

POLARIZER ATTACHMENT

for the RF-540/5000/5301PC/6000 Series

Visible Type (P/N 204-03290-01, 204-03290-42)

Ultraviolet/Visible Type (P/N 204-03290, 204-03290-41)

Instruction Manual

Read the instruction manual thoroughly before you use the product.
Keep this instruction manual for future reference.

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1. Inspection of Parts

When unpacking, confirm that the parts shown in Fig. 1 are all contained.

No.	Description	Qt.	Part No.
①	Polarization attachment assembly	1	204-05617-01(VIS) 204-05617-41(UV-VIS)
②	Parts box	1	200-95010-01
③	Container	1	200-48505-03
④	Silica gel	4	200-53655-01
⑤	Instruction manual	1	206-96781

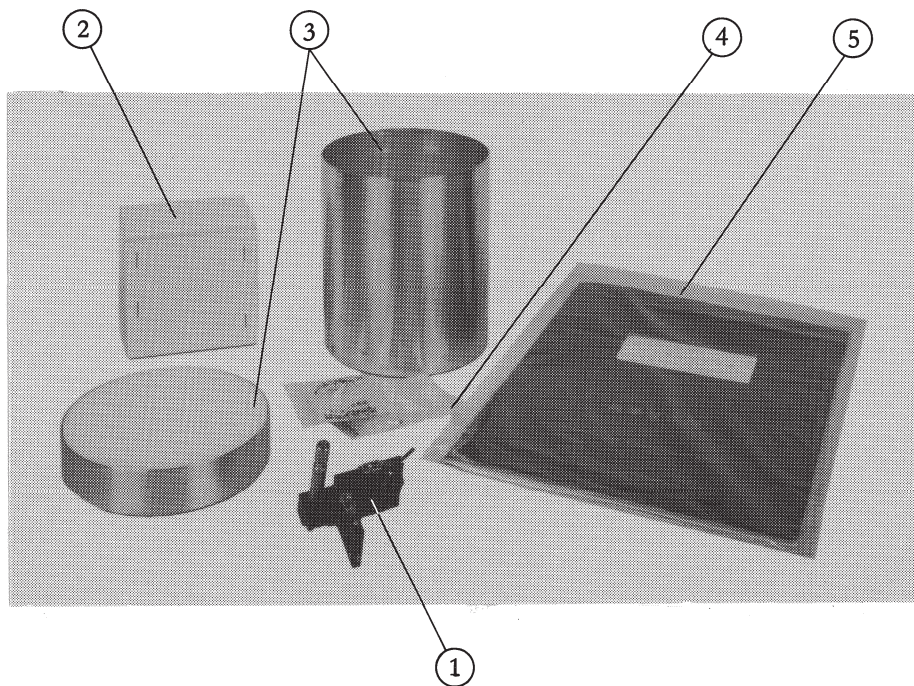
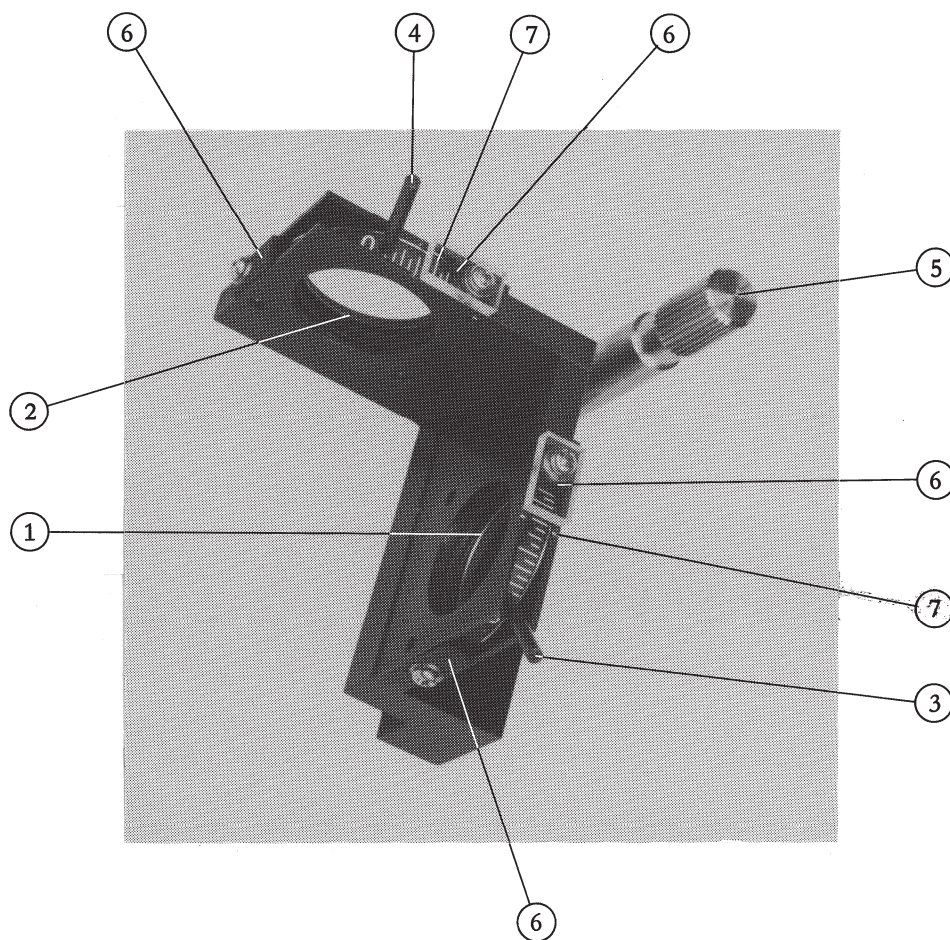


