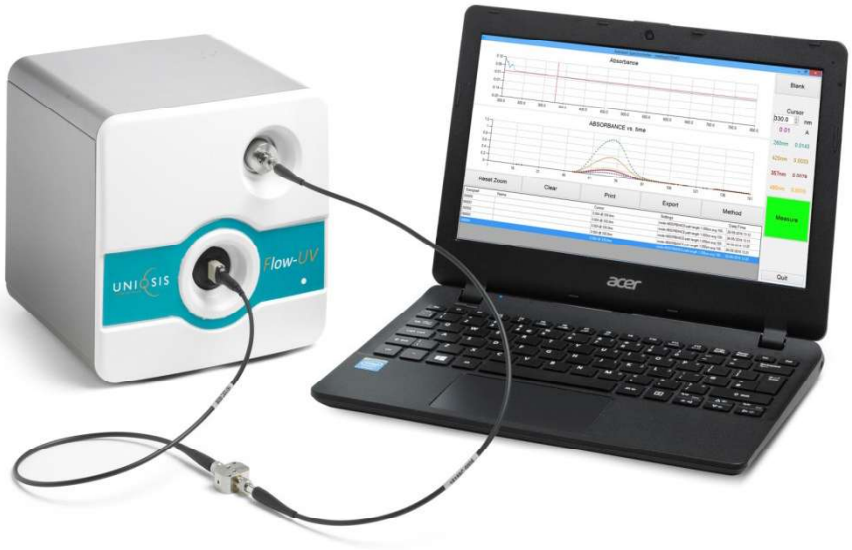
Asynt
By chemists, for chemists



Asynt FlowUV™

UV-Vis/NIR Spectrophotometer

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1. Introduction

The Asynt Flow UV™ is a solid-state UV/Vis fibre optic coupled spectrometer that utilises a Xenon strobe flashlamp emitting from approximately 200nm to 1050nm. The unit is supplied with a 110/230V automatic switch-mode power supply

Housed in an attractively styled extruded aluminium case with plastic moulded facia, the unit features a main PCB (Printed Circuit Board), referred to as the FPGA (Field Programmable Gate Array) PCB, and a detector header PCB. The Xenon flashlamp source is mounted inside the instrument case.

The FPGA board contains an ARMv6 100MHz 32-bit microprocessor with 1M byte RAM and 4M bytes Flash memory for non-volatile data logging, 64k bytes of EEPROM for storage of system settings, Ethernet and RS232 communication.

The UV/Vis spectrometer is supplied with a Hamamatsu Xenon Flash Lamp, this is triggered by the FPGA PCB via a digital output channel.

In addition, the following features are available on the rear I/O connector:

- 4 x 0.13mA - 34mA current outputs, internally powered, 12bit resolution
- 4 x low-side switch digital outputs, 24V/100mA
- 4 x 24V tolerant TTL level digital inputs
- TTL level RS-232 using software handshake

To utilize these features, a bespoke cable and software will be required. Please contact Asynt for the necessary information.

Digital Inputs are pulled up to +5V so are suitable for open collector or totem-pole drives and are tolerant to +/-24V.

Digital Outputs are low-side switches, which can sink up to 100mA and are also 24V tolerant. A component change could increase this to 50V if necessary, but the current limit would remain. Excessive current sink (>250mA) will cause damage to the board.

Reverse voltage protection is also provided.

Analogue output range is approximately 0.13mA to 34mA sourced from the spectrometer power supply.

The processing power and speed of the FPGA board allows rapid collection of spectral data.

For continuous flow chemistry applications, the instrument is supplied with a flow cell constructed from a length of PFA tubing through which light is passed and then returned to the spectrometer using fibre optic patch cable connectors. The tubing supplied has the dimensions 1.00mm ID x 1.58mm (1/16”) OD and may easily replaced if it becomes contaminated or damaged. This tubing can withstand pressures up to 30bar and may therefore be positioned directly in the high-pressure region of the flow path.

2. Connecting up the Spectrometer

Ensure the unit is switched off, then connect the supplied 24V power unit to a mains outlet and insert the small jack plug connector into the power inlet socket located to the rear of the unit.

Connect the instrument directly to the PC supplied using the null modem (crossover) Ethernet cable supplied.

Connect fibre optic patch cables supplied to the flow cell, and then to the Flow-UV spectrometer itself. **Note:** connection is only possible in one orientation.

Switch the unit on. A green indicator light should appear on the front panel of the spectrometer.

The Flow-UV is supplied with a laptop computer that has been pre-configured with control software for the spectrometer. The software will automatically connect to the spectrometer when the spectrometer is powered.

If you need to reinstall the software on another PC, please contact Uniqsis customer support for advice and assistance.

3. Software Operation

The spectrometer is supplied with 2 alternative versions of control software.
For basic flow chemistry applications where it is desirable to monitor and record up to 5 fixed wavelengths, it is recommended that the 'Uniqsis Flow-UV' software is used. Alternatively, a more sophisticated interface, 'AstraNet Flow-UV', that gives access to more advanced spectrometer functions including I/O is also supplied.

Please note: it is not possible to have both programs running at the same time

3.1 Uniqsis Flow-UV Software

With the spectrometer switched on and connected to the laptop using the ethernet cable supplies, open the 'Uniqsis Flow-UV' application by double-clicking on the desktop icon.

The control panel shown below (Fig. 1) will appear.

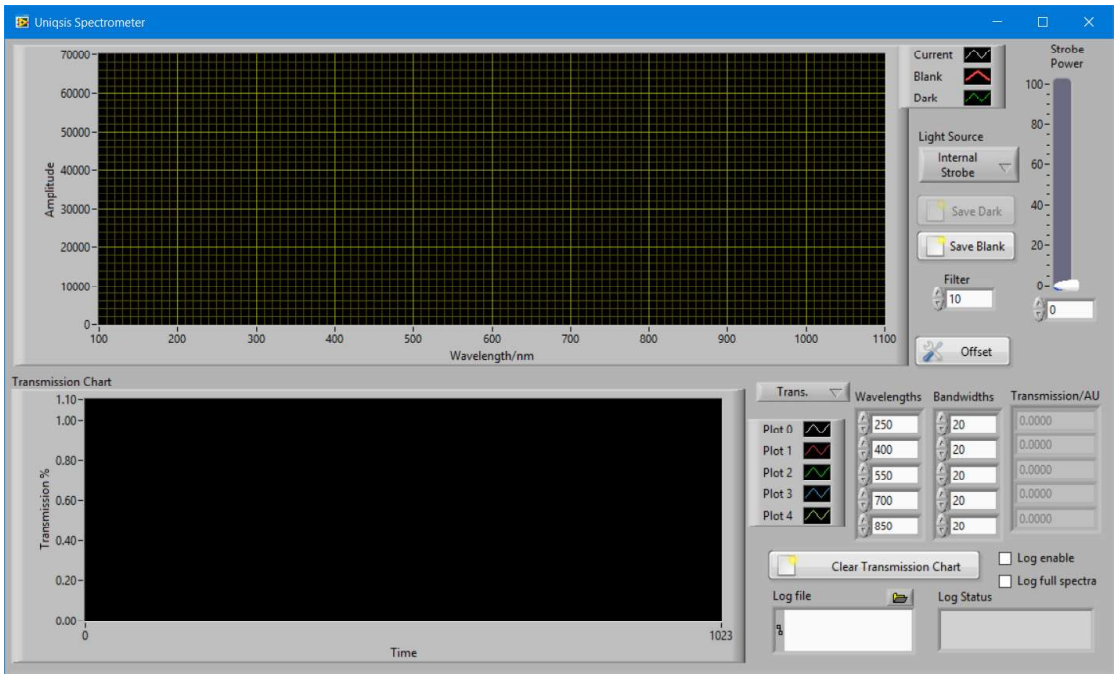


Fig. 1: Asynt Flow-UV™ Control Panel

Function	Description
<Strobe Power>	Switches the internal xenon strobe flashlamp on/off (0) and sets the intensity.
<Internal Strobe>	Selects between internal xenon flashlamp or external tungsten source.
<Save Blank>	Saves 'blank' background spectrum and subtracts this from measured spectrum.
<Save Dark>	When using a continuous external tungsten source, it is necessary to manually save a dark spectrum for internal processing within the spectrometer. The dark spectrum is saved automatically when the internal xenon strobe is selected.
<Filter>	Adjusts the observed signal noise. Increasing the filter value will reduce noise but increase the response time. Recommended value: 10
<Offset>	Currently not utilised
<Trans.>	Switch between TRANSMISSION and ABSORBANCE modes
<Plot 0,1,2,3,4>	Display/remove a trace on the transmission/AU chart.
<Wavelengths>	FIVE wavelengths must be selected. These are the fixed wavelengths that are monitored in real-time.
<Bandwidths>	Select the bandwidth for each selected wavelength. Recommended value: 10/20nm.
<Transmission/AU>	Measured transmission/absorbance values in real-time.
<Clear (Transmission) Data>	Clears the transmission/absorbance plot and resets the time axis.
<Log File>	Select a location in which to save data as it is acquired by the spectrometer
<Log Enable>	Starts/stops logging the response at the 5 selected fixed wavelengths. Tab separated file format.
<Log Full Spectra>	Starts/stops logging the full acquired spectrum. Note: it is strongly recommended to increase the exposure time to

	reduce the number of data points and resulting file size obtained. Tab separated file format.

3.1.1 Introduction

The Uniqsis Flow-UV software is designed to monitor the pre-configured output from the spectrometer continuously in real-time.

All parameters may be changed on-the-fly. A new blank may be taken to re-zero the spectrometer at any time and the acquisition plot may be cleared and reset when desired. The Acquisition window can be set to scroll with time or to auto-scale and show all the spectral data obtained for the selected fixed wavelengths in a particular session.

3.1.2 Configuring the Spectrometer

To set up the spectrometer, first of all ensure that there is liquid present in the flow cell (air bubbles will give a markedly different response!). This should be the 'blank' system solvent that is being used for the flow chemistry experiment.

