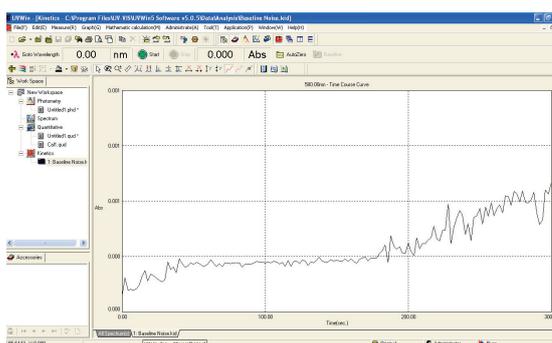
QUANTITATIVE WORKSPACE

- Use the Quantitative workspace to determine the concentration of unknown samples.
- Create a calibration curve using a series of standard solution or by directly entering the coefficients for the calibration curve equation.
- Specify 1st, 2nd, 3rd and 4th order correlation for the best calibration curve fit.
- Set Quality Control monitors to take user specified action in the event of measurement results falling outside user defined limits.
- Export measurement data into Word, Excel, CSV and ASCII formats.
- Create method files for routine analysis whilst also being able to save measurement data.



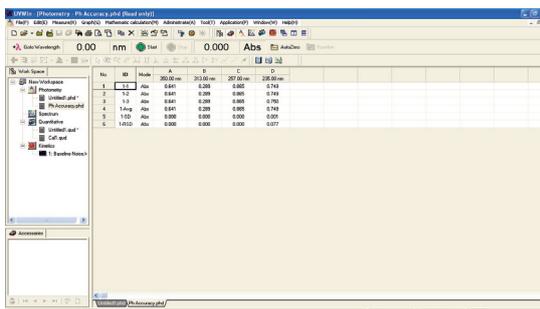
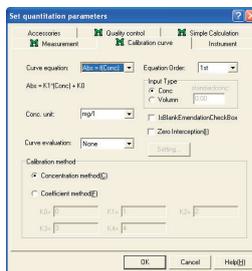
KINETIC WORKSPACE

- Monitor the change of Absorbance or Transmission as a function of time for Enzyme type reactions.
- Use in conjunction with a Flowcell for sample introduction or Peltier water circulator for temperature control.
- Specify data intervals and acquisition time for up to 24 hour reactions.
- Export measurement data into Word, Excel, CSV and ASCII formats.
- Create method files for routine analysis whilst also being able to save measurement data



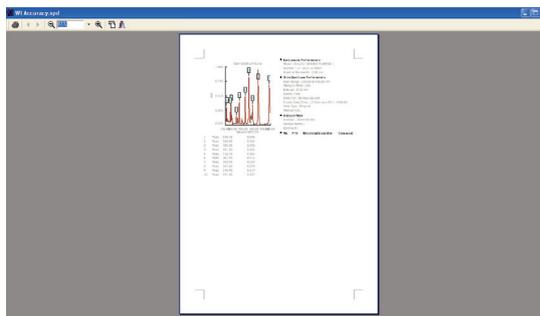
PHOTOMETRIC WORKSPACE

- Perform a series of sequential fixed wavelength measurements in either Absorbance or Transmission.
- Automate sample measurements by configuring the instrument cell changer.
- Calculate concentration of unknown samples quickly using the "Simple Calculation" option where complete calibration is not required.
- Automatically calculate statistics like standard deviation, relative standard deviation, and averages.
- Export measurement data into Word, Excel, CSV and ASCII formats.
- Create method files for routine analysis whilst also being able to save measurement data.



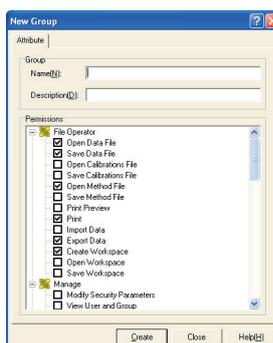
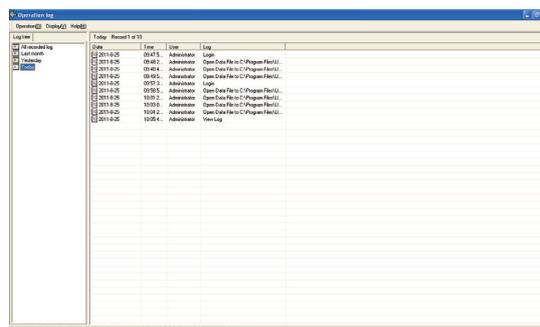
REPORTING

- Produce reports for photometric, spectrum, kinetic and quantitative measurement data.
- Include or remove spectra, calibration curves along with samples measurement tables.



