Lambda 265 Reflectance Module Installation Instructions

This instruction sheet describes the installation of this accessory which is used with the Lambda 265 Spectrophotometer.

NOTE: *Read these instructions before you install this accessory.*

Contacting PerkinElmer

Supplies, replacement parts, and accessories can be ordered directly from PerkinElmer, using the part numbers.

See our website:

http://perkinelmer.com

PerkinElmer's catalog service offers a full selection of high-quality supplies.

To place an order for supplies and many replacement parts, request a free catalog, or ask for information:

If you are located within the U.S., call toll free 1-800-762-4000, 8 a.m. to 8 p.m. EST. Your order will be shipped promptly, usually within 24 hours.

If you are located outside of the U.S., call your local PerkinElmer sales or service office.

Features

- For measuring the Specular Reflection of Solid Sample
- For measuring the Thickness of thin film
- Small and compact design

Figure 1 Lambda 265 Reflectance Module [P/N: N4103003]

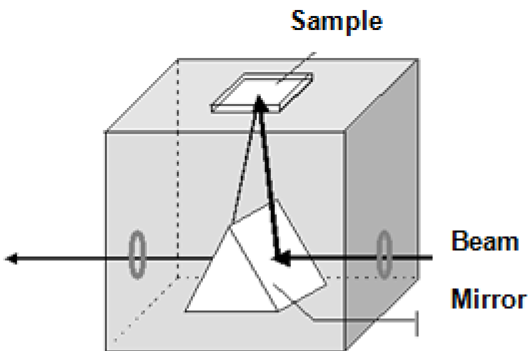
PerkinElmer, 710 Bridgeport Avenue,
Shelton, CT 06484-4794, U.S.A

Produced in the USA.

Dimensions and Specifications

Physical Characteristic	Specification
Incident Angle	30°
Temperature Range (℃)	5~ 40 (Recommended Room Temp.)
Dimensions (mm)	64 (W) X 80 (L) X88.5 (H)
Weight (kg)	0.82

Mechanism of Reflectance Module



Reference (having a specular surface) = $\mathbf{I_o}$

Sample (deposited on the reference) = **I**

%R = $\mathbf{I/I_o}$ x 100(%)

Figure 2 Mechanism for the Lambda 265 Reflectance Module

The measurement of film thickness using reflected light is a well-established technique. Such optical techniques for the determination of thin film characteristics rely upon the interaction of the film with light and can be used to determine not only thickness but also roughness and optical constants.

In the case of a thin film on the surface of another material, both the top and bottom surfaces of the film reflect light with the total amount reflected being dependent upon the sum of these two reflections. Furthermore, these two reflections may add together constructively or destructively depending upon their phase relationship. This phenomenon is due to the wavelike nature of light with the phase relationship determined by the difference in optical path lengths of the two reflections.

The resulting interference pattern can be used to determine the thickness of the film in question, assuming that reflective index and angle of incidence are both known. Film thickness can thus be calculated using the following equation:

$$d = \frac{p}{2\sqrt{n^2 - \sin^2\theta}} \times \frac{\lambda_1 \cdot \lambda_2}{\lambda_1 - \lambda_2} \times \frac{1}{1000} \ (\mu m) \qquad \text{(i)}$$

Where: d = film thickness   p = number of fringes (waves) between λ_1 and λ_2

, θ = angle of incidence

λ_1 & λ_2 = peak wavelengths (nm)

Description

Reflectance Module

The Reflectance Module allows the measurement of specular reflectance to be made at a fixed angle of 30°. This accessory is particularly useful for studies of film thickness on metallic substrates and measurement of epit-axial film thickness.

Configuration of the Reflectance Module

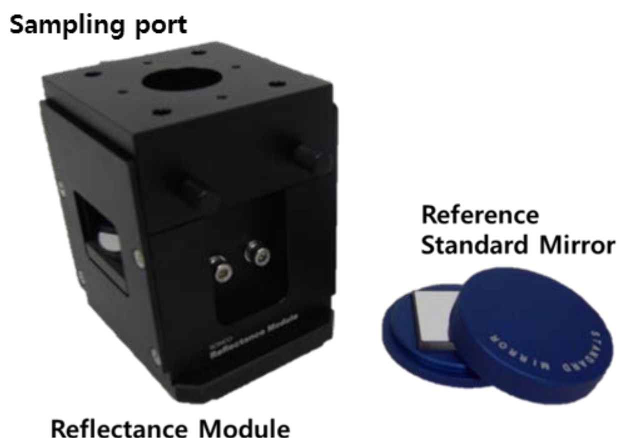


Figure 3 Lambda 265 Reflectance Module Accessory

Installation

1. Prepare the Lambda 265 Spectrophotometer to install this accessory.
2. Disassemble the existing cell holder in the sample compartment.