1. Press the button to select <Absorbance> or <Transmission> modes.

2. Select the 5 five fixed <Wavelengths> that you wish to monitor and assign each a <bandwidth> (10 or 20nm usually works well). Try and ensure the range of wavelengths selected is such that most wavelengths are likely to be 'off-peak' and therefore less likely to saturate the detector. Once saturated, the response of the spectrometer is unreliable. The ability to select 5 specific wavelengths should help to avoid this outcome.
Note: Wavelengths can be changed on-the-fly during acquisition.

3. Select either the <internal xenon> or <external> tungsten source (available as an optional extra).

4. Use the slider on the RHS of the control panel to adjust the strobe flashlamp power such that the amplitude (raw counts) shown in the upper graph has a maximum intensity between 30,000 and 50,000 counts.
Note: Setting low single digit values (<5) is fine and does not affect the operation of the spectrometer.

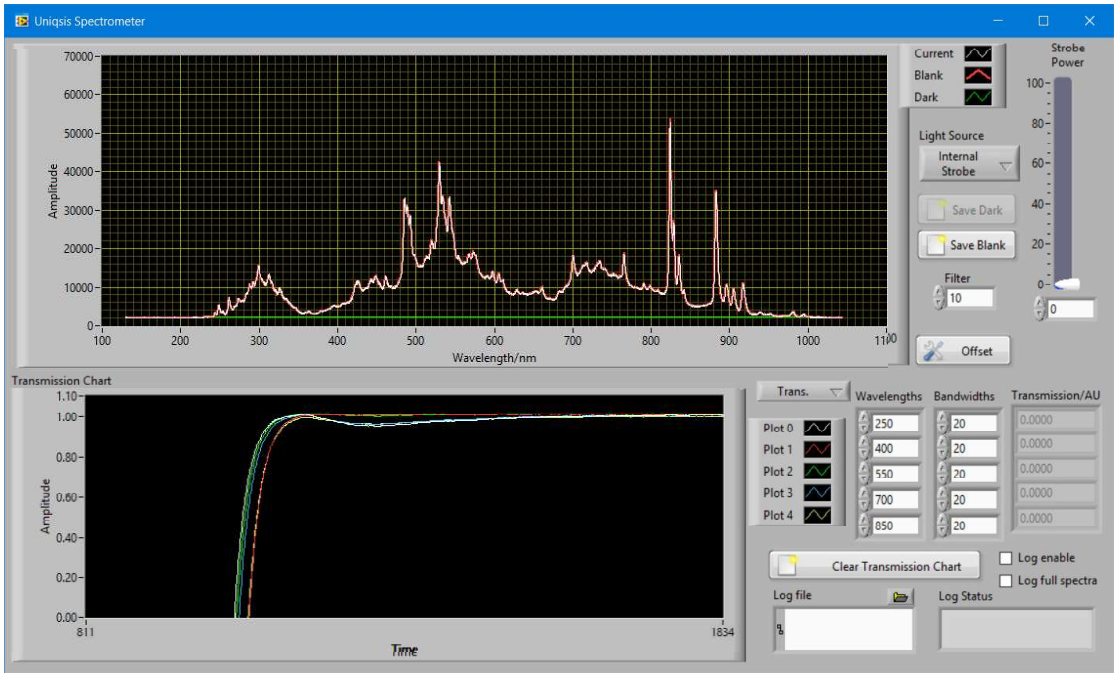
You will be able to hear the strobe lamp pulsing and notice that the transmission values associated with the different wavelengths shown to the bottom RHS of the panel begin to change with the same frequency.
Note: if the transmission values are not observed to oscillate and the strobe lamp is on, then connectivity to the spectrometer has been lost. To re-connect try rebooting the application.

The default exposure is set to 2ms. If you wish to alter the frequency of the strobe lamp (<Exposure>) this can be done by 'grabbing' and extending the RHS edge of the control panel to reveal some additional hidden functions.
Note: These functions are not normally required in general use.

5. Set the <Filter> function to manage the noise level of the responses received from the spectrometer. This function averages successive values. Setting a high value will produce a smooth but slow or delayed response. Setting a low value will result in a rapid response but with significant noise. Generally, a filter setting of 10-20 works well in practise.

6. Take a background spectrum (<Save Blank>) and, if using an external continuous (tungsten) source, a <Dark> spectrum with the lamp off. The transmission/AU plot will reset and 'zero' the baseline.

The response from the spectrometer is now being monitored and displayed cumulatively, such that if a sample is passed through the flow cell, something like this will be observed:



3.1.3 Changing the Appearance of the Acquisition Plot:

The default option is for the x-axis to scroll and maintain a view window with a fixed size. However, by right-clicking on the plot autoscaling of x (or y) is possible. There are also some other useful functions in this pop-up and the ability to export data from, or an image of the graph plot.

Individual traces may be de-selected by right-clicking over the trace icon to the side of the control panel.

3.1.4 Logging Data:

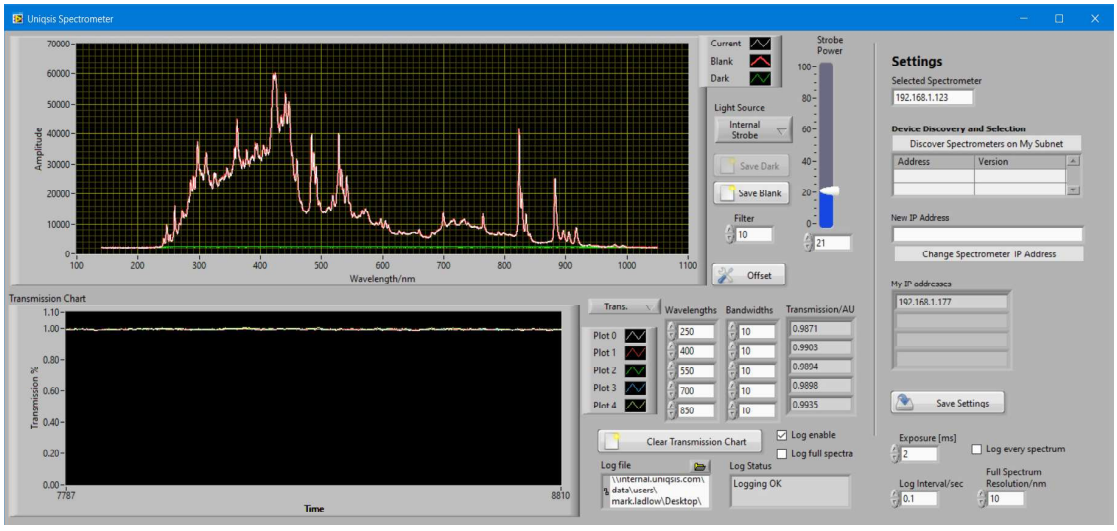
It is possible to log the data as it acquired in real-time and save it for subsequent import into Excel or spreadsheet software.
To do this, first specify a file path and location in the <Log File> field. That is to say, create a file in a convenient location for the data to be saved to. In the example shown, a file called 'TEST DATA' has been created on the desktop.

To log only the **5 selected wavelengths** to a comma separated file format (.csv suitable for importing into Excel for example), set the 'log interval' to a suitable value and then select <Log Enable>. Spectral data for each of the 5 selected wavelengths will be saved at the time interval specified to 'TEST DATA'. For interval=0.1s, this will look something like this:

Date	Time	Seconds	250±10 nm	400±10 nm	550±10 nm	700±10 nm	850±10 nm
01/09/2020	35:01.9	0.1	0.9932	0.9938	0.9907	0.9899	0.989
01/09/2020	35:02.0	0.22	0.9934	0.9928	0.9895	0.9885	0.9878
01/09/2020	35:02.1	0.33	0.9951	0.9939	0.9907	0.9897	0.9902
01/09/2020	35:02.2	0.44	0.9949	0.9929	0.9892	0.9882	0.9876
01/09/2020	35:02.3	0.55	0.9955	0.9931	0.9891	0.9881	0.9876
01/09/2020	35:02.3	0.61	0.9964	0.9934	0.9895	0.9886	0.9889
01/09/2020	35:02.5	0.71	0.9964	0.9944	0.9901	0.9893	0.9891
01/09/2020	35:02.6	0.83	0.9958	0.9939	0.9894	0.9887	0.988
01/09/2020	35:02.7	0.94	0.9968	0.9935	0.989	0.9886	0.9874
01/09/2020	35:02.8	1.05	0.9981	0.9939	0.9894	0.9893	0.989
01/09/2020	35:02.9	1.11	0.9985	0.9938	0.9897	0.9895	0.9897

To log the **full diode array spectrum**, select <Log Full Spectra>. The logging interval and the full spectrum resolution may be changed by accessing the hidden menu options. To do this, drag the right hand side of the window to the right to reveal, <Exposure>, <Log Interval (sec)> and <Full Spectrum Resolution (nm)>.

If you wish to save **all spectra**, select 'Log Every Spectrum'. The data will be saved at approximately 80 spectra per second. Note: This is not recommended if you are saving full spectra since it will produce an overwhelming amount of data very quickly.



The spectrometer firmware does not support DHCP and uses a fixed IP address. However, for compatibility with alternative subnets, this may be changed from the hidden menu using <New IP Address> once an initial connection has been made.

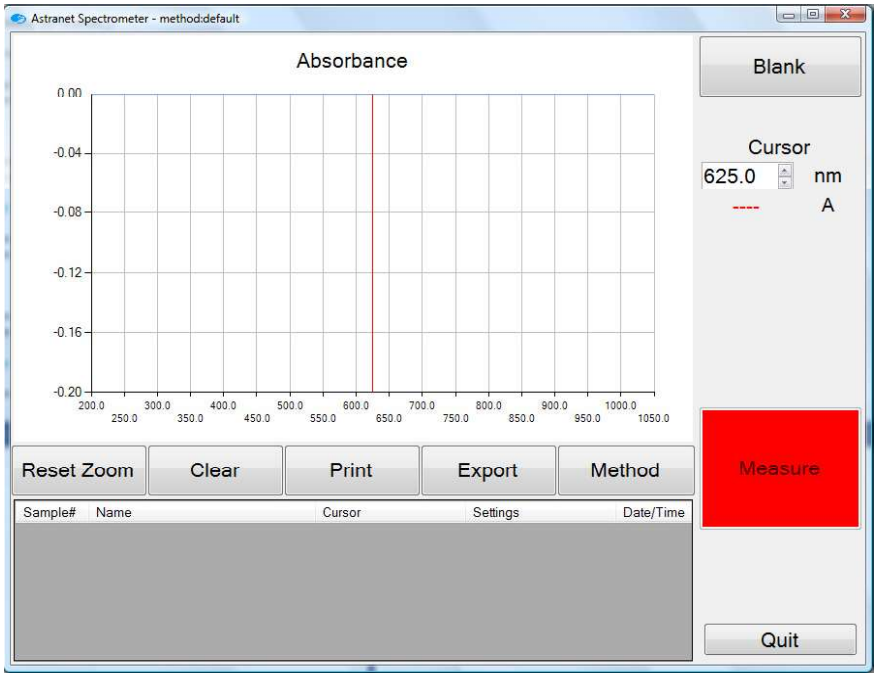
3.2 AstraNet Flow-UV Software

The AstraNet Flow-UV applications software comprises two windows: Spectral Display and **Method Editor**. The Method Editor provides access to a wide range of operational parameter settings.