ADMINISTRATION

- Administrative settings can be made where Analysts may require conformity to GLP/GMP/GRP
- Create User groups specifying exactly what actions they are able to perform.
- Add New Users to custom User Groups to determine their privilege settings.
- Automatically log software activity in an Audit Trail.
- Use Password control to ensure Users and logged in for instrument usage.
- CFR 21 Part 11 Software Options are Available.



Spectrophotometer Liquid IQ/OO Qualification Package





The purpose of the Qualification Package is to offer both laboratory analysts and regional distributors the flexibility to perform a full installation, operation and performance qualification on spectrophotometers manufactured by PG Instruments.

The work instructions within the qualification workbook have been developed with considerations of the requirements of the European Pharmacopoeia to ensure compliance with good laboratory practice.

The documentation supplied with the package guides the user through the qualification as it offers detailed instructions on how to carry out the tests, document and record results, and perform any necessary corrective action. The package is comprehensive and offers all the materials required to complete the qualification.

The contents of the package are as follows:

- Holmium Oxide Solution – For determining the wavelength accuracy (NIST srm 2034)
- Potassium Dichromate Solution – For determining the photometric accuracy (NIST srm 935a)
- Potassium Chloride – For determining the stray light @ 200nm
- Sodium Iodide – For determining the stray light @ 220nm
- De-Ionised Water – Reference solution
- Two 10mm path length Quartz Cuvettes – To perform the validation
- Certificate for Solutions
- Qualification Workbook containing Qualification Worksheets
- CD containing Qualification Workbook

NOTE: UVWin software is a mandatory requirement for performing instrument qualification

P11

PORTABLE VIS SPECTROPHOTOMETER

Portable Spectrophotometer

P11



The P11 is an extremely compact and portable user friendly spectrophotometer designed for field measurement and laboratory analysis.

It can provide all of the traditional functions of a laboratory based spectrophotometer such as Photometric, Spectral scanning, Kinetic and Quantitative measurement modes. The instrument has a dynamic memory space to allow internal storage of up to 100 spectra or calibrations.

The P11 incorporates a touch screen display offering a clear visual interface. RS-232 connectivity allows the transfer of measurement data and methods from the instrument to a PC, where measurement data can be interpreted, stored and reports can be generated.

FEATURES & FUNCTIONS

- 1.5kg weight allowing mobility and hand held operation.
- Microsoft Windows® embedded operating system.
- Integrated clock, storage, power supply management.
- Dynamic memory space for up to 100 spectra or calibrations.
- Long life battery and power management system with real time monitoring of battery voltage, low power and charging status all visibly indicated.
- Optional car adaptor for recharging or continued use.
- Durable, industrial carry case and associated accessories.

P11 continued



OPTICAL SYSTEM & COMPONENTS

The P11 uses a polychromatic optical system offering high resolution scanning for fast acquisition of spectral data. The P11 optical design incorporates a CCD (Charge Coupled Device) linear image sensor with a fixed holographic grating and a tungsten halogen light source for measurements in the visible spectra.

Specifications

P11	
Optical System	Array based spectrometer
Scan Speed	>4200nm/s
Wavelength Range	380-800nm
Wavelength Accuracy	< 1.0nm
Wavelength Reproducibility	0.1nm
Spectral Bandwidth	4nm \pm 1nm
Photometric Mode	Transmittance, Absorbance, Energy and Concentration
Photometric Noise	0.003Abs
Baseline Flatness	0.005Abs
Integration Time	0.005 – 25s
Standard Functionality	Photometric, Quantitative, Spectrum, Kinetic and dedicated water quality programs.
Cell Holder	Fibre Optic dip probe
Detector	CCD
Light Source	Tungsten Halogen lamp
Display	320 x 240 dot touch screen display
PC Interface	RS232
Software Support	Local and Fastget software
Power Supply	Re-chargeable battery
Weight	2Kg
Dimensions (Width, Depth, Height)	215mm, 185mm, 70mm

Each Unit is supplied with the following as standard:

- 1 x Spectrometer
- 1 x Fibre dip probe
- 1 x 20mm pathlength fibre dip probe tip
- 1 x Test tube rack
- 1 x Sampling pipette
- Selection of glassware for sample handling.

