

Lambda 465 Reflectance Holder Installation Instructions

This instruction sheet describes the installation of this accessory which is used with the Lambda 465 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 1-800-762-4002, 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 465 Reflectance Holder [P/N: N4104004]



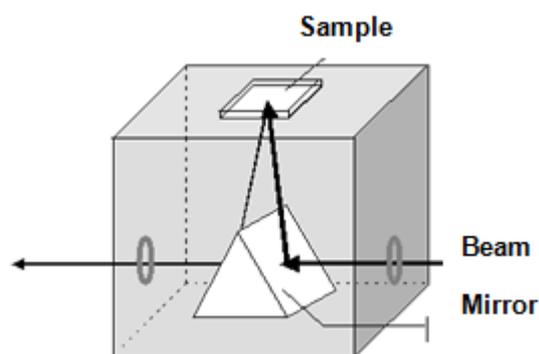
PerkinElmer, 710 Bridgeport Avenue,
Shelton, CT 06484-4794, U.S.A

Produced in the USA.

Dimensions and Specifications

Characteristic	Specification
Incident Angle	34°
Temperature Range (°C)	5~ 40 (Recommended Room Temp.)
Dimensions (mm)	56.8 (W) X 116 (H) X 130 (L)
Weight (kg)	1.34

Mechanism of Reflectance Holder



Reference (having a specular surface) = I_o

Sample (deposited on the reference) = I

$$\%R = I/I_o \times 100(\%)$$

Figure 2 Mechanism of reflectance Holder

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:

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

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

n = reflective index of thin film, θ = angle of incidence

λ_1 & λ_2 = peak wavelengths (nm)

Description

Reflectance Holder

The Reflectance Holder allows the measurement of Specular Reflectance to be made at a fixed angle of 34° . This accessory is particularly useful for studies of film thickness on metallic substrates and measurement of epit-axial film thickness.

Configuration of the Reflectance Holder

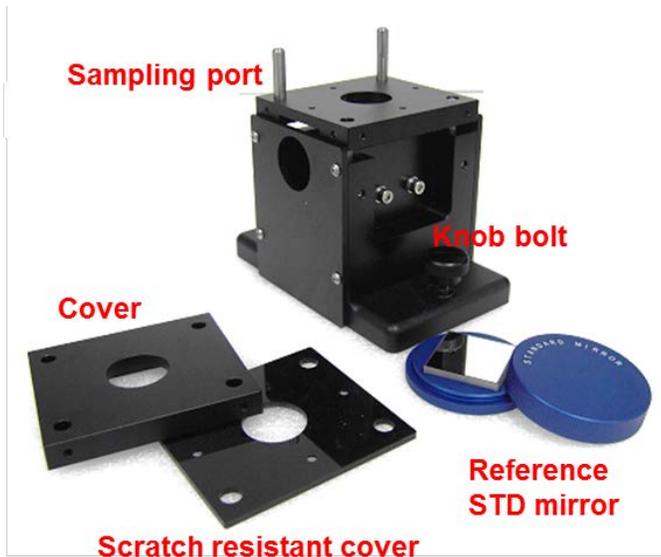


Figure 3 Lambda 465 Reflectance Holder

Installation

1. Disassemble the existing cell holder.

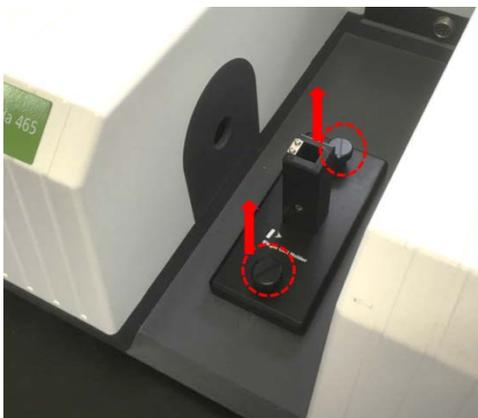


Figure 4 Location of the two knob bolts

2. Install the reflectance holder and tighten it with knob bolts.

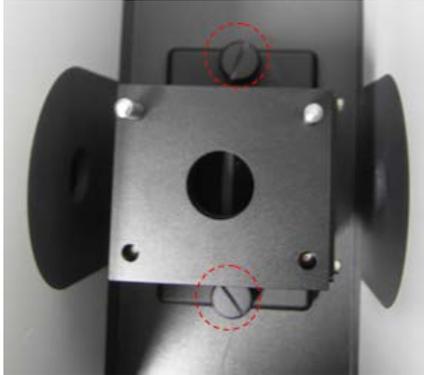


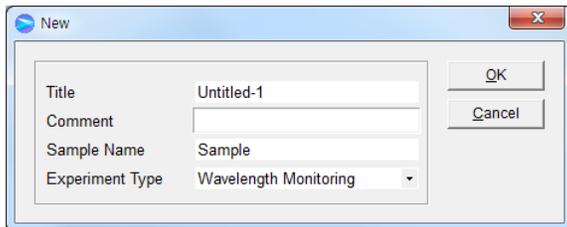
Figure 5 Installing the reflectance holder

3. Connect the communication cable and the power cord, and then turn on the power of the Lambda 465.

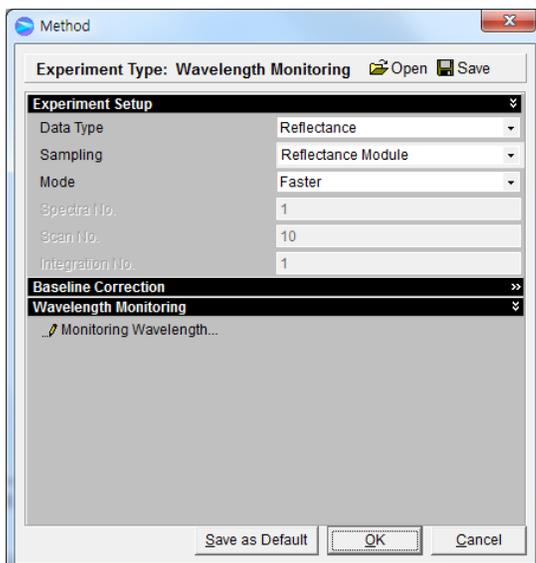
Measurement

NOTE: Start the sample measurement after warming-up the system at least 20 minutes.