Fig. 1 Standard Parts

2. Description of Each Part

Fig. 2 shows the polarization attachment assembly.



- ① Excitation side polarizer
- ② Emission side polarizer
- ③ Excitation side polarizer lever
- ④ Emission side polarizer lever
- ⑤ Fixing screw
- ⑥ Stopper plate
- ⑦ Marking

Fig. 2 Polarization Attachment Assembly

3. Installation

Insert the positioning pin on the bottom of the polarizer attachment assembly (in Fig. 2) into the positioning hole (② in Fig. 4) in the sample compartment base, and then fix the polarizer assembly with the screw (⑤ in Fig. 2), as shown in Fig. 5.

The angle setting for the excitation side and emission side polarizers can be made with the excitation side polarizer lever (③ in Fig. 2) and the emission side polarizer lever (④ in Fig. 2) respectively. The angle can be read with the marking (⑦ in Fig. 7) on the scale. The scale is graduated by long lines at 10-deg. intervals and by short lines at 5-deg. intervals. When the polarizer lever is attached to the stopper plate (⑥ in Fig. 2), the polarizer angle becomes 0 deg. or 90 deg.

Fig. 3 shows the relation between the polarizer angle and the electric field vector of the transmitted light.

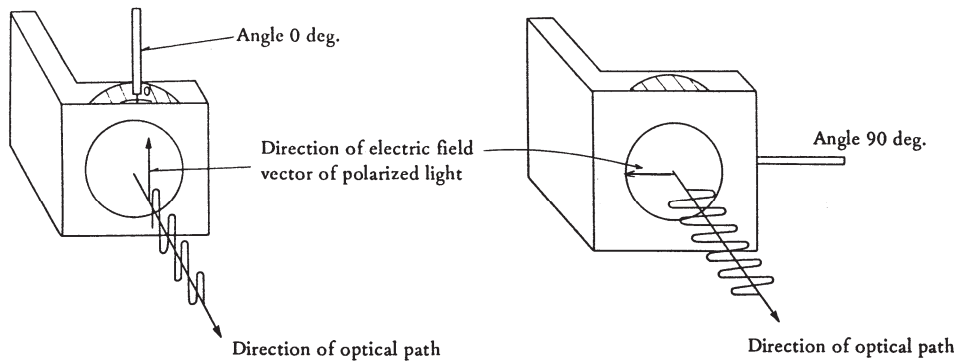
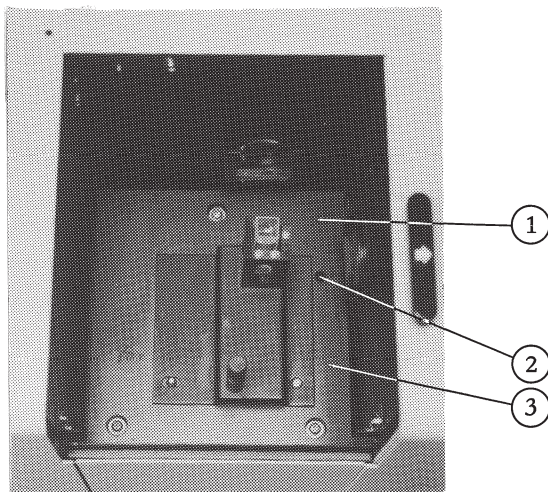