Open the software by clicking on the icon and, if necessary, select the desired mode (e.g. Absorbance mode). If a message from the Windows Firewall appears, make sure that you allow the application to communicate with the spectrometer. Failure to do so will result in the application being unable to function. The Firewall prompt will only occur once, as the setting is stored within the Windows Firewall configuration for future uses of the application.

3.2.1 Measuring

Once the software is running, the following screen will be displayed:



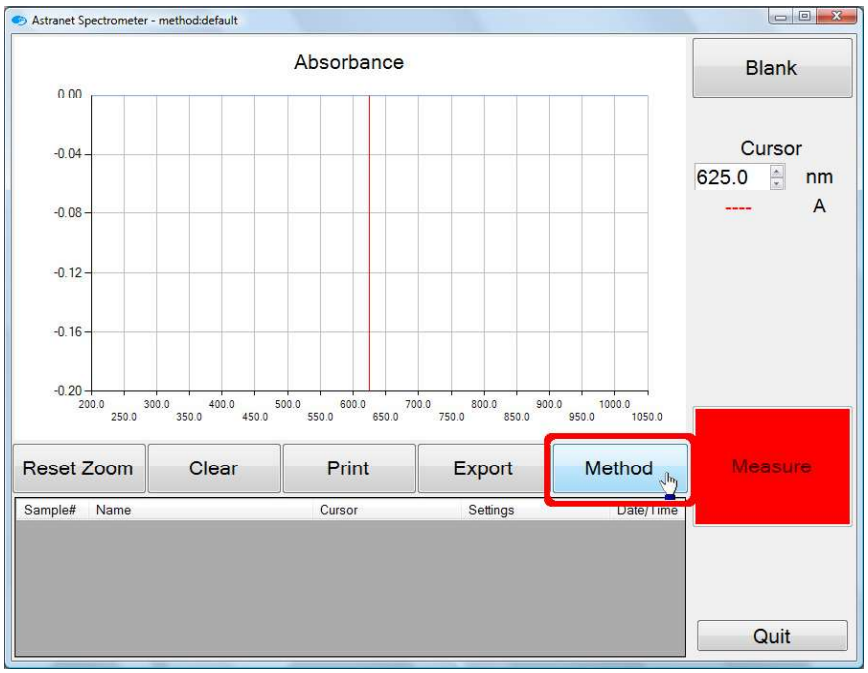
Note that the Method Editor can be minimized at any time by clicking on the top right 'X'. It can also be moved by clicking on the top bar to drag and drop elsewhere.
The graph display can be re-sized. To set to full screen simply click on the Full screen icon, top right.

The standard operating procedure for the Flow-UV Spectrometer is to configure the appropriate method, take a blank and then measure samples in Absorbance units, Transmission (%T), Reflectance (%R) or Raw Counts. In addition to being able to measure a single sample, an option to measure samples over time is also provided.

Note: In addition to the use of a continuous flow cell, liquid samples can be measured in standard cuvettes with the cuvette reader attachment, micro-litre pipette reader attachment or by using an immersion probe.

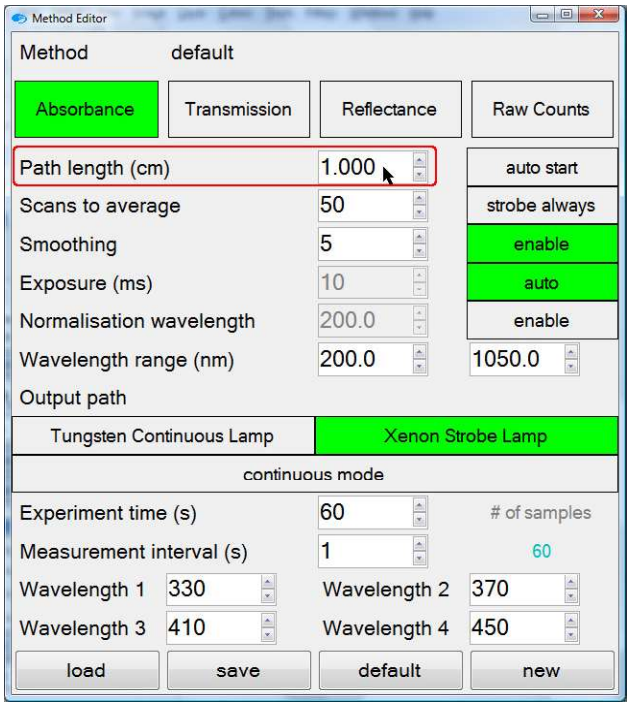
With the spectrometer connected to the laptop and a suitable blank placed in the reader attachment, proceed as follows:

Using the left mouse button, click on the button marked <Method> as show in the image below.

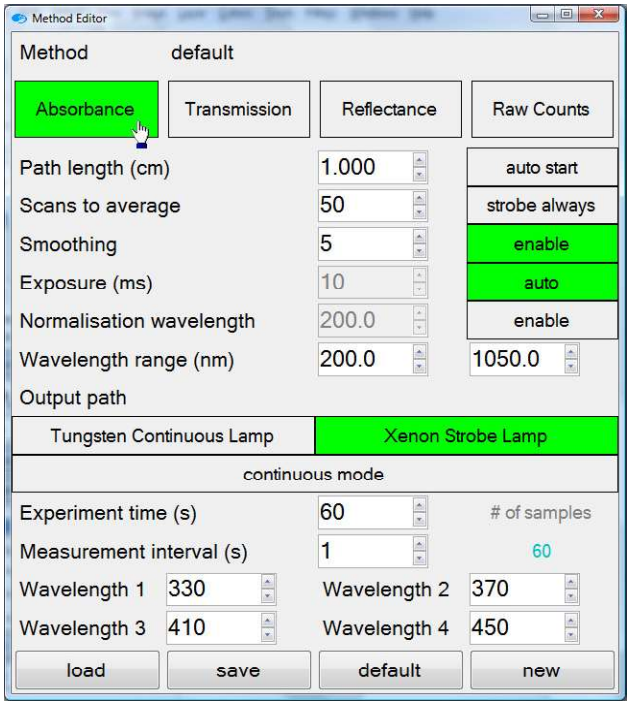


Set the path length.

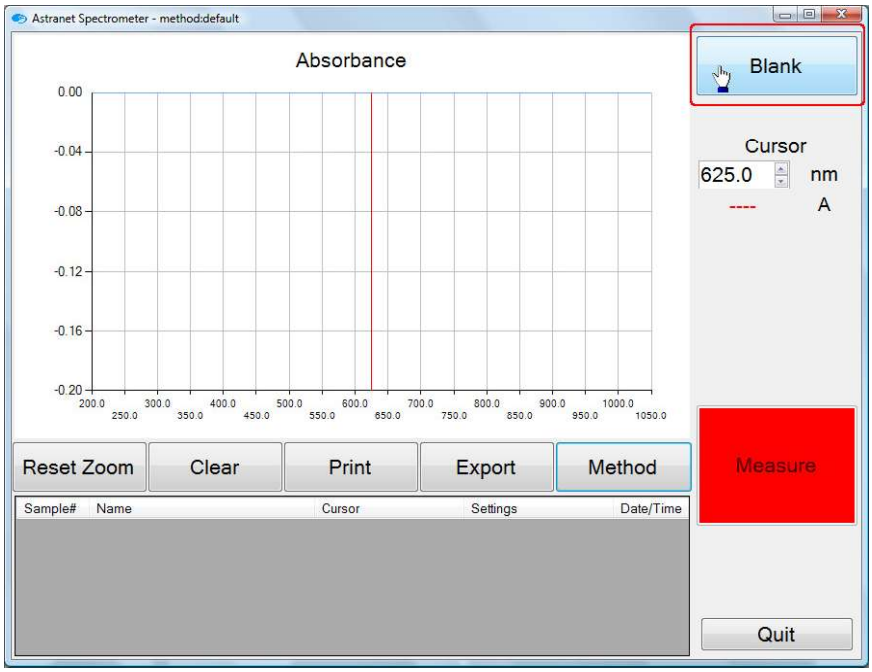
In most applications the path length is based upon a 1cm path length, this is also the default setting. Check the documentation relevant to your sampling attachment for the path length value and sampling method.



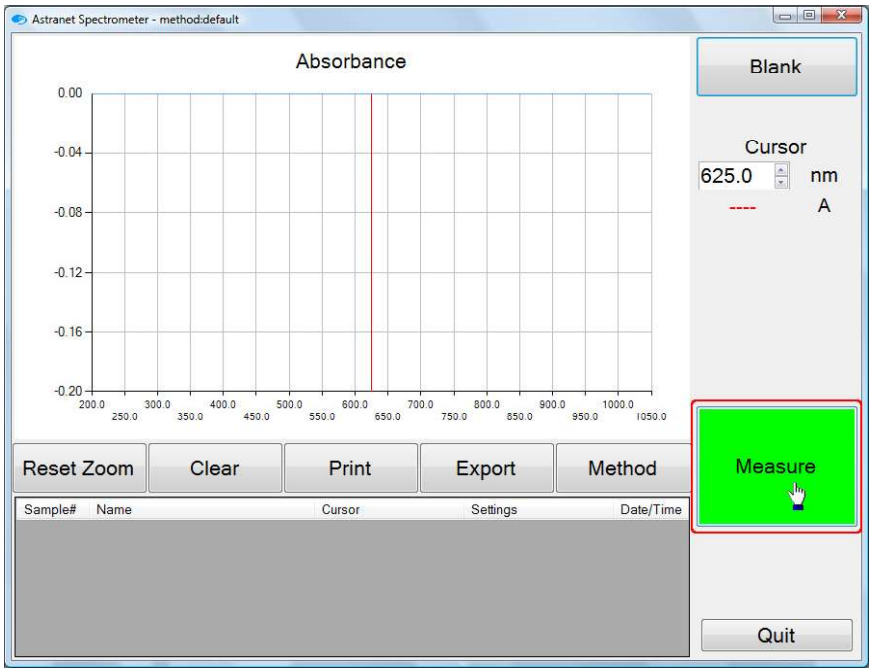
Select <Absorbance> mode in the Method Editor (for example).