1. Launch the **UV Lab** software. When the window below is appeared, select **Experiment Type** and select **OK**.



2. Select **Reflectance** and **Reflectance Module**.

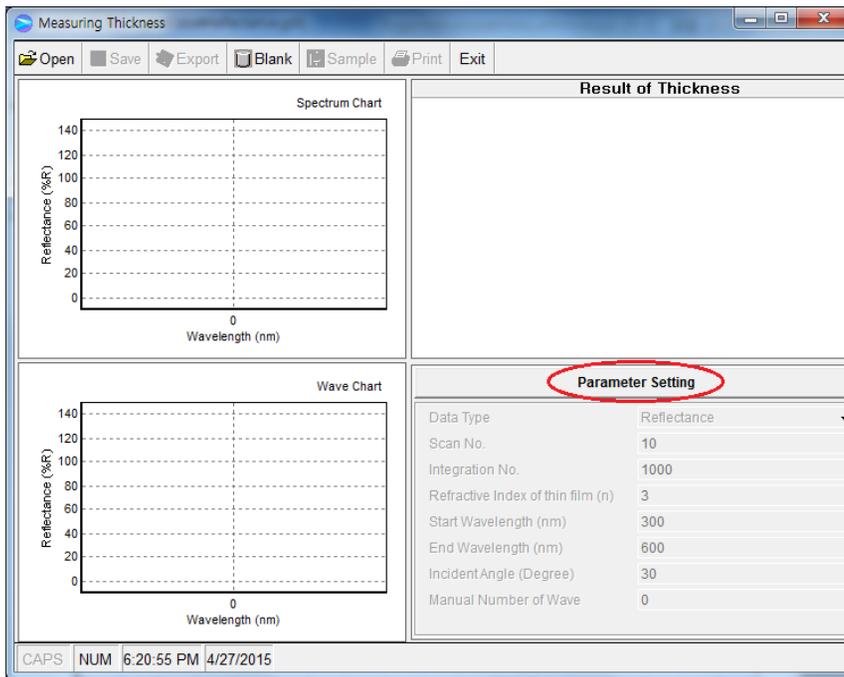


- Place the reference mirror on the sampling port and click **Blank** to measure blank.
- Place the sample on the sampling port, and then click **Sample** to measure sample.

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

Measurement of Thickness

- Select **New** and select **Thickness in the Experiment Type**.
- The following box will be displayed. Select **Parameter Setting** and **OK** after setting up the 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.
- **Integration No.:**
This parameter which determines the length of time a sample is exposed to light. A high integration number gives a better signal-to-noise ratio. High signal-to-noise results in good spectral data. However, you must control the integration time carefully so as not to saturate the spectrum.
- **Refractive 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.

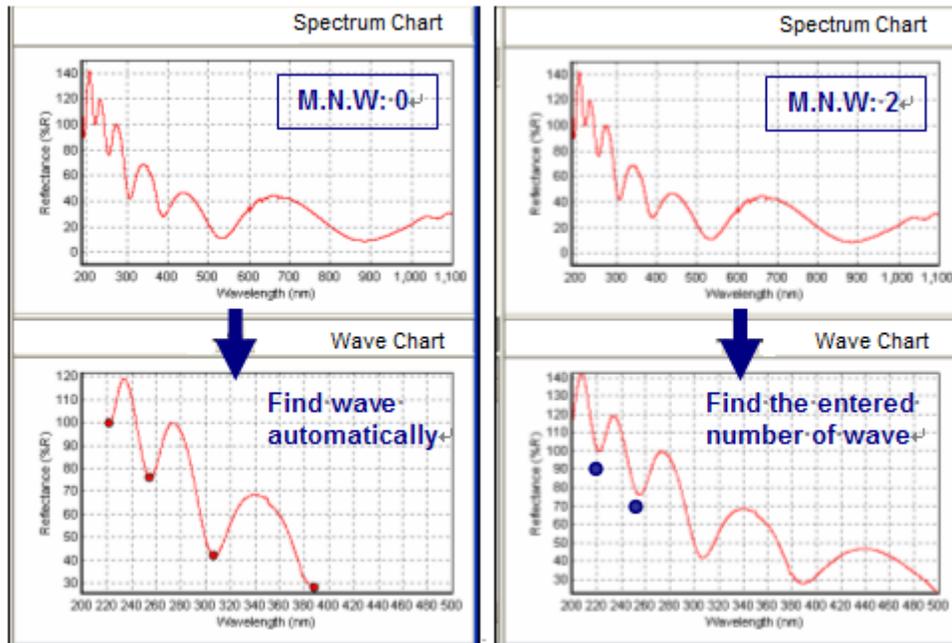
- **Incident Angle (Degree):** 34° (fixed for PerkinElmer Reflectance Holder).
- **Manual Number of Wave (M.N.W):**

The required fringe (wave) numbers are used to calculate the thickness between start wavelength and end wavelength. After measurement, user can change the M.N.W.

- 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.

Troubleshooting

When the Intensity value is low

1. **Increase the Integration Number in UV Lab Software.**
 - You should increase the Integration Number since the intensity of the light which passes through the Reflectance Holder is not high enough.