Fig. 3 Relation Between Polarizer Angle and Electricfield Vector of the Transmitted Light



- ① Tapped hole
- ② Positioning pin hole
- ③ Sample compartment base

Fig. 4 RF Series Sample Compartment Base

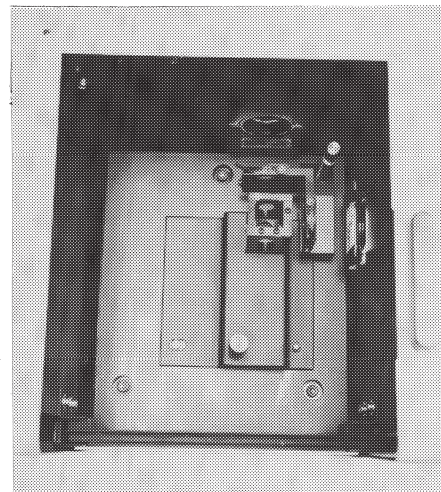


Fig. 5 Polarization Attachment Assembly Installed in RF Series Sample Compartment

4. Specifications and Precautions

4.1 Specifications

		Ultraviolet/visible type (P/N 204-03290, 204-03290-41)	Visible type (P/N 204-03290-01/42)
1	Wavelength range	240 ~ 700 nm	390 ~ 700 nm
2	Polarizers	105UV polarizers* manufactured by POLACOAT Co., U.S.A. 1 pc. on each of excitation and emission sides.	1 pc. on each of excitation and emission sides.
3	Polarizer scale	5-deg. divisions	5-deg. divisions

- * Reference (1) SCIENCE Vol. 147 P729 ~ 732
(2) TECHNICAL BULLETIN: Polacoat Ultraviolet Polarizing Filters.
“Effective Polarization from 200 to 800 Millimicrons.”

4.2 Precautions

- Note 1: For an accurate measurement in the visible range, use the visible type. Refer to Figs. 6, 7 and Reference 2.
- Note 2: It is impossible to exchange the visible type polarizer with the ultraviolet/visible type one and also impossible to exchange the ultraviolet/visible type polarizer with the visible type one.
- Note 3: The membrane of the polarizer for the ultraviolet/visible type is covered with a protective quartz plate. Don't remove the polarizer by any means; otherwise, the protective quartz plate will be removed at the same time. If removed, our company is not responsible even during the period of guarantee.
- Note 4: Both sides of the polarizer are protected with a quartz plate (in the ultraviolet/visible type) or a glass plate (in the visible type). However, don't wipe it with organic solvent or water; otherwise, the organic solvent or water may leak onto its membrane, thus damaging it. If the polarizer is contaminated with finger-prints, wipe them out with cotton or soft paper.
- Note 5: To reserve the polarizer attachment, store it in the accessory moisture-proof container.

5. Compensation of Polarization Characteristics of Spectrofluorometer (Ref. 1)

- (1) Generally, a fluorescence spectrophotometer has a polarization characteristic, and so in order to measure the fluorescence polarization accurately, it is necessary to compensate the polarization characteristic of the instrument. Therefore, it is required to know the polarization characteristic of the fluorescence spectrophotometer, especially on the emission side including the detector. Set a non-polarized light source at the cell position, and make a measurement at a fluorescence measuring wavelength with the emission side polarizer at 0 deg. and 90 deg. Let I_0 and I_{90} be the optical intensities at 0 deg. and 90 deg. respectively, and $G = I_0/I_{90}$ is the polarization degree at this wavelength.

A tungsten lamp can be considered practically as a non-polarized light source, but it has no optical energy in the ultraviolet region. Therefore, the following procedure is effective to make a non-polarized light source in the ultraviolet region.

- Fill the cell with a sample, and then insert it into the cell holder.
- Select and set the excitation wavelength and emission wavelength for the sample.
- Set the excitation side polarizer to 90° (horizontal).
- The fluorescence emitted from the sample is observed from the emission side monochromator as a non-polarized fluorescence.

