



The Linearity Test kit is used for testing photometric linearity. Photometric linearity refers to how accurately the instrument measures absorbance with increasing concentration. Poor photometric linearity will produce incorrect results.

## Installation

**To install the Linearity Test kit:**

- 1 Ensure that there is nothing in the sample beam.
- 2 Install a cell base in the sample beam.
- 3 Take the filter holder supplied with the Linearity Test kit and screw it to the top of the cell base.

## Operation

### NOTE

Use the Linearity Test kit to determine how linear the instrument is within the working Abs range you are using.

### NOTE

The terms 'lowest abs', 'middle abs' and 'highest abs' are used to indicate in which order to insert the filters. If you are going to measure up to 3.0 Abs, you might measure at three absorbance levels — 0.6 Abs, 1.5 Abs and 3.0 Abs using the following combination of filters:

	<b>Filter 1</b>	<b>Filter 2</b>	<b>Total</b>
Low Abs set	0.3 Abs	0.3 Abs	0.6 Abs
Middle Abs set	0.5 Abs	1.0 Abs	1.5 Abs
High Abs set	1.5 Abs	1.5 Abs	3.0 Abs



## Cary WinUV Software

### NOTE

The Cary WinUV Software always measures at 465 nm regardless of the wavelength selected. The wavelength is used as a reference point as the filter's absorbance is temperature independent at that point.

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- 1 Start the Validation application.
- 2 Click **Tests**.
- 3 Select **Enable All Tests**.
- 4 Select the **Photometric Linearity** test. Delete all of the other tests that are enabled by highlighting them and clicking the red **X** icon to the right of the window.
- 5 Click the **Linearity** tab and ensure that the **Photometric Linearity** check box is selected.

### NOTE

At this point, the UV-Vis tolerances may need adjusting depending on the linearity specification for your instrument.

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- 6 Click **OK** at the bottom of the Tests window.
- 7 Click the **Start** button.
- 8 Insert the blank filters for zeroing. Click **OK** for the instrument to take readings.
- 9 Remove one of the blanks and replace it with Filter 1 of the 'Low Abs' set. Click **OK** for the instrument to take readings.
- 10 Remove the other blank and insert Filter 2 of the 'Low Abs' set. Click **OK** for the instrument to take readings (refer to the note in the 'Operation' section).
- 11 Remove Filter 1 of the 'Low Abs' set and replace it with the blank. Click **OK** for the instrument to take readings.
- 12 Replace Filter 2 of the 'Low Abs' set filter with Filter 1 of the 'Medium Abs' set. Click **OK** for the instrument to take readings.
- 13 Remove the other blank and replace it with Filter 2 of the 'Medium Abs' set. Click **OK** for the instrument to take readings.
- 14 Replace Filter 1 of the 'Medium Abs' set with one of the blanks. Click **OK** for the instrument to take readings.
- 15 Remove Filter 2 of the 'Medium Abs' set and replace it with Filter 1 of the 'Highest Abs' set. Click **OK** for the instrument to take readings.
- 16 Replace the other blank with Filter 2 of the 'Highest Abs' set. Click **OK** for the instrument to take readings.
- 17 Remove Filter 1 of the 'Highest Abs' set and replace it with a blank. Click **OK** for instrument to take readings.

After this final reading, the application will determine whether the instrument has passed or failed the tests at the specified wavelengths according to the Abs tolerances that were entered.

## Manual operation with older instruments

### NOTE

The wavelength you select for the Linearity Test should be close to or the same as the wavelength you are using for your analysis. If you are analyzing samples over a range of wavelengths, it is suggested that you perform the Linearity Test over the same wavelengths.

- 1 Insert the blank filters and zero the instrument.
- 2 Remove one of the blanks and replace it with Filter 1 of the 'Low Abs' set being used and note the reading (refer to the note in 'Operation' section).
- 3 Remove the other blank and insert the Filter 2 of the 'Low Abs' set and note the reading.
- 4 Remove Filter 1 and replace it with a blank and note the reading.
- 5 Replace Filter 2 of the 'Low Abs' set with Filter 1 of the 'Medium Abs' set and note the reading.
- 6 Remove the other blank and replace it with Filter 2 of the 'Medium Abs' set and note the reading.
- 7 Replace Filter 1 of the 'Medium Abs' set with one of the blanks and note the reading.
- 8 Remove Filter 2 of the 'Medium Abs' set and replace it with Filter 1 of the 'Highest Abs' set and note the reading.
- 9 Replace the other blank with Filter 2 of the 'Highest Abs' set and note the reading.
- 10 Remove Filter 1 of the 'Highest Abs' set and replace it with a blank and note the reading.
- 11 Repeat for the next wavelength if required.
- 12 Calculate the results of the test by using the below equation.

### Calculations — UV/Vis tolerances

Once the results have been obtained, the following calculation should be applied for each pair of filters:

$(\text{Abs of Filter 1 and Filter 2}) - ((\text{Abs of Filter 1}) + (\text{Abs of Filter 2})) = \text{Error in Abs reading}$

These data points can then be plotted on a graph. The point at which the graph stops being linear is where the instrument becomes increasingly inaccurate.



## Maintenance

If the filters of the Linearity Test kit become dirty, they can be cleaned with a soft cloth.

This information is subject to change without notice.



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