Insert a blank specimen (e.g. system solvent) into the measurement attachment, then using the left mouse button, click on the button marked <Blank> in the Spectral Display.



Once the blank process is complete, the <Measure> button will change colour from red to green.
This process may take a little while to complete.



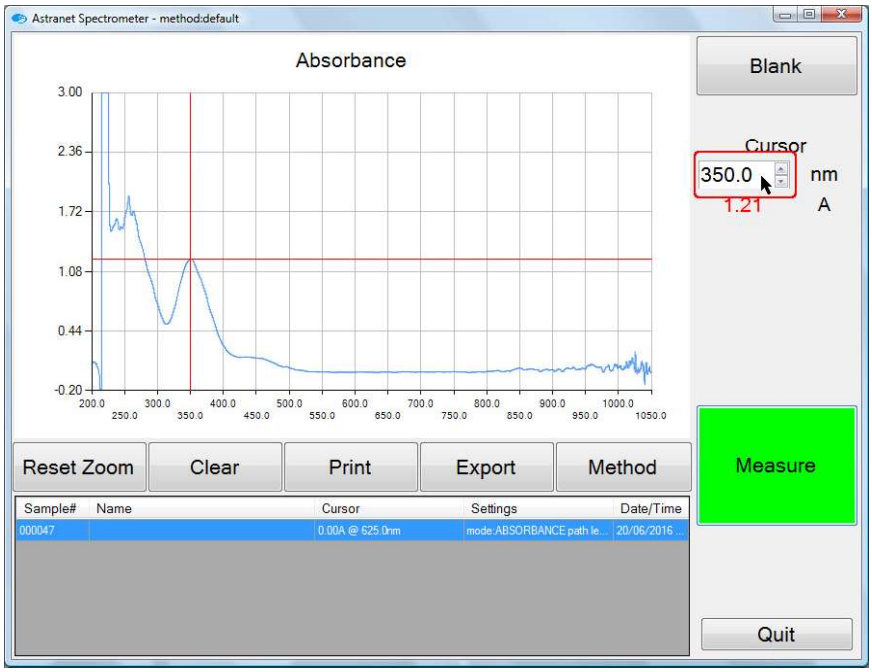
Introduce the sample and the spectrum should appear on the screen.

3.2.2 Cursors

Use the cursor to accurately read the spectrum. Click on the chart and the cursor will snap to the nearest position on the spectrum under your cursor position.

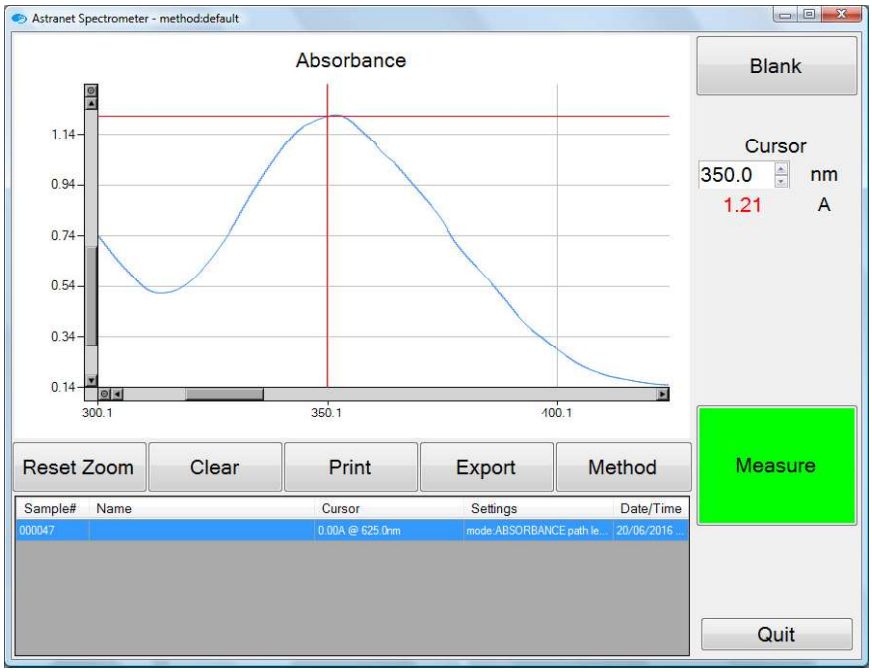
Alternatively, use the cursor input box to specify a wavelength more precisely.
Use the left mouse button to click on the up and down buttons to finely increase or decrease the cursor wavelength. Alternatively, type a number directly into the box and press the <Enter> key.

Wavelengths less than 220nm will be automatically set to 220nm and wavelengths in excess of 1050nm will be limited to 1050nm.

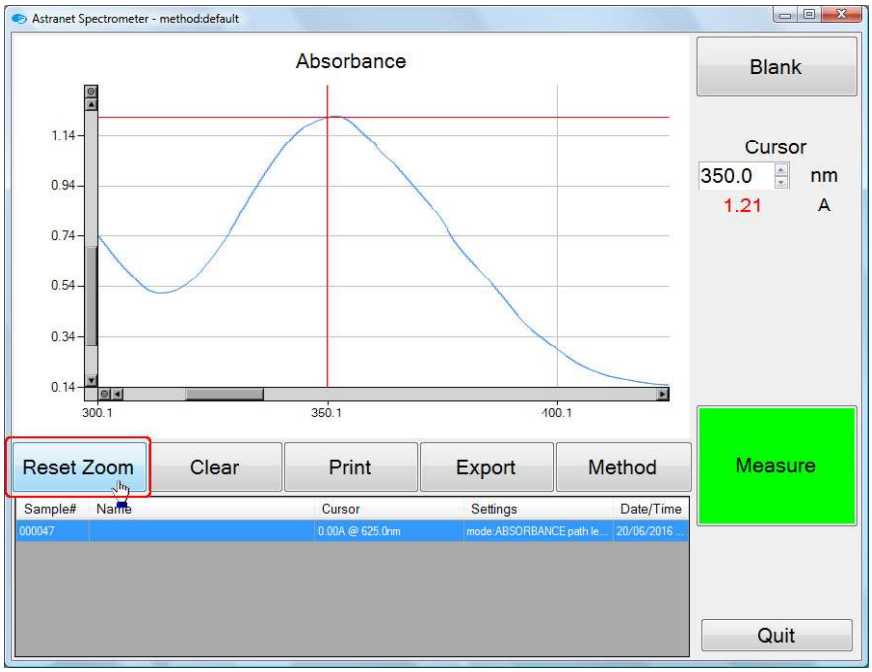


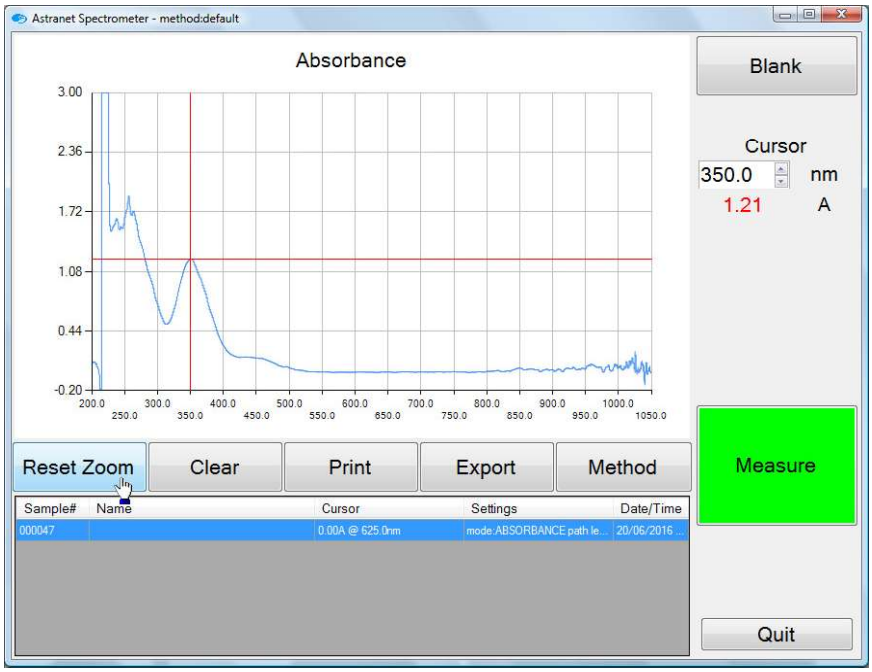
To zoom into an area of interest, click on the left mouse button and drag a rectangle;

The magnified portion is shown once the left mouse button has been released. Use the horizontal and vertical scroll bars to pan around the displayed spectrum.



Using the left mouse button, click on the <Reset Zoom> button to return the chart to its original axes.