This fluorescent light is used as a non-polarized light source.

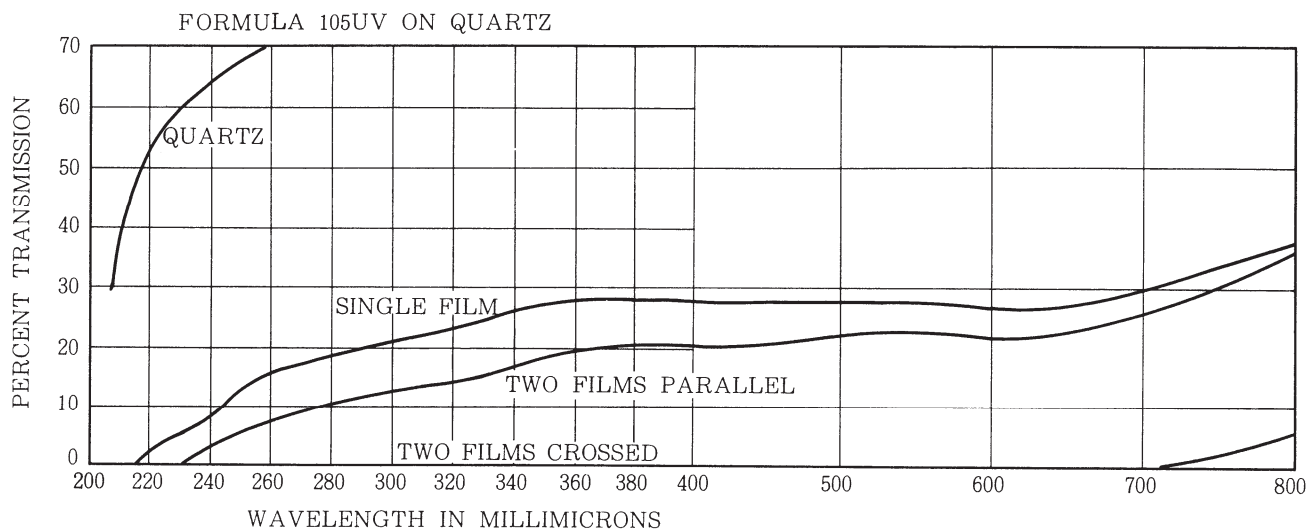
- (2) The degree of polarization is given by

$$P = \frac{I_{0^\circ, 0^\circ} - I_{0^\circ, 90^\circ}}{I_{0^\circ, 90^\circ} + I_{0^\circ, 90^\circ}} \quad \text{-----} \quad (1)$$

where $I_{i,j}$ indicates the fluorescence intensity when the excitation side and emission side polarizers are set at i deg. and j deg. respectively. In Eq. (1), the polarization characteristic of the instrument is not considered. If it is considered, the compensated degree of polarization P_{corr} is expressed as

$$P_{\text{corr}} = \frac{I_{0^\circ, 0^\circ} - G \cdot I_{0^\circ, 90^\circ}}{I_{0^\circ, 0^\circ} + G \cdot I_{0^\circ, 90^\circ}} = \frac{1 - G \frac{I_{0^\circ, 90^\circ}}{I_{0^\circ, 0^\circ}}}{1 + G \frac{I_{0^\circ, 90^\circ}}{I_{0^\circ, 0^\circ}}} \\ = \frac{(1 - \frac{I_{90^\circ, 0^\circ}}{I_{90^\circ, 90^\circ}} \times \frac{I_{0^\circ, 90^\circ}}{I_{0^\circ, 0^\circ}})}{(1 + \frac{I_{90^\circ, 0^\circ}}{I_{90^\circ, 90^\circ}} \times \frac{I_{0^\circ, 90^\circ}}{I_{0^\circ, 0^\circ}})} \quad \text{-----} \quad (2)$$





**Fig. 7 Typical Characteristics of Ultraviolet Visible Type Polarizer
(after Technical Data of POLACOAT Co.)**

6. Renewal Parts

No.	Description	Part No.
1.	Fixing screw (for polarization attachment)	204-03291
2.	Stopper plate (for 0° and 90°, made of aklilite)	204-57223
3.	Plate spring	202-33959