Specifications

	T60U (UV-Visible)	T60V (Visible)	T70
Optical System	Split beam ratio	Split beam ratio	Split beam ratio
Scan Speed	Selectable	Selectable	Selectable
Wavelength Range	190 - 110nm	325 - 1100nm	190 - 1100nm
Wavelength Accuracy	± 1nm	± 2nm	± 0.3nm
Wavelength Reproducibility	≤ 0.2nm	≤ 0.4nm	≤ 0.2nm
Spectral Bandwidth	2nm	2nm	2nm
Photometric Mode	Transmittance, Absorbance, Energy	Transmittance, Absorbance, Concentration	Transmittance, Absorbance, Energy and Concentration
Photometric Range	-0.3 - 3.0Abs	-0.3 - 3.0Abs	-0.3 - 3.0Abs
Photometric Accuracy	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)	0.001Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)
Photometric Reproducibility	0.001A (0 - 0.5A), 0.002A(0.5 - 1.0A), 0.15%T (0 - 100%T)	0.001A (0 - 0.5A), 0.002A (0.5 - 1.0A), 0.15%T (0 - 100%T)	0.001A (0 - 0.5A), 0.002A (0.5 - 1.0A), 0.15%T (0 - 100%T)
Photometric Noise	0.001A (500nm) 30min warm-up	0.001A (500nm) 30min warm-up	0.001A (500nm) 30min warm-up
Baseline Flatness	0.002A (200 - 1000nm)	0.002A (325 - 1000nm)	0.002A (200 - 1000nm)
Baseline Stability	0.001A/h (500nm, 0Abs), 2hr warm-up	0.001A/h (500nm, 0Abs), 2hr warm-up	0.001A/h (500nm, 0Abs), 2hr warm-up
Stray light	≥ 0.05%T	≥ 1.0%T	≥ 0.12%T (220nm NaI, 340nm NaNO ₂)
Integration Time	N/A	N/A	N/A
Standard Functionality	Photometric Measurement. (Quantitative, Multi-wavelength, Spectrum and Kinetic measurements with program cards)	Photometric and Quantitative measurements.	Photometric, Quantitative, Spectrum and DNA measurements.
Cell Holder	Automatic 8 Cell Changer	Automatic 8 Cell Changer	Automatic 8 Cell changer
Detector	Silicon photo diode	Silicon photo diode	Silicon photo diode
Light Source	Tungsten Halogen and Deuterium arc lamps	Tungsten Halogen lamps	Tungsten Halogen and Deuterium arc lamps
Display	Digital LCD display	Digital LCD display	Digital LCD display
Printer	Mini printer	Mini printer	N/A
PC Interface	RS232	RS232	RS232
Software Support	Local and UV Win	Local and UV Win	Local and UV Win
Power Supply	Switch mode 95 - 250VAC 50 - 60Hz	Switch mode 95 - 250VAC 50 - 60Hz	Switchable 120 - 230VAC 560Hz
Weight	15Kg	15Kg	25Kg
Dimensions (Width, Depth, Height)	476mm, 362mm, 225mm	476mm, 362mm, 225mm	520mm, 420mm, 230mm

T70+	T80	T80+	T90+
Split beam ratio	Double beam	Double beam	Double beam
Selectable	Selectable	Selectable	Selectable
190 - 1100nm	190 - 1100nm	190 - 1100nm	190 - 900nm
± 0.3nm	± 0.3nm	± 0.3nm	± 0.3nm
≤ 0.2nm	≤ 0.2nm	≤ 0.2nm	≤ 0.1nm
0.5, 1.0, 2.0, 5.0nm	2nm	0.5, 1.0, 2.0, 5.0nm	0.1, 0.2, 0.5, 1.0, 2.0, 5.0nm
Transmittance, Absorbance, Energy and Concentration			
-0.3 - 3.0Abs	-0.3 - 3.0Abs	-0.3 - 3.0Abs	-4.0 - 4.0Abs
0.001Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)
0.001A (0 - 0.5A), 0.002A (0.5 - 1.0A), 0.15%T (0 - 100%T)	0.001A (0 - 0.5A), 0.002A (0.5 - 1.0A), 0.15%T (0 - 100%T)	0.001A (0 - 0.5A), 0.002A (0.5 - 1.0A), 0.15%T (0 - 100%T)	0.001A (0 - 0.5A)
0.001A (500nm) 30min warm-up	0.001A (500nm) 30min warm-up	0.001A (500nm) 30min warm-up	0.0004A (500nm) 30min warm-up
0.002A (325 - 1000nm)	0.0015A (200 - 1000nm)	0.0015A (325 - 1000nm)	0.001A (200 - 1000nm)
0.001A/h (500nm, 0Abs), 2hr warm-up	0.0008A/h (500nm, 0Abs), 2hr warm-up	0.0008A/h (500nm, 0Abs), 2hr warm-up	0.0008A/h (500nm, 0Abs), 2hr warm-up
≥ 0.12%T (220nm NaI, 340nm NaNO ₂)			
N/A	N/A	N/A	N/A
Photometric, Quantitative, Spectrum and DNA measurements.	Photometric, Quantitative, Spectrum and DNA measurements.	Photometric, Quantitative, Spectrum and DNA measurements.	No stand alone function
Automatic 8 cell changer	Automatic 8 Cell changer	Automatic 8 cell changer	Fixed position sample and reference
Silicon photo diode	Silicon photo diode	Silicon photo diode	Photo multiplier tube
Tungsten Halogen and Deuterium arc lamps			
Digital LCD display	Digital LCD display	Digital LCD display	No display
N/A	N/A	N/A	N/A
RS232	RS232	RS232	RS232
Local and UV Win	Local and UV Win	Local and UV Win	UV Win
Switchable 120 - 230VAC 50 - 60Hz			
25Kg	25Kg	25Kg	43Kg
520mm, 420mm, 230mm	520mm, 420mm, 230mm	520mm, 420mm, 230mm	545mm, 580mm, 270mm