Figure 4 Removing the existing cell holder

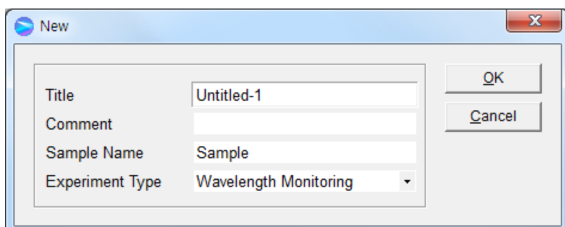
3. Install the reflectance module in the sample compartment of the Lambda 265.

Figure 5 Installing the reflectance module

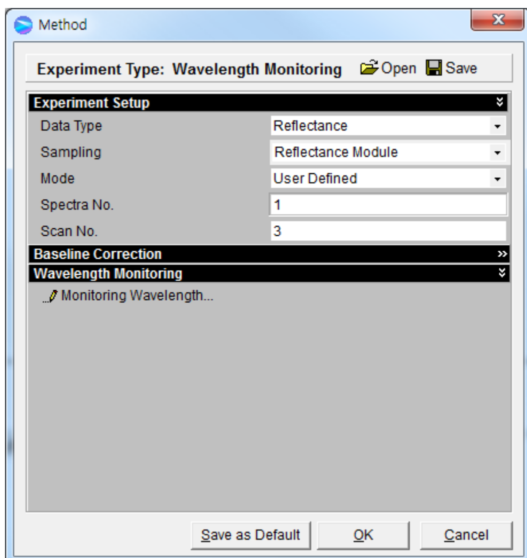
4. Connect the power cord and communication cable to the ports located at the rear of the instrument.

Measurement

1. Launch the **UV Lab** software. Select **Experiment Type** and click **OK**.



2. Select **Reflectance** and **Reflectance Module** in the experiment setup. Set each parameter and click **OK**.



3. Place the reference mirror on the sampling port and click **Blank** to measure blank.

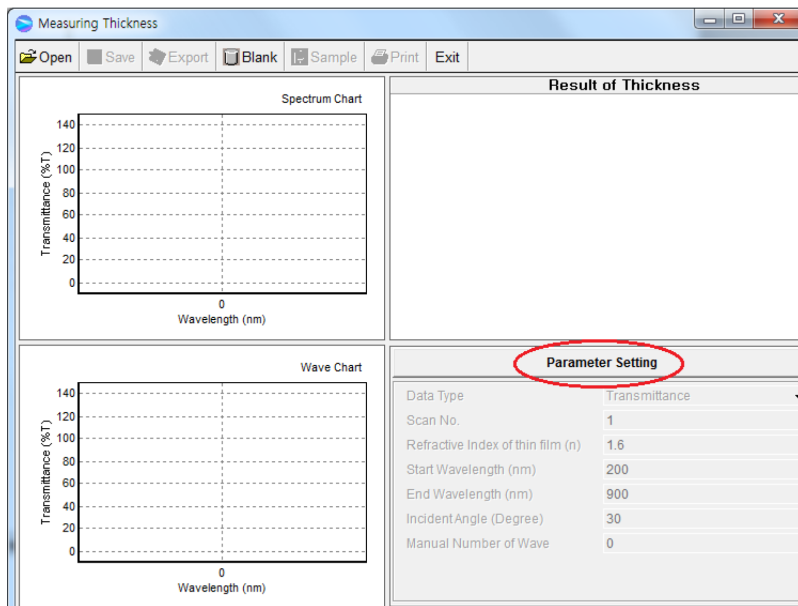
4. Place the sample on the sampling port, and then click **sample** to measure sample.

NOTE: *Sample size should be larger enough to cover the sample port fully.*

Measurement of Thickness

1. Select **New** and select **Thickness** in the **Experiment Type**.

2. The following box will be displayed. Select **Parameter Setting** and set parameters. Click **OK** after set-up of parameters.



▶ **Data Type**: Choose the unit of reflectance.

▶ **Scan No.**:

The scan number parameter determines how many scans are performed during a data collection. If you specify a scan number of more than one, the system averages all the collected data. This increases the signal-to-noise ratio and total collection time.

▶ **Reflective index of thin film (n)**:

Enter the known value for the coating material of the thin film.

▶ **Start Wavelength (nm)**: Enter the start wavelength for measurement.

▶ **End Wavelength (nm)**: Enter the end wavelength for measurement.