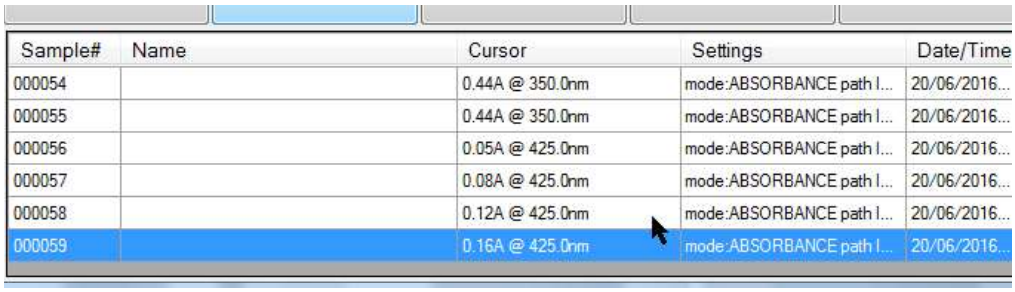




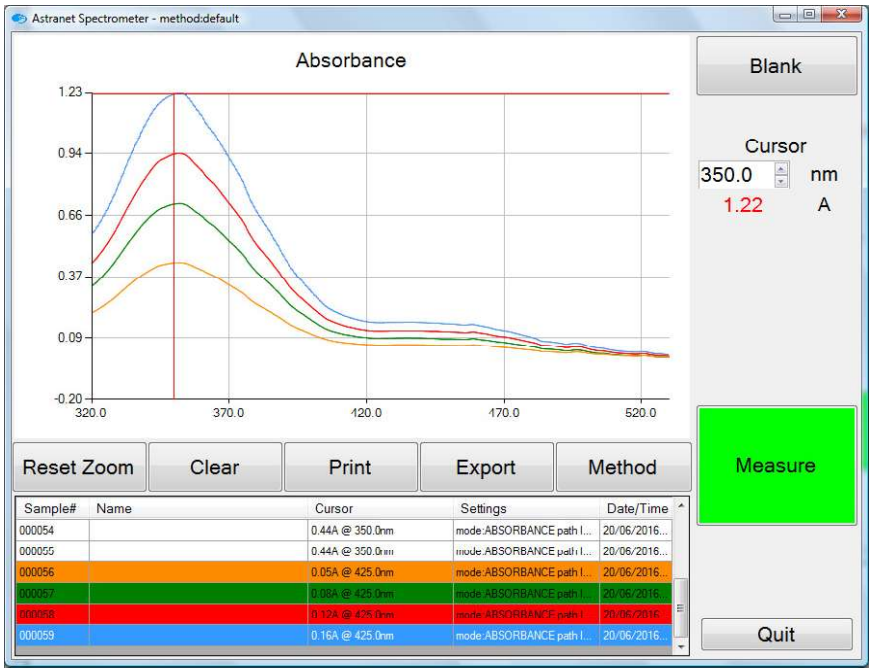
The cursor will remain on the selected wavelength after the zoom reset.

3.2.3 Overlays

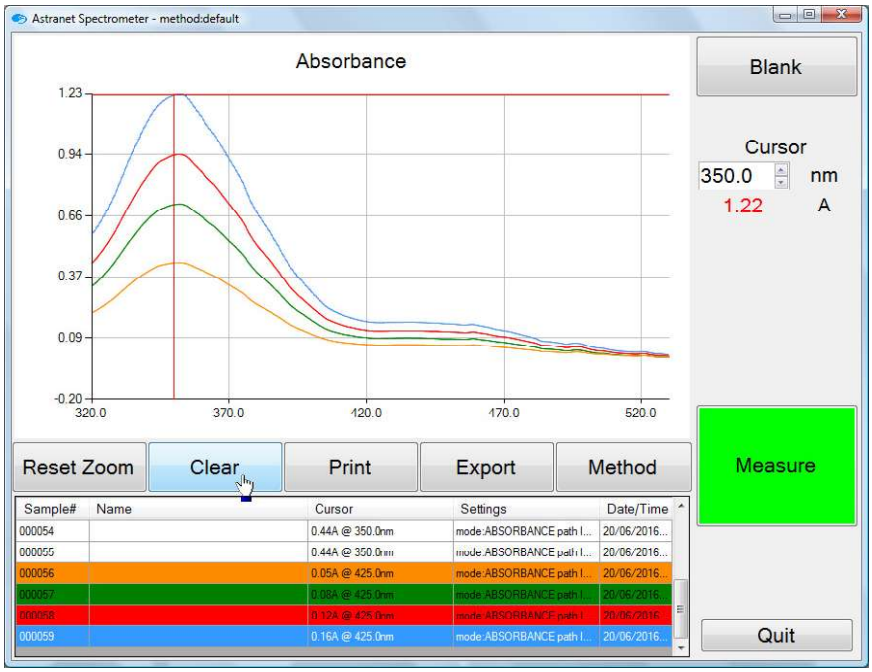
Graph overlays can be displayed by double clicking with the left mouse button, upon a row in the samples table. Each spectrum is coloured according to the colour of the included row.



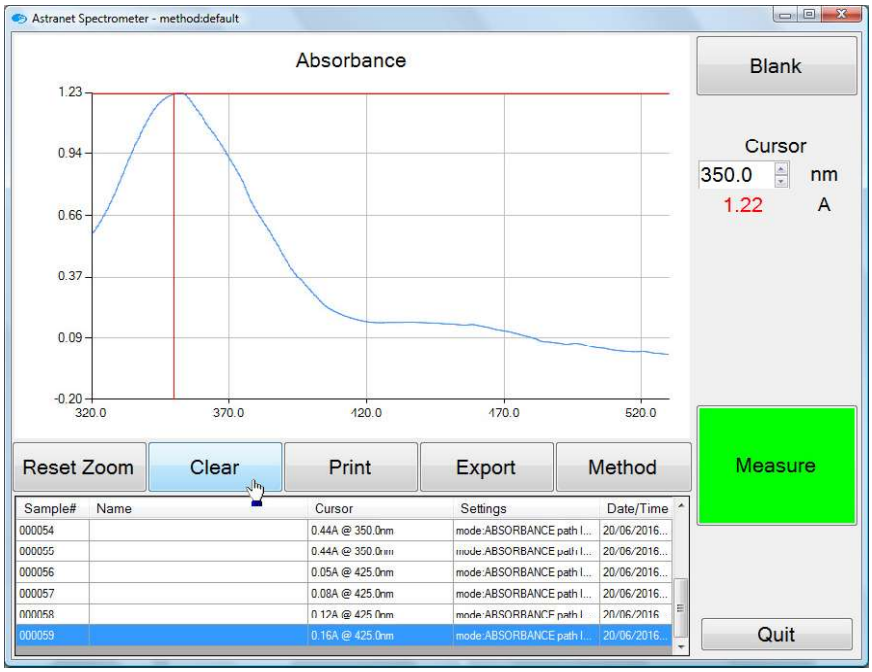
Sample#	Name	Cursor	Settings	Date/Time
000054		0.44A @ 350.0nm	mode:ABSORBANCE path l...	20/06/2016...
000055		0.44A @ 350.0nm	mode:ABSORBANCE path l...	20/06/2016...
000056		0.05A @ 425.0nm	mode:ABSORBANCE path l...	20/06/2016...
000057		0.08A @ 425.0nm	mode:ABSORBANCE path l...	20/06/2016...
000058		0.12A @ 425.0nm	mode:ABSORBANCE path l...	20/06/2016...
000059		0.16A @ 425.0nm	mode:ABSORBANCE path l...	20/06/2016...



To clear overlays and return to the original displayed spectrum, go to the <Clear> button and click on the left mouse button.

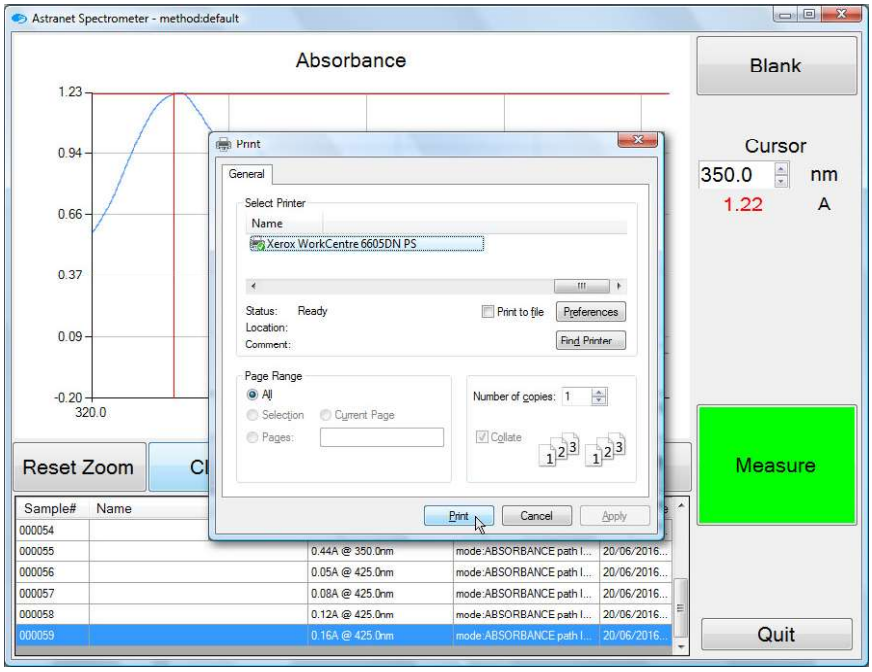


Now only the last spectrum is displayed, if no previous measurement has been taken, the screen will not show a spectrum here.