Specifications

	T92+	P11
Optical System	Double beam	Single beam
Scan Speed	Selectable	>4200nm/s
Wavelength Range	190 - 900nm	380 - 800nm
Wavelength Accuracy	± 0.3nm	< 0.1nm
Wavelength Reproducibility	≤ 0.1nm	0.1nm
Spectral Bandwidth	Continuous slit 0.1 - 5.0nm (0.1nm interval)	4nm ±1nm
Photometric Mode	Transmittance, Absorbance, Energy and Concentration	Transmittance, Absorbance, Energy and Concentration
Photometric Range	-4.0 - 4.0Abs	
Photometric Accuracy	0.002Abs (0 - 0.5A), 0.004 (0.5 - 1.0A), 0.3%T (0 - 100%T)	
Photometric Reproducibility	0.001A (0 - 0.5A)	
Photometric Noise	0.0004A (500nm) 30min warm-up	0.003Abs
Baseline Flatness	0.001A (200 - 1000nm)	0.005Abs
Baseline Stability	0.0008A/h (500nm, 0Abs), 2hr warm-up	
Stray light	≥ 0.12%T (220nm NaI, 340nm NaNO ₂)	
Integration Time	N/A	0.005 - 25s
Standard Functionality	No stand alone function	Photometric, Quantitative, Spectrum, Kinetic and dedicated water quality programs.
Cell Holder	Fixed position sample and reference	Fibre Optic dip probe
Detector	Photo multiplier tube	CCD
Light Source	Tungsten Halogen and Deuterium arc lamps	Tungsten Halogen lamp
Display	No display	320 x 240 dot touch screen display
Printer	N/A	N/A
PC Interface	USB	RS232
Software Support	UV Win	Local and Fastget software
Power Supply	Switchable 120 - 230VAC 50 - 60Hz	Re-chargeable battery
Weight	43Kg	2Kg
Dimensions (Width, Depth, Height)	545mm, 580mm, 270mm	215mm, 185mm, 70mm

Accessories

T60



Available Program cards include:

- Quantitative card 21602-2801-00
- Spectrum scanning/Kinetics card 21604-2801-00
- Multi wavelength card 21605-2801-00
- Palm Oil Analysis Card (DOBI)



- CH16-1**
Constant temperature cell holder
- Cell Pathlength: 10mm
 - Number of Cells: 5
 - Requires PTC-2 Peltier Water Circulator



- PS16-2**
Sipper Pump
- Pump Speed: 0.1 - 250 RPM
 - Speed resolution: 0.1 RPM less than 30 RPM Speed and 1 RPM above 30 RPM Speed



- DS16-1**
Angle adjustable sample holder
- Maximum angle: 45 Degrees
 - Minimum Sample Size: 4mm (Width)
 - Maximum Sample Size: 80 x 55 x 5mm



- PTC-2**
Peltier
- Temperature range: 5 - 75°C
 - Use in conjunction with CH16-1



- TR16-1**
Test tube holder
- Test Tube Diameter: 15 - 25mm
 - Test Tube Height: 90 - 120mm



- USB Printer driver P2U**
- Connect the T60 to specific USB printers

T70



- LS181-1**
5 cell holder
- Cell Pathlength: 5 - 50mm (adjustable)
 - Number of Cells: 5



- CH181-1**
Constant temperature sample holder
- Cell Pathlength: 10mm
 - Number of Cells: 5
 - Requires PTC-2 Peltier Water Circulator



- DS181-1**
Angle adjustable holder
- Maximum angle: 45 Degrees
 - Minimum Sample Size: 4mm (Width)
 - Maximum Sample Size: 80x55x5mm