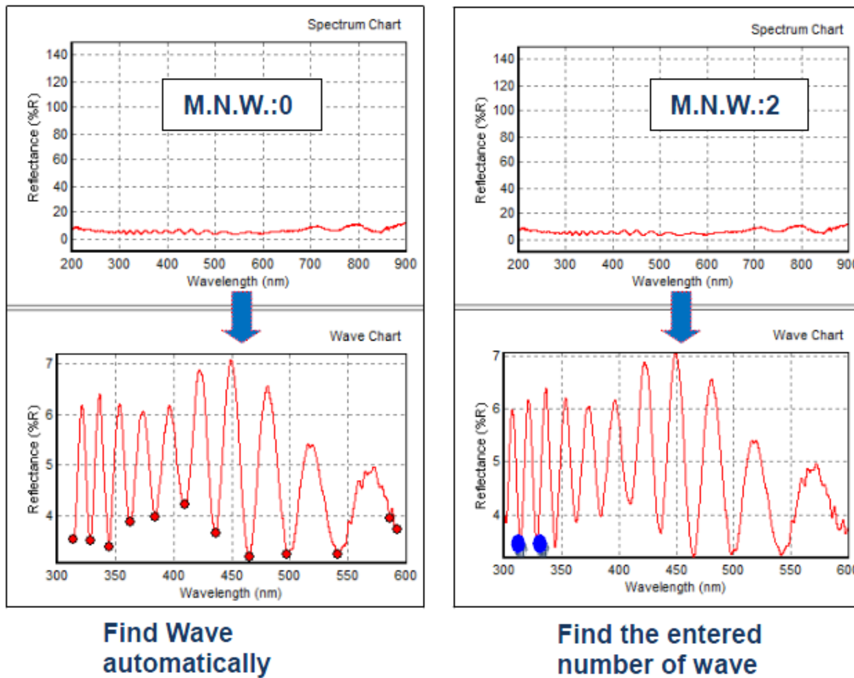
▶ **Incident Angle (Degree)**: 30 °(fixed for Reflectance Module).

▶ **Manual Number of Wave (M.N.W)**: The required fringe (wave) numbers are used to calculate the thickness between start wavelength and end wavelength. M.N.W. can be modified after the measurement is complete.

a. 0: Fringe (wave) numbers and the wavelengths are automatically set and the thickness is calculated.

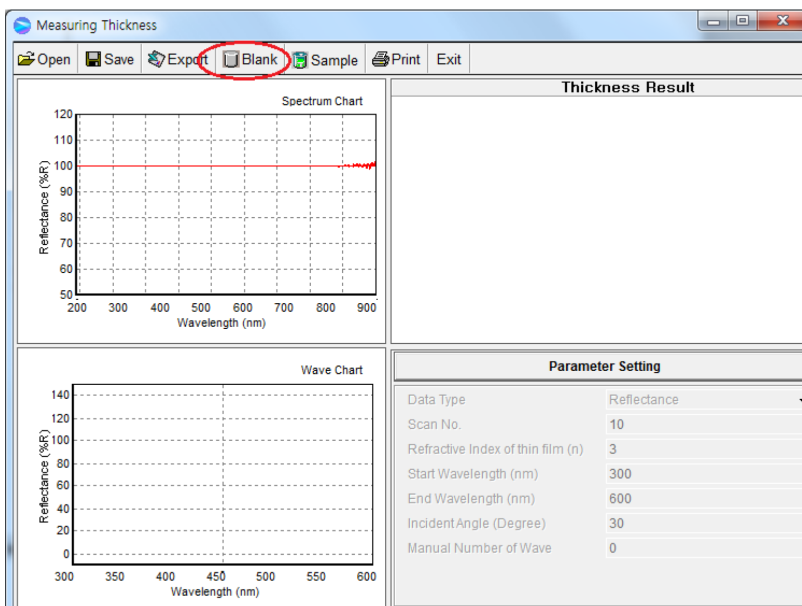
If user cannot find the appropriate fringe (wave) shapes and numbers, set numbers more than 2 in the Manual Number of Wave.

b. ≥2: From the start wavelength, the entered numbers of fringe (wave) are used to calculate the thickness.

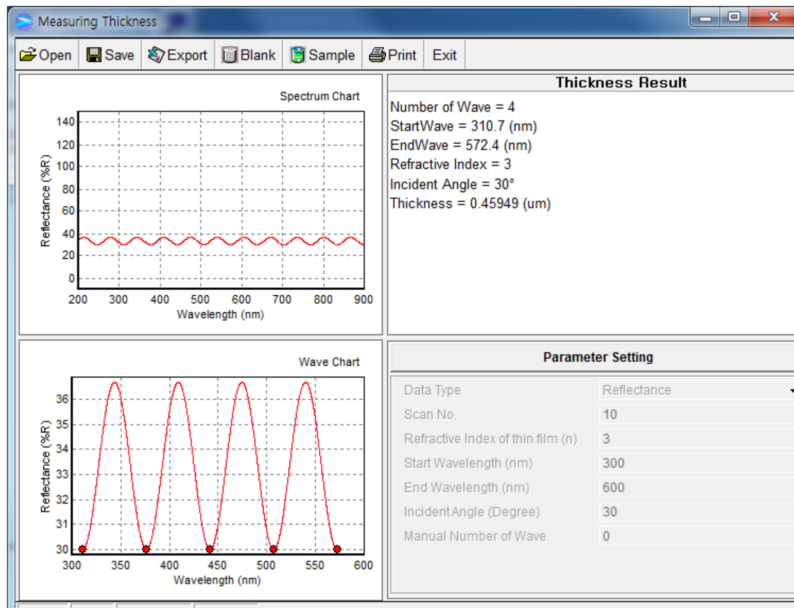


3. Select **OK**.

4. Place the reference material on the sampling port and click **Blank** to measure blank.



5. Place the sample on the sampling port and click **Sample** to measure sample.



6. Film thickness calculations are performed automatically.