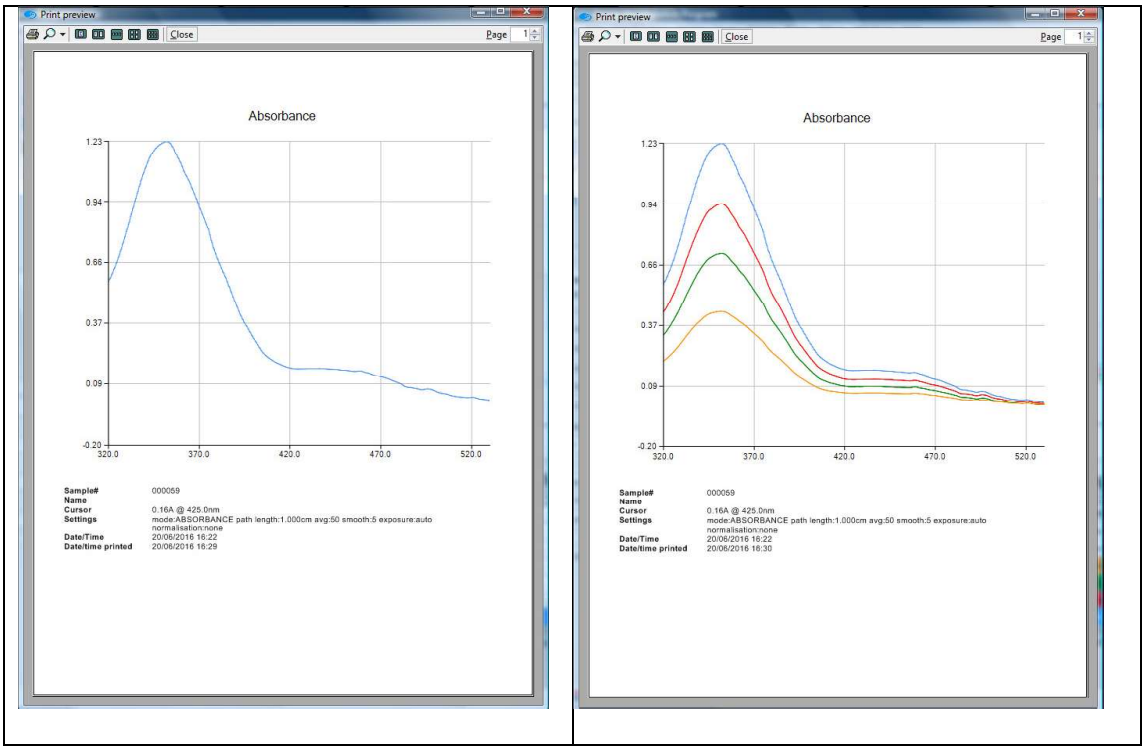
3.2.4 Printing

To produce a hard copy of the currently displayed Spectral Chart, use the <Print> feature. With the left mouse button, click on the button marked <Print> and the following dialogue box will be displayed.



Select your printer and associated preferences.
Note: the application is assuming a paper size of A4.

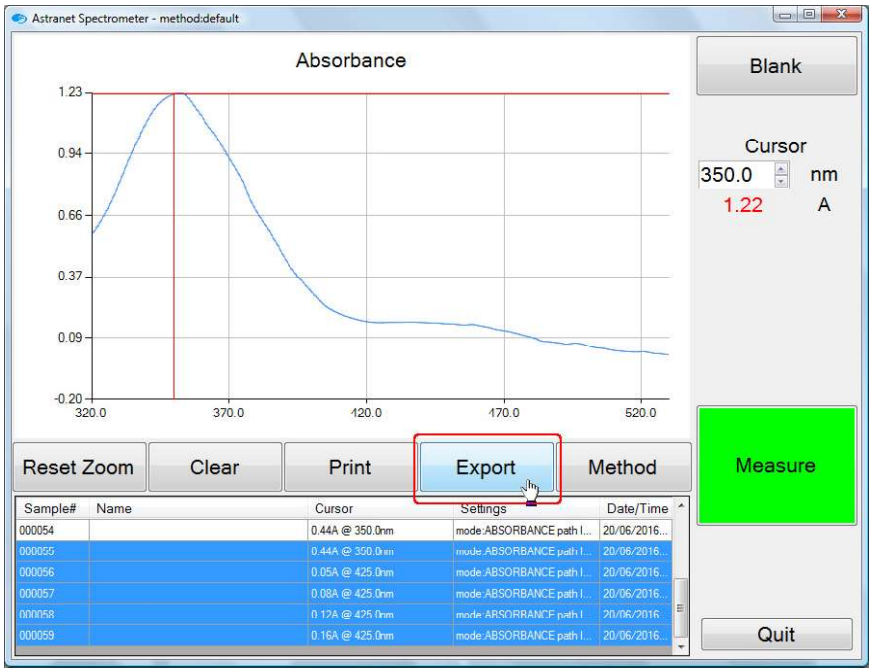
Now, using the left mouse button, click on the Print button to display the Print Preview screen.



The hardcopy follows the Spectral Display window, if you have multiple overlays, the data shown is for the last selected sample. If no spectrum is present, the information only of the currently selected spectrum is shown.
Note: Always ensure that the currently selected spectrum is the spectrum being displayed.

3.2.5 Exporting

To use the spectral data collected by this application in another application it is possible to export data as text organised as tab separated values. To export data, first select the rows you wish to process (click on a row with the left mouse button, hold Control or Shift to highlight blocks or additional rows, respectively).

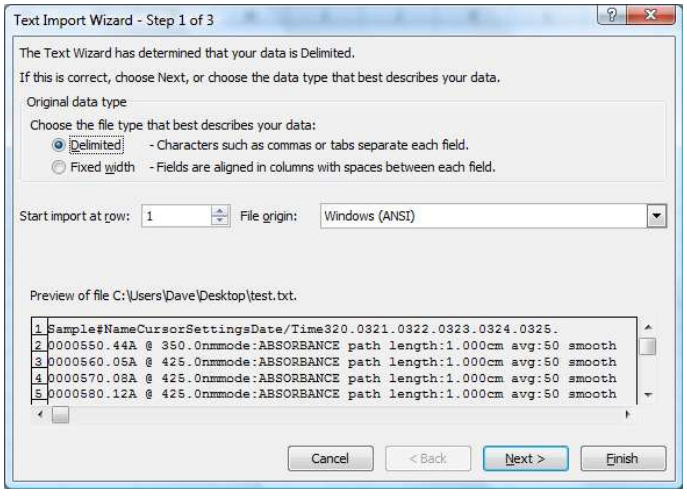


Now, using the left mouse button, click upon the <Export> button to begin the export procedure. You will now be asked what wavelength range you wish the export to contain. The data is output at 0.1nm intervals, thus outputting the entire range, 200nm to 1050nm will create a document with 8,500 data columns!

A standard file system dialogue box will appear, select a name and location for the exported file.

To import the file into Microsoft Excel, use the normal file open procedure but make sure that text files are selected in the file type drop down list. Alternatively, you may drag and drop the file into Excel.

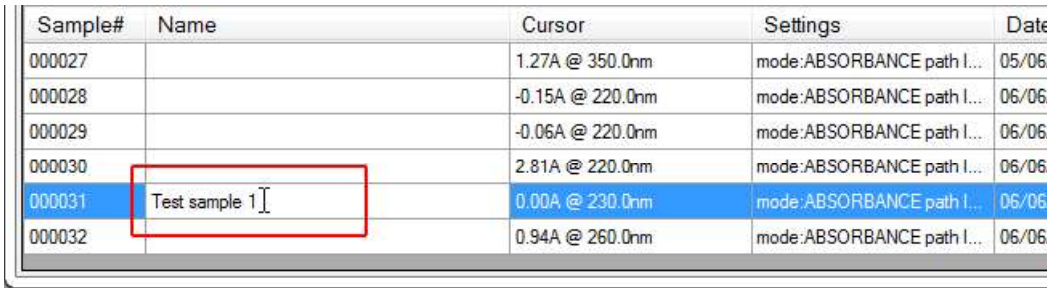
The following dialogue will appear, using the left mouse button, click on the button marked <Finish>.



The data will now appear in columns inside the Excel worksheet. **Note:** Spectral data is presented in columns from 220nm to 1050nm. Where there no spectral data is present, the resulting output cells will be empty.

3.2.6 Editing & Deleting

The Name field in the results table can be edited by clicking the left mouse button once on the Name field on the row of interest. When finished editing press <Enter> to commit the change.
Note: the edit is final once committed.



To delete an unneeded sample, use the left mouse button to click on a row and press the <Delete> key.
Respond 'Yes' to the confirmation dialogue box to delete the sample from disc, or, press 'No' to cancel the operation.
For multiple sample deletion, use Control to select one or more rows by holding down the Control key whilst, using the left mouse button, clicking on rows that you wish to delete.
Note: the delete is final once committed.

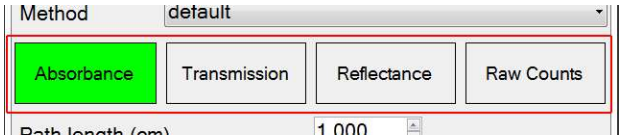
3.2.7 Method Editor

This applications software comprises two windows; Spectral Display and Method Editor. The Method Editor provides access to a wide range of operational parameter settings.

The Method Editor allows control over the seldom changed technical parameters of the spectrometer. These settings are Methods and can be edited, stored and recalled at will.
Note: changes to the method will require re-blanking.

3.2.7.1 Mode Select

The spectrometer can be operated in four modes, depending on your requirements, select the correct mode by clicking on the <Mode> Button with the left mouse button. Each mode has a self-contained library of samples, e.g. samples taken in Absorbance will not show in the samples library for Transmission.



3.2.7.2 Path Length

The path length must be set according to the sample accessory, a standard cuvette is 1cm, a UV pipette tip has a path length of 0.092cm. A typical flow cell has a path length of 0.1cm. Consult your sample accessory documentation for more information.

Adjust the path length by either typing a value directly into the box or by using the up and down arrows.

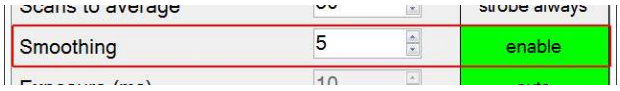
3.2.7.3 Averaging

To reduce periodic noise several spectra can be recorded and then averaged. More averages will take longer to measure but will produce a smoother spectrum.

Adjust the level of averaging by either typing a value directly into the box or by using the up and down arrows.

3.2.7.4 Smoothing

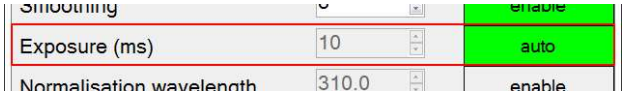
Smoothing reduces the effect of artefacts in the spectrum. More smoothing will reduce noise but will reduce and widen peaks.



Adjust the level of smoothing by either typing a value directly into the box or by using the up and down arrows. To disable smoothing, use the left mouse button to dim the <Enable> button from green to grey.

3.2.7.5 Exposure

Exposure controls the amount of light to be collected by the detector inside the spectrometer. The default setting is auto. When set to auto the spectrometer will automatically vary the intensity of the integrated light source to be within the wavelength band specified in the wavelength range further down the panel. An external light source will need to be setup by specifying an exposure time manually.