- TR181-1**
Test tube holder
- Test Tube Diameter: 15 - 25mm
 - Test Tube Height: 90 - 120mm



- S181-1**
Solid Sample Holder
- Maximum sample size: 80mm x 55mm x 5mm

PG Instruments offer a complete range of cuvettes
please visit our website for further information, www.pginstruments.com

T70 continued



MR181-1

Specular Reflection

- Incidence angle: 5°
- Size of Sample Area Measured: 11 × 9mm to 60 × 40mm
- Spectral Range: 200 - 1100nm



PS181-2

Sipper Pump

- Pump Speed: 0.1 - 250 RPM
- Speed resolution: 0.1 RPM less than 30 RPM Speed and 1 RPM above 30 RPM Speed



MH181-1

Micro cell holder

- Pathlength: 10mm
- Minimum Cell Window Width: 2mm
- Minimum Cell Window Height: 10mm



PTC-2

Peltier

- Temperature range: 5 - 75°C
- Use in conjunction with CH181-1

T80



LS188-1

5 cell holder

- Cell Pathlength: 5-50mm (adjustable)
- Number of Cells: 5



CH188-1

Constant temperature holder

- Cell Pathlength: 10mm
- Number of Cells: 2 Cells (one for Sample and one for Reference)
- Requires PTC-2 Peltier Water Circulator



PS181-2

Sipper Pump

- Pump Speed: 0.1 - 250 RPM
- Speed resolution: 0.1 RPM less than 30 RPM Speed and 1 RPM above 30 RPM Speed



PTC-2

Peltier

- Temperature range: 5 - 75°C
- Use in conjunction with CH188-1

NOTE: All T70 Accessories can be used in the T80 but only single beam measurements can be performed.

T90+ / T92+



CH19-1

Constant temperature holder

- Cell Pathlength: 10mm
- Number of Cells: 2 Cells (one for Sample and one for Reference)
- Requires PTC-2 Peltier Water Circulator



S19-1

Solid Sample Holder

- Maximum Sample Size: 80mm × 55mm × 5mm
- Sample and reference beams



IS19-1

Integrating Sphere

- Incidence angle: Sample 0° reference 8°
- Minimum Sample Size for Diffuse Reflectance: 15mm × 25mm
- Minimum Sample Size for Transmission: 20mm Diameter
- Wavelength Range: 230 - 850nm with a 5nm Bandpass
- Sphere Diameter: 58mm



DS19-1

Angle adjustable cell holder

- Maximum angle: 45 Degrees
- Minimum Sample Size: 4mm (Width)
- Maximum Sample Size: 80 x 55 x 5mm

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T90+ / T92+ continued



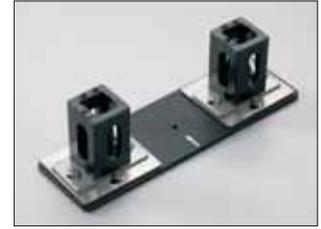
- TR19-1**
Test tube holder
- Test Tube Diameter: 15 - 25mm
 - Test Tube Height: 90 - 120mm



- MR19-1**
Specular reflection
- Incidence angle: 5°
 - Size of Sample Area Measured: 30 x 15mm
 - Spectral Range: 200 - 900nm



- LS19-1**
Long path-length holder
- Pathlength: 5, 10, 20, 30, 40, 50, 100mm
 - Number of Cells: 2 Cells (one for Sample and one for Reference)



- MH19-1**
Micro cell holder
- Pathlength: 10mm
 - Minimum Cell Window Width: 2mm
 - Minimum Cell Window Height: 10mm



- MH19-2**
Ultra micro cell holder
- Pathlength: 10mm
 - Minimum Cell Window Width: 2mm
 - Minimum Cell Window Height: 5mm



- PS19-2**
Sipper Pump
- Pump Speed: 0.1 - 250 RPM
 - Speed resolution: 0.1 RPM less than 30 RPM Speed and 1 RPM above 30 RPM Speed



- PTC-2**
Peltier
- Temperature range: 5 - 75°C
 - Use in conjunction with CH19-1



- MS19-1**
Manual Cell Changer
- 8 position cell changer
 - Pathlength: 10mm

P11



- 170-002**
10mm cell/test tube holder and fibre cable assembly

- 170-017**
Universal 10-50mm pathlength cell holder assembly

- 170-003**
Fibre optic cable

Consumables



D2 lamp D2-100 (T60U)



D2 lamp D2-200 (T70, T80, T90, T92)



W lamp W-100 (T60V, T60U)
W lamp W-200 (T70, T80, T90, T92)



Glass and Quartz cuvettes

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