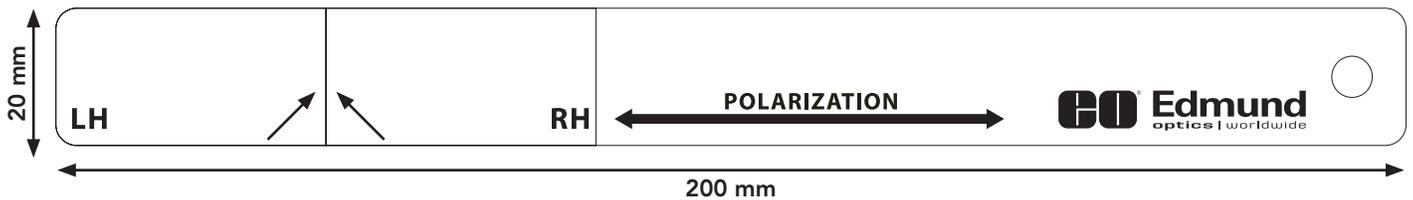


POLARIZATION TESTER

Description

The Polarization Tester is designed to determine different characteristics of unknown polarizers.



Sketch of the Polarization Tester: LH = left-handed and RH = right-handed

The following characteristics can be determined using this Polarization Tester

1. The type of the polarizer—linear or circular
2. The polarization direction of linear polarizers
3. The position of the retarder and the linear polarizer in a circular polarizer (which element is on which site)
4. The rotational direction of the polarization (left–or right-handed) of circular polarizers
5. The fast axis direction in retarders

Instruction Guide

To obtain accurate results, it is essential to make sure that all protective films have been removed from your unknown polarizer before conducting any tests described in the following guide. If mounting of the polarization tester is required, #54-997 is recommended.

- **Determination of the type of an unknown polarizer - linear or circular**

Hold the Polarization Tester in front of the unknown polarizer. If both the LH- and the RH-field appear equally bright, turn the polarizer around so that its other surface faces the tester. If the LH-/RH-fields remain equally bright, you are looking at a linear polarizer. Does one of the fields appear dark it is a circular polarizer.

- **Determination of the polarization direction of linear polarization filters**

Hold the linear polarizer part of the tester (with the arrow) with the writing facing up in front of your linear polarizer. Next, rotate the polarization tester making sure it is parallel to the polarizer until it turns “dark”. In this state the two polarizers are crossed and are therefore oriented with their polarization direction at 90° to each other. The arrow on the polarization tester will now indicate the blocking direction of the linear polarizer. If you now turn the tester an additional 90°, the arrow will indicate the polarization direction of your linear polarizer. If the polarization tester appears “light grey,” this indicates that the polarization direction of the polarizer and the tester are now parallel to each other.

- **Determination of the position of the retarder and the linear element of a circular polarizer**

Circular polarizers consist of a linear polarizer and a retarder element that are cemented together. It is important that the retarder element is rotated by 45° to the polarization direction of the linear polarizer. Incoming light is linearly polarized and then turned into circularly polarized light by the retarder. Depending on whether the retarder is oriented at +45° or -45° left–or right-handed circularly polarized light is obtained respectively.

Determining the position of the linear polarizer or the retarder element in the circular polarizer is also possible using the linear polarization element of the polarization tester. Therefore, the linear polarization element of the tester is placed in front of the circular polarizer with the front facing up. If you turn the circular polarizer by 360°, holding it parallel to the tester, you observe the following:

- The field appears alternately “bright” or “dark” – the linear polarizer element of the circular polarizer is facing towards the back of the polarization tester
- The field appears “greyish-brown”, but not completely “dark” – the retarder element of the circular polarizer faces towards the back side of the polarization tester

• **Determination of the rotation direction (left- or right-handed light) of circular polarizers**

To determine the rotation direction of an unknown circular polarizer, the retarder should be held facing the back of the polarization tester elements labelled LH and RH. One of the fields will appear “dark” and the other “bright.” The label on the “bright” field will tell you the rotation direction of the unknown circular polarizer.

Therefore:

- If you observe a right-handed (RH) polarizer from the retarder side, the field labelled RH will appear “bright” and the field labelled LH will appear “dark”
- If you observe a left-handed (RH) polarizer from the retarder side, the field labelled LH will appear “bright” and the field labelled RH will appear “dark”

• **Determination of the fast axis in $\lambda/4$ -retarder films**

An additional linear polarizer is required for this test. Place the linear polarizer behind the linear polarizer field of the tester, so that it is parallel (“bright”). Now move the linear polarizer behind the LH-/RH-fields of the tester keeping it in the same orientation. Both fields should appear the same.

Place the $\lambda/4$ -retarder film between the linear polarizer and the polarization tester and observe the LH-/RH-fields. Rotate the retarder film clockwise until one of the LH-/RH-fields is as dark as possible and the other one as bright as possible.

- the LH-field appears dark – the fast axis of the $\lambda/4$ -retarder film is parallel to the arrow on the LH-field (+45°)
- the RH-field appears dark – the fast axis of the $\lambda/4$ -retarder film is parallel to the arrow on the RH-field (-45°)