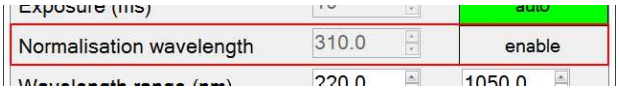


To enable the manual exposure control, ensure that the auto mode is off. To disable the auto exposure mode, click on the adjoining auto button with the left mouse button. Adjust

the exposure by either typing a value directly into the box, or by using the up and down arrows. To enable auto-exposure, use the left mouse button to change the button colour from grey to green.

3.2.7.6 Normalisation

To remove a background effect, select a wavelength at which the sample exhibits an unwanted background. Normalisation is disabled by default. To enable normalisation, use the left mouse button to click on the <enable>e button, changing its background from grey to green.



Adjust the normalisation wavelength by either typing a value directly into the box or by using the up and down arrows. To disable normalisation, use the left mouse button to dim the <enable> button from green to grey.

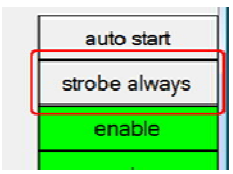
3.2.7.7 Wavelength Range

The default wavelength range is a full scan, to optimise the spectrometer, choose a narrower band of interest. This control works in conjunction with the auto exposure control, optimising the signal to noise ratio of the chosen area.

Adjust the wavelength range by either typing a value directly into the box or by using the <up> and <down> arrows.

3.2.7.8 Light Sources

There are two types of light sources that can be supplied with the instrument. The built-in light source is the xenon flash lamp, this provides a large amount of deep ultra-violet light and some visible light. The second light source is a tungsten lamp and this provides a large amount of visible and infra-red light. The tungsten lamp is a separate module to the instrument and cannot be controlled by the instrument. Use this control to specify the lamp type.



As the xenon lamp varies slightly from flash to flash and also has a warm-up period it is possible to select the strobe always mode. This keeps the xenon flash module firing continuously even when not reading.

3.2.7.9 Loading and Saving Methods

Unsaved changes to methods are discarded when the application is closed. To permanently save a method, use the left mouse button to click on the <Save> button. You may overwrite the default method so that the spectrometer always starts in a particular configuration.

If you wish to create a new method based upon the current method, use the left mouse button to click on <New>. Provide a name for the new method and using the left mouse button, click on <OK> or press <Enter>. To load a method, click on the <Load> button and select the method that you have previously saved and then click <OK>.

To reset the panel values to factory default, use the left mouse button to click on the <Default> button. **Note:** the factory default and the default method are separate.

3.2.8 Continuous Measurement

3.2.8.1 Introduction

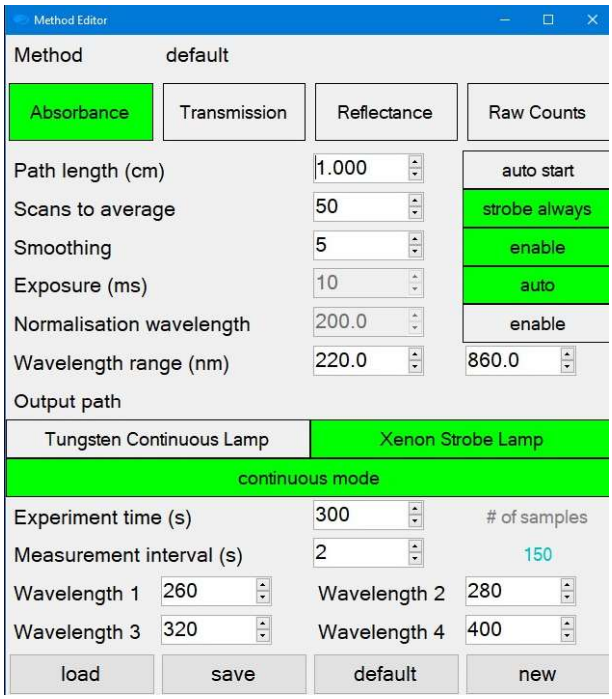
This mode allows the spectrometer to natively measure the change of a sample over a period of time. The chart display is split into two, the upper chart displaying the complete spectrum specified by the wavelength range controls set in the Method Editor. The lower chart displays the current sample number against the reading at the cursor. All other controls behave in the same manner as in single scan mode.

3.2.8.2 Setting up

First enable the continuous mode. Do this by clicking on the left mouse button upon the <Continuous Mode> button.

Select the operating mode <Absorbance/Transmission/Reflectance/Raw Counts>, as previously.

Selecting <Auto Start> will combine the acquisition of an initial blank spectrum with the start of data collection according to the length and number of samples set. Otherwise these 2 functions will need to be performed separately in sequence.



To avoid an excessively delayed response whilst achieving an acceptable noise level, it is recommended that <Scans to average> and <Smoothing> be set in the range 50-200 and 2-10, respectively.

At short wavelengths, emission from the lamp is weak and perfluoropolymer tubing is largely opaque, therefore if a wavelength shorter than 220nm is required it is almost certain that a quartz flow cell will be required. Set the upper wavelength limit to a sensible value to avoid the possibility of creating unnecessarily large data files.

The Experiment time is self-explanatory. The number of samples the instrument will sample is calculated from the Experiment time divided by the Measurement interval.

The interval is the time between measurements, measured in seconds. Slow reactions will require longer time intervals and fast reactions will require shorter time intervals.

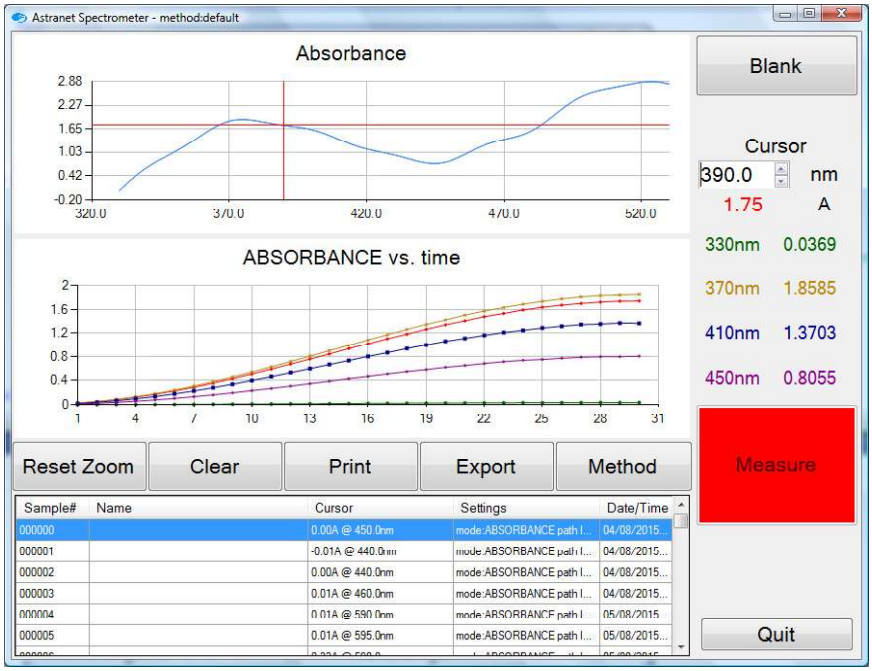
You may save this configuration a New method or save it as the Default method.

3.2.8.3 In Operation

The operation procedure is very similar to that of the single scan mode. Ensure that the flow cell is filled with clean system solvent and, using the left mouse button, click on the <Blank> button followed by the <Measure> button to start the data acquisition once the blanking process has finished. Alternatively, with <Auto Start> specified in the Method, press <Measure> to perform both of these tasks automatically.

The measuring cycle will need at least two spectra before the trend line is drawn on the secondary chart.

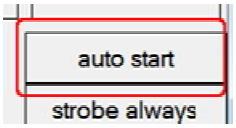
During the measurement cycle, the <Measure> button will become the <Stop> button, by clicking on this button with the left mouse button, the operation can be cancelled.

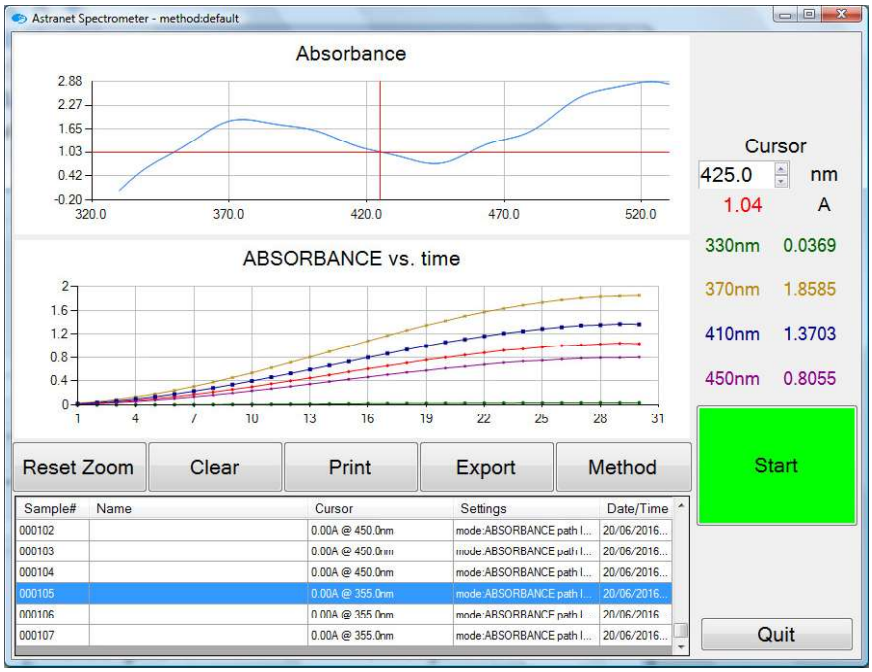


The current progress is displayed in the title of the secondary chart, on completion, a row will be added to the samples library.

3.2.8.4 Automatic blanking

This function is primarily for use with flow cells where the reagent blank is already present in the chamber at the start of the measurement cycle. When this mode is activated, the <Blank> button will be removed and the <Measure> button will now become <Start>.





3.2.8.5 Cursors

Four additional cursors allow readings at four different wavelengths to be monitored in real time. The ad-hoc cursor is also available to easily investigate any area of interest at any time.

The secondary chart that displays the readings vs. time is scaled depending on the active cursors. The cursors are shown in the right panel of the spectrum display screen as shown above.

Clicking on the cursor wavelength or its value will disable the scaling feature for that cursor. You may wish to do this when a wavelength you have been monitoring has gone outside of a useful range and you now wish to concentrate on the other cursor values. When a cursor has been de-activated it has a line drawn through both the value and the wavelength (but it is still plotted on the chart).

Use the cursor to accurately read the spectrum. Click on the chart and the cursor will snap to the nearest position on the spectrum under your cursor position.

Alternatively, use the cursor input box to specify a wavelength more precisely.

Use the left mouse button to click on the up and down buttons to finely increase or decrease the cursor wavelength, or type a number directly into the box and press the <Enter> key.

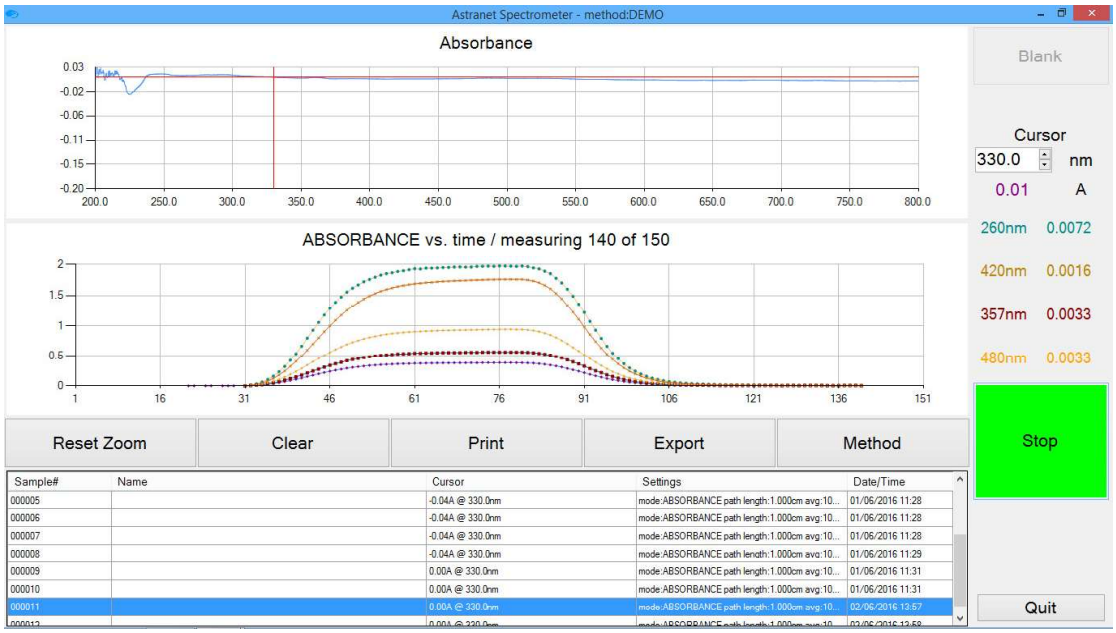
Wavelengths less than 220nm will be automatically set to 220nm and wavelengths in excess of 1050nm will be set to 1050nm.

To zoom into an area of interest, click on the left mouse button and drag a rectangle;

The magnified portion is shown once the left mouse button has been released. Use the horizontal and vertical scroll bars to pan around the displayed spectrum.

Using the left mouse button, click on the Reset Zoom button to return the chart to its original axes.

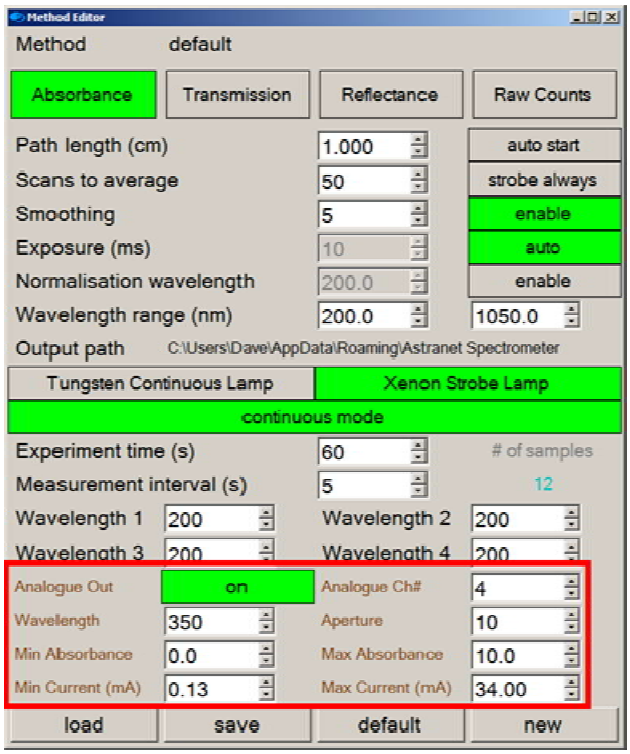
The cursor will remain on the selected wavelength after the zoom reset.

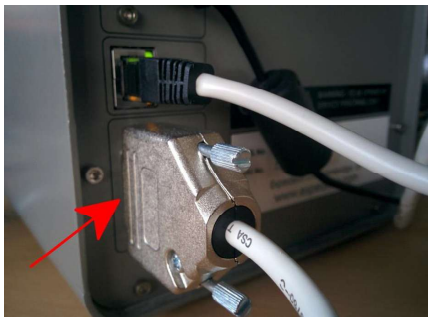


3.2.9 Analogue Output

3.2.9.1 Introduction

The analogue output of the unit can be changed in response to an absorbance measured at a wavelength.
On the rear of the unit is a dedicated I/O connector that, amongst other features, contains four user accessible analogue output ports.
The available user analogue outputs are numbered 4, 5, 6 and 7 (0-3 are for internal use only)
The analogue outputs are in the form of a current output, from 0.13mA to 34mA at 12 bits of resolution (4096 distinct values)





This I/O cable, with bare, tinned ends is available from Asynt Ltd

3.2.9.2 Getting started

Connect the Analogue #1 Cable to the I/O connector on the rear panel (ensure that none of the bare ends of the wires are touching each other) Using a multi-meter with a current range of around 1 -> 10mA, connect the positive probe (red) to the orange wire and connect the negative probe (black) to the orange and white wire. With the unit powered, a reading of 0.13mA should be shown.

3.2.9.3 Switching on and off.

Use this button to enable or disable the analogue output. Note: the analogue output is only affected in **Absorbance Mode**.

3.2.9.4 Changing the Analogue Output Channel

Use this control to change the Analogue Output Channel. User channels available are 4->7.

3.2.9.5 Changing Reporting Wavelength

Use this control to select the centre wavelength of interest. Use in conjunction with the aperture control.

3.2.9.6 Changing Wavelength Aperture

Use this control to select a range around the centre wavelength.

For example, with the aperture set to 50nm and the centre wavelength set to 400nm, the wavelength range that an average absorbance will be calculated for will be from 375nm to 425nm.

3.2.9.7 Changing Absorbance Range (Minimum & Maximum)

The analogue output is affected by the absorbance values being measured.
To give more control, the minimum absorbance level and maximum absorbance level are used to provide the application with your range of interest.

3.2.9.8 Changing Current Range (Minimum & Maximum)

In addition to being able to specify a minimum and maximum absorbance range, the current range can also be limited to your application specifications. Thus, it would be possible to say, limit the absorbance range from 0.5A to 1.5A and the current range from 4mA to 20mA to cover that absorbance range.

3.2.10 Further Notes

The minimum current is 0.13mA from switch on. The minimum specified in the Control Panel will only be set once a measurement has been taken in the **absorbance** mode. When the AstraNet Spectrometer Application is closed (or opened) all the analogue outputs are reset to their minimum hardware level of 0.13mA

4. Error Conditions

1. Unable to set lamp intensity

This is usually because either the connection to the control computer has been broken (network error) or because the spectrometer is unable to set the strobe intensity to a sufficiently low level (<5%). This latter situation can be remedied by reducing the pathlength or by fitting an attenuator to the spectrometer. Please contact Uniqsis for more information.

5. CE Declaration of Conformity

Product: Optic Coupled Spectrometer

Type: UV/VIS.

We declare that the above-specified systems are compliant with the regulations of the European Community when installed as a system.

The devices are compliant with the following standards:

LV Directive 72/23/EC

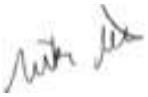
EMC Directive 89/336/EC

RoHS directive 2011/65

Note: This declaration of conformity becomes invalid if:

1. The devices are installed, modified, complemented or changed in a manner which has not been specifically approved by either AstraNet II Ltd

2. In case of improper usage.



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CEO
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Phone: +44 (0) 1223 223 722 Email: info@astranetsystems.com

6. Technical Specification

Parameter	Specification
Path length	Nominally 1.0mm (0.2mm – 2.4mm optional)
Light Source	Pulsed Xenon strobe lamp (powered for reading only)
Detector	3648 Pixel CCD array (UV enhanced)
Photometric linearity	Better then 1%
Photometric range	-0.2 to 2.5A
Wavelength range	230 – 1050nm
Wavelength accuracy	±0.5nm
Spectral bandwidth	<2nm
Absorbance precision	0.003A
Read time	Default is 2 seconds (including full spectrum scan)
PC communication	Ethernet (TCP/IP)
Power	24VDC from supplied adaptor with 100-240VAC input
Dimensions	18 x 18 x 17cm
Weight	3.5kg

7. Warranty

Asynt Ltd provides a limited warranty of one year from the date of delivery. Should any failure or defect be found within this warranty period Asynt Ltd will repair or replace the defective parts without charge.

All warranty will be immediately invalidated if unauthorized repairs or modifications are made to the instrument, or in any case of accident, misuse, damage caused by improper installation and altered serial numbers.

Freight and insurance costs for items returned for repair or replacement will be borne by the customer. The cost for the return shipment shall be the responsibility of Uniqsis Ltd.

If a fault or defect is found in the product please contact our sales office by phone or e-mail providing us with the model and serial number of the product. Please include as much information relating to the fault or defect as possible.

For service and support please call Asynt: